

**Universidade do Minho**  
Escola de Ciências da Saúde

Andreia Alexandra Neves de Carvalho

**When gaining is losing: insights into the function of ataxin-3 and its perturbation in the context of Machado-Joseph disease**

**Quando ganhar é perder: estudo da função da ataxina-3 e da sua perturbação no contexto da Doença de Machado-Joseph**

outubro de 2014



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Tese de Doutoramento em Ciências da Saúde

Trabalho realizado sob a orientação da

**Professora Doutora Patrícia Espinheira de Sá Maciel**

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## **Agradecimentos/ Acknowledgments**

As últimas palavras de uma tese são provavelmente as de maior importância e certamente as mais difíceis de escrever. Ao finalizar este trabalho, gostaria de expressar o meu profundo agradecimento e reconhecimento a todos os que de alguma forma contribuíram para a sua realização. Mais do que uma experiência desafiante no laboratório, este trabalho proporcionou-me um ambiente enriquecedor de crescimento pessoal.

Com o apoio de todos os que humildemente homenageio aqui, os meus olhos abriram-se para um mundo novo!

With the support of those who I acknowledge herein, my eyes were opened to different “funny” things.

Obrigada! Thank you! Dank U Wel!

## **ICVS**

À Professora Doutora Patrícia Maciel pela oportunidade de integrar o seu grupo de investigação e pela orientação, apoio, energia e acompanhamento ao longo destes [8] anos com o devido grau de exigência e rigor. Obrigada pelas oportunidades de formação. Obrigada por querer *sempre mais*.

À Professora Doutora Cecília Leão e restantes membros do Concelho Científico, em particular ao Professor Doutor Jorge Pedrosa presidente do Instituto de Investigação em Ciências da Vida e da Saúde (ICVS) e ao Professor Doutor Nuno Sousa presidente do Domínio de Investigação em Neurociências (NeRD), por me terem aceite como aluna de doutoramento da Escola de Ciências da Saúde (ECS) e do seu Instituto de Investigação e por terem reunido todas as condições necessárias à realização deste trabalho.

À Fundação para a Ciência e Tecnologia (FCT) pelo financiamento.

## **VU, Amsterdam, Holland**

I would like to thank Professor Peter Heutink for allowing me to work in his lab, for the energy and scientific input. For his availability and encouragement words. For the Thursdays afternoon beers at the *Basket!*

Shoey: for his help with *Sushi* cells, for being always available to answer all my emails. For the scientific ideas and sharing of information. For teaching me that in the Netherlands people greet each other with three kisses.

Sasja: for the wonderful smile, for the availability and help. For introducing me to the “*tau word*”.

Francesca: for hosting me since the very first moment and introducing me to everyone. For sharing with me the experience of being an *expat at Adam*.

Ashu and Sjik for the *VERY* spicy indian food. For making fun of my height and microscopic handwriting. Thanks for the help.

## **IBMC**

À Professora Doutora Elsa Logarinho pelo sorriso, pela calma e pela *confiança* no meu trabalho. Porque sempre arranhou um tempinho para adquirir as minhas imagens.

Ao Professor Doutor João Relvas pelas *ideias* e discussões científicas.

À Professora Doutora Sandra Macedo Ribeiro por me abrir as portas do seu *laboratório* sempre que precisei.

Ao Bruno Almeida, por todos os “*favorzinhos*” e por todas as dicas e por partilhares o teu conhecimento sobre proteínas.

## **University of Michigan, USA**

I would like to thank Professor Henry Paulson for the scientific *input*.

Carmo (aka Maria do charme): pela ajuda e pela partilha de conhecimento sobre integrinas. Pelas *críticas* duras mas sempre relevantes. Por acreditares no meu trabalho. Por todos os “coisas” e por me fazeres rir.

## Neurociências

A todos os NeRDs pelo sentido de crítica, exigência, ajuda e partilha. Pelas boas memórias do ICVS amarelo. Pelo bom ambiente no laboratório, pelos momentos divertidos de descontração e pelo esforço de sermos um grupo e aprendermos a trabalhar num *open space!*

### Em especial...

Joana Silva (aka Joaninha): pela ajuda, pelas risadas e pelos desabafos. Pelos infinitos Western blots. Pelos jantares temáticos em tua casa. Por me chamares *Andreiiinha* com tanto carinho. Por seres minha amiga.

Carina Cunha: pela companhia nos almoços, lanches e intervalos. Por me compreenderes e ouvires. Pela tua má disposição e pessimismo (*sempre com resolução*) que me fazem rir. Pela ajuda. Por seres minha amiga.

Bárbara: por nunca te *zangares* comigo quando brinco contigo. Pela tua calma e boa disposição e por me ajudares sempre com o MAC. Por seres minha amiga.

John (aka Jonecas): já devias saber português! Anyway, thanks for all the "*re/p*" and all the "*portant*" and important scientific discussions. For all the advices and for believing in me. For understanding me with no need of words. Thanks also for the craziness and for making me laugh. For teaching me the greek. For being my friend.

Ana João (aka Ani Joni): por acreditares em mim mais do que eu própria. Pelos desabafos e incentivos sempre com a certeza de que vou conseguir. Pela ajuda, pela cumplicidade, por me defenderes e pelos *panikes* gordurosos. Por teres sido a minha primeira inspiração na vida científica. Por continuar a ser *a tua menina* e o teu *monstrinho*. Por seres minha amiga.

Fábio (aka Fabinho): pela ajuda e por estares *sempre* lá. Por me fazeres ri. Por seres meu amigo. O pastel de nata não está esquecido!

Miguel Carvalho (aka Migas): por seres o meu *coleguinha* de sempre. Por partilhares angústias e desafios. Por não me teres deixado desistir. Por seres meu amigo.

André Lopes, Belém, Sofia Serra, Eduardo, Ana Pires, Ana Freitas, Margarida, Nuno Silva, Tó, Ana Inês Silva, Ana Oliveira: pela ajuda técnica, pela partilha de conhecimentos e por me deixarem “*cravar*” coisas. Pelos bons e maus momentos na cultura de células e por haver sempre um *cantinho* na câmara!

## **Macielitas**

Sara Silva (aka Sarinha): pelas discussões no telhado, no laboratório, no biotério..intermináveis! Por te entusiasmares com o meu trabalho, pela ajuda e generosidade. Pelas 8:45 no baroque. Por falares sempre que tive vergonha. Por contarmos as mesmas histórias vezes sem conta, pelas gargalhadas e por nunca te zangares comigo (mas por me ralhares de vez em quando). Por não precisarmos de palavras. Pelo amor, carinho e cumplicidade. Por me conheceres. Por seres o meu *Tico* ou o meu *Teco*. Por estares (sempre) lá!

Anabela (aka Belita): pela ajuda com as culturas primárias, a estatística e o Photoshop e por me explicares com paciência as tuas “*ratices*”. Pelos breaks no telhado, pela cumplicidade e amizade sincera. Por sentires falta do meu “*barulho*” quando não estou, pelas ideias *brilhantes* de negócio, as sangrias e as *bubbles*; um dia ainda vamos ter a nossa *roulotte* de genotipagem no S. Pedro!

Ana Jalles (aka Mary Jalles): por teres esse jeito especial de me “*tratar mal*” que me faz rir. Por partilhares os teus resultados e as fotos dos teus sobrinhos.

Andreia Castro (aka De Castro): pelos “*Maria*”, “*ouvi dizer que me ias fazer isto*”, “*asap*”..pela tua atitude sempre crítica, pela ajuda e por teres sempre “*2 minutinhos*”. Pelo teu mau humor de Segunda-feira e pelas tuas gargalhadas. Pelo tour por Chicago. Falhaste o ano do teu casamento!

Sofia (aka Sofs): pelas “*bananas*”, pelas horas partilhadas no biotério e pelas pateticas para passar o tempo. Por ter aprendido contigo que nem tudo o que parece é.



Liliana Santos (aka Li): pelas conversas sociais e científicas e por desenvolveres *novas ideias* no grupo. Por ter aprendido contigo a ver o que não está à mostra.

Dulce, Marta e Stephanie: pela paciência na descrição das infinitas estirpes de *C. elegans* e dos cruzamentos on going. Por me fazerem lembrar o tempo em que também fui “*elegante*”!

Fátima Lopes: por me ensinares o dialecto fafense, pelos teus comentários cómicos e pela “mãozinha” no projeto do *splicing*.

Gang do neurodesenvolvimento (Filipe, Marina e Carlos Bessa): pela partilha de conhecimento e pela *boa vizinhança*!

### **Alguns amigos/ Some friends**

Àqueles que sabem quem são...por serem verdadeiros comigo e por gostarem de mim como eu sou. Por não me cobrarem nada e por me levarem ao colo quando mais precisei. Por fazerem com que a vida valha a pena ser vivida. Por fazerem caminho comigo. Pelas grandes e pelas pequenas coisas. Por serem *quem são e como são*.

### **Em especial..**

Lorinha (e Zé): pela tua maneira particular e tão especial de ser! Porque nunca te esqueces da Biologia do 12º ano para tentares perceber o que eu faço. Por nunca teres desistido da nossa amizade e por compreenderes que “ainda” continuo a estudar. Pelas mensagens de apoio, pelos beijinhos e pelo *carinho*. Espero estar à altura de retribuir!

Liliana (aka Jimi): mesmo à distância *continuas* presente! Obrigada por te preocupares comigo, por partilhares sucessos e fracassos e por seres minha amiga e minha “prima”.

Óscar: por muito que os nossos caminhos se cruzem e descruzem, estiveste *sempre lá...* e ainda estás! Obrigada pela paciência, pela compreensão, pelo carinho, por me fazeres rir e por te rires comigo.

Hugo Almeida (aka Huguito), Magda (aka Maguxa) e Pedro Leão (aka Peter Lion): por todas as conversas loucas, pelos momentos divertidos, pelos jantares em que se *ria mais do que se comia*. Por me terem apoiado sempre ao longo do caminho. Por partilharem stress, angustias e vitórias. Por serem meus amigos mais do que meus colegas de trabalho.

Emiel: my first real dutch friend! Thank you for inviting me to party, for the music at the lab, for making fun of me and making me laugh. *I still laugh!* For introducing me to the chameleons! Miss you! Dank U Wel!

Margherita (aka Magui): *menina...*obrigada pela companhia ao jantar (pela *pasta*), pelas longas e divertidas conversas, pela amizade, pelo otimismo científico, pela partilha de experiências. Por me fazeres rir com os “combolhos”. Por guardares sempre a minha bicicleta e por me arranjares sempre um *espacinho* na tua casa (I’m sure you can follow this!) Miss you!

Mohit: for upsetting me all the time (in a good way), for all the chatting, for worrying about me. For the good moments and for cooking for me. For the *Bollywood* parties. For being the party animal and for loving Porto wine! Well.. I also miss you!

Nikhil: for being my buddy, for all the meetings at the ping pong table. For all the late in night chatting. For lending me your *[small]* lab coat! I am sure you are going to be a brilliant scientist! Miss you!

Stella: my first and favorite roommate! Thank you for ALL the good and funny moments. For the Bulgarian food and other “*stuff*”. Still have your t-shirt with me and will keep it forever! Hope we can catch up soon...miss you girl! Dimitri thanks for the *contagious* laugh!

### **À minha segunda família**

D. Luzia, Sr. Belmiro, Bruno (O meu *chatinho* preferido! Obrigada pelo carinho, pelo apoio e pelas nossas brincadeiras..parece que vou ter de te aturar por muito tempo!), Avó Cândida, tia Adélia, tia Lurdes, tio Lúcio, Luciano, Luiz Carlos, Bibiana, Filipe, D. Helena, Sr. João e restante

família...obrigada pelo vosso carinho, pelo apoio, por se preocuparem comigo, pelo *mimooooo* e por me fazerem sentir “da casa”.

### **Ao André**

Talvez as palavras mais difíceis de escrever...porque entre nós não é preciso dizer muito; conheces-me de cor! Obrigada pela partilha incondicional, pela compreensão, pelo apoio desmedido. Por conseguires pôr sempre tudo em perspectiva. Por teres orgulho em mim e nunca duidares que seria capaz. Por me fazeres rir. Pelo amor. E por tudo aquilo que nunca ninguém entenderá...”Para lá do infinito”. *Oscar Bravo!*

### **À minha família**

Avô Lourenço, avó Rosa e avô Manel: simplesmente por terem feito parte da minha vida e continuarem a ser as *estrelas mais brilhantes* todas as noites!

Família Coelho e Zulmirinha: não são do meu sangue, mas *são família!* Obrigada pelo apoio e por partilharem sempre as minhas alegrias.

Mãe, pai, mano e cunhada: porque *os últimos são sempre os primeiros*. Mas vocês são os primeiros e os últimos, as minhas lágrimas e o meu riso, o meu medo e a minha coragem, o meu sossego e a minha inquietude, a minha partida e a minha chegada. Obrigada pelo apoio incondicional, pelo amor, pelo mimo, por compreenderem que nunca tenho tempo nem horários, por terem aprendido a usar o Skype e o Facebook.. Obrigada, obrigada, obrigada, obrigada, obrigada, obrigada...

Esta tese também é vossa!

This thesis is also yours!

Deze thesis is ook van jou!



*“Science...never solves a problem without creating ten more!”*

George Bernard Shaw



## Abstract

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### **“When gaining is losing: insights into the function of ataxin-3 in neurons and its perturbation in the context of Machado-Joseph Disease”**

Ataxin-3 (ATXN3) is the protein involved in Machado-Joseph Disease (MJD), one of the nine neurodegenerative disorders known to be caused by a polyglutamine (polyQ) expansion. This polyQ tract causes the appearance of misfolded protein species, protein aggregates, neuronal dysfunction and cell death. ATXN3 is known to interact with polyubiquitin chains and to have deubiquitylating (DUB) activity *in vitro*, but its substrates and its cellular and physiological role(s) remain unknown, specially in neurons. Since the leading hypothesis concerning the pathogenesis of MJD is that the expanded polyQ tract confers a toxic gain of function of ATXN3, not much attention has been dedicated to its normal function. However, it is believed that a partial loss of the normal function of ATXN3 may also contribute to and modulate disease progression.

This study was based on the idea that understanding the normal physiological role of ATXN3 will be of relevance for our understanding of the pathogenesis of MJD.

In this work, we explored the function of ATXN3 in neuronal cells and its perturbation in the context of MJD. We found that ATXN3 is required for neuronal differentiation and for normal cellular morphology, cytoskeleton organization, proliferation and survival. This phenotype is associated with increased proteasomal degradation of alpha5-integrin subunit (ITGA5) and reduced activation of integrin signaling. Interestingly, we show that silencing of ATXN3, overexpression of a catalytically inert version of the protein or a mutant protein bearing an expanded polyQ tract led to partially overlapping phenotypes, suggesting that a loss of the neuronal function of ATXN3 may be contributing to neurodegeneration.

Consistent with a wider role of ATXN3 in the regulation of the cytoskeleton network, we found that loss of function of ATXN3 also leads to a deregulation of tau expression, namely a deregulation of tau exon 10 splicing. This event has a negative impact in neuronal morphology and differentiation. Additionally, we found that ATXN3 interacts with SFRS7, a regulator of tau splicing, and regulates its ubiquitylation levels. As similar alterations were found in the brain of a mouse model of MJD, it is likely that this mechanism is contributing to pathogenesis of this disorder. Hence, this work establishes for the first time a functional link between two key proteins involved in different neurodegenerative diseases.

Lastly, we characterized the ubiquitome of neuronal cells lacking ATXN3 in an attempt to identify potential substrates of its DUB activity. We found that a large proportion of these proteins were involved in RNA post-transcriptional modification. Considering this, we analyzed by transcriptomic analysis and using reporter minigenes the global splicing pattern in neuronal cells upon silencing of ATXN3 and found that splicing was globally altered in these cells. These findings lead us to propose for the first time that ATXN3 plays a role in splicing regulation in neurons, a novel function for this protein.

In summary, this work adds new knowledge about the relevance for neurons of one specific DUB, ataxin-3, and provides new clues about its biological functions and the pathways in which it is involved. It reinforces ATXN3's involvement with the UPP and it also raises new hypotheses for its role in cytoskeleton organization and in splicing regulation. Additionally, it provides evidence for perturbation of the normal function of ATXN3 in the context of disease, through a dominant negative effect, which may have relevance for the development of future therapeutical strategies.



### **“Quando ganhar é perder: estudo da função da ataxina-3 e a sua perturbação no contexto da Doença de Machado-Joseph”**

A Ataxina-3 (ATXN3) é a proteína envolvida na Doença de Machado-Joseph (DMJ), uma das nove doenças neurodegenerativas que se sabe serem causadas por uma expansão de poliglutaminas (poliQ). Este trato de poliQ causa o aparecimento de espécies proteicas com uma conformação anormal, agregados proteicos, disfunção neuronal e morte celular. A ATXN3 interage com cadeias de poliubiquitina e tem atividade de ubiquitina hidrolase (DUB) *in vitro*, mas os seus substratos e a(s) sua(s) função(ões) fisiológica(s) permanecem desconhecidos, especialmente em neurónios. Dado que a hipótese actualmente mais aceite relativa ao mecanismo patogénico da DMJ considera que o trato de poliQ expandido confere um ganho tóxico de função à ATXN3, não tem sido dedicada muita atenção à sua função normal. Contudo, acredita-se que a perda parcial da função normal da ATXN3 também pode contribuir e modular a progressão da doença.

Este estudo baseou-se na ideia de que conhecer a função fisiológica normal da ATXN3 será relevante para conseguirmos compreender a patogénese da doença.

Neste estudo, explorámos a função da ATXN3 em neurónios e a sua perturbação pela expansão poliQ em DMJ. Descobrimos que a ATXN3 é necessária para a diferenciação neuronal e para a normal morfologia celular, organização do citosqueleto, proliferação e sobrevivência. Este fenótipo está associado a um aumento da degradação da subunidade 5-alpha da integrina (ITGA5) pelo proteossoma e uma ativação diminuída da sinalização pela via das integrinas. Curiosamente, demonstrámos que o silenciamento da ATXN3, a sobre-expressão de uma versão cataliticamente inerte da proteína ou de uma proteína mutante contendo um trato de poliQ expandido conduzem a fenótipos parcialmente sobreponíveis, sugerindo que a perda da função neuronal da ATXN3 pode contribuir para a neurodegeneração.

De forma consistente com um papel mais abrangente da ATXN3 na regulação da organização do citosqueleto, descobrimos que a perda de função da ATXN3 também origina uma desregulação da expressão da tau, nomeadamente uma desregulação do splicing do exão 10 da tau em células neuronais. Este evento tem um impacto negativo na sua morfologia e diferenciação. Além disso, descobrimos que a ATXN3 interage com o SFRS7, um factor regulador do splicing da tau, e regula os seus níveis de ubiquitilação. Considerando que alterações semelhantes foram

encontradas no cérebro do modelo de DMJ em ratinho, este mecanismo parece contribuir para a patogénese. Este trabalho estabelece assim, pela primeira vez, uma ligação funcional entre duas proteínas chave envolvidas em diferentes doenças neurodegenerativas.

Por fim, caracterizámos o ubiquitoma de células neuronais silenciadas para a ATXN3, com o objectivo de identificar potenciais candidatos para a sua atividade DUB. Concluimos que uma grande proporção destas proteínas estão envolvidas na modificação pós-transcricional do RNA. Tendo este dado em consideração, analisámos o padrão global do splicing por análises de transcriptómica e usando minigenes repórteres, e descobrimos que o splicing estava globalmente afetado nestas células. Estes achados levaram-nos a propor pela primeira vez que a ATXN3 desempenha um papel na regulação do splicing em neurónios, uma nova função para esta proteína.

Em sumário, este trabalho amplia o conhecimento acerca da relevância para os neurónios de uma DUB específica, a ataxina-3, e fornece indicativos sobre as suas funções biológicas e as vias celulares onde está envolvida. Além disso, reforça o envolvimento da ATXN3 com a UPP, levantando também novas hipóteses para o seu papel na regulação do citosqueleto e na regulação do splicing. Adicionalmente, são apresentadas evidências para a perturbação da função normal da ATXN3 no contexto da doença através de um efeito dominante negativo, facto que poderá ser relevante para o desenvolvimento de futuras estratégias terapêuticas.

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## Abbreviations

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3R-tau: 3 repeat tau isoform	GABA: Gamma-aminobutyric acid
4R-tau: 4 repeat tau isoform	GO: Gene ontology
17-AAG: 17-N-Allylamino-17-demethoxygeldanamycin	HD: Huntington's disease
17-DMAG: 17-dimethylaminoethylamino-17-demethoxygeldanamycin	HDL2: Huntington disease-like 2
AD: Alzheimer's disease	hnRNP: Heterogeneous nuclear ribonucleoproteins)
ALS: Amyotrophic lateral sclerosis	HS: Horse serum
AMPA: $\alpha$ -Amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid	HSP: Heat shock protein
C14: Cysteine 14	HSR: Heat shock response
<i>C. elegans. Caenorhabditis elegans</i>	JD: Josephin domain
CHIP-seq: Chromatin immunoprecipitation sequencing	JOSD: Josephin-domain proteins
CLIP-seq: Cross-linking immunoprecipitation sequencing	K: Lysine
CNS: Central nervous system	Kb: Kilobase
DAPI: 4',6-diamidino-2-phenylindole	KD: Knockdown
DMEM/F-12: Dulbecco's Modified Eagle Medium/Nutrient Mixture F-12	kDa: Kilodalton
DRG: Dorsal root ganglia	KEGG: Kyoto encyclopedia of genes and genomes
DRPLA: Dentatorubral-pallidoluysan atrophy	KO: Knockout
DUB: Deubiquitylating enzyme/deubiquitylase	LB: Luria-Bertani
ECM: Extracellular matrix	LC-MS/MS: Liquid chromatography-tandem mass spectrometry
EGFP: Enhanced green fluorescent protein	LNA: Locked nucleic acid
EYFP: Enhanced yellow fluorescent protein	MAP: Microtubule-associated protein
FBS: Fetal bovine serum	MG132: Carbobenzoxy-Leu-Leu-leucinal
FCS: Fetal calf serum	Min: Minute
FTD: Frontotemporal dementias	MJD: Machado-Joseph disease
FTDP-17: Parkinsonism linked to chromosome 17	MRI: Magnetic resonance imaging
	mRNA: Messenger RNA
	MTOC: Microtubule-organizing center
	NES: Nuclear export signals
	NLS: Nuclear localization signal

NMDA: N-methyl-aspartic acid	SDS: Sodium dodecyl sulphate
Opti-MEM: Reduced serum medium	SDS-PAGE: Sodium dodecyl sulphate – polyacrylamide gel electrophoresis
O/N: Overnight	SMA: Spinal muscular atrophy
P4: Postnatal day 4	SMBA: Spinobulbar muscular atrophy
PBS: Phosphate-buffered saline	SMN: Survival motor neuron
PD: Parkinson's disease	SN: <i>Substantia nigra</i>
PD: Pick's disease	snRNP: Small nuclear ribonucleoprotein
PI: Propidium iodide	t-test: Student's t test
PNA: Peptide nucleic acid	TUBEs: Tandem ubiquitin binding entities
PolyQ: Polyglutamine	UBA: Ubiquitin-associated domains
PolyUb: Polyubiquitin	UBB <sup>1</sup> : Ubiquitin mutant
PROTACS: Proteolysis targeting chimera molecules	UBL: Ubiquitin-binding domain
PTM: Post-translational modifications	UCH: Ubiquitin C-terminal hydrolases
RA: Retinoic acid	UDP: Ubiquitin-domain protein
RNAi: RNA interference	UIM: Ubiquitin-interacting motifs
RNA-seq: RNA sequencing	UPP: Ubiquitin-proteasome pathway
RT_qPCR: quantitative real time polymerase chain reaction	UPS: Ubiquitin proteasome system
SCA: Spinocerebellar ataxias	USP: Ubiquitin specific proteases
SCA3: Spinocerebellar ataxia type 3	UTR: Untranslated regions
SCR: Scrambled	WT: Wild type



## Thesis planning

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The present dissertation is organized in five different chapters. Chapter 1 is the General Introduction, the experimental work is presented in Chapter 2 to 4 in the shape of research articles (published and in preparation) and Chapter 5 is the General Discussion of the work.

In **chapter 1**, a general introduction to the theme of this dissertation is provided. An overview of the Ubiquitin proteasome system (UPS) and its components is given, concerning its role in the neuronal function. Some considerations about the involvement of the UPS in neurodegenerative disorders are also made. Then, an extensive presentation is provided about Machado-Joseph disease (MJD) and ataxin-3 (ATXN3), the protein involved in this disorder. At the end, there is a compilation of the available evidence concerning the function of ATXN3 in cells, ranging from *in vitro* studies to known protein interactors. A brief description of pathways in which ATXN3 is thought to be involved is also provided.

In **chapter 2**, the work *“Dominant negative effect of polyglutamine expansion perturbs normal function of ataxin-3 in neuronal cells”* shows that loss of function of ATXN3 has a negative impact on neuronal differentiation and deregulates proteasome degradation of alpha-5 integrin subunit, leading to decreased cell adhesion and disorganization of neuronal cytoskeleton. In this study we also present evidence suggesting a partial loss of this function of ataxin-3 in the context of MJD.

**Chapter 3**, *“Perturbation of ATXN3 function leads to Tau splicing deregulation and contributes to Machado-Joseph disease”* focuses on the role of ATXN3 in the regulation of the neuronal cytoskeleton network, extending our knowledge of ATXN3 function. We show that depletion of ATXN3 in SH-SY5Y cells leads to a deregulation of tau exon 10 splicing, perturbing the 3R/4R tau ratio, a mechanism that seems to contribute for MJD pathogenesis.

**Chapter 4**, *“Loss of function of ATXN3 alters the ubiquitome of neuronal cells, negatively impacting on the splicing process”* presents an exploratory work regarding the identification of candidate targets of ATXN3's DUB activity. These potential substrates were searched using the

Tandem ubiquitin binding entities (TUBEs) system combined with mass spectrometry. We present data indicating that ATXN3 might be regulating RNA transport and processing in neurons, a hypothesis that we validated using reporter minigenes and transcriptomic analysis.

The **General Discussion** of the dissertation, as well as the Future Perspectives, are presented in Chapter 5.

Two **appendices** are included in this thesis; appendix 1 corresponds to the list of primers used in this work. Appendix 2 shows a list of the splicing factors with altered expression in ATXN3 knockdown cells and the predicted upstream regulators of these factors.

# **Chapter 1**

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**General Introduction**



## 1.1 The Ubiquitin-proteasome system

The UPS is a highly conserved intracellular pathway for degradation of proteins [1]. The 26S proteasomes, localized both in the cytoplasm and in the nucleus [1, 2], are essential for cell quality control by eliminating defective proteins, and for regulation of fundamental cellular processes by rapid destruction of key proteins (Reviewed in [3]). More recently, the UPS has also emerged as a crucial mechanism in the regulation of many physiological functions of the nervous system (Reviewed in [4, 5]).

Proteolysis by the UPS is highly regulated and precise: only selectively polyubiquitylated proteins are degraded by the proteasome, at the expense of ATP [6]. However, ubiquitylation of a substrate fated to be degraded can be reversed by deubiquitylating enzymes (DUBs).

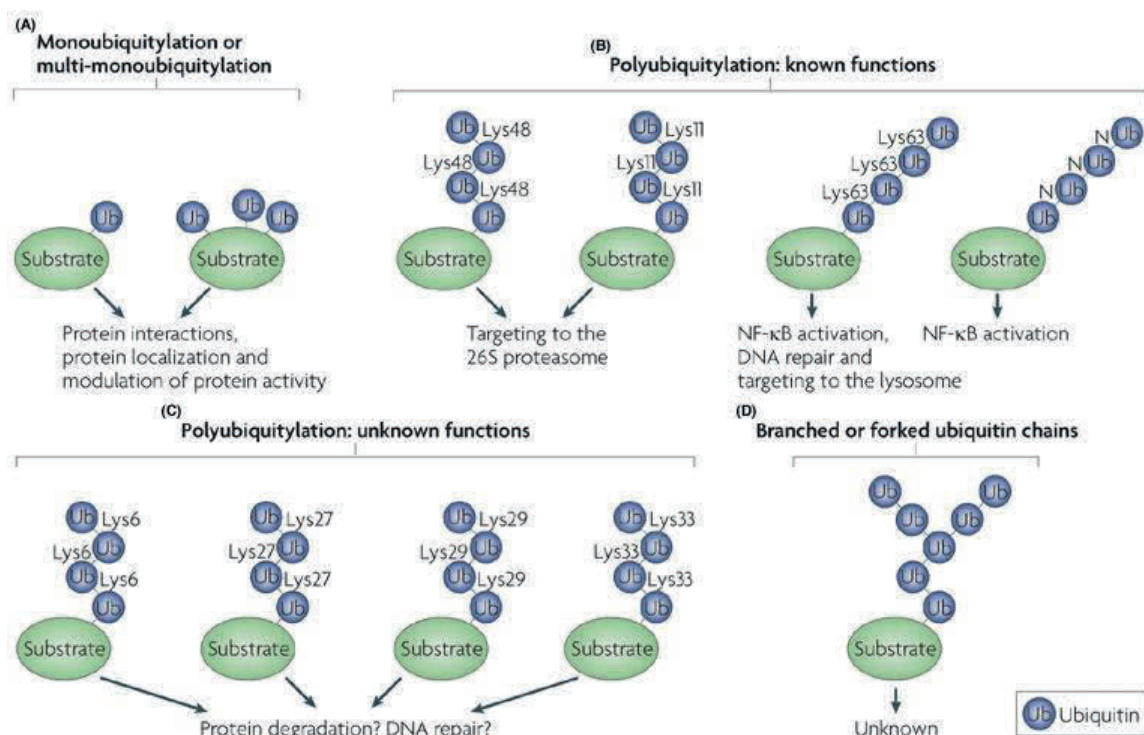
### 1.1.1 Roles of the ubiquitin signaling

In all tissues, the UPS and the ubiquitin signaling play crucial roles in regulating the levels and/or the fate or localization of proteins acting in several basal processes: i) rapid degradation of proteins – termination of cellular processes and adaptation to new physiological conditions [7], ii) transcriptional regulation – degradation of transcriptional factors or alteration of their localization [8], iii) quality control mechanism – elimination of misfolded or damaged proteins that have arisen by biosynthesis errors, by mutations or damage by oxygen radicals and/or denaturation (protein aging) [9, 10], iv) source of amino acids – maintenance of cellular homeostasis at low energy costs by recycling of amino acids, v) non-proteolytic functions – monoubiquitylation tagging triggers internalization of cell surface proteins into the endocytic pathway [11].

More recently, an increasing amount of data has suggested that several UPS-related genes are causally linked to neurodegenerative diseases, such as Alzheimer's disease (AD), Parkinson's disease (PD), Amyotrophic lateral sclerosis (ALS), Frontotemporal dementias (FTD), Huntington's disease (HD), and other polyglutamine (polyQ) diseases (Reviewed in [12]). Although not clearly sustained yet by experimental data, some authors additionally suggest that dysfunction of the UPS may also be a consequence of the neurodegeneration observed in these disorders [12]. Moreover, a better understanding and identification of the components involved in the UPS-mediated proteolysis have also implicated this mechanism in other disease conditions, as for example cardiac dysfunction, cancer, viral infections, inflammation, and autoimmune diseases [13]. Additionally, multiple lines of evidence support the concept that UPS components are promising drug target candidates for therapeutic intervention in many of these disorders (Reviewed in [14-18]).

### 1.1.2 (Poly)Ubiquitylation

Ubiquitin (Ub) is a small 76 amino acid regulatory protein, highly conserved among eukaryotes. Ub first captured the interest of neuroscientists due to its presence in protein aggregates that were observed in various neurodegenerative diseases (Reviewed in [19-22]). Conjugation of Ub to a substrate through a series of enzymatic reactions is called ubiquitylation. Ub molecules can also be attached to other Ubs via an isopeptide linkage between the lysine residue of the previous Ub and the C-terminal glycine residue of the subsequent Ub [23] (Figure 1). Therefore, a target protein can be modified by a single Ub molecule (monoubiquitylation) or by a poly-Ub chain (polyubiquitylation). There are seven different lysine (K) residues in Ub that can potentially be used *in vivo* for Ub-chain synthesis – K6, K11, K27, K29, K33, K48 and K63. Depending on the type of ubiquitylation, the length of the Ub chain and the nature of Ub-Ub linkage, the modified protein is subjected to different fates (Reviewed in [24-27]). For example, proteins conjugated with K48-linked poly-Ub chains are usually targeted for proteasomal degradation. Monoubiquitylation and polyubiquitylation using other lysines, such as K63, have been implicated in non-degradative pathways, including regulation of subcellular localization, vesicular trafficking, protein sorting and activation of DNA repair [23, 27].

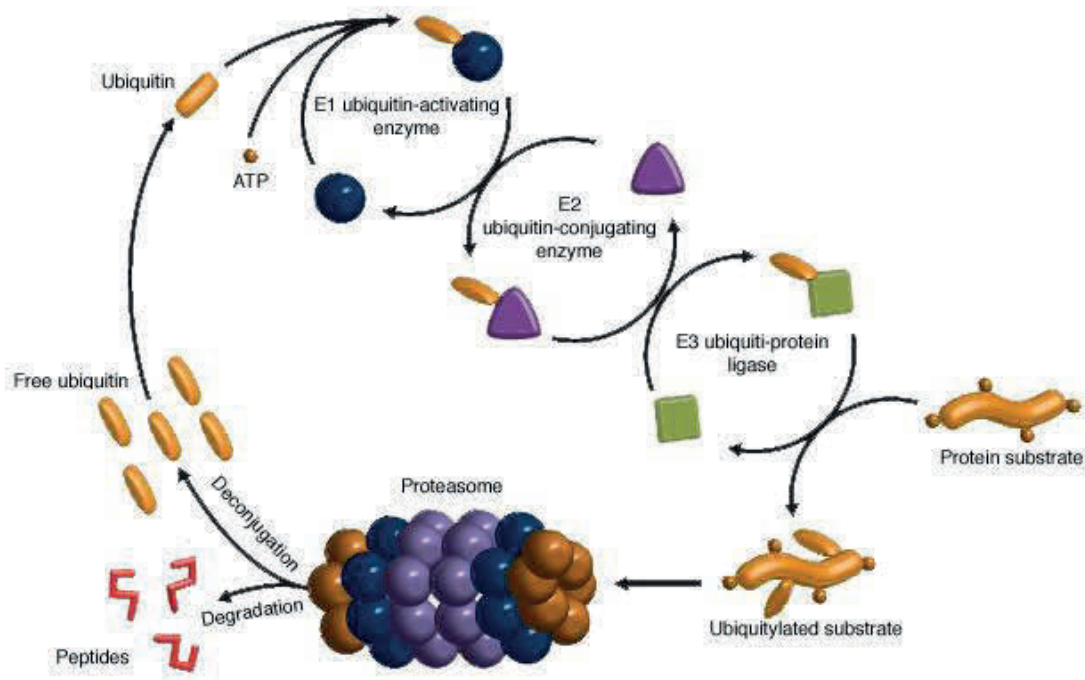


**Figure 1.** Diversity and specificity of ubiquitin signaling. Protein substrates can be monoubiquitylated (A) or multiubiquitylated (B), or even polyubiquitylated (C, D and E). Ubiquitin chains can form extended or closed conformations for one or more linkage type (B and C) or even forked chains with multiple ubiquitin attached to a common moiety (D). Adapted from [28].

### 1.1.3 Ubiquitin-conjugating enzymes: E1, E2, E3 and E4

Ubiquitylation is a cascade of sequential reactions regulated by the action of three enzymes: E1 (Ub-activating enzyme), E2 (Ub-conjugating enzyme) and E3 (Ub-protein ligase) (Figure 2). The first reaction is the activation of Ub by the E1 enzyme in an ATP-dependent manner. The activated Ub is then transferred from the E1 to the active cysteine site of the E2 enzyme. Finally, the E3 enzyme catalyzes the transfer of the Ub moiety to a lysine residue in the substrate protein. There are two major classes of E3s: the HECT domain and the RING finger E3s. Typically, DUBs oppose the activity of the E3s by mediating the removal of Ub from target proteins. Additionally, the E3s can regulate their own stability by ubiquitylating themselves, and DUBs may also regulate their proteasomal degradation, either by preventing or promoting it [29-31]. Among the three classes of ubiquitin-conjugating enzymes, the E2s are the more selective and are thought to interact with specific E3s, which largely determine the substrate specificity (Reviewed in [32]). The number of E2s in humans is estimated to be around 39 while the diversity of E3s is even greater (estimated to be about 475) [33]. Although the substrate specificity of ubiquitylation is essentially determined by the E3s, the diversity of E2s and E3 adaptor proteins, and the combination of E2s and E3s also contribute to a high degree of specificity [34].

An additional component of the UPS is the E4 enzymes. E4s were initially shown to be involved in the elongation of short Ub chains [35], but, more recently, these enzymes were shown to edit polyubiquitin chains and it was suggested that they might be involved in the regulation of the activation of specific proteins, by acting on the switch between the mono and polyubiquitylated states of these target proteins (Reviewed in [36]). The number of E4 ligases encoded in eukaryotic genomes is still not known [33].



**Figure 2.** The ubiquitylation cycle. Ubiquitylation requires the involvement of a E1 ubiquitin-activating enzyme that transfers ubiquitin to the ubiquitin-conjugating enzyme (E2). Then, the E2 transfers the ubiquitin molecule to an ubiquitin-protein ligase (E3) which subsequently ubiquitylates the substrate. In the case of K48 ubiquitylation, the substrate is sent for proteasomal degradation and ubiquitin is recycled. Adapted from [www.tebu-bio.com](http://www.tebu-bio.com).

#### 1.1.4 Deubiquitylating enzymes (DUBs)

The DUBs are key regulators in the two major degradation pathways, the proteasomal and lysosomal (autophagy) routes, where they play different catalytic roles: i) processing of the Ub precursors, ii) editing and/or rescue of Ub conjugates, iii) recycling of Ub from Ub targeted conjugates, and iv) disassembly of anchored ubiquitin oligomers. Autophagy is an alternative pathway to the UPS, that can degrade long-lived proteins and protein aggregates which cannot be degraded by the proteasome [37, 38]. The fact that DUBs (and probably other UPS components) act on these two pathways is consistent with the observations that severe impairment of the proteasome also impairs autophagy and vice-versa [39]. The human genome encodes 80-90 DUBs, categorized into five classes based on the architecture of their catalytic domains: the USP family (ubiquitin specific proteases), the UCH family (ubiquitin C-terminal hydrolases), the OUT family (otubain protease), the Josephin/MJD family (genes containing the Josephin domain and ataxin-3), and the JAMM family (JAB1/MPN/MOV34 metalloenzyme).



*USP family*

The USPs are the largest family of DUBs and are thought to specifically recognize the free carboxy-terminus Gly-Gly motif of Ub [40-43]. Several USPs have been associated with DNA repair pathways [44-47], control of differentiation and maintenance of stem cell characteristics in osteosarcoma cells [48], and regulation of tumor suppression proteins [49].

*UCH family*

The UCH family comprises DUBs that preferentially cleave Ub from small substrates [50] and other enzymes that can accommodate larger substrates in their catalytic site [51]. One of the most studied UCHs is the ubiquitin carboxyl-terminal hydrolase L1 (UCHL1). UCHL1 is a highly abundant neuronal enzyme involved in the stabilization and recycling of mono-Ub, and is known to be genetically linked to PD (Reviewed in [52, 53]) and a major target of oxidative damage in AD [54]. Additionally, aberrant expression of UCHL1 is observed in a variety of cancer types and has been associated with the determination of cellular invasiveness [55].

*OTU family*

Despite the structural conservation within the catalytic domain, OUT proteins show diverse specificity for Ub chain linkages. These enzymes have been linked to regulation of the pro-inflammatory NF $\kappa$ B pathway (OUT protein A20) (Reviewed in [56-58]), to suppression of K63-linked polyubiquitylation of histones (that likely include H2A and H2AX) at DNA double-strand breaks (OTUB1) [59], and to the inhibition of the activity of associated E2 enzymes [59-61].

*JAMM family*

JAMMs are generally part of large multimeric complexes such as the proteasome lid complex and the endocytic ESCRT machinery (Reviewed in [62, 63]). While several members of this family show a strong preference for K63 polyUb chains, others preferably cleave Ub proximal to a substrate protein [64-66].

*Josephin/MJD family*

Josephin/MJD DUBs seem to represent a relatively late addition to the Ub system, since no homologues were found in yeast [67]. So far, the substrates for these DUBs remain mostly unknown. The most well studied protein from this family is ataxin-3 (ATXN3). Although it has been

shown that ATXN3 is involved in Machado-Joseph disease (MJD) [68], its biological function remains poorly characterized. It was recently demonstrated that ATXN3 directly ubiquitylates Parkin [69] and most likely regulates the degradation of  $\alpha$ 5-integrin [70]. This will be further discussed in the next chapters.

#### **1.1.1.4 Non-catalytic activity of DUBs**

Not all DUB functions require catalytic activity. Many DUBs contain additional non-catalytic functions that mediate their function in membrane trafficking, cellular signaling, transcriptional regulation and DNA repair (Reviewe in [71]). Several DUBs, referred as housekeeping enzymes, such as Ubiquitin-specific protease 14 (USP14), the Ubiquitin-carboxy-terminal hydrolases UCH37/UCH-L5 and RPN11/POH1, protect Ub from degradation thus maintaining sufficient levels of free Ub that can be used for chain assembly [63]. Other DUBs regulate proteasome activity noncatalytically. For example, it was reported that Ubp6, the yeast homologue of human USP14, uses catalytic and noncatalytic mechanisms to modulate proteasome function; besides cleaving the Ub chains regulating proteasomal degradation of a specific substrate, Ubp6 appears to inhibit the proteasome directly, reducing the flux of some specific substrates through the proteasome [72]. Also, USP14 was shown to regulate synaptic function through a DUB-independent mechanism [73].

#### **1.1.5 Adaptor proteins and Ub-like proteins**

As mentioned above, ubiquitylation generates a broad repertoire of signals that are not strictly related to the proteasomal degradation. Several adaptor proteins associated with the ubiquitin signalling have been recognized to contain protein domains that bind Ub. Such domains include the Ub-binding domains (UBLs), the Ub-associated domains (UBAs) and the Ub-interacting motifs (UIMs) (Reviewed in [74]).

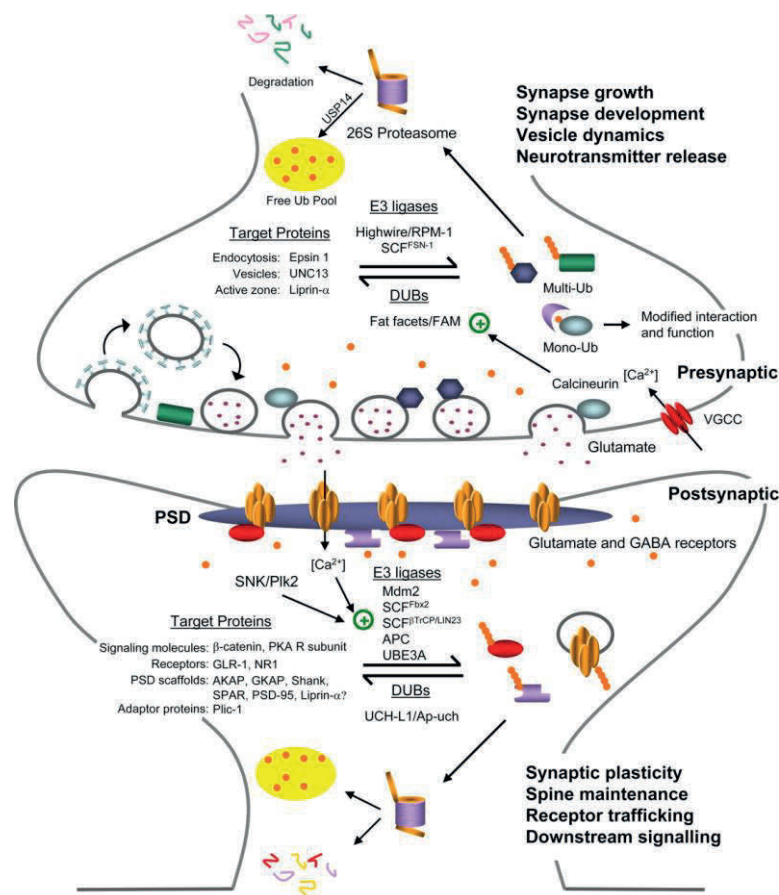
In addition, several other proteins with structural and biochemical similarity with Ub have been identified as modulating protein degradation. These proteins can be divided into two classes: proteins containing an Ub-domain (UDPs) and Ub-like proteins (UBLs). The UDPs are highly homologous to Ub but instead of conjugating with substrates, they function as adaptors, binding to Ub or Ubl proteins, and are able to bind to proteasome subunits [75]. UDP proteins include Rad23, Parkin and PLIC (protein linking IAP to the cytoskeleton) (Reviewed in [76, 77]). The UBLs can either freely or covalently form conjugates with proteins. Two examples of UBL proteins are NEDD8

(neuronal-precursor cell expressed developmentally downregulated 8) and SUMO (small ubiquitin-like modifier) (Reviewed in [78]).

The functions of these adaptor and Ub-like proteins are still poorly characterized, but it is thought that they can be identified by downstream receptors/interactors and can be used to regulate a large variety of cellular processes including cytoskeleton regulation, cell cycle control, mRNA processing, signal transduction, homeostasis, stress response, and metabolism (Reviewed in [76]).

### 1.2 Role of Ubiquitin signalling in neuronal function

The function of the nervous system relies on the precise formation of highly dynamic networks of synaptic connections. The UPS has emerged as a critical mechanism used by neurons to control the free pool of Ub and the renewal of internal components, both necessary for the normal nervous system development and function (Reviewed in [4]). During neuronal development, synapse formation and pruning [79, 80], axon pathfinding [81, 82] and neuronal migration [83, 84] are regulated by the UPS, as are inhibitory [85] and excitatory neurotransmission [85, 86] in the mature brain (Figure 3).



**Figure 3.** Roles for ubiquitin and protein degradation in neuronal function. The UPS regulates several aspects of synaptic biology, playing a role on neuronal function. Adapted from [87].

### **1.2.1 Transport of Ubiquitin in neurons**

Two classes of genes encode for Ub in mammalian genome: the genes encoding ribosomal fusion proteins Rsp27a and Uba52, and the polyubiquitin genes *Ubb* and *Ubc*. The levels of free Ub in a cell are determined by Ub synthesis and degradation, and by polyubiquitin chain assembly and disassembly. Nevertheless, both *Ubb* and *Ubc* genes are transcribed at increased rates in response to cell stress, as Ub is a component of the cellular response to heat shock and other stressors [88]. Following the *de novo* synthesis of Ub in the soma of the neuron, Ub is transported via axonal transport to axons and dendrites [89], a process that may take days or even months in certain neurons [90]. For this reason, although the levels of free Ub are maintained high in neurons, as a reservoir to allow for rapid responses to cell stimulation or stress, distal axons and dendrites are particularly vulnerable to stress and may be particularly sensitive to local fluctuations in Ub levels [91].

### **1.2.2 Neuronal migration**

Nervous system development requires proper migration of neuronal cells. Neuronal migration is regulated by a wide range of extracellular cues and intracellular signaling cascades, and dependent on cell adhesion proteins and various cell surface receptors, which, in turn, are regulated by the UPS and related components (Reviewed in [4]). Many studies have shown that the neuronal migration is dependent, directly or indirectly, on the activity of E3 ligases, making ubiquitylation one of the intracellular signaling pathways regulating neuronal migration [92-94]. For example, it was recently described that the FBX031-SCF centrosomal E3 ligase is required for an efficient migration of neurons in the developing cerebellum [94].

### **1.2.3 Axonal growth, guidance and morphogenesis**

Growth and guidance of axons are vital steps in the establishment of neuronal circuits. The UPS has been shown to regulate these processes through ubiquitylation and/or proteasomal degradation of proteins involved in the axonal cytoskeleton, transcription factors and small GTPases (Reviewed in [95]). The most well studied UPS-dependent regulators of axon growth and guidance are the PHR proteins, Nedd4, cdc20 and cdh1 E3 ligases. Cdh1, for example, was shown to bind to the anaphase-promoting complex (APC) [96], regulating the degradation/stability of specific transcription factors (such as Id2 and SnoN), impacting on axon growth [97-99]. Other E3 ligases, such as smurf-1, also have identified roles: smurf-1 was shown to directly target RhoA, a small

GTPase associated with the actin filaments network, for ubiquitylation and proteasomal degradation [100], thus enhancing axonal outgrowth [101].

Notably, many E3 ligases that are important for axonal growth and guidance also regulate axonal morphogenesis. For example, PAM (an E3 ligase, member of the PHR family) primarily regulates axon growth and guidance, but it also plays a role in axon morphology [79, 102, 103].

#### **1.2.4 Pre-synaptic function**

Growing evidence supports a contribution of the UPS to the regulation of synaptic physiology and transmission, by regulating the proteolysis of key presynaptic elements at the synaptic terminals (Reviewed in [74, 104-106]). Several regulatory molecules controlling long-term synaptic plasticity as well as synaptic transmission and short-term synaptic plasticity have been shown to be substrates for UPS-mediated degradation. For example, the protein Duc-13, which is critical in priming synaptic vesicles, accumulates in presynaptic terminals upon proteasome inhibition [107]. Also, specific Ub ligases interacting with syntaxin 1 – a presynaptic protein involved in synaptic vesicle exocytosis – and RIM1 $\alpha$  (Rab3-interacting molecule 1 $\alpha$ ) – which acts as a presynaptic scaffold – have been identified [108, 109]. Additionally, it appears that the UPS also functions in recycling of synaptic vesicles and maintaining vesicle homeostasis [110]. Recently, Waith and colleagues described that presynaptic Ca<sub>v</sub>2 channels are targets of the UPS, adding further to the relevance of UPS function in neurons [111].

#### **1.2.5 Postsynaptic plasticity**

The discovery of UPS components and target proteins at synapses gave indirect evidence for a postsynaptic role of this system (Reviewed in [74, 112-114]). Subsequent studies indicated that the UPS modulates regulatory molecules, structural proteins and neurotransmitter receptors in the postsynaptic compartment [106]. Studies in *Caenorhabditis elegans* and mammalian neurons showed a role for ubiquitin in trafficking and endocytosis of neurotransmitter receptors such as AMPA [85], GABA [115], NMDA [116] and glycine receptors [117]. Also, Colledge and collaborators showed that the postsynaptic density protein PSD-95 is regulated by UPS-mediated degradation, which in turn modulates AMPA receptors [85]. In addition to PSD-95, the UPS seems to regulate several other proteins, namely structural proteins such as Shank, GKAP and AKAP97/150 [118]. Finally, there is also evidence that the UPS contributes for the regulation of spine shape by

modulating the degradation of SPAR, a protein that acts on the reorganization of the actin cytoskeleton at the spine [119].

### **1.2.6 Nonproteolytic functions of Ubiquitin signaling**

In recent years, mounting evidence suggests that Ub has also nonproteolytic functions; Ub or polyUb chains serve as a signal to recruit proteins harboring UBD, bringing together ubiquitylated substrates and Ub receptors to perform specific biological functions. These functions include membrane trafficking, protein kinase activation, transcriptional regulation and DNA repair (Reviewed in [120]).

#### *Membrane trafficking*

Monoubiquitylation and the attachment of K63-linked Ub dimers have been shown to maintain the balance between degradation, recycling and trafficking of cargo molecules and cell surface receptors [11, 62]. For example, depletion of the DUB AMSH accelerates epidermal growth factor receptor (EGFR) trafficking to lysosomes [121, 122].

#### *Protein kinase activation*

K63 polyubiquitylation is an important post-transcriptional modification of signaling cascades, such as NF- $\kappa$ B and the Wnt pathway, playing a key role in the activation of protein kinases [123, 124]. For example, the DUB USP4 was shown to be required for the regulation of the Wnt signaling activation [125].

#### *Transcriptional regulation and DNA repair*

DUBs can directly influence the structure of chromatin and coordinate DNA repair mechanisms or contribute to gene transcriptional regulation through reversible ubiquitylation of specific transcription factors and histones (Reviewed in [126]). It has been shown that certain DUBs can reverse monoubiquitylation of both H2A and H2B [127-130], impacting on multiple nuclear processes including mitosis, transcriptional initiation and elongation, mRNA export [127, 131-133] and gene silencing [46, 134].

### 1.3 The UPS and Ub in neurodegenerative disorders

Components of the UPS have been linked to several diseases of the nervous system, including neurodevelopmental and neurodegenerative diseases (Reviewed in [5, 32, 135]). In some cases, mutations in specific UPS genes have been linked to the etiology of the disease while in other events, impairment of the UPS seems to be a late event in the pathogenesis (Reviewed in [136]). It is believed that one of the first effects of perturbations in UPS-mediated proteolysis is synaptic malfunction that is followed later in disease progression by cell death and/or degeneration (Reviewed in [137]). Nevertheless, it is still poorly understood whether UPS impairment is a cause or a consequence of the disease - or both.

#### 1.3.1 Ub deposition in protein aggregates

Misfolded or aberrant proteins are targeted for degradation through the UPS [138]. Failure to remove misfolded proteins may lead to their sequestration in aggregates, a shared hallmark of many neurodegenerative disorders, including PD, AD, HD and other polyQ disorders (Reviewed in [139-144]). These aggregates are immunoreactive for Ub and UPS-associated components [21, 136, 145]. However, the significance of these aggregates in the etiology of neurodegenerative disorders remains highly controversial. Several findings suggest that the visible aggregates do not fully correlate with neuronal death [146-149]. In contrast, several studies indicate that these Ub-rich aggregates contain the pathogenic protein (and in some cases the normal protein as well), UPS components, chaperones and transcription factors [150-155], which has been interpreted as evidence that sequestration of these key cellular proteins may lead to neuronal dysfunction and death. Additionally, a recent study showed a polyQ-induced global UPS impairment *in vivo* in an HD mouse model [156], while others exclude such an effect [157, 158]. Despite this discrepancy, the fact that mutations in UPS genes are linked to inherited neurological diseases supports the concept that UPS dysfunction might contribute to a wide range of nervous system diseases (Reviewed in [12, 159]).

#### 1.3.2 The UPS in Parkinson's disease (PD)

PD is an age-related progressive neurodegenerative disorder affecting, among others, dopaminergic neurons of the *substantia nigra* (SN).

The first evidence implicating a role for the UPS in PD came from the finding of disease-causing mutations in the E3 ligase parkin, which is now known to be involved in proteasomal

degradation of several important neuronal substrates, including  $\alpha$ -synuclein and synaptotagmin XI [160-164]. Ubiquitylated  $\alpha$ -synuclein was shown to accumulate contributing to the formation of Lewy-like inclusions, providing more evidence for a role of the UPS in PD [165].

A link between proteasome dysfunction and PD has also been demonstrated in a mouse model using conditional depletion of the 26S proteasome through inactivation of a 19S proteasome subunit, Psmc1. Upon 26S proteasome depletion, these mice displayed neurodegeneration and Lewy-like inclusions containing Ub and  $\alpha$ -synuclein in neurons of nigrostriatal pathway and forebrain, similar to the ones found in the brains of human PD patients [165, 166].

Consistent with a role for the UPS in PD, other components of this pathway also seem to play a role in PD pathology. For example, a missense mutation (I93M) in the UCHL1 was found in a pair of German siblings with inherited PD. Notably, this mutation markedly reduces UCHL1 DUB activity *in vitro* [52]. Mutations in the 26S ATPase of the regulatory subunit of the proteasome (PSMD4/RPN10) have also been described as increasing the risk for PD [166]. Furthermore, *in vitro* analyses of SN extracts from PD brains revealed a marked decrease in the activity of the 20S proteasome and in the levels of proteasomal core subunits [167, 168].

### **1.3.3 The UPS in Alzheimer's disease (AD)**

AD is the most common neurodegenerative disorder, clinically characterized by progressive loss of memory and other cognitive skills, resulting in severe dementia. In the brain, the pathological signs include the presence of both intracellular neurofibrillary tangles containing hyperphosphorylated microtubule associated protein (MAPT) and extracellular amyloid- $\beta$  plaques (Reviewed in [169]). The fact that these protein aggregates are ubiquitylated, strongly suggest that a malfunctioning or overloaded UPS may contribute for AD pathology [170-172]. In addition, several studies have implicated the UPS and proteolytic defects in AD. An ubiquitin mutant (UBB<sup>-1</sup>) was identified as a potent inhibitor of the proteasome in AD brains, and shown to accumulate and co-localize with the amyloid plaques and neurofibrillary tangles [171]. Interestingly, ubiquitylation of UBB<sup>-1</sup> was shown to be mediated by the ubiquitin-conjugating enzyme, E2-25K/HIP-2, found to be critical for A $\beta$  toxicity in AD animal models [173]. Additionally, *in vitro* experiments showed that A $\beta$  could bind and inhibit the proteasome, thus blocking degradation of ubiquitylated substrates [174, 175]. The neuronally expressed DUB enzyme UCHL1 (linked to PD, as described above) was shown to have a highly reduced activity in AD brains due to its increased oxidation [176]. Also, both expression of the 26S protease regulatory subunit 6B (PSMC4, RTP3) [177] as well as the



proteasome function were shown to be reduced in several brain regions of AD patients (reviewed in [178]).

#### 1.3.4 The UPS in Huntington's disease (HD)

HD is one of the nine polyQ disorders known to date, which is caused by an expansion in the CAG repeat in the huntingtin (*Htt*) gene. The polyQ tract renders a mutant protein prone to aggregate, causing cellular toxicity [179-181]. The neuropathological changes in HD lead to a progressive cognitive decline ending in severe dementia, motor dysfunction and psychiatric disturbances, namely depression and psychosis [182]. Various studies suggested that the UPS is involved in the processing of mutant Htt, since intranuclear aggregates containing the mutant protein are positively stained for Ub and proteasome subunits in cell cultures, HD transgenic mouse models and human HD brains [152, 183, 184]. When present in the nucleus, Htt is degraded by the UPS [185]. However, experiments with purified 26S proteasomes showed that proteasomes may be unable to degrade the protein bearing a polyQ expansion. Thus, long polyQ sequences have been proposed to cause the clogging of the proteasome impairing UPS function [186].

Indeed, several studies in cell models and in patient's material have reported an impairment of the UPS and its components in HD. For example, a change in the activity of the 20S proteasome was shown in HD patient's brains, causing an increase in the half-life of a polyubiquitylated reporter [187]. Furthermore, co-expression of mutant Htt with proteasomal subunits in cells revealed irreversible recruitment of proteasomes into HD aggregates [188]. Also, global proteasome impairment was reported when mutant aggregates were present both in the nucleus and in the cytoplasm of HEK293 cells [189].

Interestingly, experiments using a model for polyQ disorders showed that the E2-25K/HIP-2 enzyme increases aggregation of polyQ proteins, in addition to its role in mediating the toxicity of A $\beta$  and UBB<sup>1+</sup> [190]. This suggests that the impairment of the UPS may be a common mechanism among several neurodegenerative disorders, irrespective of the toxic protein species.

However, there are also contradictory reports regarding the relevance of the proteasome impairment for HD pathogenesis. For example, a recent study suggested that toxic forms of Htt do not impair proteasome function [191]. Also, no global impairment of UPS activities was found in an HD mouse model characterized by Mangiarini et al [184, 192]. These apparently opposing results may be in part explained by the discrepancy between results obtained from cell and mouse models [193, 194]. However, more recently, Ortega and collaborators proposed a possible explanation that

reconciles the data from cell models supporting the polyQ-induced UPS impairment with the contradictory findings of no impairment in mouse models – their results demonstrate that mutant Htt can indeed impair UPS function *in vivo* but that this is only a transient event due to the protective effect on mutant Htt aggregation [157].

### **1.3.5 The UPS in Ataxias**

Ataxia is a neurological symptom present in a group of disorders, generally caused by degeneration of neurons in the cerebellum, brain stem and spinocerebellar tracts, which is related with the patients' loss of control of body movements. Several inherited ataxias are caused by an abnormal polyQ expansion within a variety of mutant proteins (Reviewed in [195]). As in HD, expanded polyQ bearing proteins tend to aggregate and form intranuclear inclusions. These inclusions contain several cellular components, including Ub and subunits of the proteasome, therefore suggesting a relationship between spinopontocerebellar neurodegeneration and the UPS [153-155]. In addition, some disease-causing proteins such as ataxin 1, 3 and 7, are known to be ubiquitylated and targeted for proteasomal degradation [196-198]. Several evidence suggest that the misfolding of the polyQ proteins might lead to difficulties in the recognition and degradation process by the proteasome, resulting in impaired clearance of mutant proteins (Reviewed in [199]). Moreover, the aggregates of these mutant proteins were also shown to directly impair UPS function [199].

Besides the proteasome, other components of the UPS have been implicated in the development of ataxia. For example, the loss of DUB activity of the Ups14 enzyme, that regulates important cellular processes such as inhibition of proteasome and protein turnover [200], causes ataxia in a mouse model, which is associated with synaptic transmission defects [201].

### **1.3.6 Connection between UPS and neurodegeneration through autophagy**

Autophagy is a lysosomal-dependent degradation pathway that can be divided into macroautophagy (bulk degradation of the cytosol), chaperone-mediated autophagy (CMA) and mitophagy (selective degradation of mitochondria) (Reviewed in [202]). Protein aggregates that cannot be transported to and degraded by the proteasome are usually degraded by autophagy [203]. Therefore, it has been proposed that autophagy could serve as an alternative degradation pathway when the proteasome capacity is insufficient or its function is impaired (Reviewed in [204]). Clearance by autophagy has been shown for several disease proteins such as tau [205],  $\alpha$ -synuclein

[206] and a range of polyQ expanded proteins [37, 205, 207, 208]. Interestingly, Wild type proteins show a much lower dependence on autophagy for their clearance, compared with their mutant counterparts, and can be rapidly degraded by the proteasome [206, 209].

Nevertheless, recent findings showing that impairment of the proteasome also impairs autophagy and vice versa, suggested an interdependence of UPS and autophagy [39]. Indeed, it is known that ubiquitylation, mainly through K63 polyUb chains, can lead to autophagic degradation of the ubiquitylated targets [210]. In addition, several Ubl proteins, such as Atg5, 7, 8 and 12, are critical for autophagy; it was shown that mice lacking either Atg5 and Atg7 in the central nervous system (CNS) presented ubiquitylated aggregates, which were associated with neurodegeneration and motor deficits [211]. Also, mutations in proteasome subunits caused neurodegeneration in a *Drosophila* model, which was rescued by overexpression of the histone deacetylase 6 (HDAC6) in an autophagy-dependent manner [212]. Defects in autophagy have been linked to the pathology of several neurodegenerative diseases, such as AD, PD and HD (Reviewed in [213, 214]). It is believed that an abnormal autophagic activity leads to accumulation of intracellular protein aggregates in axons, dendrites and/or synapses, affecting the intercellular communication of selective neuronal populations [215].

Opposing results, however, suggest that proteasome inactivation induces autophagy [204, 216-218]. For example, Ding and co-workers showed that proteasome inhibition activates autophagy and, conversely, blockage of autophagy leads to the formation of polyubiquitylated aggregates [218]. Also, proteasome inactivation induced autophagy via the hypoxia signaling in *Drosophila* [216]. These results suggest that a compensatory autophagy may be induced when the proteasome fails to efficiently remove aggregate-prone proteins. However, the fact that several substrates of autophagy and UPS overlap (Reviewed in [204, 217, 219]), may potentially explain why in some cases impairment of one of these pathways leads to impairment of the other.

### **1.3.7 The UPS as a therapeutic target**

As described above, it is now widely accepted that the UPS contributes for the pathology of several neurodegenerative disorders. Therefore, targeting the proteasome or UPP components has emerged as an attractive therapeutic approach for these disorders (Reviewed in [17, 220-222]).

One of the most appealing targets for therapeutic intervention is the proteasome itself. Since abnormal protein aggregates and inhibition of the proteasome are common features of neurodegenerative diseases, enhancement of proteasome activity might be an efficient way to

remove aggregates that accumulate in the brain (Reviewed in [223]). This may be achieved by employing the following strategies: i) increasing proteasome activity by promoting assembly of 19S and 20S complex of proteasome [224], ii) overexpressing the  $\beta 5$ , the proteasome maturation protein (POMP) [225] or the arsenite-inducible RNA-associated protein (AIRAP) [226], all resulting in enhanced proteasome activity, iii) stimulating proteasome activity using natural and/or synthetic activators such as olive oil, fatty acids and SDS [227-229], iv) enhancing ubiquitylation of a substrate using proteolysis targeting chimera molecules (PROTACS), molecules comprising a ligand for the target protein, a linker moiety, and a ligand for an E3 Ub ligase [230], v) promoting SUMOylation of proteins implicated in neurodegenerative disorders such as tau,  $\alpha$ -synuclein and huntingtin [231], vi) facilitating substrate proteasomal degradation through overexpression or modulation of heat shock proteins [232-234].

Besides the proteasome, other UPS components are now being envisaged as “druggable” targets to treat neurodegenerative diseases. As substrate specificity is mainly determined by E3s, they have been proposed as the best potential therapeutic targets [5, 32]. Therefore, modification of the active site of E3s either to increase or to decrease the affinity towards specific substrates, could be one strategy to selectively control the accumulation of ubiquitylated proteins [223]. However, interfering with E3s is not easy to devise due to the lack of knowledge about their mechanisms of catalysis (Reviewed in [235]). DUBs have also been attractive molecular targets for the development of therapeutic approaches. Perhaps the best example of the use of DUBs for therapy is USP14. Lee and colleagues showed that specific inhibition of the USP14 E3 ligase might improve clearance of misfolded proteins in neurodegenerative diseases [200]. However, one shall be mindful of the potential side effects from inhibiting/activating this DUB’s activity. Indeed, it was shown that mutations or silencing of several DUBs in mice, including USP14, negatively impacted on the entire organism or on specific organ systems. Also, KD of most DUBs in a *Drosophila* model had negative physiological consequences during development and in adult animals [236].

#### **1.4 Machado-Joseph disease**

In the early 1990’s, converging lines of investigation identified a new type of mutation: the dynamic expansion of a trinucleotide repeat sequence within the coding region of a given gene, translated into a repetitive aminoacid sequence in the corresponding protein. Among them, the polyQ diseases, caused by CAG repeat expansions are the most common. To date, ten polyQ diseases have been characterized: Kennedy’s disease or spinobulbar muscular atrophy (SMBA)

[237], spinocerebellar ataxias (SCA) type 1 [238], 2, 3 [68], 6 [239], 7 [240], and 17 [241, 242], dentatorubral-pallidoluysan atrophy (DRPLA) [243, 244], HD and Huntington disease-like 2 (HDL2) [245]. These group of diseases share several features that suggest a common toxic mechanism, not yet fully understood: i) the CAG expansion is translated into an abnormally long tract of glutamines, ii) there is a negative correlation between the age of onset and the number of CAG repeats, i.e., the age of onset of symptoms decrease with increased polyQ length [241, 246-248], iii) the CAG repeats present an intergenerational instability, with a tendency for disease to worsen in successive generations (anticipation) [246, 249], iv) formation of protein aggregates or inclusion bodies in the nucleus and/or cytoplasm of neuronal cells [241].

Machado-Joseph disease (MJD), also known as spinocerebellar ataxia type 3 (SCA3), is now known to exist worldwide [250], representing the most common dominantly inherited ataxia (Reviewed in [250-252]) and the second most common polyQ disease [253]. Despite the increasing number of therapeutic strategies assessed in mouse models of polyQ diseases (around 250 preclinical therapeutic trials have already been described [254]), there are no effective treatments for these disorders, including MJD, and current therapeutic approaches are only able to provide limited symptomatic relief (Reviewed in [255]).

#### **1.4.1 Clinical and pathological features**

The core clinical feature in MJD is a slowly progressive ataxia, being the average age at onset 40 years and the mean survival time of 21 years (Reviewed in [256]). Numerous other clinical symptoms, including weight loss, dystonia, dysarthria, spasticity, rigidity, fasciculations, postural instability, proprioceptive loss, visual, speech and sleep disorders, dysphagia, amyotrophy, corticospinal and autonomic nervous system dysfunctions and neuropathy, are also frequently observed in MJD patients [257-261].

Neuropathologically, MJD is characterized by neuronal loss in the cerebellum, substantia nigra, striatum, thalamus, pontine nuclei, spinal cord and cranial nerves, precerebellar brainstem, cholinergic and dopaminergic midbrain, as well as visual, auditory, vestibular, somatosensory, and ingestion and urination-related systems. Retained integrity of the cortical and subcortical regions of the limbic system and mild degeneration of cerebral and cerebellar cortexes, white matter of cerebellum, inferior olive and Purkinje cells, are also characteristic of MJD [248, 258, 260, 262-266]. Magnetic resonance imaging (MRI) and neuroimaging studies have revealed an enlargement

of the fourth ventricle, atrophy of the pons, cerebellar vermis and hemispheres, basal ganglia, midbrain and medulla oblongata [267-271]. Regarding brain functionality, magnetic spectroscopy analysis has shown decreased metabolism in the cerebellum, brainstem, cerebral cortex, thalamus and putamen, suggestive of axonal dysfunction, at symptomatic ages [257, 259, 272-274].

### **1.4.2 MJD genetics**

The MJD causative gene – *ATXN3* gene – was mapped to the long arm of chromosome 14 (14q32.1) [68]. The gene spans 48 kb and contains 13 exons (two of them recently described), with the (CAG)<sub>n</sub> tract located at exon 10 [275, 276]. In the healthy population, the number of CAG repeats ranges from 12 to 44 CAG, while expanded alleles usually comprise from 61 to 87 repeat units (Reviewed in [277, 278]). Four different *ATXN3* transcripts of approximately 1.4, 1.8, 4.5 and 7.5 kb were described to be ubiquitously expressed in neuronal and non-neuronal human tissues [276, 279]. These different mRNA species may result from differential splicing of exons 2, 10 and 11 of *ATXN3* gene, and alternative polyadenylation of exon 10 [68, 276, 280]. A recent study proposed the existence of 50 potential new splice variants of *ATXN3* gene, generated by different types of splicing events (exon skipping, new exons and usage of alternative 5' or 3' splice sites) [275]. This suggests that alternative splicing may be an important mechanism regulating *ATXN3* expression. Additionally, the existence of *ATXN3* transcripts carrying different 3' untranslated regions (UTRs), suggest another potential level of regulation of *ATXN3* expression [276], which remains unexplored.

### **1.4.3 Therapeutic approaches**

To date, no effective treatment for MJD and other polyQ diseases have been developed. However, some symptoms of disease can be treated using pharmacological approaches. Importantly, efforts have been made to generate animal models of the disease that will facilitate the understanding of MJD pathogenic mechanisms and subsequent therapeutic testing (Reviewed in [281]).

#### *Silencing of ATXN3 gene*

Because the detailed pathogenic mechanism remains unclear in MJD, silencing strategies targeting the causative gene have shown to be the most promising. Indeed, Boy and collaborators showed that switching off the expression of the pathogenic protein reverted the disease phenotype (including motor deficits, inclusion formation and neuronal degeneration) in a conditional mouse

model of MJD [282]. Silencing of *ATXN3* gene by RNA interference (RNAi) in a non-allele-specific manner has also been shown to mitigate degeneration in a rat model of MJD, indicating that silencing of Wild type ATXN3 together with the mutant protein appears not to be deleterious [283, 284]. In fact, *Atn3* knockout mice do not show any signs of neurodegeneration [285]. Accordingly, Rodriguez-Lebrón and colleagues also showed that short term silencing of mutant ATXN3 in the cerebellum of an MJD mouse model, using RNAi sequences targeting 3'UTR of ATXN3, cleared abnormal nuclear accumulation of the disease protein [286]. However, and unexpectedly, chronic RNAi treatment did not improve survival or motor function in treated transgenic mice. One possible explanation is that the RNAi-mediated suppression of *Atn3* expression was relatively low (roughly 50%) and confined to the cerebellum, and the delivery of the virus occurred in lower extents to other CNS regions also affected in disease. The failure of the treatment to improve the motor dysfunction of the MJD mice suggests that the phenotype is not solely due to cerebellar dysfunction, as it likely happens in MJD patients. This illustrates the need of silencing strategies enabling broader delivery approaches, in order to target different brain regions/nuclei affected in the disease context.

Other types of molecules targeting RNA, such as peptide nucleic acids (PNAs) and locked nucleic acids (LNAs) have also been shown to be effective in silencing *ATXN3* in fibroblasts from MJD patients [287], supporting the idea that this strategy may constitute a potential route to MJD therapy.

However, a major problem of ataxin-3 silencing may be the lack of knowledge about its function, specially in neurons. It is still unclear to what extent ataxin-3 is an essential protein for normal cellular function. Although studies using knockout (KO) animal models suggest that depletion of ataxin-3 is not detrimental [285, 288], we cannot exclude the existence of compensatory mechanisms masking the effects of the absence of the protein in these models. Of note, ataxin-3 contains several highly evolutionarily conserved domains [289], which may indicate that the protein is not completely dispensable. Also, silencing of ataxin-3 in non-neuronal cultured cells [70, 290] resulted in cytoskeletal disruption, loss of cell adhesion, increased ubiquitylation and increased cell death, further suggesting that prolonged full knockdown of the normal protein could be harmful. Therefore, understanding the exact physiological(s) role(s) of ataxin-3 is of relevance for the development of efficient and safe therapeutic strategies.

An alternative oligonucleotide therapy proposes the removal of the polyQ tract from the ATXN3 protein by exon skipping, maintaining the expression levels and the main functional domains and Ub binding capacity of the protein [291]. However, it is still necessary to assess whether the resulting modified ataxin-3 protein is not toxic and to evaluate whether its localization and function are not affected. Furthermore, future studies are required to evaluate whether polyQ skipping ameliorates the phenotype of MJD animal models.

#### *Prevention of aggregation*

As previously described, ATXN3 protein aggregates are a hallmark of MJD, and probably play a central role in the disease mechanism. Therefore, preventing aggregation may have therapeutic potential. The finding that heat shock proteins (HSPs) co-localize with aggregates of mutant ataxin-3 [292-294], suggested that these chaperones act (or attempt to act) in promoting the correct refolding of the pathogenic proteins in order to reduce the formation of toxic aggregated forms. Therefore, it has been proposed that the use of compounds that induce expression of HSPs, might have a beneficial effect in the clearance of the mutant protein (Reviewed in [295, 296]). Indeed, increased activity of molecular chaperones such as heat shock protein 70 (HSP70) and heat shock protein 40 (HSP40) was shown to reduce both aggregation and toxicity of expanded polyQ tracts in cell and mouse models, resulting in improved phenotypes [297, 298]. It was proposed that these molecular chaperones increase the solubility of expanded polyQ tracts and subsequently, the degradation of the protein by the proteasome [299-302]. Pharmacologic inactivation of the heat shock protein 90 (HSP90) triggers overexpression of several molecular chaperones, activating the heat shock response (HSR), through the persistence of the heat shock factor 1 (HSF-1) action [303, 304] and thus was thought to be a promising therapeutic strategy, harnessing the cell's protective potential. Indeed, HSP90 inhibitors (such as 17-AAG and 17-DMAG) have been shown to reduce aggregate load and toxicity in cell, fly, nematode and mouse models of several neurodegenerative diseases, including Huntington and MJD [305-310]. For example, it was shown that exposure of ataxin-3 mutant *C. elegans* or mice expressing mutant ATXN3 to 17-DMAG improved the motility defects of these transgenic animals when compared to untreated controls [308, 311].

#### *Activation of autophagy*

Enhancing degradation of ATXN3 by stimulating cellular degradative systems that regulate its turnover may be an alternative therapeutic strategy for MJD. Indeed, pharmacological induction of



autophagy using tensirolimus (a rapamycin analogue already used in patients for treatment of renal cell carcinoma) resulted in increased degradation of mutant ATXN3, a reduction in the number of aggregates, and improved the motor phenotype (with some limitations) in a mouse model of MJD [312]. Additionally, overexpression of the autophagic protein beclin-1 was shown to increase clearance of the mutant protein and to prevented neurodegeneration in a rat model of localized ATXN3 over-expression [313].

Other studies showed that treatment of *Drosophila*, *C. elegans* and mouse models of MJD with inhibitors of HSP90 decreased mutant ATXN3 aggregation and improved motor phenotype in MJD transgenic *C. elegans* and mouse models [308, 311, 314]. Although these compounds were expected to act by inducing chaperone expression and thus promoting refolding of the mutant protein, as described above, it has also been shown that these compounds are able to activate autophagy in different model systems [315-317].

Finally, lithium chloride was also shown to have therapeutic potential in a *Drosophila* MJD model through upregulation of autophagy [318]. While this was not confirmed in a mouse model of MJD [319], a recent phase II/III clinical trial with this compound, although not effective considering its major endpoint, showed a significant reduction in the progression of gait ataxia severity [320].

#### *Proteolytic cleavage inhibition*

Proteolytic cleavage of ATXN3 may also be relevant for polyQ-expanded ATXN3 toxicity. There is indeed evidence supporting the proteolysis of ATXN3 in mammalian cells, transgenic animals and MJD brain tissue [321-324], and it has been proposed that this event is required for inclusion formation, because truncated ATXN3 is detected in neuronal inclusions in human brain [321, 325]. In line with this, inhibition of ATXN3 proteolysis, by mutating its putative cleavage sites, was shown to reduce toxicity in a *Drosophila* model of MJD [326, 327]. Also, inhibition of the calpains showed a good potential in reducing mutant ATXN3 toxicity in several cellular and animal models [324, 328-330].

#### *Antioxidants*

There is some evidence that impairment in the cellular defense mechanism against oxidative stress could play a role in MJD pathogenesis [331, 332]. Yu and colleagues showed that certain antioxidant enzymes such as glutathione reductase, catalase and superoxide dismutase (SOD) exhibit decreased activity in a mutant MJD cell line as compared to Wild type cells [331].

Therefore, antioxidants might have a beneficial effect for neuronal dysfunction and neurodegeneration in MJD. Although antioxidants have been demonstrated to have beneficial effects for other polyQ diseases such as HD [333-338], nothing is known about their effects in MJD. Furthermore, creatine, a bioenergetic supplier for the cell, was also demonstrated to have antioxidant properties, which could have beneficial effects in these diseases [339-341]. Indeed, food supplementation with creatine was shown to improve muscle strength and motor coordination deficits in a MJD mouse model (Duarte-Silva, S. et al, *in preparation*).

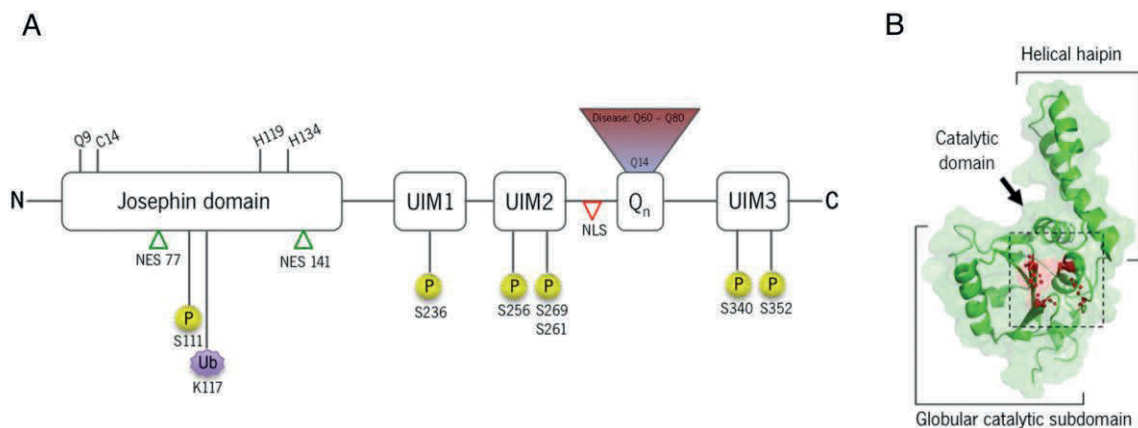
#### **1.4.4 MJD protein: Ataxin-3 (ATXN3)**

Ataxin-3 (ATXN3) is an evolutionarily conserved protein, with orthologs in a wide range of eukaryotic organisms, from protozoans to vertebrates [279, 288, 342, 343]. Wild type human ATXN3 has a molecular weight of 42 kDa, the size slightly varying according to the length of the polymorphic glutamine tract. Despite the localized neuronal degeneration observed in MJD patients, ATXN3 is ubiquitously expressed among different body tissues and cell types, being widely expressed throughout the brain [20, 276, 325, 342, 344]. Also in terms of subcellular localization, ATXN3 is ubiquitously found and is able to translocate from the cytoplasm to the nucleus and vice-versa [20, 153, 325, 344-346]. This ability was shown to be associated with the existence of a nuclear localization signal (NLS) and 6 potential nuclear export signals (NES) in the ATXN3 protein sequence [289, 346-348]. Furthermore, the first 27 amino acids of ATXN3 were shown to have a role in the regulation of ATXN3 nuclear localization [345]. Nuclear localization was also shown to be modulated by phosphorylation events. These phosphorylation sites were shown to be targets for the serine-threonine kinase 2 (CK2) and for the glycogen synthase kinase 3 $\beta$  (GSK 3 $\beta$ ) [349, 350]. While likely important for pathogenesis [351], the biological relevance of this regulated subcellular distribution of ATXN3 remains to be clarified.

##### *Structure and domains*

ATXN3 belongs to the family of cysteine proteases. Structurally, it is essentially composed by a structured globular N-terminal – the catalytic Josephin domain (JD) – followed by a flexible C-terminal tail that contains 2 or 3 ubiquitin interacting motifs (UIMs) and the polyQ tract [280, 289, 352-355] (Figure 4). Comparative analysis of the JD showed that ATXN3 belongs to the papain-like cysteine protease family and contains two binding sites for Ub [355-357]. The Ub protease activity resides in the catalytic pocket, which comprises that catalytic triad, C14, H119 and N134, strictly

conserved among different classes of DUBs (Figure 4). The Q9 residue was also shown to be important for the catalytic activity of ATXN3 [355, 357]. Biochemical evidence confirmed that the DUB activity of this protein requires the active site cysteine 14 (Reviewed in [198, 354, 358]). The UIMs may help to recruit and position the polyubiquitylated substrates relative to the catalytic site, determining ATXN3 preference for specific topologies of polyUb chains and allowing for a sequential editing [357, 359]. However, despite this important role in the regulation of the type of chains that can be cleaved by ATXN3, UIMs seem to be dispensable for its activation [360]. Although several potential ATXN3 isoforms might be translated, only two have been studied in detail; both of these isoforms contain the polyQ tract and UIMs 1 and 2, but only one contains UIM3. The 3 UIMs protein was proposed to be the predominant isoform in the brain [325, 344, 361]. However, some important limitations may have affected this conclusion: i) the 2UIM ataxin-3 isoform is a less stable protein than the 3UIM ataxin-3 and is subjected to rapid proteasomal degradation, ii) the 2UIM ataxin-3 is more prone to aggregate than the 3 UIM protein, and iii) the YACs used for the generation of the mouse model possesses a slightly longer 2 UIM isoform with a predicted molecular weight very closed to the molecular weight of the 3 UIM ataxin-3. Therefore, further analyses are needed to conclude about the relative abundance of ATXN3 isoforms in the brain.



**Figure 4.** Domain architecture, structure and post-translational modifications of ataxin-3. (A) ATXN3 is mainly composed by a N-terminal catalytic domain, the Josephin domain with DUB activity, followed by a C-terminal tail containing 2 or 3 UIMs and a polyQ sequence of variable length. Five serine residues present in the UIMs (S236, S259, S260/S261, S340 and S352) have been identified as phosphorylation sites and an ubiquitylatable lysine residue was mapped to aminoacid 117 in the JD. One functional NLS and two NES are also present in the JD. Adapted from [362]. (B) Solution structure of the JD (PDB code: 1YZB). The active site amino acid (Q9, C14, H119 and N134) localize in a cleft formed by the globular catalytic and the helical hairpin subdomains of the JD. Reproduced from [362].

#### 1.4.4.1 Function, biological function and molecular partners

##### *Deubiquitylating (DUB) activity and regulation of protein degradation: involvement in the UPS*

As for most DUBS, the precise physiological role of ATXN3 remains undetermined. However, multiple lines of evidence implicate ATXN3 in the UPS, playing a role in the cellular protein quality control. Supporting this idea, it is now widely accepted that ATXN3 has DUB activity *in vitro* mediated by the JD, being able to bind and cleave both K48 and K63-linked chains, in a UIM-dependent manner [198, 354, 359, 363-365]. Curiously, Winborn and colleagues found that ATXN3 preferentially cleaves K63-linked chains and chains of mixed K48 and K63 linkage, suggesting that it may function as a regulator of polyubiquitin chains with complex topology [359]. Additionally, ATXN3 also interacts with polyubiquitylated proteins and subunits of the proteasome [198, 354, 363, 366], with the ubiquitin-like protein NEDD8 [367], with proteins known to be involved in the shuttling of substrates for proteasomal degradation, such as VCP/p97, Ubiquilin/PLIC1 and Rad23 homologues [363, 368-372], and with UBXN-5, an adaptor of substrate binding of VCP/p97 [373]. ATXN3 was also shown to bind polyUb chains in neuronal cells in a UIM-dependent manner [364].

Although when assessed using artificial substrates such as polyUb chains, Ub aldehyde and Ub-AMC, the DUB activity of ATXN3 *in vitro* appears to be very low, it was possible to determine that it has a preference for chains of no less than 4 Ub moieties, which notably corresponds to the smallest Ub stretch involved in the targeting of proteins for proteasomal degradation [285, 353, 354, 357, 359]. In addition to facilitating protein degradation through the UPS, it has been proposed that ATXN3 partially deubiquitylates targeted proteins, preventing their degradation by binding through the UIMs. Indeed, it was shown that ATXN3 is able to block proteasome-dependent degradation of an artificial substrate *in vitro*, by editing K48-linked polyUb chains [374]. The low proteolytic activity of ATXN3 *in vitro* may be explained by the absence of an endogenous substrates and other external factor(s) that may be required for optimal proteolysis such as co-factors or activating molecular partners [375, 376]. In agreement with this idea, Reyes-Turcu and collaborators propose that as many DUBs, ATXN3 might require association with proper substrate(s) to acquire an optimal catalysis-competent conformation.

Studies using *Atnx3* KO mice provided the first *in vivo* (albeit indirect) evidence that ATXN3 may function as a DUB: these mice had increased levels of total ubiquitylated proteins, suggesting that ATXN3 may regulate the (de)ubiquitylation of target proteins [285, 288]. More recently, it was

also shown that the worm and mouse ATXN3 orthologues are involved in the turnover of a model substrate *in vitro* [288, 370].

The fact that mouse and nematode KOs for ATXN3 do not show an overt phenotype (other than a temperature sensitive movement impairment and an altered stress response in the worm [373, 377]) suggested the existence of redundancy among DUBS and/or compensatory mechanism in these organisms [70, 285, 288]. In contrast, the absence of ATXN3 in cell lines did lead to relevant cellular phenotypes, as described below, maybe because less compensation mechanisms take place.

#### *Transcriptional regulation*

Besides its role in protein degradation, ATXN3 has been involved in transcriptional regulation. The binding of ATXN3 to DNA together with *in vitro* and *in situ* molecular interaction studies, support a function of ATXN3 as a transcription regulator, through diverse mechanisms [378]. ATXN3 is known to interact with numerous transcriptional regulators (both activators and repressors): TATA box binding protein (TBP) associated factor 4 (TAF4) [379], cAMP response element-binding protein binding protein (CBP) [155, 378, 380], p300, p300/CBP associated factor (PCAF) [378], nuclear receptor co-repressor (NCoR1), HDAC 3 and 6 [374, 381], and forkhead box O (FOXO) transcription factor FOXO4 [382]. Moreover, through its interaction with HDAC3 and NCoR1, ATXN3 has been shown to decrease histone acetylation and consequent transcription, by inhibition of p300-mediated histone acetylation [378, 381].

Interestingly, it has been proposed that the UPS may also be associated with transcriptional regulation. It has been hypothesized that ATXN3, through its DUB activity, may interfere with the turnover or the activation of transcription machinery components with which it interacts. Additionally, the structure of chromatin, which in turn regulates transcription, is also modulated by ubiquitylation [381].

#### *Aggresome formation, cytoskeleton organization and myogenesis*

Another circumstance where ATXN3 has been associated with protein quality control systems is its proposed role in aggresome formation. Aggresomes are aggregates of misfolded/toxic proteins, found near the microtubule-organizing center (MTOC), when the UPS is compromised or overwhelmed. This protective process is dependent on microtubule-based transport [374]. Thus, the fact that ATXN3 interacts with dynein, HDAC6, PLIC1, microtubules, tubulin, and microtubule-

associated protein 2 (MAP2), further supports the involvement of ATXN3 in aggresome formation. In agreement, ATXN3 was shown to co-localize with aggresomes and preaggresomes [290, 372, 374, 383]. Indeed, a recent study showed that ATXN3 promotes the recruitment of a mutant version of superoxide dismutase 1 (SOD1, involved in ALS) to the aggresome, a process that was found to be dependent on the DUB activity of ATXN3 [384].

Besides its involvement in aggresome formation, ATXN3 has also been shown to be important for the organization of the cytoskeleton itself. Absence of ATXN3 was shown to cause disorganization of cytoskeleton components (microtubules, filaments and intermediate filaments), loss of cell adhesion and morphological alterations in different cell types (namely HeLa and C2C12 cell lines) [70, 290]. ATXN3 was also shown to be critical for the initial myoblast differentiation steps in C2C12 cells, for organization of the cytoskeleton of myoblasts, and for regulation of the levels of integrin subunits [70], which are key participants in muscle differentiation (Reviewed in [385]). ATXN3 was shown to interact with the alpha-5 subunit of integrin (ITGA5) and to repress its degradation, with impact on myogenesis.

#### *Heat shock and oxidative stress response*

Several studies have proposed that ATXN3 may participate in the cellular stress response. It was shown that heat shock and oxidative stress increase the nuclear localization of ATXN3, most likely by regulating expression of genes that encode components of the cellular stress response [386]. Indeed, another study showed that upon oxidative stress, ATXN3 is translocated to the nucleus together with its molecular partner FOXO4, activating the transcription of manganese superoxide dismutase (SOD2), which in turn protects cells from oxidative damage [382]. Additionally, Reina and colleagues found that ATXN3 KO fibroblasts were more sensitive to heat stress than controls [386].

Interestingly, *C. elegans atx-3* KOs display a temperature-dependent phenotype: when subjected to a noxious heat shock stimulus, ATXN-3 mutants have an exarcebated stress response and survive significantly better than Wild type animals, as a result of activation of DAF-16 pathway and a consequent overexpression of molecular chaperones [377]. These results support the involvement of ATXN3 in stress response, in this case a negative regulatory role [373].

### *Role in longevity*

Recent work provided the first indications for a role of ataxin-3 in the regulation of longevity. Through a synergistic interaction with the AAA ATPase valosin-containing protein (VCP/p97), ataxin-3 was shown to be important in longevity, as double KOs in *C. elegans* have a longer lifespan than Wild type (WT) worms. Additionally, ataxin-3 also seems to regulate the ubiquitylation and degradation of components of the insulin/insulin-like growth factor 1 (IGF1) signaling pathway implicated in lifespan regulation, further suggesting a role for ataxin-3 in longevity [370]. Interestingly, the IGF1 pathway has been proposed as a link between aging, proteotoxicity and neurodegenerative diseases [387-389], as is a strong modifier of MJD pathogenesis [308].

### *Regulation of E3s function*

Typically, DUBs oppose E3's activity by mediating the removal of Ub from target proteins. However, and because they are often regulated by monoubiquitylation, DUBs can also modulate the activity of these enzymes. ATXN3 was demonstrated to deubiquitylate the Hsc70 interacting protein (CHIP), which in turn enhances the overall DUB activity of ATXN3 [390]. ATXN3 is recruited to the ubiquitylation complex by monoubiquitylated CHIP, where it limits the length of polyUb chains of substrates and terminates the ubiquitylation cycle by removing monoUb from CHIP [391]. The fact that changes in ATXN3 levels do not affect CHIP levels, makes it likely that ATXN3 regulates the E3 ligase activity of CHIP rather than its degradation.

ATXN3 also interacts with Parkin, the Parkinson Disease-associated E3. Through this interaction, ATXN3 regulates the ability of Parkin to ubiquitylate itself [392, 393] but does not affect its stability [69]. It is possible that ATXN3 controls the levels and edits the architecture of Ub chains linked to Parkin, thus targeting this protein for specific cellular pathways or affecting its activation state [69].

### *Neuroprotection*

ATXN3 has also been proposed to act as a neuroprotectant. Studies conducted in *Drosophila* showed that overexpression of ATXN3 alleviated neurodegeneration caused by several polyQ disease proteins, including ATXN3 itself, huntingtin and ataxin-1 [394]. Also, Tsou and collaborators recently demonstrated that catalytically active ATXN3 protects against polyQ-dependent degeneration in flies. This neuroprotective process seems to be dependent on ATXN3 ubiquitylation [395]. Of notice, *Drosophila* does not possess an orthologue of ATXN3. This may explain the contradictory evidence, showing that ATXN3 does not serve as a neuroprotectant in other species.

Hubener and colleagues showed that co-expression of normal ATXN3 with the pathogenic version did not have a beneficial effect in a mouse model of MJD [396]. Also, overexpression of Wild type ATXN3 did not protect against MJD pathology in a rat model of MJD [284] nor in a *C. elegans* model of the disease [397].

#### *DNA repair*

A role for ATXN3 in DNA repair has also been suggested. Wang and collaborators found that ATXN3 interacts binds to important participants of the DNA repair pathway, the two human homologues of the yeast DNA repair protein RAD23, HHR23A and HHR23B [371].

#### **1.4.4.2 Regulation of Ataxin-3 DUB activity**

Due to its critical cellular function, DUBs are precisely regulated through diverse mechanisms. The cellular localization of ATXN3 is one of the mechanisms that might be influencing its function [376]. On the other hand, regulation of ATXN3 localization seems to be determined by post-translational modifications (PTMs) (Figure 4). Additionally, PTMs can enhance ATXN3 activity, as *in vitro* experiments reported low activity of ATXN3 in the absence of PTMS [355, 375].

Another factor influencing ATXN3 DUB activity is its interaction with other proteins (scaffolds or adaptors), important for DUB activation and the correct placement of substrate molecules relative to the catalytic site, thus compensating for the possible low affinity with certain substrates [376]. PTMs may also be important in regulating these interactions and thus, interfering with ATXN3 DUB activity.

Todi and co-workers demonstrated that ATXN3 monoubiquitylation increases its DUB activity [360]. Indeed, ubiquitylation of the residue K117 of the JD was sufficient to enhance ATXN3 DUB activity both *in vitro* and in cells [390] (Figure 4).

Several E3 ligases and proteasome shuttle proteins were reported to be involved in ATXN3 proteasome-mediated degradation, such as E4B/VCP, HIP/HSP70, E6-AP/HSP70 and Gp78 [398-401]. Direct binding to the 19S proteasome also seems to control ATXN3 degradation [402]. More recently, it was shown that this ubiquitination-independent degradation of ATXN3 is also regulated by protein interactions with the proteasome-associated proteins Rad23A/B, through an ubiquitin-binding site 2 (Ubs2) located in the N terminal domain of ATXN3 [403]. However, it remains unclear whether other protein quality control pathways may also be involved in the regulation of ATXN3 turnover. Interestingly, ATXN3 turnover may also be regulated by its own DUB activity [404].



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## Objectives

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In the last years several published works have contributed for our understanding of ATXN3 biochemical activity *in vitro* and in cells. Although the enzymatic activities described for this protein as a DUB suggest a role for ATXN3 in the UPS, the physiologic and cellular relevance of this activity has not been extensively characterized, specially in neurons, and the substrates of its action remain mostly unidentified.

The goal of this work was to define the functional relevance of ATXN3 and to identify new substrates of its DUB activity in neurons. We also explored the potential perturbation (gain or loss) of ATXN3 function by expansion of the polyQ tract at its C-terminus, and its contribution to human disease.

The specific aims of this work were:

**To characterize the phenotypic effects caused by absence of ATXN3 or overexpression of a catalytically inactive version of the protein:** morphology, proliferation, migration, cell death, differentiation, signaling pathways and gene expression (Chapter 2)

**To study the effects of ATXN3 absence on alternative splicing:** splicing of microtubule associated protein tau, global splicing patterns (Chapters 3, 4)

**To identify potential substrates of ATXN3 DUB activity in neurons:** characterization of the ubiquitome of neuronal cells lacking ATXN3 (Chapter 4)

**To define the relevance of candidate ATXN3 substrates for the disease process in cellular and mouse models of MJD:** cellular consequences of overexpression of mutant ATXN3 and link to MJD pathogenesis (Chapters 2, 3, 4)



## **Chapter 2**

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**Dominant negative effect of polyglutamine expansion perturbs  
normal function of ataxin-3 in neuronal cells**



# Dominant negative effect of polyglutamine expansion perturbs normal function of ataxin-3 in neuronal cells

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Received July 1, 2014; Revised August 7, 2014; Accepted August 14, 2014

**The physiological function of Ataxin-3 (ATXN3), a deubiquitylase (DUB) involved in Machado–Joseph Disease (MJD), remains elusive. In this study, we demonstrate that ATXN3 is required for neuronal differentiation and for normal cell morphology, cytoskeletal organization, proliferation and survival of SH-SY5Y and PC12 cells. This cellular phenotype is associated with increased proteasomal degradation of  $\alpha 5$  integrin subunit (ITGA5) and reduced activation of integrin signalling and is rescued by ITGA5 overexpression. Interestingly, silencing of ATXN3, overexpression of mutant versions of ATXN3 lacking catalytic activity or bearing an expanded polyglutamine (polyQ) tract led to partially overlapping phenotypes. *In vivo* analysis showed that both Atxn3 knockout and MJD transgenic mice had decreased levels of ITGA5 in the brain. Furthermore, abnormal morphology and reduced branching were observed both in cultured neurons expressing shRNA for ATXN3 and in those obtained from MJD mice. Our results show that ATXN3 rescues ITGA5 from proteasomal degradation in neurons and that polyQ expansion causes a partial loss of this cellular function, resulting in reduced integrin signalling and neuronal cytoskeleton modifications, which may be contributing to neurodegeneration.**

## INTRODUCTION

The importance of ubiquitin signalling in the nervous system is becoming increasingly recognized (1–3). Impairment of the ubiquitin-proteasome pathway (UPP) and mutations in some of its components have been linked to both neurodevelopmental and neurodegenerative disorders, the later including Alzheimer's, Parkinson's and Huntington's diseases (4–6). In the context of the nervous system, deubiquitylases (DUBs) are central players in the regulation of protein ubiquitylation in processes, such as (i) axon guidance and establishment of neuronal connectivity (7), (ii) dendritic and axon pruning (8,9), (iii) regulation of synaptic number and size (10,11), (iv) regulation of

synaptic plasticity (11) and (v) modulation of the postsynaptic structure (7,12).

Ataxin-3 (ATXN3) is a protein with DUB activity known to be mutated in Machado–Joseph Disease (MJD), an autosomal dominant neurodegenerative disorder caused by a polyglutamine (polyQ) tract expansion within the C-terminus of this protein (13). PolyQ expansions are thought to cause deleterious effects in neurons by conferring toxic properties to the proteins into which they are inserted (gain of function model) and by perturbing some of the biological activities of these proteins (partial loss of function model) (14–16).

Although the physiological role and substrates of ATXN3 are mostly unknown, functional analyses in different cell and animal

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models have shed some light on its biological functions. Evidence supports ATXN3 involvement in protein quality control pathways: (i) DUB activity conferred by cysteine 14 (C14) within the N-terminal Josephin-domain, which is essential for its protease activity (17–19); (ii) interaction with ubiquitin, polyubiquitin chains, ubiquitylated proteins (20–22) and proteasome subunits (21,23); (iii) interaction with the ubiquitin-like protein NEDD8 and deneddylase activity (24) and (iv) binding to and regulating the activity of VCP/p97, which is involved in shuttling substrates for proteasomal degradation (25,26) and binding to UBXLN-5, an adaptor of substrate binding to VCP (27). In addition to its involvement in the regulation of protein degradation, the numerous molecular partners of ATXN3 known to date suggest that it is involved in other cellular processes (28–31). Although mouse and nematode knockouts (KO) for this gene are viable and show no gross phenotype, our previous results showed that the absence of ataxin-3 in *Caenorhabditis elegans* affects the expression of several transcripts related to cell structure/motility (32) and that ataxin-3 regulates the degradation of integrin subunits such as  $\alpha 5$  integrin subunit (ITGA5), a molecular partner of ATXN3 (33). These regulatory functions were shown to be important for the cytoskeleton organization of different cell types (31,33).

Integrins are the major family of transmembrane cell surface receptors that mediate cell-to-cell and cell-to-extracellular matrix (ECM) interactions, regulating many cellular functions (34,35). Integrins are implicated in many aspects of neuronal development and function, such as proliferation, survival, adhesion, cytoskeletal organization, process outgrowth and synaptic function (36–40). Furthermore, cumulative evidence suggests that a disruption of the neuronal cytoskeleton network may be a common feature contributing to several neurodegenerative diseases (41,42). Data suggest that cytoskeletal deregulation initiates a cascade of intracellular events that may underlie the loss of synaptic connectivity, the decreased ability to transmit incoming axonal information and the cell death that is observed in these disorders (43–47).

In this work, we demonstrate that ATXN3 depletion deregulates ITGA5 levels through increased proteasomal degradation, which leads to decreased cell adhesion and disorganization of the neuronal cytoskeleton. Loss of function of ATXN3 also has a negative impact on neuronal differentiation and on the associated exit from the cell cycle, promoting continued proliferation. Our data also indicate that an expanded polyQ tract leads to a partial loss of the cellular function of ATXN3 that may be relevant to neurodegeneration.

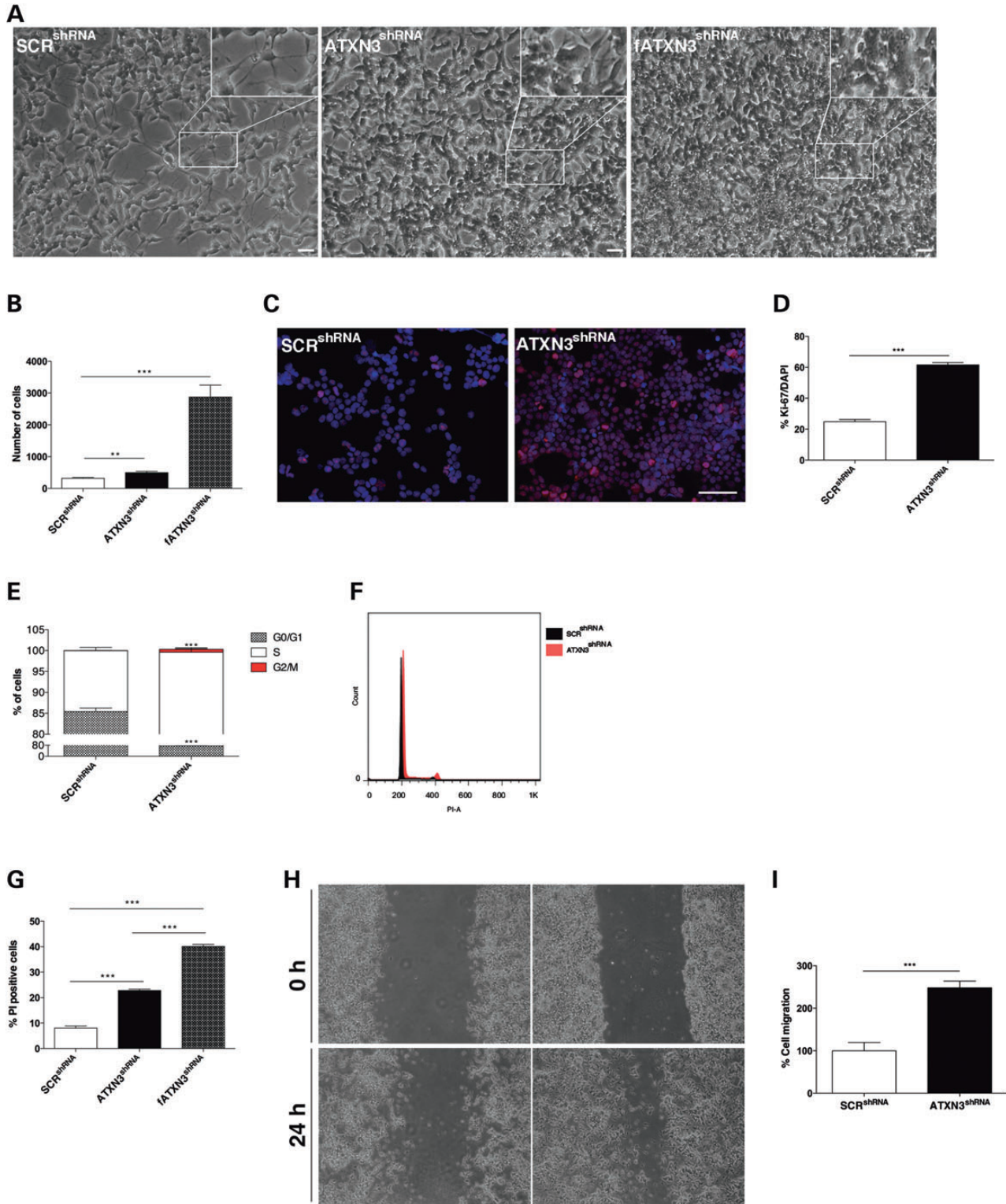
## RESULTS

### ATXN3 knock down results in altered morphology, proliferation, migration and cell death in differentiating SH-SY5Y cells

We evaluated the effects of ataxin-3 silencing in SH-SY5Y human neuroblastoma cells, widely used as a model for neuronal function and differentiation (1). After lentiviral infection and puromycin selection, we obtained monoclonal stable SH-SY5Y cell lines containing a shRNA sequence targeting *ATXN3* (*ATXN3<sup>shRNA</sup>*), the empty vector pLKO.1 (SH-SY5Y-pLKO.1) or a scrambled shRNA (*SCR<sup>shRNA</sup>*) sequence. A western blot analysis

of protein extracts confirmed that ATXN3 expression was markedly suppressed and almost undetectable in *ATXN3<sup>shRNA</sup>* clones when compared with SH-SY5Y-pLKO.1 and *SCR<sup>shRNA</sup>* controls (Supplementary Material, Fig. S1A and B). We confirmed by real-time quantitative reverse transcription polymerase chain reaction (qRT-PCR) that the shRNA sequence used for silencing ATXN3 did not interfere with similar mRNAs, as the expression levels of the transcripts encoding the ATXN3-like (*ATXN3L*) and Josephin-domain proteins (*JOSD1* and *JOSD2*) were not significantly different between *ATXN3<sup>shRNA</sup>* and *SCR<sup>shRNA</sup>* cells (Supplementary Material, Fig. S1C). ATXN3 depletion in non-differentiated SH-SY5Y cells had a mild impact on cell morphology (Supplementary Material, Fig. S2A) and statistically significant effect in migration (Supplementary Material, Fig. S2B); however, it did not affect cell cycle progression (Supplementary Material, Fig. S2C) or survival (Supplementary Material, Fig. S2E). Subsequently, we sought to analyze the effect of ATXN3 depletion on retinoic acid (RA)-differentiated SH-SY5Y cells. RA has previously been shown to induce differentiation and inhibit the cellular growth of cultured human SH-SY5Y cells (48). As shown in Figure 1A, after 7 days of RA-induced differentiation, *SCR<sup>shRNA</sup>* control cells exhibited branching neuritic networks with small rounded bodies and an inhibition of cell proliferation, whereas cells in which ATXN3 had been silenced displayed large, flat cell bodies with very few extensions. These striking morphological changes were observed in the different clonal cell lines and were evident in cells with only a few passages after silencing (*fATXN3<sup>shRNA</sup>*) as well as cells with long-term silencing of ATXN3, albeit in a more attenuated way in the latter. Such partial recovery in cell morphology might be explained by compensatory mechanisms, as has been observed in different ATXN3 KO animal models (32,49).

After RA treatment, there were significantly more *ATXN3<sup>shRNA</sup>* cells when compared with *SCR<sup>shRNA</sup>* control cultures ( $P = 0.0019$ ) (Fig. 1B). Consistent with a higher proliferation rate, *ATXN3<sup>shRNA</sup>* cultures showed an increased number of Ki-67-positive cells (61.57% versus 24.24% in control cells;  $P = 9.46 \times 10^{-6}$ ) (Fig. 1C and D). Accordingly, in comparison to the control *SCR<sup>shRNA</sup>* cells, the *ATXN3<sup>shRNA</sup>* cell population had a greater number of cells in S phase (24.4% compared with 14.5%;  $P = 0.0018$ ) (Fig. 1E and F). This higher cell proliferation was accompanied by an increased cell death in RA-treated *ATXN3<sup>shRNA</sup>* cultures as determined by flow cytometry analysis (22.8% versus 8.02% of PI-positive cells;  $P = 0.0001$ ) that was even higher in *fATXN3<sup>shRNA</sup>* cultures (40.1%;  $P = 5.60 \times 10^{-5}$ ) (Fig. 1G). Because it has previously been demonstrated that ataxin-3 interacts with and regulates the levels of integrins (33) and because adhesion to the substrate is key for cell migration, we analyzed collective cell movement using a wound healing assay (50). Cells were monitored for 24 h starting immediately after the initial wound. As shown in Figure 1H and I, *ATXN3<sup>shRNA</sup>* cells had partially recolonized the scratched area and exhibited a 50% increase in the cell migration rate when compared with *SCR<sup>shRNA</sup>* cells ( $P = 4.42 \times 10^{-7}$ ), which suggests that *ATXN3<sup>shRNA</sup>* cells did not adhere as well to the substrate. The same was observed in two other clonal cell lines with similar degrees of ATXN3 silencing. Interestingly, these effects of ATXN3 absence seem to be generalized to different neuronal cell types, as similar phenotypes were observed in



**Figure 1.** Characterization of a SH-SY5Y neuronal cell line stably silenced for ATXN3. (A) ATXN3<sup>shRNA</sup> cells were less elongated and showed thin cell extensions as compared with the SCR<sup>shRNA</sup> controls after RA treatment. This phenotype was more pronounced in fATXN3<sup>shRNA</sup> cells. Scale bar: 100 μm. (B) RA treatment did not inhibit proliferation of ATXN3<sup>shRNA</sup> cells. (C and D) Ki-67 staining (red) showed that RA did not inhibit proliferation of ATXN3<sup>shRNA</sup> cells. Nuclei were counterstained with DAPI (blue). Scale bar: 200 μm. (E and F) Flow cytometry analysis of the cell cycle showed an increase in the percentage of cells in S phase in ATXN3<sup>shRNA</sup> cultures. (G) Flow cytometry analysis using PI showed an increased cell death in ATXN3<sup>shRNA</sup> cultures, which was even higher in fATXN3<sup>shRNA</sup> cultures. (H and I) ATXN3 knockdown increased SH-SY5Y cell migration in a wound scratch assay. Bars represent migration rate expressed as a percentage of control and calculated as the proportion of the distance between the borderlines caused by scratching, to the distance that remained cell-free after 24 h.  $n \geq 3$  independent biological replicates in all experiments. \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

PC12 cells upon ATXN3 silencing (PC12\_ATXN3<sup>shRNA</sup>), in the context of nerve growth factor (NGF)-induced differentiation (Supplementary Material, Figs S1D–F and S6).

### ATXN3<sup>shRNA</sup> cells fail to progress towards a mature neuronal phenotype

RA treatment increases the synthesis of neuron-specific enzymes, neurotransmitters, neuropeptide hormones, growth factors and cell surface receptors and induces changes in cytoskeleton markers in SH-SY5Y cells (51). Because we observed that neuronal differentiation was impaired in ATXN3<sup>shRNA</sup> cells, we wanted to further characterize the differentiation status of these cells. For this, we evaluated several neuronal markers associated with RA-induced differentiation (52).

As expected, we observed increased mRNA levels for most of the neuronal markers in the SCR<sup>shRNA</sup> cells after RA treatment and decreased expression of nestin, a marker of undifferentiated cells (Fig. 2A). In contrast, the mRNA expression pattern in RA-treated ATXN3<sup>shRNA</sup> cells was consistent with immature stages of neuronal differentiation, with increased expression of nestin ( $P = 0.02$ ) and decreased expression of  $\beta$ III-tubulin ( $P = 0.0002$ ), laminin ( $P = 0.02$ ), synaptophysin ( $P = 0.01$ ), neurogenin ( $P = 0.03$ ), neuroD1 ( $P = 7.63 \times 10^{-5}$ ) and dopamine transporter (DAT) ( $P = 0.04$ ) (Fig. 2A). Consistently, decreased expression of some neuronal differentiation markers, including  $\beta$ III-tubulin ( $P = 0.01$ ), was also observed in NGF-treated PC12\_ATXN3<sup>shRNA</sup> cells (Supplementary Material, Fig. S6F). Immunocytochemistry confirmed that the percentage of  $\beta$ III-tubulin positive cells, a marker for mature neurons, was lower in ATXN3<sup>shRNA</sup> cultures (86.26% versus 97.26%) upon RA treatment and more significantly so in fATXN3<sup>shRNA</sup> cells (41.96%;  $P = 4.12 \times 10^{-8}$ ) (Fig. 2B and C). Additionally, the average neurite length was significantly reduced in RA-treated fATXN3<sup>shRNA</sup> cells ( $P = 1.18 \times 10^{-15}$ ) when compared with control cells (Fig. 2D), which is compatible with the immature filopodia phenotype observed in the absence of ATXN3.

These results indicate that ATXN3-deficient cells fail to progress towards a mature neural phenotype upon RA treatment. Nevertheless, we verified that these cells are able to respond to RA, as demonstrated by the induction of the RA-responsive tissue transglutaminase (*tTG*) gene (53) (Supplementary Material, Fig. S3A).

### ATXN3 depletion disrupts the actin cytoskeleton network in SH-SY5Y cells

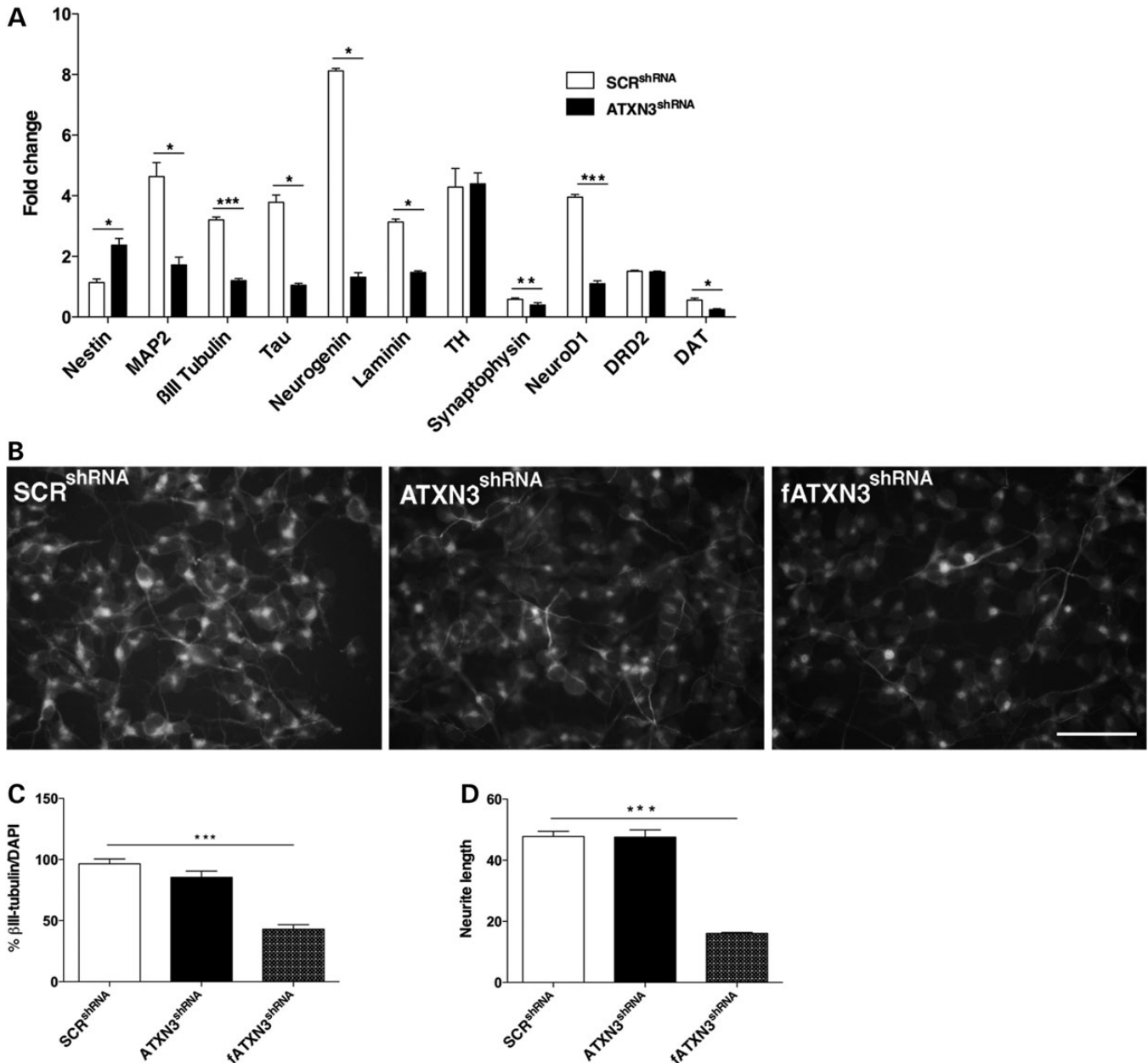
Neuronal development is highly dependent on controlled cytoskeleton dynamics and reorganization, and it has been shown that in several neurodegenerative diseases, this reorganization is defective (41,42). Phalloidin staining of actin polymers revealed the presence of disarranged actin filaments and aggregates in ATXN3<sup>shRNA</sup> and fATXN3<sup>shRNA</sup> cells (Fig. 3A) as well as in PC12\_ATXN3<sup>shRNA</sup> cells (Supplementary Material, Fig. S6G). Additionally, the ATXN3<sup>shRNA</sup> cells exhibited a higher number of small filopodia (microspikes) and the PC12\_ATXN3<sup>shRNA</sup> cells grew mostly in multilayers, which were not observed in the control cultures. These cytoplasmic projections are normally present in migrating cells and at

initial stages of neurogenesis (54). This finding further supports the hypothesis that in the absence of ATXN3, cells fail to properly complete differentiation and to establish mature neuronal processes. Very importantly, primary neurons with silenced ATXN3 expression also show a highly disrupted cytoskeleton network as compared with the scrambled controls, providing further evidence for the role of ataxin-3 in the regulation of the cytoskeleton (Fig. 3B).

### Absence of ATXN3 leads to downregulation of $\alpha 5$ integrin signalling

Integrins play an important role in mediating cell adhesion to the ECM proteins and activating signalling cascades that control cytoskeletal organization and cell motility (55,56). We have previously reported that ataxin-3 regulates the degradation of integrin subunits such as the ITGA5 (33). Accordingly, we observed that depletion of ATXN3 downregulates ITGA5 protein levels in SH-SY5Y ( $P = 0.001$ ) and PC12 ( $P = 0.0047$ ) cells induced to differentiate (with RA and NGF treatment, respectively) (Fig. 4A and B, Supplementary Material, Fig. S6H–J, respectively), but does not affect those of other integrin subunits, such as the  $\alpha 1$  integrin subunit (Supplementary Material, Fig. S4A). Because  $\alpha 5 \beta 1$  is the receptor for fibronectin (FN), which has been implicated in neuronal cell migration, adhesion, proliferation and differentiation both *in vitro* and *in vivo* (36), we next assessed the FN-binding capacity of ATXN3<sup>shRNA</sup> cells using a CultreCoat®Fibronectin 96 well adhesion assay (Ambio). As expected, the adhesion of ATXN3<sup>shRNA</sup> cells to FN was significantly reduced (89.5%;  $P = 0.004$ ) in relation to SCR<sup>shRNA</sup> controls (Fig. 4C). We subsequently assessed cell migration on an FN substrate. For this, we coated the plates with FN and performed the wound healing assay as described above. As shown in Figure 4D, RA-treated ATXN3<sup>shRNA</sup> cells had almost fully recolonized the scratched area with an 89% increase in the wound-healing rate when compared with the RA-treated SCR<sup>shRNA</sup> control cells ( $P = 0.0009$ ). Interestingly, this phenotype was specific for FN, because on laminin or poly-D-lysine substrates, no significant differences between cells with or without ATXN3 were observed (Supplementary Material, Fig. S4B). Additionally, it has been suggested that integrins modulate CDK5 activity, which in turn modulates the activity of the ERK and PI3K/AKT pathways (57) affecting neuronal development and survival (58). Immunoblotting analysis of RA-treated ATXN3<sup>shRNA</sup> cells showed a decreased expression of p35 ( $P = 5.94 \times 10^{-5}$ ), which is known to be associated with a decrease in CDK5 activity (Fig. 4E and F). The decrease in CDK5/p35 complex activity is associated with reduced phosphorylation-mediated activation of ERK1/2 ( $P = 0.001$ ), AKT ( $P = 0.005$ ) and PI3K ( $P = 0.012$ ) in ATXN3<sup>shRNA</sup> cells, with no alteration in the total levels of these proteins, and, with a downregulation of BCL2 ( $P = 0.007$ ) (Fig. 4E and F). BCL2 inhibits BAX and BAK apoptotic functions (59); therefore, decreased levels of BCL2 may contribute to the increased neuronal death observed in ATXN3<sup>shRNA</sup> cultures (Fig. 1G). Interestingly, the levels of nuclear CDK5 were also significantly reduced in ATXN3<sup>shRNA</sup> cells (Fig. 4E and F), which correlates well with the increased proliferation (Fig. 1C and D) observed upon RA treatment (60). Knowing that integrin cell signalling can modulate the activity of Rho and Rac1 GTPases (61), we next investigated if the



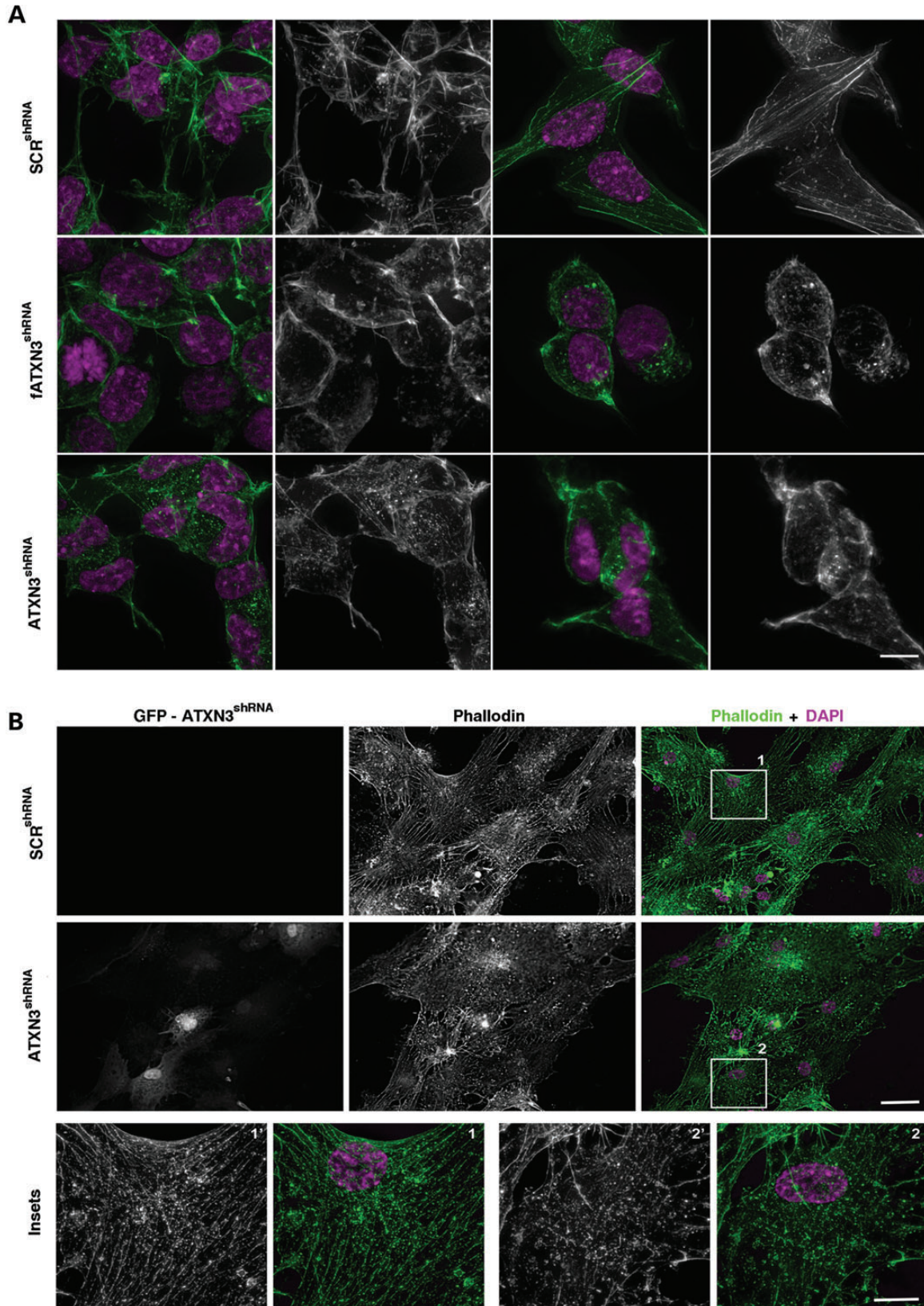


**Figure 2.** Impairment of the differentiation process in ATXN3<sup>shRNA</sup> cultures. (A) qRT-PCR analysis of the variation of neuronal markers after RA treatment showed that the mRNA level was not altered for *TH* and *DRD2*, was increased for nestin and decreased for the other markers analyzed in ATXN3<sup>shRNA</sup> cultures. Transcript levels were normalized to levels in undifferentiated cells and to the *HBMS* gene. (B and C) ATXN3<sup>shRNA</sup> cultures presented a decreased number of βIII-tubulin positive cells. (D) The average length of the neurites was reduced in fATXN3<sup>shRNA</sup> cells. This morphological alteration was attenuated after long-term silencing of ATXN3. \* $P < 0.05$ ;  $n \geq 3$  independent biological replicates in all experiments. \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

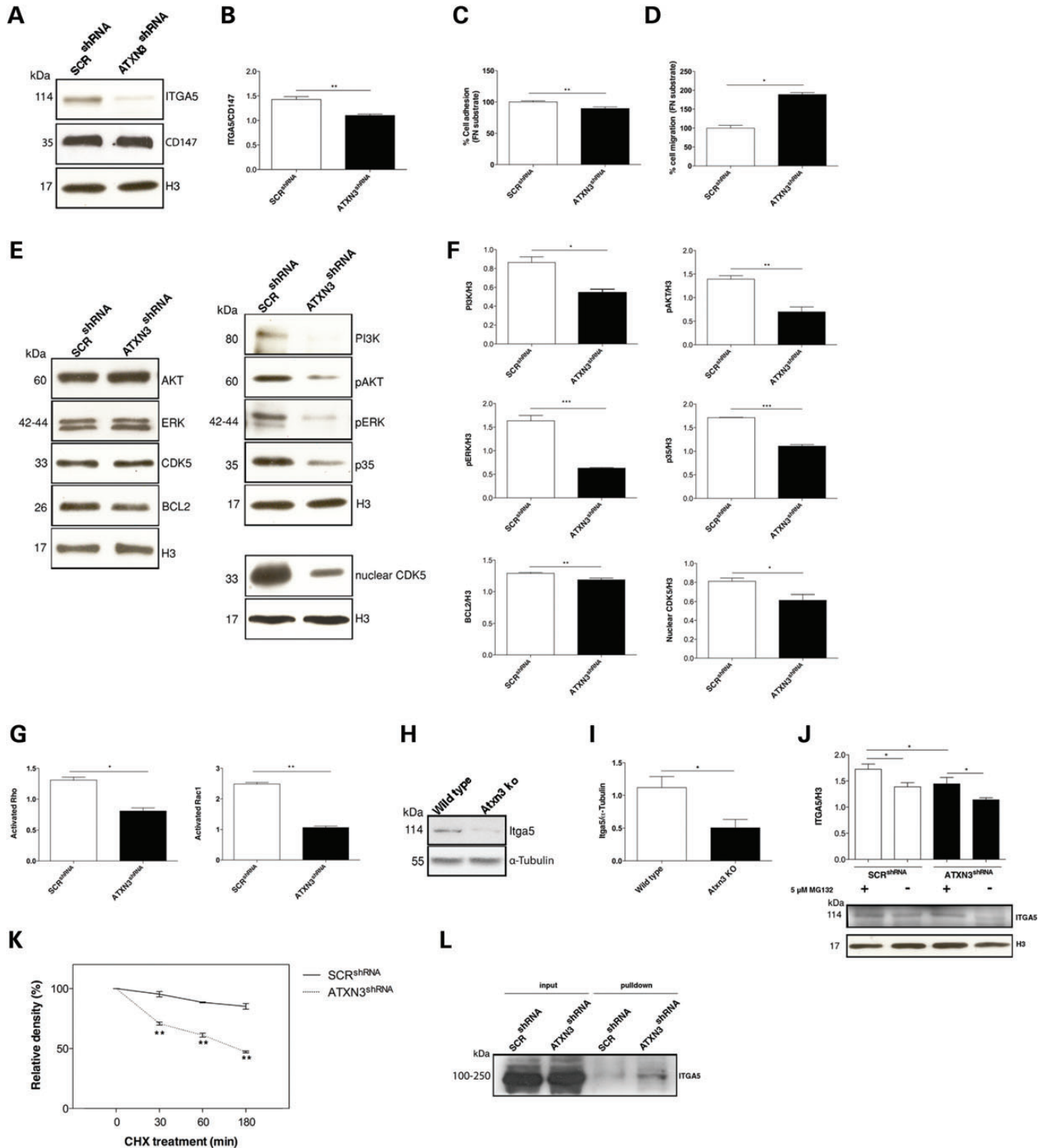
decreased levels of ITGA5 affected the activity of these regulatory proteins in neuronal cells lacking ATXN3. We found that the activities of both Rho and Rac1 proteins were significantly reduced in RA-treated ATXN3<sup>shRNA</sup> cells (Fig. 4G). To verify the relevance of our findings *in vivo*, we assessed the levels of Itga5 in the cerebellum of *Atxn3* KO mice (62), confirming that they were reduced as observed in the ATXN3 knockdown neuronal cell cultures (Fig. 4H and I).

Based on previous observations in non-neuronal cells (33) and considering that ATXN3 is a DUB enzyme, we hypothesized

that ATXN3 could modify ubiquitylation and regulate the degradation of ITGA5 through the UPP. To test this hypothesis, we assessed the levels of ITGA5 upon proteasome inhibition with 5 μM MG132 for 24 h in cultures treated with RA and found them to be significantly increased in ATXN3<sup>shRNA</sup> cells (Fig. 4J). Additionally, inhibition of protein synthesis by cycloheximide (CHX) treatment showed a decrease in ITGA5 half-life in these cells (Fig. 4K); this suggests that ATXN3 normally acts to inhibit ITGA5 degradation also in neurons. We found that inhibition of the proteasome with MG132 increased the levels of



**Figure 3.** ATXN3 depletion affects the actin cytoskeleton network in neuronal cells. **(A)** Phalloidin staining (green) showed unparallel actin filaments and abnormal filopodia in ATXN3<sup>shRNA</sup> cells. The right panel shows a detailed view of isolated cells. **(B)** Primary neurons silenced for ATXN3 (GFP positive cells) showed a disrupted network of actin filaments as assessed by phalloidin staining (green). The lower panel shows a detailed view of isolated cells. Nuclei were counterstained with DAPI (purple).  $n \geq 3$  independent biological replicates in all experiments. Scale bar is 5  $\mu$ m.



**Figure 4.** Decrease in adhesion proteins and decreased activation of regulatory molecules in ATXN3<sup>shRNA</sup> cells. (A and B) Western blot analysis showed a decrease of ITGA5 levels in ATXN3<sup>shRNA</sup> cells. (C) Depletion of ATXN3 leads to decreased FN responsiveness in SH-SY5Y cells. (D) ATXN3<sup>shRNA</sup> cells showed increased cell migration on a FN substrate. Bars represent migration rate relative to control cells and expressed as the proportion of the mean distance that remained cell free after 24 h. (E and F) Deregulation of the ERK and PI3K/AKT pathways, with decreased levels of p35, pERK1/2, pAKT and PI3K, and decreased levels of nuclear CDK5 in ATXN3<sup>shRNA</sup> cells. The results were normalized for H3 levels. (G) ATXN3<sup>shRNA</sup> cells showed significantly decreased levels of active Rac1 and Rho proteins. (H and I) Western blot analysis showed decreased levels of Itga5 in the cerebellum of Atxn3 KO mice. The results were normalized for  $\alpha$ -tubulin levels. (J) Levels of ITGA5 were increased upon treatment with 5  $\mu$ M MG132 for 24 h after induction of differentiation with RA for 7 days in ATXN3<sup>shRNA</sup> cells. (K) Relative amounts of ITGA5 in SCR<sup>shRNA</sup> and ATXN3<sup>shRNA</sup> cells at various cycloheximide treatment times. (L) Pull-down of polyubiquitylated proteins showed an increase in ubiquitylated forms of ITGA5 in ATXN3<sup>shRNA</sup> cells. The results were normalized for H3 or CD147 levels.  $n \geq 3$  independent biological replicates in all experiments. \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

ubiquitylated ITGA5 in ATXN3<sup>shRNA</sup> cells ( $P = 0.02$ ) (Fig. 4L). We confirmed that ATXN3 affects the steady-state levels of ITGA5 by acting at the protein level, as qRT-PCR analysis revealed no significant differences in *ITGA5* transcript levels between ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells (Supplementary Material, Fig. S3B). Together, these results suggest that excessive degradation of ITGA5 in ATXN3<sup>shRNA</sup> cells induced to differentiate caused defects in adhesion to FN substrates, deregulation of the ERK and PI3K/AKT pathways and a decrease in the activity of small GTPases Rho and Rac1, leading to abnormal cell morphology, motility, proliferation and differentiation.

### Restoring the levels of ITGA5 ameliorates the phenotype of ATXN3<sup>shRNA</sup> cells

To test if the ATXN3 depletion phenotype could be reverted by the normalization of ITGA5 levels, we overexpressed *ITGA5* in ATXN3<sup>shRNA</sup> cells (ATXN3<sup>shRNA</sup><sub>α5</sub>) and evaluated their phenotype upon RA treatment. We found that not only were the cellular morphology (Fig. 5A) and cytoskeletal organization (Fig. 5B) significantly restored but also the ATXN3<sup>shRNA</sup><sub>α5</sub> cells expressed normal levels of the majority of the neuronal markers tested (Fig. 5C). In addition, the migration rate (Fig. 5D) and cell cycle progression (Fig. 5E and F) were comparable to the SCR<sup>shRNA</sup><sub>α5</sub> control cells. Therefore, we conclude that most aspects of the phenotype observed in ATXN3-deficient cells were caused by the reduction in the ITGA5 levels.

### Interference with the DUB activity of ATXN3 leads to an abnormal neuronal phenotype that parallels the loss of expression of this protein

To clarify whether the regulation of ITGA5 levels by ATXN3 was dependent on its DUB activity, we generated a SH-SY5Y cell line that stably overexpressed a catalytically inert version of ATXN3 (Supplementary Material, Fig. S5A), obtained by mutating the catalytic cysteine residue (C14) (ATXN3\_C14A). Interestingly, cells expressing ATXN3\_C14A recapitulated many characteristics of ATXN3-deficient neurons: (i) a round, flat shape with very few and short extensions in comparison to the controls (Supplementary Material, Fig. S5B); (ii) a lack of proliferative inhibition after RA treatment as assessed by Ki-67 staining (62.97% Ki-67-positive cells in ATXN3\_C14A cultures versus 25.03% for the pEGFP controls;  $P = 1.10 \times 10^{-14}$ ) (Fig. 6A and B) and cell cycle analysis (74.9% in S phase versus 17.5%;  $P = 0.0018$ ) (Fig. 6C and D); (iii) an increased cell death (32.1% versus 10.9%;  $P = 0.002$ ) (Fig. 6E); (iv) a significant decrease in mRNA levels for several neuronal markers, indicating an immature differentiation status (Fig. 6F) and (v) misaligned actin with randomly distributed filaments (Fig. 6G). ATXN3\_C14A cells also showed decreased levels of ITGA5 ( $P = 0.0017$ ) and downstream targets of CDK5 (the expression of p35 protein was not detectable) (Fig. 6H and I). These results suggest that ATXN3 with the C14A mutation interferes with the function of normal (endogenous) ATXN3 through a dominant negative effect, provoking a more severe phenotype as compared with the silencing, probably due to the lack of the compensatory mechanisms. Importantly, as found in ATXN3<sup>shRNA</sup> cells (Fig. 4J), 5 μM

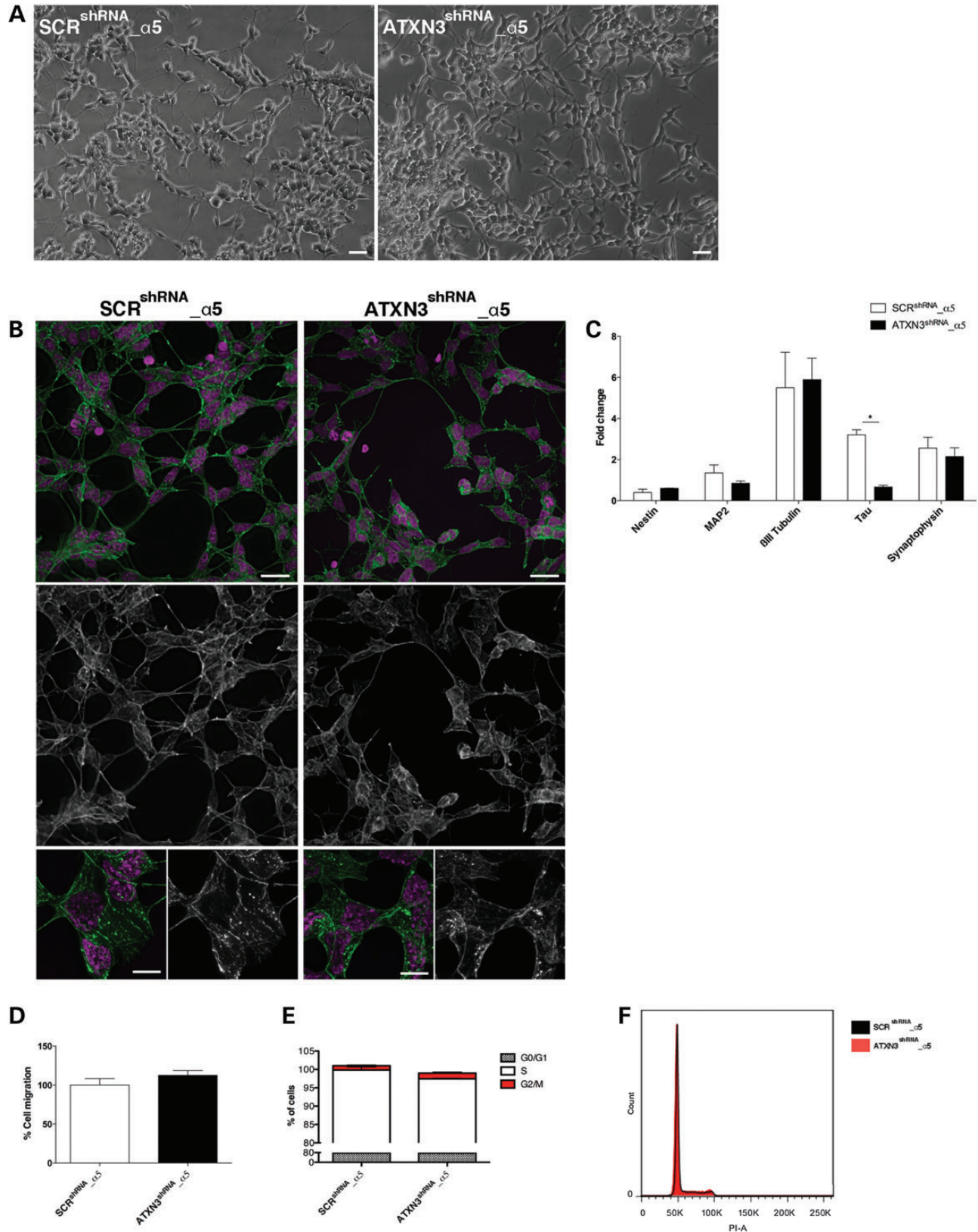
MG132 treatment for 24 h increased the levels of polyubiquitylated ITGA5 in ATXN3\_C14A cultures treated with RA (Fig. 6H and I), supporting the hypothesis that ITGA5 is a substrate of the DUB activity of ATXN3 in neurons.

### PolyQ expansion in ATXN3 causes a similar but milder neuronal phenotype than the absence of this protein

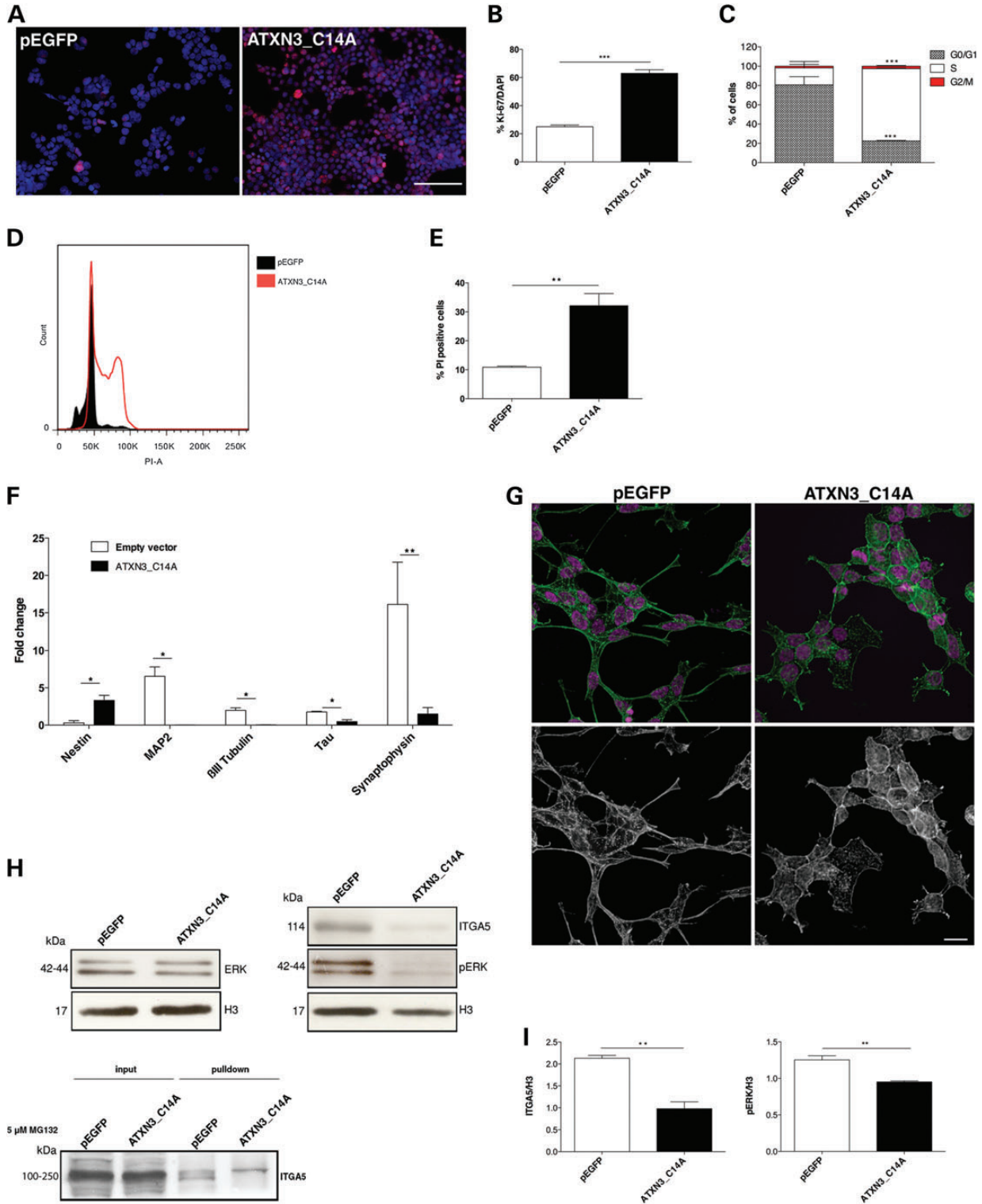
To determine whether the presence of an expanded polyQ tract within ATXN3 would lead to a gain or loss of function, we generated a SH-SY5Y cell line expressing an ATXN3 protein bearing 83 glutamines (ATXN3\_83Q) (Supplementary Material, Fig. S5A). We found that, although expression of the polyQ did not cause visible aggregation of the expanded ATXN3, it led to a similar but slightly milder neuronal phenotype than the one observed in cells lacking this protein. Upon RA treatment, the cells displayed: (i) an abnormal morphology without extensions (Supplementary Material, Fig. S5B); (ii) maintenance of their proliferative activity (64.39% Ki-67-positive cells;  $P = 1.03 \times 10^{-13}$ ) (Fig. 7A and B); an increased proportion of cells in the S phase (80.5% versus 17.5% for the pEGFP controls;  $P = 0.0008$ ) (Fig. 7C and D); (iii) increased cell death (25.4% versus 18.4% for ATXN3\_28Q;  $P = 0.009$  and 10.9% for the pEGFP controls;  $P = 1.43 \times 10^{-5}$ ) (Fig. 7E); (iv) reduced expression of several neuronal differentiation markers (Fig. 7F) and (v) disorganization of the actin cytoskeleton (Fig. 7G). ATXN3\_83Q cells also had reduced levels of ITGA5 ( $P = 0.01$ ) and decreased activation of its downstream targets (Fig. 7H and I). While overexpression to similar levels, i.e. 2.5-fold, of wild-type (WT) ATXN3 (with 28 glutamines) also caused some degree of perturbation in differentiation and cytoskeleton organization, the effects were much milder than those of ATXN3 loss of function or polyQ expansion (Fig. 7). Together, these results suggest that the dose of ATXN3 needs to be strictly balanced and that polyQ expansion perturbs the normal function of ATXN3 in neuronal cells.

### In vivo evidence for downregulation of α5 integrin signalling in the context of Machado–Joseph disease

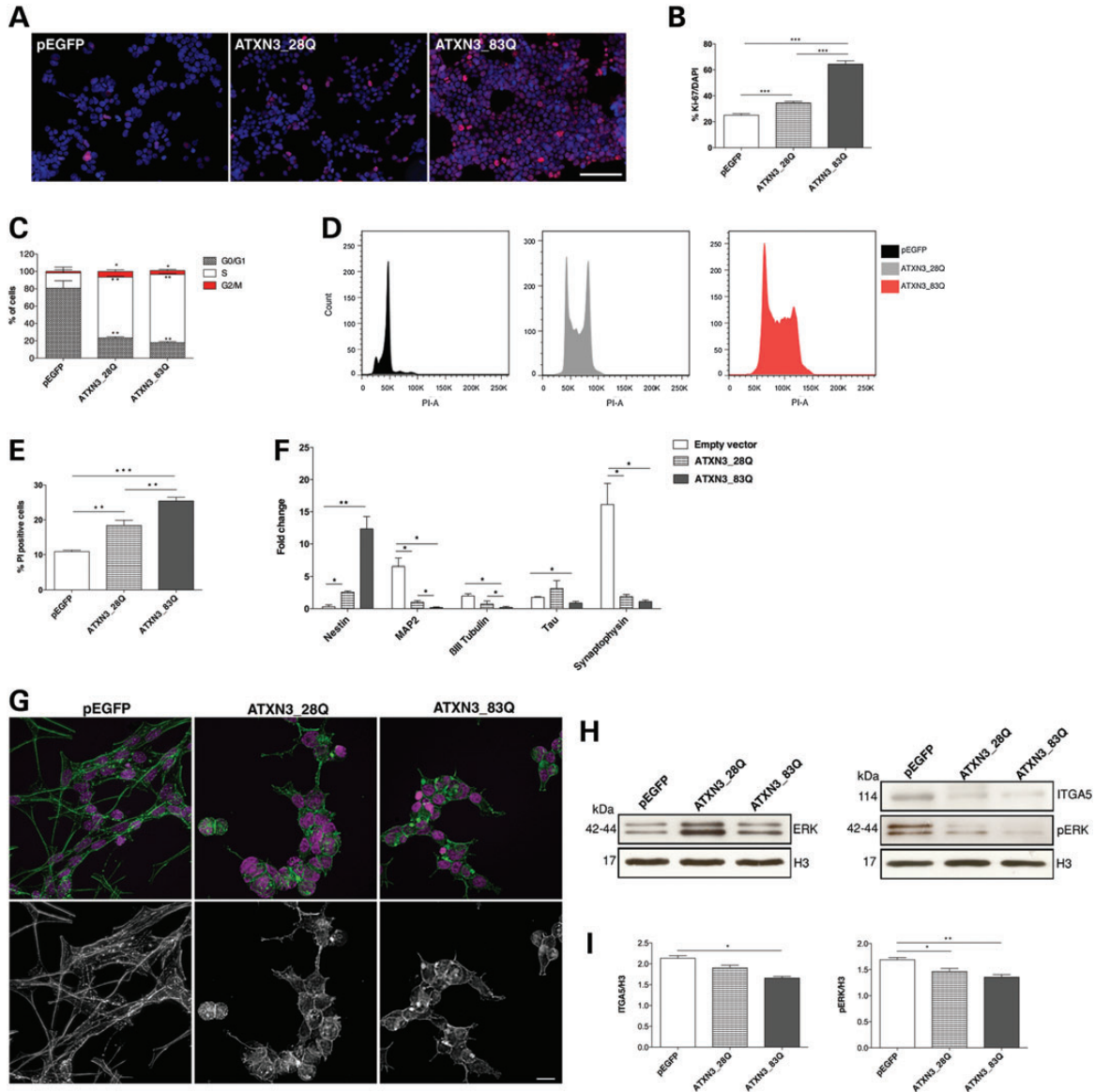
To investigate whether the partial loss of function of expanded ATXN3 could contribute to the pathogenesis of MJD, we analyzed the levels of *Itga5* in the nervous system of an MJD mouse model (CMVMJD135) generated in our lab, expressing an expanded human ATXN3 with 135 glutamines and mimicking the neurological and neuropathological phenotype of the human disease, as described elsewhere (63). As shown in Figure 8A and B, CMVMJD135 mice had significantly reduced levels of *Itga5* in the brainstem (an affected brain region) ( $P = 0.04$ ) and dorsal root ganglia (DRG) ( $P = 0.0019$ ). Considering the cytoskeletal disorganization and reduced branching phenotype observed in the absence of ATXN3, we analyzed neurons isolated from the DRGs of CMVMJD135 mice. We found a marked difference in the morphology of these neurons (Fig. 8C and D), with a drastic reduction in both the total ( $P = 1.4 \times 10^{-7}$ ) and mean ( $P = 1.6 \times 10^{-12}$ ) neurite length when compared with WT littermate controls (Fig. 8C and D). Additionally, the cell bodies of the DRGs from transgenic animals had a reduced diameter in comparison to those from WT controls ( $P = 3.63 \times 10^{-10}$ ) (Fig. 8C



**Figure 5.** The phenotype observed in ATXN3<sup>shRNA</sup> is dependent on α5 integrin subunit levels. (A) Overexpression of ITGA5 in ATXN3<sup>shRNA</sup> cells (ATXN3<sup>shRNA</sup><sub>α5</sub>) restored their cellular morphology upon RA treatment. Scale bar: 100 μm. (B) ATXN3<sup>shRNA</sup><sub>α5</sub> cells no longer presented detectable actin filament disorganization, as shown by phalloidin staining (green). Nuclei were counterstained with DAPI (purple). Upper panel scale bar: 20 μm. Lower panel scale bar: 5 μm. (C) mRNA levels of the neuronal markers analyzed by qRT-PCR in ATXN3<sup>shRNA</sup><sub>α5</sub> cells were normal and comparable to the SCR<sup>shRNA</sup><sub>α5</sub> control cells. mRNA levels were normalized to undifferentiated cells and *HMBS* gene. (D) Normalized ITGA5 levels abolished their increased migration of ATXN3<sup>shRNA</sup> cells in a wound scratch assay, 24 h after scratching. Bars represent migration rate expressed as a percentage of control and calculated as the proportion of the distance between the borderlines caused by scratching, to the distance that remained cell-free after 24 h. (E and F) Normal cell cycle in ATXN3<sup>shRNA</sup><sub>α5</sub> cells. *n* ≥ 3 independent biological replicates in all experiments. \**P* < 0.05.



**Figure 6.** Effects of ATXN3 silencing is likely related to its DUB activity. (A and B) RA treatment did not inhibit proliferation of ATXN3\_C14A cells, as assessed by Ki-67 labelling (red). Nuclei were counterstained with DAPI (blue). Scale bar: 200  $\mu$ m. (C and D) Flow cytometry analysis of the cell cycle showed an increase in S phase in ATXN3\_C14A cultures. (E) ATXN3\_C14A cultures presented high percentage of cell death as compared with the pEGFP controls, as assessed by PI staining followed by flow cytometry analysis. (F) ATXN3\_C14A cells presented increased expression of nestin and decreased mRNA levels of neuronal markers. mRNA levels were normalized to undifferentiated cells and *HMBS* gene expression. (G) Phalloidin staining (green) showed that actin filaments were disorganized and not parallel in ATXN3\_C14A cells. Nuclei were counterstained with DAPI (purple). Scale bar: 20  $\mu$ m. (H and I) Western blot analysis showed a decrease of ITGA5 levels and downstream targets of CDK5 in ATXN3\_C14A cells. The results were normalized for H3 levels.  $n \geq 3$  independent biological replicates in all experiments. \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .



**Figure 7.** Partial loss of function of expanded ATXN3. (A and B) Ki-67 staining (red) showed that ATXN3\_83Q cells kept their proliferative activity upon RA treatment. Nuclei were counterstained with DAPI (blue). Scale bar: 200  $\mu$ m. (C and D) ATXN3\_83Q cultures showed an increase in S phase of the cell cycle as assessed by flow cytometry analysis. (E) Increased cell death in ATXN3\_83Q cultures as assessed by flow cytometry analysis. (F) mRNA level of nestin was increased and expression of neuronal differentiation markers was significantly decreased in ATXN3\_83Q cells. mRNA levels were normalized to undifferentiated cells and *HMBS* gene expression. (G) Actin filaments network was severely affected in ATXN3\_83Q cells with unparallelled actin polymers, as shown by phalloidin staining. Nuclei were counterstained with DAPI (purple). Scale bar: 20  $\mu$ m. (H and I) Western blot analysis showed a decrease of ITGA5 levels and its downstream targets in ATXN3\_83Q cells. The results were normalized for H3 levels.  $n \geq 3$  independent biological replicates in all experiments. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

and D). This supports the hypothesis that a partial loss of function of ATXN3 due to the expansion of the polyQ tract may contribute to neuronal dysfunction in MJD.

## DISCUSSION

Given the significance of DUBs to nervous system function and homeostasis, we focussed here on characterization of the normal function of ATXN3 in neuronal cells. Stable depletion of ATXN3 in SH-SY5Y cells by lentiviral transduction of shRNA inhibited neuronal differentiation following exposure

to RA. ATXN3-depleted cells displayed a markedly abnormal morphology, becoming flat and with very few extensions, and showing an altered structure of the actin cytoskeleton. Furthermore, the proliferative activity of these cells was not inhibited by RA treatment, their motility was increased and cell survival was significantly reduced.

Although ATXN3 KO animals do not show an overt phenotype, including any neuronal differentiation abnormalities, which is likely due to compensatory mechanisms (32,49,62), the current findings concur with previous studies showing abnormal differentiation, adhesion and morphology in other, non-neuronal, cellular models of ATXN3 loss of function (31,33).

This is interesting, as cumulative evidence suggests that disruption of the neuronal cytoskeleton network may be a common feature contributing to neurodegeneration in several diseases, including polyQ disorders (41,64–66). In addition, ATXN3<sup>shRNA</sup> cultures showed reduced levels of many neuronal markers while maintaining expression of immature cell markers and a significantly decreased neurite length, which is compatible with an immature filopodia phenotype. Filopodia play an important role in cell migration, neurite outgrowth and wound healing, and their elongation depends on tightly regulated actin polymerization (54). Thus, disruption of the actin filament network impairs neurite elongation and ultimately cell differentiation, as we observed in ATXN3-deficient neuronal cells. Interestingly, when ATXN3<sup>shRNA</sup> cells were kept in culture for long, we observed a partial recovery of several effects seen with silencing of ATXN3, which might be explained by compensatory mechanisms similar to those occurring in ATXN3 KO animal models. This recovery was less evident in cells expressing the catalytically silent version of the protein. In the disease model (ATXN3\_83Q), the compensatory mechanisms also seem to be prevented by the presence of the expanded protein, which has a dominant negative effect.

Neuronal process outgrowth and maturation, as well as neuronal survival, are at least partially regulated by the integrin signalling pathway. We found that the phenotype observed in ATXN3<sup>shRNA</sup> cells was due to a decrease in the expression of ITGA5, associated with a decrease in the CDK5/p35 complex activity and, consequently, to a deregulation of the PI3K/AKT and ERK pathways. This had a negative impact on neurite outgrowth, cytoskeleton regulation, cell adhesion and motility and survival. CDK5 plays an important role in neuronal differentiation (60), morphogenesis (67), proliferation (68,69), survival, axon guidance, synaptic transmission, neurocytoskeletal dynamics and neuronal degeneration (70–75). It has been shown that inhibition of CDK5 either pharmacologically (with roscovitine) or by expression of a dominant negative form, causes a dramatic decrease in RA-induced cell differentiation (73). Moreover, Cdk5-deficient neurons are significantly arrested or delayed in their developmental program, both *in vitro* and *in vivo* (60), and homozygous Cdk5 KO mice mutants die *in utero* with neuronal migration deficits throughout the brain (70). Additionally, we observed decreased activation of small GTPases, both Rac1 and the Rho family, which are key actin cytoskeleton regulators, further compromising actin dynamics. Interestingly, a recent large-scale huntingtin–protein interaction study revealed that Rho family GTPases and actin remodelling play an important role in huntingtin function and Huntington's disease pathogenesis (76).

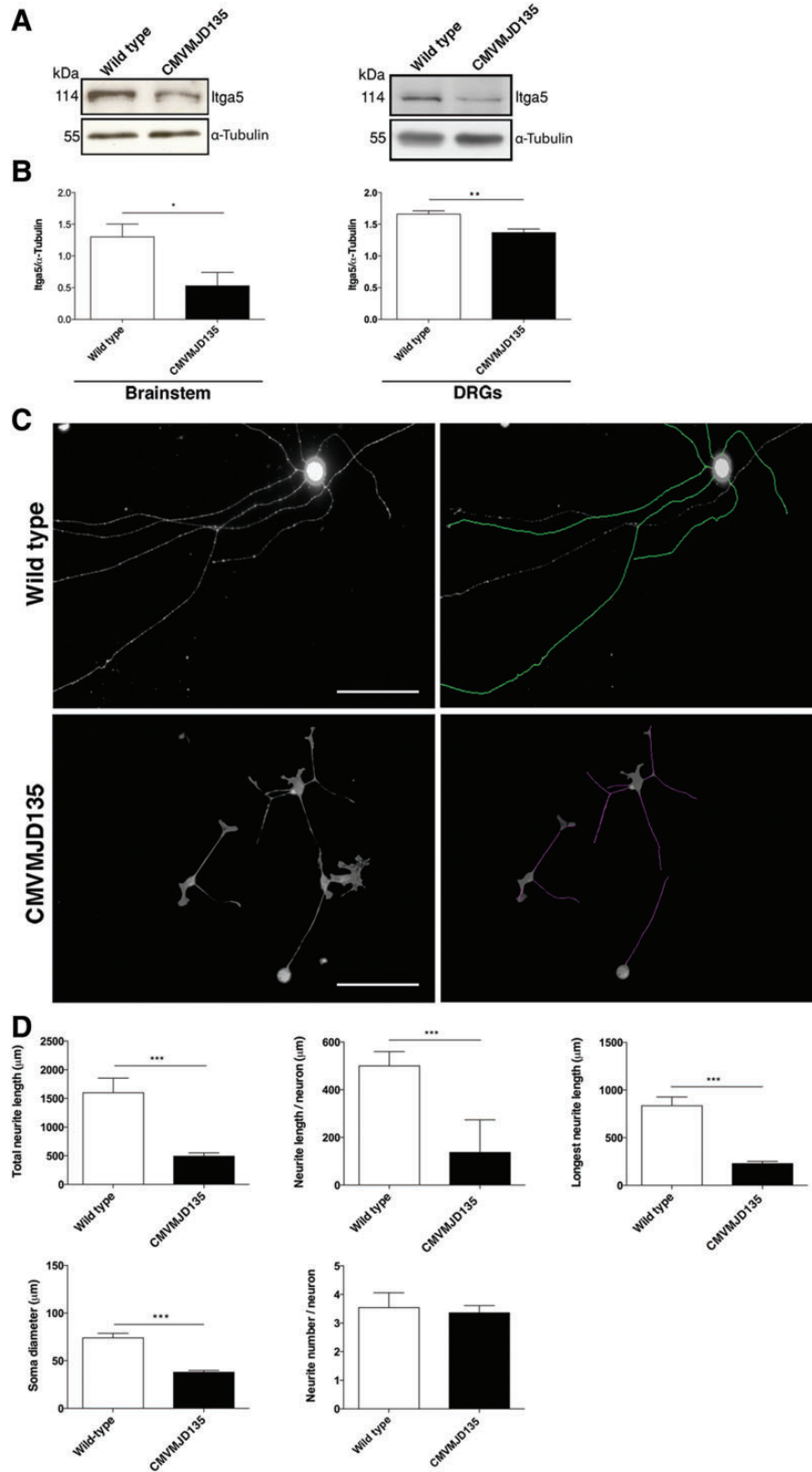
The fact that cells expressing the catalytically inactive ATXN3 also show a reduction of ITGA5 protein levels and that inhibition of the proteasome leads to an accumulation of polyubiquitylated ITGA5 species in both ATXN3<sup>shRNA</sup> and ATXN3\_C14A cells suggests that ITGA5 protein levels are regulated through the DUB activity of ATXN3 that defines the extent of ITGA5 degradation by the proteasome. This proposed mechanism is compatible with the previous finding that the ITGA5 is a molecular partner of ataxin-3 (33). Confirming the relevance of ATXN3 for regulation of ITGA5 *in vivo*, the levels of this protein were significantly reduced in the nervous system of Atxn3 KO mice.

To date, the type(s) of ubiquitylation of ITGA5 and the amino acid position of this modification are not known. However, comparing the cytoplasmic tails of all human  $\alpha$  integrins, Lobert and Stenmark observed that the first lysine residue was strictly conserved among human integrins and suggested that this might be the site at which ubiquitylation occurs (77). Although it has been described that ITGA5 may be degraded in lysosomes (78), there are also reports demonstrating that it is degraded by the proteasome through the action of the E3 ligase Cbl (33,79). Indeed, Kaabeche and colleagues showed that Cbl recruitment induced by FGFR2 activation triggers ITGA5 proteasomal degradation (79). These observations, together with the fact that FGFR2 expression is known to be upregulated by RA (80), lead us to propose a mechanism that may explain the phenotype of ATXN3<sup>shRNA</sup> cells upon RA treatment (Fig. 9). In this model, ATXN3 prevents the degradation of ITGA5 triggered by the RA-induced activation of FGFR2 (Fig. 9A). When ATXN3 is silenced, RA treatment causes ITGA5 degradation to an extent that leads to a deregulation of the CDK5, PI3K/AKT and ERK pathways and affects neuronal morphology and cell adhesion, proliferation, differentiation and survival (Fig. 9B). In agreement with this model, overexpression of a catalytically inactive form of ATXN3 led to similar morphological and biochemical changes and the same differentiation impairment as the silencing of ATXN3, suggesting that the regulation of ITGA5 levels in neurons is dependent on the DUB activity of ATXN3. Furthermore, the fact that proteasomal inhibition prevents the decrease of ITGA5 in ATXN3<sup>shRNA</sup> cells indicates that ATXN3 rescues ITGA5 from degradation by the proteasome. Importantly, restoring the levels of ITGA5 rescued most of the abnormal features of ATXN3<sup>shRNA</sup> cells.

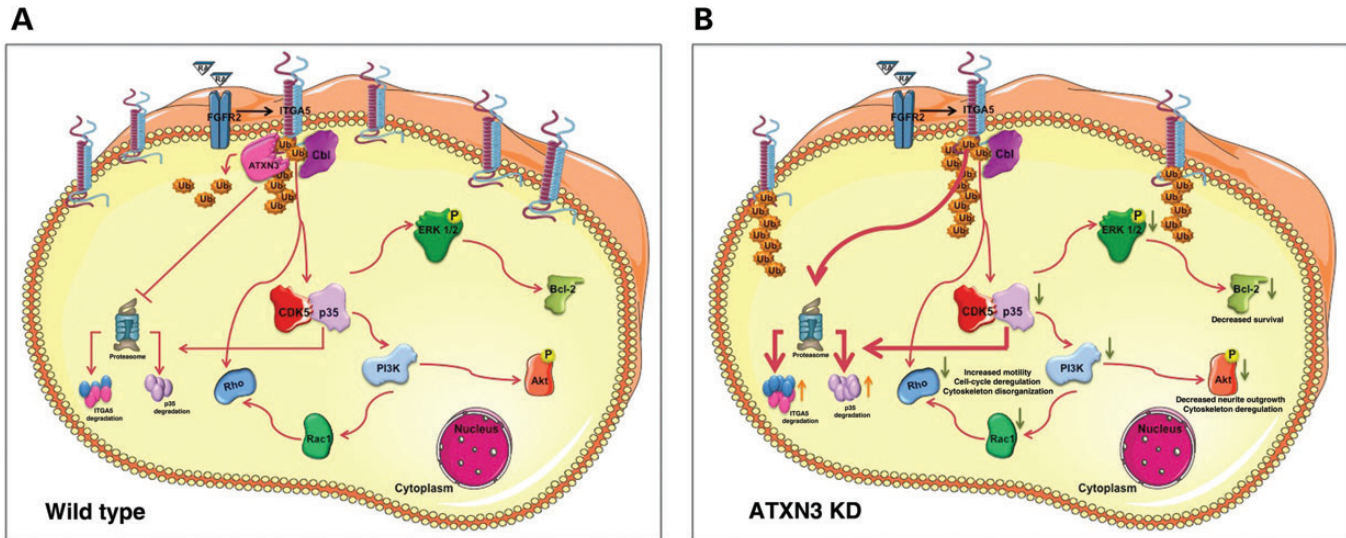
Given that this DUB is involved in the human neurodegenerative disease MJD, we conducted experiments to determine the relevance of this abnormal phenotype and impairment in neuronal differentiation to MJD pathogenesis. Interestingly, similar but milder alterations were found in cultures expressing expanded ATXN3, which suggests a partial loss of normal function of the protein in the presence of this type of mutation. Overexpression of the WT ATXN3 also caused some degree of toxicity, suggesting the importance of a tight regulation of ATXN3 expression levels, as has been described elsewhere (81–85).

Confirming the perturbation of ATXN3 normal function by polyQ expansion, we observed a downregulation of Itga5 in the brainstem and DRGs of CMVMJD135 transgenic mice. Cultures of DRG neurons from these animals showed that transgenic neurons were smaller and displayed a drastic decrease in the neurite length, as observed in neuronal cultures depleted for ATXN3. This finding suggests that the loss of this normal cellular function of ATXN3 might be relevant for the neurodegeneration caused by the polyQ tract. Although the *in vitro* assays performed so far suggest that the polyQ expansion does not significantly affect ATXN3 DUB activity (86), these assays were performed using artificial substrates that may not mirror the biological substrates of ATXN3, or the post-translational modifications, co-factors and key partners that may be lacking. Improved assays addressing DUB activity within a cellular environment based on specific substrates and/or addressing ATXN3 as part of multi-protein complexes would be important to adequately assess WT and mutant ATXN3 activity.





**Figure 8.** The polyQ expansion in ATXN3 affects the integrin signalling pathway. (A and B) Western blot analysis showed decreased levels of Itga5 in the nervous system of CMVMJD135 mice ( $n = 5$  animals/genotype). The results were normalized for  $\alpha$ -tubulin levels. (C and D) DRG neurons from CMVMJD135 mouse (two pools of three animals for each genotype) showed no differences in the number of neurites and decreased neurite length and soma diameter as compared with the WT controls. Neurite length was measured using NeuronJ software and Ferret's diameter was used to measure the soma ( $n = 50$  neurons/genotype). Scale bar:  $200 \mu\text{m}$ .  $n \geq 3$  independent biological replicates in all experiments. \* $P < 0.05$ ; \*\*\* $P < 0.001$ .



**Figure 9.** Model of  $\alpha 5$  integrin subunit modulation of the PI3K/AKT and ERK cascades to insure neuronal differentiation and survival. (A) In normal functioning neurons, ATXN3 is preventing degradation of ITGA5 triggered by the RA induced activation of FGFR2. (B) When ATXN3 is silenced, RA treatment causes ITGA5 degradation to an extent that leads to a deregulation of the PI3K/Akt and ERK pathways affecting neuronal morphology and cell adhesion and survival.

Overall, our data support the importance of ATXN3 in neuronal cells and the link between its biological function and MJD. Loss of function of ATXN3 in neuronal cells affects degradation of ITGA5 through its DUB activity, which affects many processes that are important for neuronal development and function, such as cell adhesion, differentiation, cytoskeleton organization and neurite length. PolyQ expansion imparts loss of this cellular function of ATXN3 in neurons, with effects on neuronal morphology and process extension, which chronically may contribute to neurodegeneration.

## MATERIALS AND METHODS

### Cell culture

**SH-SY5Y cell cultures:** human neuroblastoma SH-SY5Y cell line (ATCC, CRL-2266) was cultured in Dulbecco's modified eagle medium: nutrient mixture (DMEM)/F-12 (Invitrogen) supplemented with 10% (v/v) fetal bovine serum (FBS) (Biochrom), 2 mM GlutaMAX (Invitrogen), 100 U/ml penicillin, 100  $\mu$ g/ml streptomycin and 25 ng/ml puromycin (Sigma Aldrich). Medium was changed every 2 days. Differentiation was induced by 0.1  $\mu$ M all-trans-retinoic acid (Sigma Aldrich) in opti-MEM (Invitrogen) supplemented with 0.5% FBS. Medium was replaced every 2 days. **PC12 cell cultures:** rat PC12 cells were cultured in DMEM (Invitrogen) supplemented with 10% (v/v) FBS (Biochrom), 5% (v/v) horse serum (HS) (Biochrom), 2 mM GlutaMAX (Invitrogen), 100 U/ml penicillin, 100  $\mu$ g/ml streptomycin and 25 ng/ml puromycin (Sigma Aldrich). Medium was changed every 2 days. Differentiation was induced by 1  $\mu$ g/ml NGF (Invitrogen) in DMEM supplemented with 0.75% FBS and 0.75% HS. Medium was replaced every 2 days. **Primary cultures of dorsal root ganglion neurons:** for dorsal root ganglion (DRG) neuron culture, cells isolated from 8 weeks-old mice were plated in poly-D-lysine

(Sigma) and laminin (Sigma) pre-coated coverslips at a density of  $5 \times 10^3$  cells/ml in DMEM/F12 supplemented with 10% (v/v) FBS, 100 U/ml penicillin, 100  $\mu$ g/ml streptomycin, 50 ng/ml NGF (Millipore),  $1 \times$  B27 (Invitrogen) and 1.176 g/L L-glutamine (Invitrogen) for 72 h. **Primary cultures of hippocampal neurons:** hippocampal neuron cultures were prepared from P4 Wistar rats. Briefly, upon dissection, hippocampi were submitted to a trypsin-based enzymatic digestion followed by mechanical dissociation. Isolated cells were then plated on coverslips previously coated with poly-D-lysine (Sigma) at a density of 40 000 cells/cm<sup>2</sup> using Neurobasal A medium (Gibco) supplemented with 1 mM GlutaMAX (Gibco), 10 ng/ml bFGF (Gibco), 0.1 mg/ml kanamycin (Gibco) and  $1 \times$  B27 (Gibco) for 7 days. Cells were incubated in a humidified 37°C/95% air/5% CO<sub>2</sub> incubator.

### Vectors and lentivirus packaging

HEK293T packaging cells were plated at a density of  $3 \times 10^5$  cells/well in 6-well plates, cultured in opti-MEM supplemented with 10% FBS and transfected on the following day with the scrambled sequence vector (CAACAAGATGAAGAG CACCAA), the pLKO.1/shRNA-ATXN3 vector (CCGGCAG GGCTATTTCAGCTAAGTACTCGAGTACTTAGCTGAATA GCCCTGCTTTTT) or the empty vector pLKO-1 (TRC1; Open Biosystems) for virus production, following the RNAi Consortium High-Throughput Lentiviral production protocol (87). For overexpression the following plasmids were used: PPCB7/ITGA5 (Addgene plasmid 16 041), pEGFP/ATXN3\_28Q, pEGFP/ATXN3\_83Q and pEGFP/ATXN3\_C14A. Medium was changed in the next day and cells were cultured for 48 h. Conditioned medium was then collected and stored at  $-80^\circ\text{C}$ .

### Transduction of target cells

A total of  $2.5 \times 10^5$  SH-SY5Y or PC12 cells were seeded on a 6-well plate in complete DMEM/F-12 medium and transduced by the lentiviral vectors. Medium was changed 24 h after, and cells were incubated for 72 h. For selection of clones with stable shRNA expression, fresh complete DMEM/F-12 or DMEM medium containing 25  $\mu\text{g/ml}$  puromycin was added to the cells. During the selection period, medium was replaced by fresh medium containing puromycin every 2 days. After 5 days, cells that formed colonies were selected and sub-cultured in 96-well plates under puromycin selective pressure (2.5  $\mu\text{g/ml}$  puromycin) for subsequent expansion, with passaging every 3–5 days. The percentage of silencing of each clone was monitored by immunoblotting.

### High-throughput high-content functional imaging

SH-SY5Y cells were seeded at a density of  $4 \times 10^3$  cells/well in flat bottom 96-well plates previously coated with Matrigel (BD, Biosciences), and 10  $\mu\text{M}$  all-trans-retinoic acid (Sigma Aldrich) was added the day after plating in DMEM/F-12 with 1% FBS. After 5 days, cells were washed with DMEM/F-12 and incubated with 50 ng/ml BDNF (Peprotech) in DMEM/F-12 without serum for 3 days. Cells were then labelled for  $\beta$ III-tubulin (1:1000, R&D Systems), scanned at different locations of each well and the quantitative analysis of total number of cells, number of  $\beta$ III-tubulin positive cells and neurite length were automatically done using the automatic imaging system Thermo Scientific Cellomics® ArrayScan® VTI.

### Pulldown

RA-treated SH-SY5Y cells were washed in ice-cold PBS, incubated 5 min on ice in FISH buffer (50 mM Tris-HCl, pH 7.4, 2 mM  $\text{MgCl}_2$ , 10% glycerol, 1% NP-40, 100 mM NaCl and protease inhibitors cocktail) and centrifuged for 5 min, 21 000 g, at 4°C. Aliquots were taken from the supernatant to compare protein amounts. The supernatant was incubated with bacterially produced GST-PAK-CD or GST-RHOTEKIN-RBD fusion proteins bound to glutathione-coupled sepharose beads (GE Healthcare) at 4°C for 30 min. The beads and proteins bound to the fusion protein were washed three times in an excess of FISH buffer, eluted in Laemmli buffer and analyzed for bound Rho and Rac1 by immunoblotting. For the pulldown of polyubiquitylated proteins, RA-treated cells were lysed in lysis buffer (50 mM HEPES, pH 7.5, 0.15 M NaCl, 1 mM EDTA, 1% NP-40, 10% glycerol, 50  $\mu\text{M}$  PR-619 and protease inhibitors cocktail) and centrifuged for 10 min, 14 000 g, at 4°C, or treated with 5  $\mu\text{M}$  MG132 (Calbiochem) for 24 h prior to lysis. One milligram of the supernatant were incubated with 100  $\mu\text{l}$  of Agarose-TUBEs (Lifesensors) and incubated 1 h at 4°C. Beads were washed three times with TBS-T and bound proteins were eluted in Laemmli buffer.

### Protein synthesis inhibition and proteasome inhibition

RA-treated SH-SY5Y cells were incubated with 5  $\mu\text{M}$  CHX (Merck) during 30, 60 or 180 min. For proteasome inhibition,

RA-treated cells were incubated with 5  $\mu\text{M}$  MG132 (Calbiochem) for 24 h prior to lysis.

### Immunoblotting

RA-treated SH-SY5Y cells or NGF-treated PC12 cells were pelleted and frozen in liquid nitrogen. For cellular and brain tissue extracts, 50  $\mu\text{g}$  of total protein isolated in RIPA buffer [150 mM NaCl, 50 mM Tris-HCl, pH 7.6, 0.5% NP-40, 1 mM Phenylmethylsulfonyl fluoride, protease inhibitors (Roche)] were resolved in 10% SDS-PAGE gels and transferred to a nitrocellulose membrane (Bio-Rad). After incubation with the primary antibodies against ATXN3 (1H9, 1:2000, Millipore),  $\alpha$ 5 integrin (1:5000, Millipore), CDK5 (1:1000, Millipore), p35 (1:1000, cell signalling), pERK1/2 (1:2000, cell signalling), ERK1/2 (1:1000, cell signalling), PI3K (1:1000, cell signalling), pAKT (1:1000, cell signalling), AKT (1:3000, cell signalling), BCL2 (1:100, Abcam), pan-Rho (1:1500, Millipore) and Rac1 (1:2000, Millipore), overnight at 4°C, membranes were incubated with secondary antibodies for 1 h at room temperature (anti-rabbit or anti-mouse, 1:10 000, Bio-Rad). Antibody affinity was detected by chemiluminescence (Clarity kit, Bio-Rad). Histone H3 (1:7500, Millipore), MCT4 (1:500, Santa Cruz), CD147 (1:500, Santa Cruz) and  $\alpha$ -tubulin (1:500, DSHB) were assessed as loading controls.

### Flow cytometry

For propidium iodide (PI) staining, RA-treated SH-SY5Y cells or NGF-treated PC12 cells were collected and fixed using ice-cold 70% ethanol for 1 h on ice. Pelleted cells were washed with PBS and incubated with staining solution (0.1% Triton-X100, 20  $\mu\text{g/ml}$  PI solution, 250  $\mu\text{g/ml}$  RNase in PBS) for 1 h at 50°C. For cell cycle analysis, cells were starved for 6 h before RA treatment. Samples were washed with PBS and analyzed using a FACSCaliber2 flow cytometer (BD-Biosciences) with a 568-nm excitation laser. Signals from 30 000 cells/sample were captured in FL3 (>670 nm) at a flow rate of 1000 cells/s. Offline data were processed with the FlowJo (Tree Star) software and quantified with WinList software.

### Wound healing assay

SH-SY5Y cells were grown to confluent monolayers on 6-well plates. After RA treatment, monolayers were wounded by a pipette tip. This initial wounding and the movement of the cells in the scratch were photographically monitored using the Olympus IX-51 inverted microscope equipped with a TH4-200 camera for 24 h. This time window has been chosen because it is shorter than the doubling time reported for SH-SY5Y cell line (88). Eight different fields were considered for quantitative estimation of the distance between the borderlines and in each image five different equidistant points were measured. The migration rate was calculated as the distance between the borderlines caused by scratching (defined at 0 h) minus the width that remained cell-free after 24 h and expressed as a percentage of the control.

### Real-time quantitative reverse transcription polymerase chain reaction

One microgram of total RNA purified from RA-treated SH-SY5Y cells or NGF-treated PC12 cells was reverse transcribed using the One-step SuperScript kit (Bio-Rad). qRT-PCR reaction was performed using the Quantitec SYBR Green kit (Qiagen) and the primers previously described (52), in a CFX96 real-time PCR detection system (Bio-Rad). Gene expression was normalized to *HMBS* levels. The results are presented as fold change.

### Immunocytochemistry

Cells cultured on poly-D-lysine (Sigma Aldrich) and gelatin, Collagen (BD Biosciences) or Poly-D-lysine pre-coated glass coverslips (SH-SY5Y, PC12 or primary neurons, respectively) were fixed with 4% paraformaldehyde in PBS for 30 min at room temperature. Cells were permeabilized with 0.5% Triton X-100 in PBS for 5 min. Next, cells were incubated with 10% fetal calf serum blocking buffer for 1 h, followed by overnight incubation with primary antibody against Ki-67 (1:300, Millipore) or  $\beta$ III-tubulin (1:1000, R&D systems) at 4°C, or by incubation with phalloidin (1:500, Sigma Aldrich) for 45 min and counterstained with DAPI (1:2000, Sigma Aldrich) for 10 min at room temperature. Alexa Fluor 568 (A11004) conjugated antibody was used at 1:2000 (Molecular probes).

### Animals

The MJD mouse model (CMVMJD135) was generated as described (63). Wister Rats used for the primary cultures were purchased from Charles River, Spain. For the mouse primary cultures, two pools of three male animals for each genotype at approximately 2 months of age were used. Animals were sacrificed by decapitation and the DRGs were removed along the spinal cord. For the rat primary cultures, six P4 rats per experiment were used. Animals were sacrificed by decapitation and brains were dissected. All animal procedures were conducted in accordance with European regulations (European Union Directive 86/609/EEC) and approved by the joint Animal Ethics Committee of the Life and Health Sciences Research Institute, University of Minho. Health monitoring was performed according to FELASA guidelines (89). All animals were housed and maintained in a controlled environment at 22–24°C and 55% humidity, on 12 h light/dark cycles and fed with regular rodent's chow and tap water *ad libitum*. Animal facilities and the people directly involved in animal experiments (A.N.-C., S.D.-S. and A.S.-F.) were certified by the Portuguese regulatory entity—Direcção Geral de Alimentação e Veterinária. Animals were sacrificed by decapitation at 8 weeks of age. Their brains were immediately dissected and stored at –80°C.

### Microscopy

Image acquisition of fixed cells was carried out in a Zeiss Axio-Imager Z1 equipped with a AxioCam MR. Images represent maximum-intensity projections of all *Z* planes acquired with PLANAPO  $\times 40$  or  $\times 63$  objectives and following blind

deconvolution with a AutoquantX (Media Cybernetics). Adobe photoshop CS5 (adobe Systems) was used for image processing.

### Statistical analysis

Comparison between the different cell lines was performed using the *t*-test in the GraphPad prism version 5.0 software, assuming the homogeneity of the variances. For immunoblottings, the mean density and area of each band were measured using at least three experiments in TINA 2.0 software according to manufacturer's instructions. For qRT-PCR data, results were presented using the  $\Delta\Delta C_t$  method, as described before (90). A critical value for significance of two-tailed  $P < 0.05$  was used throughout the study.

### SUPPLEMENTARY MATERIAL

Supplementary Material is available at *HMG* online.

### ACKNOWLEDGEMENTS

We would like to thank Dr Shushant Jain for the help with generation of cell lines, Dr António Salgado for the help with the primary cultures and Dr Belém Marques for the support with the flow cytometry analysis.

*Conflict of Interest statement.* None declared.

### FUNDING

This work was supported by Fundação para a Ciência e Tecnologia and COMPETE through the project '(PTDC/SAU-GMG/101572/2008)' and by National Institutes of Health (NIH) '(R01NS038712)'. A.N.-C., S.D.-S and A.S.-F were supported by the FCT fellowships SFRH/BD/51059/2010, SFRH/BD/78388/2011 and SFRH/BPD/91562/2012, respectively.

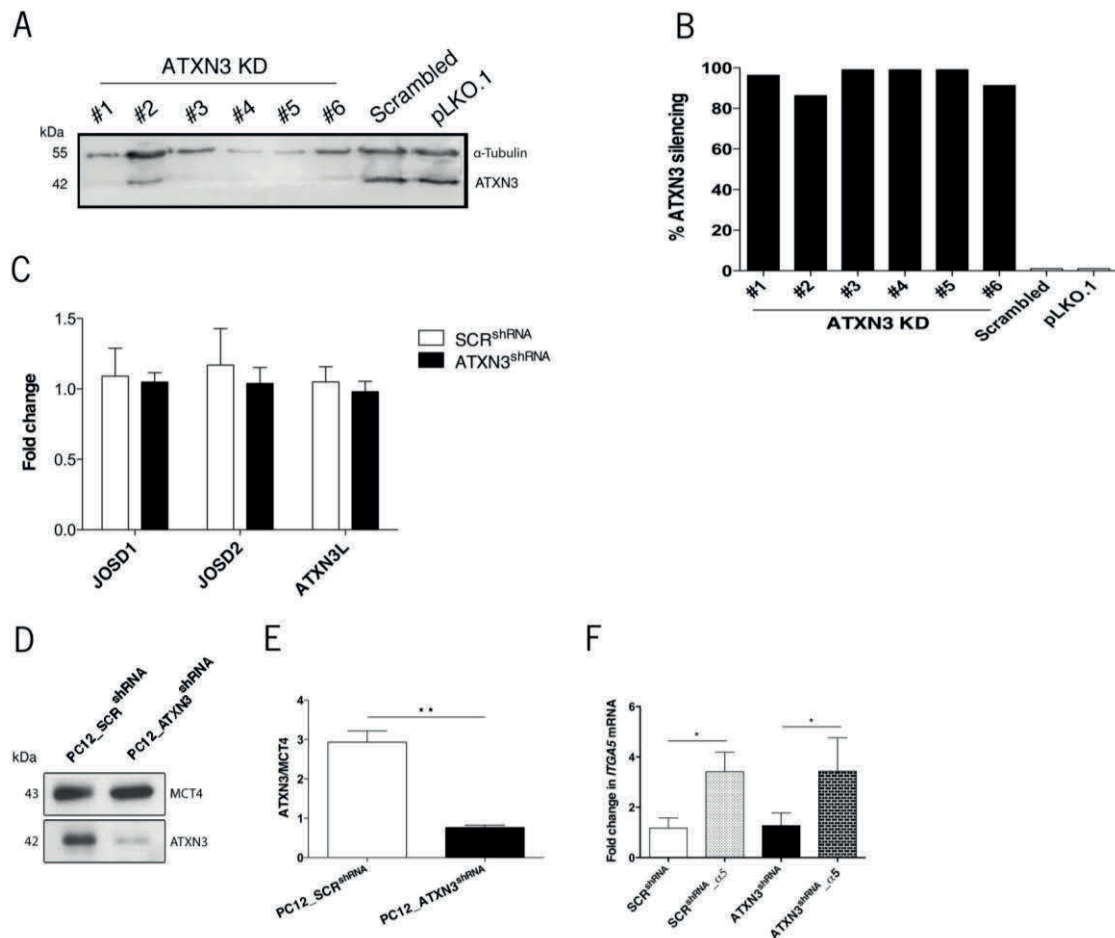
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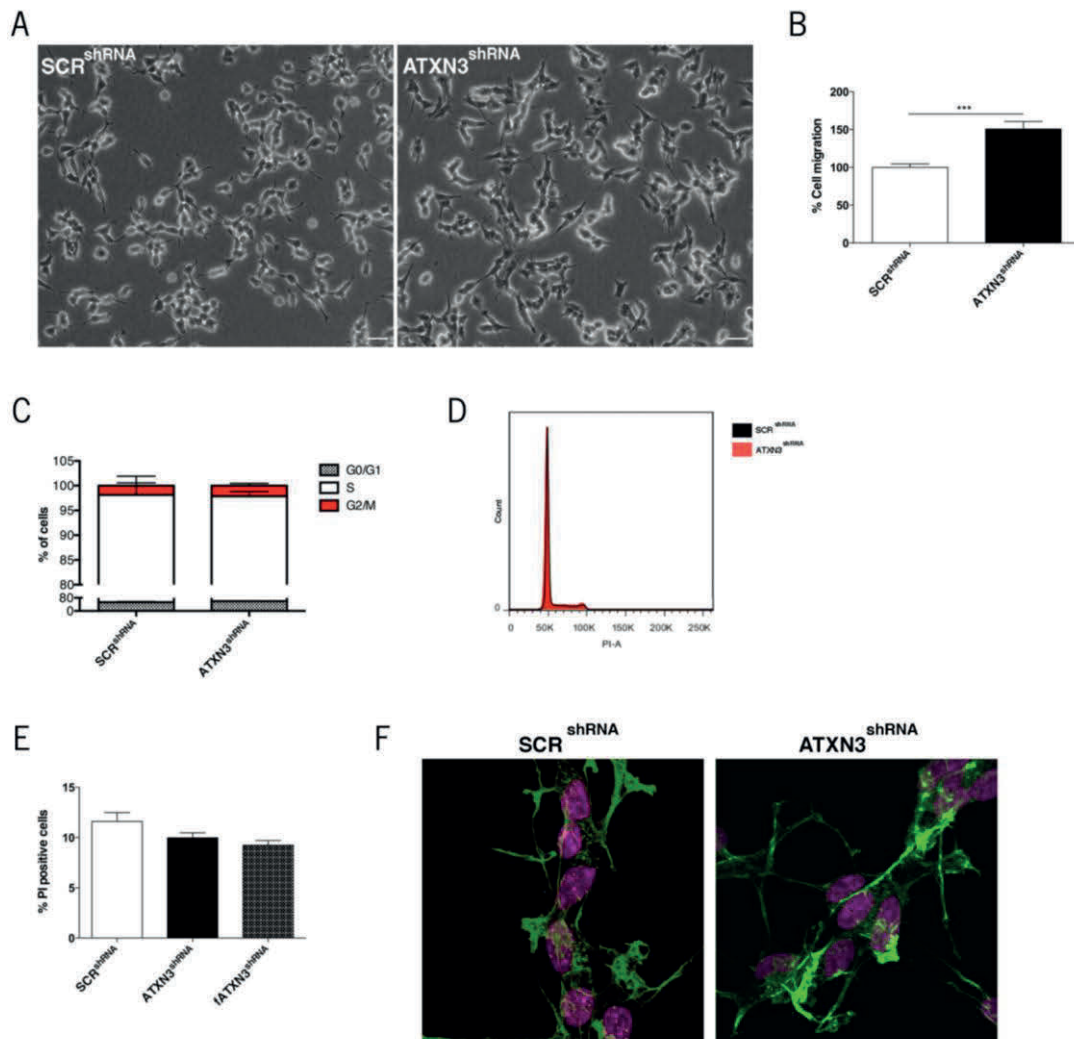
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## Supplementary Material

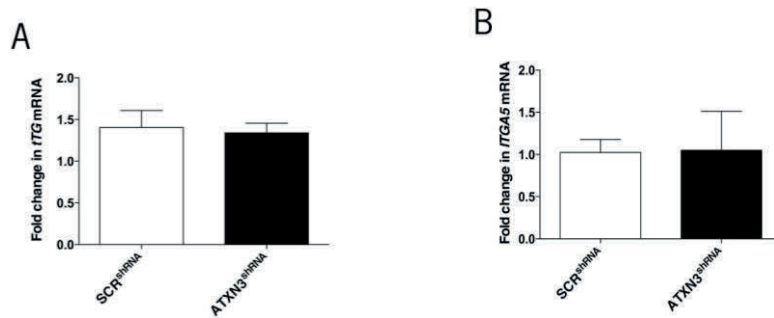


**Figure S1.** Establishment of a neuronal cell line with stably silenced ATXN3. (A, B) ATXN3<sup>shRNA</sup> cells showed a high decrease in ATXN3 expression, as compared to SCR<sup>shRNA</sup> and empty vector (pLKO.1) control cells. The ATXN3 level in the pLKO.1 cells expressing the empty vector was considered as 100% and  $\alpha$ -tubulin was used as a loading control. (C) qRT-PCR analysis showed that transcript levels of genes encoding ATXN3L and JOSD1 and JOSD2 proteins were similar between ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells. (D, E) PC12\_ATXN3<sup>shRNA</sup> cells showed a high decrease in ATXN3 levels, as compared to PC12\_SCR<sup>shRNA</sup> cells. The results were normalized for MCT4 levels. (F) Increased expression of *ITGA5* in both SCR<sup>shRNA</sup> and ATXN3<sup>shRNA</sup> cells overexpressing *ITGA5*. mRNA levels were normalized to *HBMS* gene. \* $p < 0.05$ .

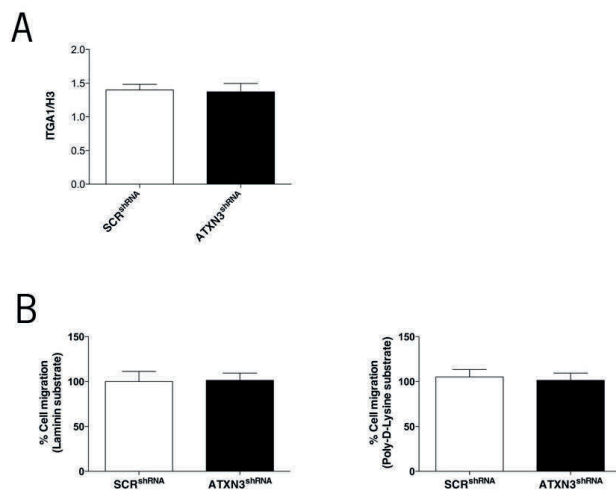


**Figure S2.** Survival and cell cycle progression are not altered in non-differentiated neuronal cells lacking ATXN3. (A) ATXN3<sup>shRNA</sup> cells were flattened as compared with the SCR<sup>shRNA</sup> cells. (B) ATXN3 knockdown increased SH-SY5Y cell migration in a wound scratch assay. Bars represent migration rate expressed as a percentage of control and calculated as the proportion of the mean distance that remained cell-free after 24 hours. (C, D) Flow cytometry analysis using PI showed no alterations of the cell cycle progression in ATXN3<sup>shRNA</sup> cells. (E) No effect on cell survival measured by propidium iodide (PI) incorporation caused by silencing of ATXN3. (F) Phalloidin staining (green) showed no major defects on the actin cytoskeleton in ATXN3<sup>shRNA</sup> cells as compared with the controls. Nuclei were counterstained with DAPI (purple). Scale bar: 20  $\mu$ m. \*\*\* $p$ <0.001.



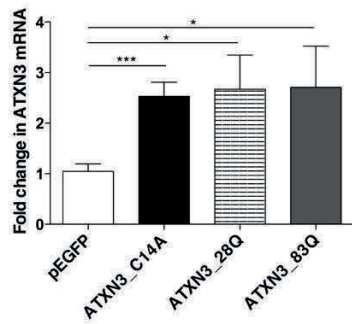


**Figure S3.** ATXN3 silencing does not affect expression of RA-responsive genes and does not alter the mRNA levels of several integrin subunits (A) Transcript levels of *tTG*, a RA-responsive gene, were not altered in ATXN3<sup>shRNA</sup> cells suggesting that these cells respond to RA treatment. (B) ATXN3 did not regulate the amounts of *ITGA5* in SH-SY5Y cells as measured by qRT-PCR. mRNA levels are normalized to *HBMS* gene.

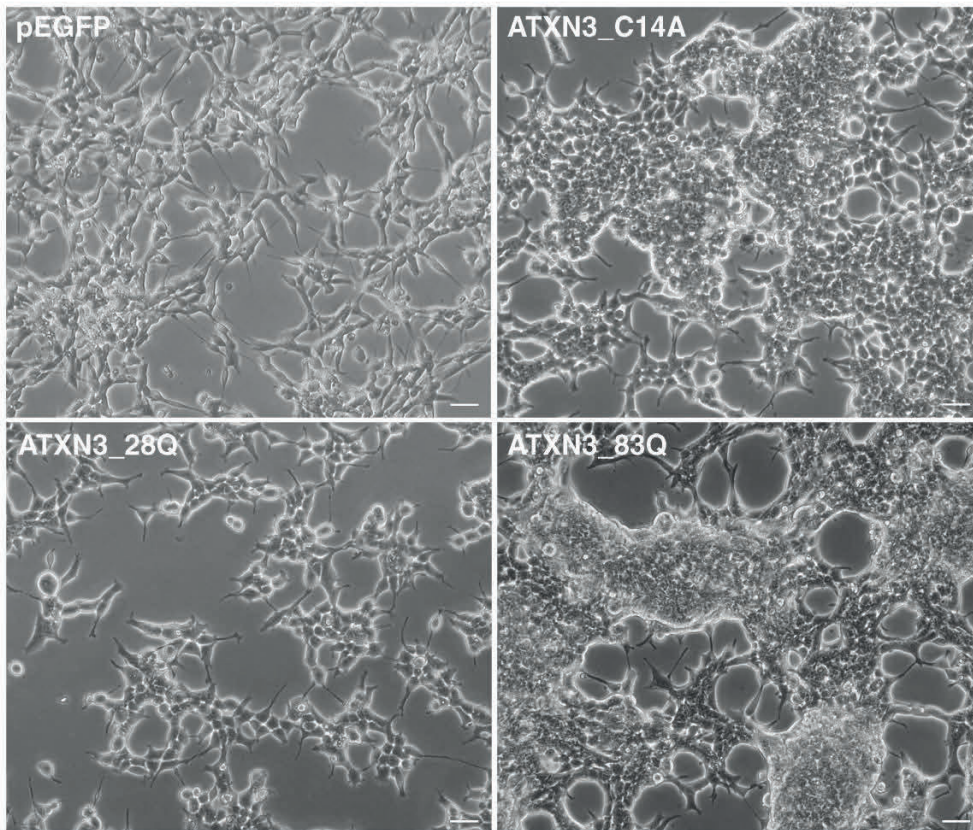


**Figure S4.** The phenotype of ATXN3<sup>shRNA</sup> cells is ITGA5-related. (A) Western blot analysis showed no differences in alpha-1 integrin levels comparing ATXN3<sup>shRNA</sup> and the SCR<sup>shRNA</sup> control cells. (B) Wound scratch assay showed no differences on migration comparing ATXN3<sup>shRNA</sup> and the SCR<sup>shRNA</sup> control cells, when using Laminin or Poly-D-Lysine coatings, 24 h after scratching.

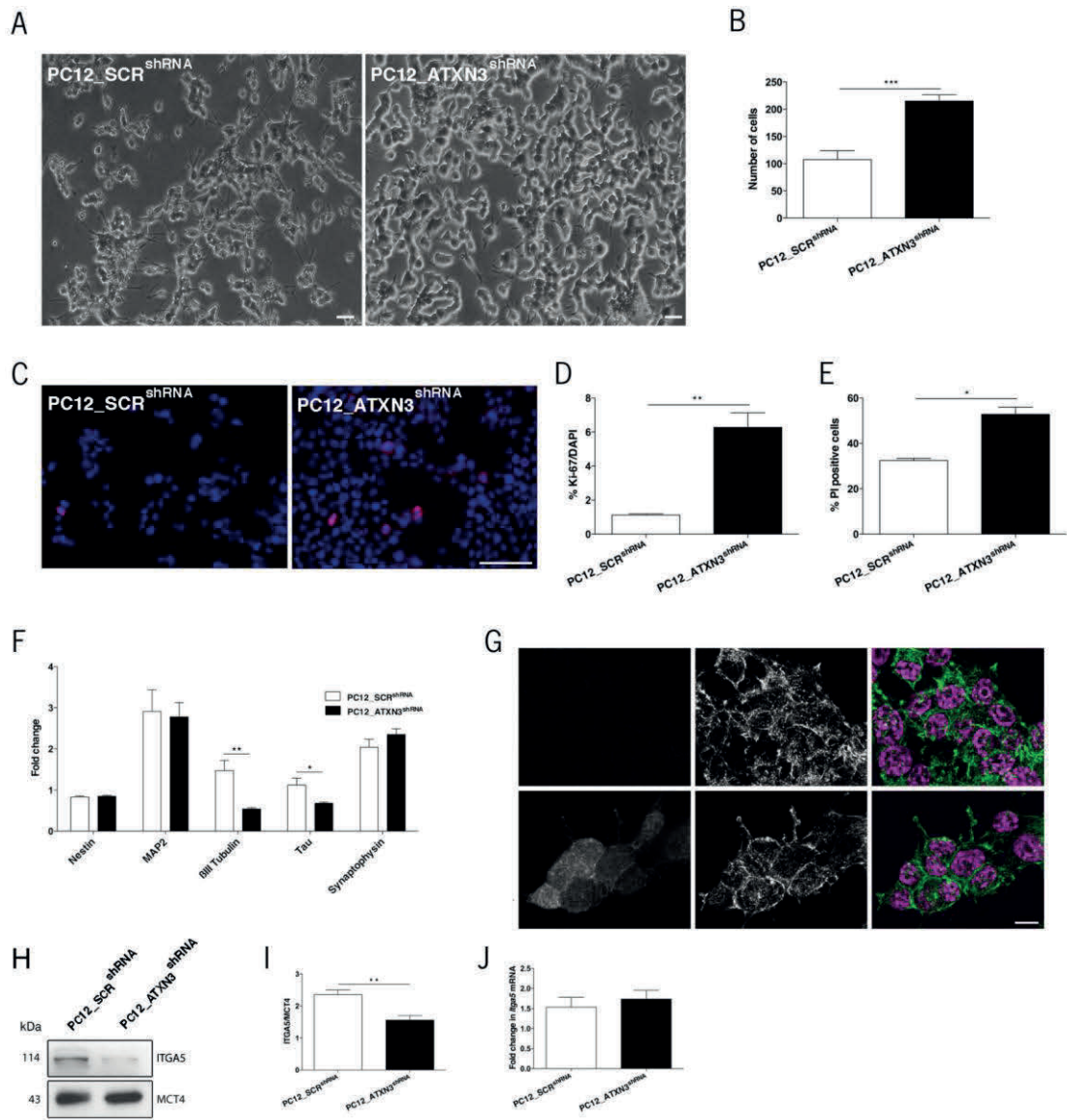
A



B



**Figure S5.** Overexpression of both catalytic and expanded mutant versions of ATXN3 results in an abnormal cell morphology. (A) Overexpression of Wild type (ATXN3\_28Q), catalytic mutant (ATXN3\_C14A) or expanded ATXN3 (ATXN3\_83Q) in SH-SY5Y cells. mRNA levels were normalized to *HMBS* gene. (B) Cells overexpressing catalytic mutant (ATXN3\_C14A) or expanded ATXN3 (ATXN3\_83Q) cells failed to acquire a neuron-like morphology as compared with their counterpart controls, after RA treatment. Scale bar: 100  $\mu$ m. \* $p$ <0.05, \*\*\* $p$ <0.001.



**Figure S6.** Characterization of a PC12 neuronal cell line with stably silenced ATXN3. (A) PC12\_ATXN3<sup>shRNA</sup> cells were less elongated and showed shorter extensions as compared with the PC12\_SCR<sup>shRNA</sup> control cells after NGF treatment. Scale bar: 100  $\mu$ m. NGF treatment did not inhibit proliferation of PC12\_ATXN3<sup>shRNA</sup> cells as seen by optical microscopy (B) and (C, D) Ki-67 staining (red). Nuclei were counterstained with DAPI (blue). Scale bar: 200  $\mu$ m. (E) Flow cytometry analysis using propidium iodide (PI) showed increased cell death in PC12\_ATXN3<sup>shRNA</sup> cultures. (F) qRT-PCR analysis of the variation of neuronal markers after NGF treatment showed that mRNA levels were decreased for  $\beta$ III-tubulin and Tau in PC12\_ATXN3<sup>shRNA</sup> cultures. Transcript levels were normalized to levels in undifferentiated cells and to *HMB5* gene expression. (G) Phalloidin staining (green) showed that the actin cytoskeleton was less spread than in control cells, with less extensions, and that actin filaments were disorganized and not parallel in PC12\_ATXN3<sup>shRNA</sup> cells. Nuclei were counterstained with DAPI (purple). Arrows mark evidences for higher adhesion in control cells and asterisks mark microspikes in PC12\_ATXN3<sup>shRNA</sup> cells. Scale bar: 20  $\mu$ m. (H, I) Western blot analysis showed a decrease of ITGA5 levels in PC12\_ATXN3<sup>shRNA</sup> cells. The results were normalized for MCT4 expression. (J) ATXN3 did not regulate the amounts of ITGA5 mRNA expression in PC12 cells, measured by qRT-PCR. mRNA levels were normalized to *HMB5* gene expression.



## **Chapter 3**

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**Perturbation of ATXN3 function leads to tau splicing deregulation  
and contributes to Machado-Joseph disease**



## **Perturbation of ATXN3 function leads to Tau splicing deregulation and contributes to Machado-Joseph disease**

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### **ABSTRACT**

The microtubule-binding protein tau is important for normal neuronal function in the nervous system. Alternative splicing of tau exon 10 originates tau isoforms including 3 or 4 microtubule-binding repeats – 3R or 4R tau. Disruption of the 4R/3R tau ratio has been suggested to contribute to several neurodegenerative disorders. Ataxin-3 (ATXN3) is a protein with deubiquitylating (DUB) activity, known to bind microtubules and to regulate cytoskeletal organization. Expansion of a polyglutamine tract in the C-terminus of ATXN3 causes Machado-Joseph Disease (MJD) (also known as Spinocerebellar ataxia type 3 – SCA3). Here we show that loss of function of ATXN3 leads to a deregulation of tau exon 10 splicing resulting in a decreased 4R/3R tau ratio, negatively impacting in neuronal morphology and differentiation. Additionally, we found that SFRS7 (9G8), a regulator of tau exon 10 splicing, physically interacts with ATXN3 and shows altered polyubiquitylation patterns in neuronal cells lacking this protein. The fact that similar alterations were found in the brain of a mouse model of MJD expressing mutant human ATXN3 with an expanded polyglutamine tract, suggests that this mechanism might be contributing for the pathogenesis of MJD, and establishes a link between two key proteins involved in different neurodegenerative disorders.

### **INTRODUCTION**

Tau proteins are microtubule-associated proteins (MAPs) predominantly expressed in neurons (Reviewed in [1]). Their major known biological function is the assembly and stabilization of microtubules, contributing to morphogenesis, cell division, axonal extension and axonal transport (Reviewed in [2]). Alternative splicing of the tau (*MAPT*) gene generates tau isoforms containing 3 or 4 microtubule binding repeats, 3R tau or 4R tau [3, 4], in a 1:1 ratio [5, 6]. Although approximately

equal levels of 3R tau and 4R tau are found in a normal human adult brain, their expression is developmentally controlled, suggesting that the regulation of tau isoforms is important during brain formation [5, 7]. Disruption of the 4R/3R tau isoform ratio has been associated with neurodegenerative diseases. For example, it was found that the splicing of tau exon 10 was disrupted in some individuals with Frontotemporal dementia with Parkinsonism linked to chromosome 17 (FTDP-17) carrying silent and intronic mutation in *tau* gene (Reviewed in [8]). More recently, it was also demonstrated that the HTT mutation leads to an increase of the 4R/3R tau isoform ratio, which seems to contribute for Huntington Disease (HD) pathogenesis [9]. In addition to FTDP-17 and HD, altered 4R/3R tau ratio was also reported in Alzheimer's disease (AD) brains, but the observations from different reports are contradictory; while some show an increase in 4R tau isoform, others report lower 4R/3R tau ratio values [10-14]. One possible explanation is that this ratio is differentially regulated in the different pathological conditions. Furthermore, exon 10 splicing is controlled by a complex set of splicing factors whose activity might be differentially affected in different diseases and/or by the Thus, the maintenance of this delicate balance appears to be critical for neuronal function (Reviewed in [11, 15-18]), and dependent on multiple etiological factors. The mechanism by which the 4R/3R tau ratio is disrupted in neurological diseases is still not completely understood. Alternative splicing of the *MAPT* gene has been shown to be regulated by enhancers and silencers as well as by trans factors and their phosphorylation [19-24], mostly belonging to two superfamilies – the SR (serine/arginine-rich)/SR-like and hnRNP (heterogeneous nuclear ribonucleoproteins) proteins (Reviewed in [25, 26]). One such protein, the SFRS7 (serine/arginine splicing factor 7), also known as 9G8 [27], is believed to participate in the regulation of tau exon 10 alternative splicing [28, 29], usually acting as a splicing activator, leading to tau exon 10 inclusion [30-32]. Thus, an alteration of SFRS7 expression or function may be critical for both the splicing regulation and the disease-causing potential of the tau proteins. Deubiquitinating (DUB) enzymes modify ubiquitin (Ub) chains removing Ub units, and play an important role in the modulation of the degradation of proteins by the proteasome (Reviewed in [33-35]) and in ubiquitin signaling in general. Ataxin-3 (ATXN3) is a protein with DUB activity, known to cause neurodegeneration in Machado-Joseph disease (MJD) [36], Interestingly, in addition to being involved in the ubiquitin-proteasome pathway (UPP) [37, 38], ATXN3 appears to play a role in the organization of the cytoskeleton network [39-41] has the ability to bind to microtubules and dynein [39, 40, 42], and seems to be involved in transcriptional regulation and DNA repair [43]. Additionally, our previous data suggested that SH-SY5Y cells lacking ATXN3 show decreased levels



of the adhesion protein  $\alpha 5$ -integrin (ITGA5), resulting in abnormal differentiation and decreased expression of several neuronal markers, including tau. Interestingly, overexpression of ITGA5 ameliorated the neuronal phenotype of these cells and normalized the expression of most of the differentiation markers, but it did not rescue the levels of TAU, suggesting that complementary mechanisms are in place.

In this work, we studied the effect of loss of function of ATXN3 on tau expression in neurons. We show that depletion of ATXN3 in SH-SY5Y cells led to a deregulation of tau exon 10 splicing which perturbs the 3R/4R tau ratio, a mechanism that seems to contribute for MJD pathogenesis.

## **MATERIALS AND METHODS**

### **Cell culture**

Human neuroblastoma SH-SY5Y cells (ATCC, CRL-2266) were transfected with a shRNA sequence targeting *ATXN3* or with a scrambled shRNA sequence as described before [41]. Stably infected cells were cultured in DMEM/F-12 (Invitrogen) supplemented with 10% (v/v) Fetal Bovine Serum (Biochrom), 2mM glutaMAX (Invitrogen), 100 U/mL penicillin, 100  $\mu$ g/mL streptomycin and 25 ng/mL puromycin (Sigma Aldrich). Cells were maintained in a humidified 37°C/95%-air/5%-CO<sub>2</sub> incubator. The medium was replaced every two days. Differentiation was induced by 0.1  $\mu$ M all-trans-retinoic acid (RA) (Sigma Aldrich) in opti-MEM (Invitrogen) supplemented with 0.5% FBS for 7 days. The medium was changed every two days.

### **Vectors and lentivirus packaging**

The packaging cell line (HEK293T) was plated at a density of  $3 \times 10^5$  cells per well in 6-well plates, cultured in opti-MEM supplemented with 10% FBS, and transfected on the following day with the pEYFP-N1\_3R1N vector, the pEYFP-N1\_4RN1 vector or the empty vector pEGFP for virus production, following the RNAi Consortium High-Throughput Lentiviral production protocol [44]. The medium was changed the next day and cells were cultured for 48 h. The conditioned medium, containing the viruses, was then collected and stored at -80°C.

### **Transduction of target cells**

SH-SY5Y cells with stably silenced ATXN3 expression (ATXN3<sup>shRNA</sup>) and the scrambled shRNA controls (SCR<sup>shRNA</sup>) [41] were cultured at a density of  $2.5 \times 10^5$  on a 6-well plate with 2 mL of complete DMEM/F-12 medium and transduced with the lentiviral vectors. The medium was changed 24h after, and cells were incubated for 72h. Expression of the constructs was evaluated by fluorescence microscopy (GFP expression) and qRT-PCR. The transduced cell lines were cultured in complete DMEM/F-12 medium containing 2.5  $\mu\text{g}/\text{mL}$  puromycin, passaging every 3-5 days.

### **RT<sup>2</sup> PROFILER™ PCR array analysis of human cytoskeleton regulators**

The mRNA expression level of 84 key genes related to the intracellular scaffolding's biogenesis, organization, polymerization and depolymerization, of 5 housekeeping genes and of controls for DNA contamination, reverse transcription and PCR efficiency, were determined simultaneously using Superarray technology (SABiosciences™). For this experiment,  $5 \times 10^4$  RA-treated SH-SY5Y cells were collected by trypsinization, immediately frozen in liquid nitrogen and stored at  $-80^\circ\text{C}$ . The RNA extraction was done using the RNasy® micro kit (Qiagen) following the manufacturer's instructions. RNA samples were suspended in RNase-free water and RNA quality was monitored using the Experion™ Automated electrophoresis System (BioRad). 1  $\mu\text{g}$  of total RNA was first converted into first-strand cDNA using the RT<sup>2</sup> First strand kit (SABiosciences™) and the RT-qPCR reaction was performed using the RT<sup>2</sup> SYBR Green Mastermix (SABiosciences™), following the manufacturer's guidelines. A total of 3 arrays per condition was hybridized.

### **Pulldown of polyubiquitylated proteins**

RA-treated ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells were lysed by sonication on ice in lysis buffer (50 mM Tris-HCl pH 7.5, 0.15 M NaCl, 1mM EDTA, 1% NP-40, 10% Glycerol, protease inhibitors (Roche) and 50  $\mu\text{M}$  UB/UBI protease inhibitor PR-619 (LifeSensors)). After lysis, 2 mg of total protein extract were incubated with 50  $\mu\text{L}$  of pre-equilibrated Agarose-TUBEs 2 (LifeSensors), overnight at  $4^\circ\text{C}$  on a rocking platform. Sedimented beads were washed 3 times with washing buffer (20 mM Tris pH 8.0, 0.15 M NaCl, 0.1% Tween-20) before being eluted with 1x Laemmli buffer (62,5mM Tris-HCl pH 6.8, 10% glycerol, 2% SDS, Bromophenol Blue). Eluted proteins were immediately boiled at  $98^\circ\text{C}$  for 15min and separated/analyzed in a 10% SDS-PAGE gel.

**Cell fractionation**

RA-treated pelleted cells were resuspended in iced cold RSB buffer (10 mM Tris-HCl pH 7.4, 10 M NaCl) and incubated on ice for 3 min. After centrifugation for 5 min, 4000 rpm at 4°C, the pellet was resuspended in RSBG40 buffer (10 mM Tris-HCl pH 7.4, 10 mM NaCl, 3 mM MgCl<sub>2</sub>, 10% glycerol, 0,5% NP-40, 0,5 mM DTT) and centrifuged for 3 min, 7000 rpm at 4°C. The supernatant was collected as cytoplasmic fraction and stored at -80°C. The nuclear pellet was resuspended in 50 µL B1 buffer (20 mM Tris-HCl pH 7.9, 75 mM NaCl, 5% glycerol, 0.5 mM EDTA, 0.85 mM DTT, 0.125 mM PMSF) and 450 µL B2 buffer (20 mM HEPES pH 7.6, 300 mM NaCl, 0.2 mM EDTA, 1 mM DTT, 7,5 mM MgCl<sub>2</sub>, 1 M Urea, 1% NP-40). Samples were vortexed for 5 sec, incubated on ice for 10 min and centrifuged for 5 min, 15000 rpm at 4°C. The supernatant was collected as nuclear fraction and stored at -80°C.

**Immunoprecipitation**

RA-treated cells were washed in ice-cold PBS and lysed by sonication on ice in NP-40 buffer. Aliquots were taken from protein extracts as 10% inputs. 1 mg of total protein were pre-cleared for 3 h at 4°C by incubation with glutathione-coupled sepharose beads (GE Healthcare) previously equilibrated in Wash buffer 1 (50 mM Tris-HCl pH 7.5, 150 mM NaCl, 1% NP-40, 1x protease inhibitors (Roche)) for 3 times, 10 min at 4°C. Beads were then centrifuged and the supernatant was incubated O/N at 4°C with 50 µL equilibrated beads. After centrifugation, the supernatant was discarded and the beads were washed 2 times with Wash buffer 1 for 10 min at 4°C. Beads were then washed twice with Wash buffer 2 (50 mM Tris-HCl pH 7.5, 500 mM NaCl, 0.1% NP-40) for 10 min at 4°C, and once with Wash buffer 3 (50 mM Tris-HCl pH 7.5, 0.1% NP-40) for 20 min at 4°C. The supernatant was discarded and the bound proteins were eluted with 1x Laemmli buffer, boiled for 5 min at 98°C and run in a 10% SDS-PAGE gel.

**Immunoblotting**

RA-treated cells were pelleted and frozen in liquid nitrogen. For cellular extracts, 50µg of total protein isolated in NP-40 buffer (150 mM NaCl, 50 mM Tris-HCl pH 7.6, 0.5% NP-40, protease inhibitors (Roche)). For CMVMJD135 brain tissue extracts, brain tissue was homogenized in cold 0.1 M Tris-HCl pH 7.5, 0.1 M EDTA and protease inhibitors (Roche), and sonicated for 10s. Samples were resolved in 10% SDS-PAGE gels and then transferred to a nitrocellulose membrane. After incubation with the primary antibodies: TAU-5 (1:2000, Abcam), TAU-4R (1:1000, Millipore),

TAU-3R (1:2000, Millipore), TAU (E178) (1:1000, Abcam), Histone H3 (1:10000, Abcam), SFRS7 (9G8) (1:1000, kindly provided by Dr. James Stévine), actin (1:200, DSHB) overnight at 4°C, membranes were incubated with secondary antibodies for 1 hour at room temperature (anti-rabbit or anti-mouse, 1:10000, Bio-Rad, anti-goat, 1:5000, Santa-Cruz Biotechnologies). Antibody binding was detected by chemiluminescence (Clarity kit, Bio-Rad).

### **High-throughput high-content functional imaging**

Cells were seeded at an initial density of  $4 \times 10^3$  cells/well in flat bottom 96-well plates previously coated with Matrigel (BD, Biosciences), and 0.1  $\mu$ M RA was added the day after plating in DMEM/F-12 with 1% FBS. After 5 days, cells were washed with DMEM/F-12 and incubated with 50 ng/mL BDNF (Peprotech) in DMEM/F-12 without serum for 3 days. Cells were then labeled by immunocytochemistry for  $\beta$ III-tubulin (1:1000, R&D Systems) and scanned at different locations of each well. The quantitative analysis of total number of cells, number of  $\beta$ III-tubulin positive cells and neurite length was performed using the automatic imaging system Thermo Scientific Cellomics® ArrayScan® VTI.

### **qRT-PCR**

1  $\mu$ g of total RNA purified from differentiated cells was reversed transcribed using the One-step SuperScript kit (Bio-Rad). The qRT-PCR reaction was performed in a CFX96 Real-time PCR detection system (Bio-Rad) using the Quantitec SYBR Green kit (Qiagen) and the primers listed on Table 1. Gene expression was normalized to *HMB5* levels within each sample. Results are presented as fold change, comparing ATXN3<sup>shRNA</sup> with SCR<sup>shRNA</sup> control cells.

### **Animals**

The MJD mouse model (CMVMJD135) was generated as described [45]. All animal procedures were conducted in accordance with European regulations (European Union Directive 86/609/EEC) and approved by the joint Animal Ethics Committee of the Life and Health Sciences Research Institute, University of Minho. Health monitoring was performed according to FELASA guidelines [46]. Animal facilities and the people directly involved in animal experiments were certified by the Portuguese regulatory entity – Direção Geral de Veterinária [46]. CMVMJD135 mice and control littermates were sacrificed at 45 weeks of age by decapitation, the brainstem (an affected area) was immediately removed and stored at -80°C.

### Statistical analysis

For PCR arrays, data was analyzed using the SPSS software version 22.0. In order to identify differentially expressed genes having biological relevance, significantly altered genes identified by SPSS analysis ( $p < 0.05$ ) were further filtered using a 1.5 fold change cut-off. For all the other comparisons between the different cell lines were performed using t-test in the GraphPad prism version 5.0 software. For immunoblotings, the mean density and area of each band was measured using at least three experiments in TINA 2.0 software according to the manufacturer's instruction. For real-time quantitative PCR data, the same approach was used and results were presented using the  $\Delta\Delta C_t$  method, as described before [47]. A critical value for significance of two-tailed  $p < 0.05$  was used throughout the study.

## RESULTS

### Silencing of ATXN3 leads to changes in gene expression of cytoskeleton regulators

Loss of function of ATXN3 was previously shown to cause a disruption of the cytoskeleton network [39, 40], loss of cell adhesion and perturbed differentiation [40], namely in neuronal cells [41]. Although increased degradation of alpha-5-integrin (ITGA5) - leading to loss of cell adhesion and altered signaling to the cytoskeleton - partially explains this cellular phenotype, the detailed mechanisms underlying the extensive modifications of the cytoskeleton remain mostly unknown. In the attempt to further define the pathways that are deregulated in the absence of ATXN3, specifically those affecting cytoskeletal organization, we quantified by qRT-PCR the expression of 84 genes controlling cytoskeleton biogenesis, fiber arrangement, polymerization and depolymerization, in Retinoic Acid (RA)-treated SH-SY5Y cells with stable silencing of ATXN3 (ATXN3<sup>shRNA</sup> cells). This analysis revealed a number of significant changes in expression, mostly corresponding to downregulation of cytoskeleton regulatory genes in ATXN3<sup>shRNA</sup> cells (Table 1). The 28 differentially expressed genes were distributed across different functional groups, related to cell projections (38%), kinases and phosphatases (38%), G-protein signaling (33.3%), actin filaments (28.6%), cell motility/migration (23.8%), cell cycle and division (9.5%), cytoskeleton adaptor activity (9.5%), calmodulin/calcineurin (9.5%), microtubules (4.8%), cell shape, size, polarity and morphogenesis (4.8%). This provided further evidence that ATXN3 is involved in the modulation of the cytoskeleton network and that its absence triggers changes in several important regulators.

### Chapter 3. Ataxin-3 and Tau

Interestingly, we confirmed that the neurodegeneration-related gene *MAPT*, encoding the Tau protein, was among those with significantly reduced expression in ATXN3<sup>shRNA</sup> cells and belonged to one of the most representative functional groups (cell projections). As mentioned above, our previous data suggested that the neuronal phenotype of ATXN3<sup>shRNA</sup> cells was partially explained by the reduced levels of ITGA5 in these cells [41]. Interestingly, overexpression of ITGA5 in ATXN3<sup>shRNA</sup> cells ameliorated their neuronal phenotype and normalized the expression levels of several neuronal markers, but did not rescue the levels of *TAU*. Hence, we focused our analysis on the role of this specific gene and protein in cells lacking ATXN3.

**Table 1.** Changes in gene expression of cytoskeleton regulators. The fold change is the average of 3 biological replicates. A fold change of 1.5 was used as a cut-off.

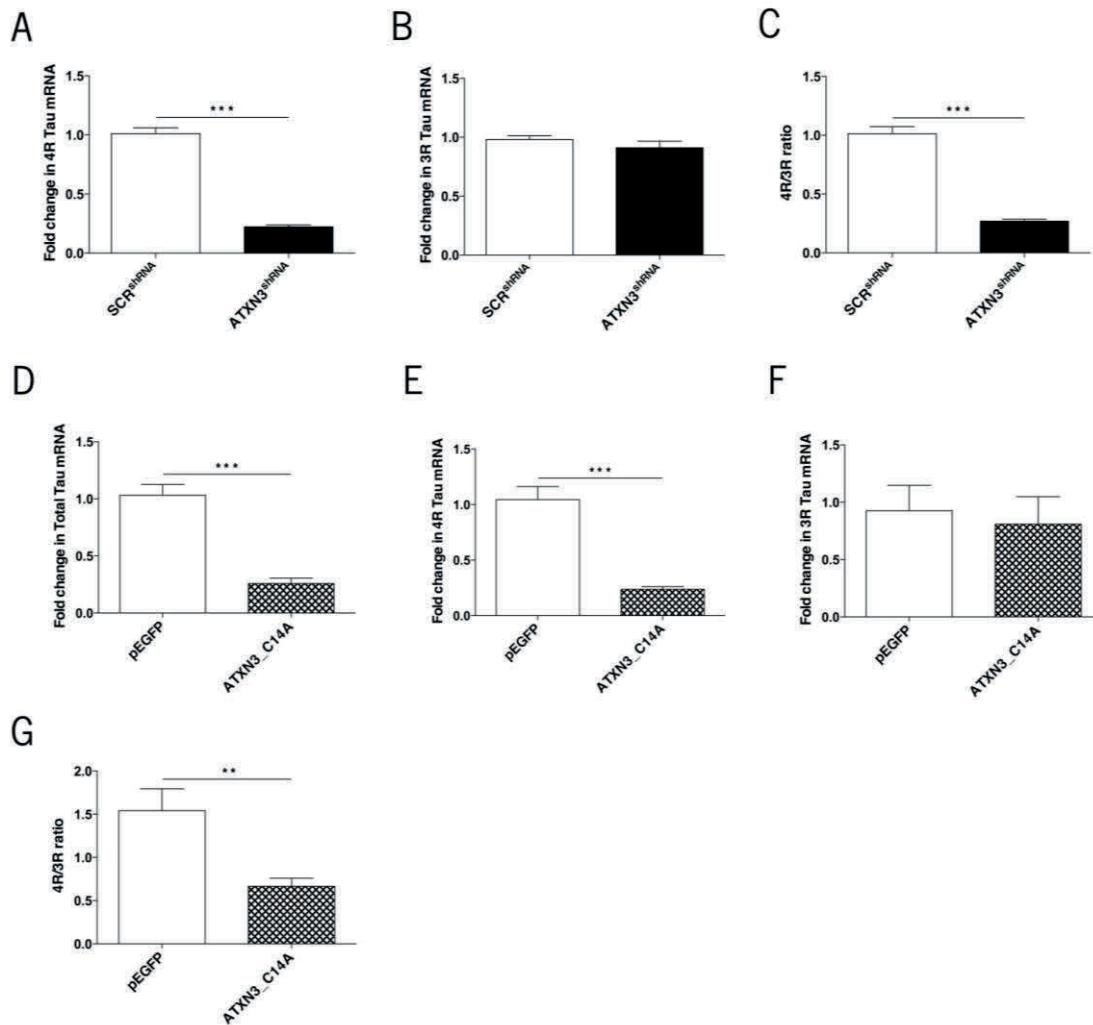
RefSeq	Gene name	Description	Group	p value	Fold change
NM_005910	MAPT	Microtubule-associated protein tau	Cell projections/ microtubules	0.000	-1.93
NM_002481	PPP1R12B	Protein phosphatase 1, regulatory (inhibitor) subunit 12B	Cell projections/ kinases and phosphatases	0.001	-2.29
NM_003941	WASL	Wiskott-Aldrich syndrome-like	Actin filaments/ cell projections/ cell motility/migration/ G-protein signalling	0.001	-3.70
NM_007174	CIT	Citron (rho-interacting, serine/threonine kinase 21)	Kinases and phosphatases/ cell cycle/ division/ G-protein signalling	0.002	-1.79
NM_003914	CCNA1	Cyclin A1	Cell cycle and cell division	0.003	-2.95
NM_005719	ARPC3	Actin related protein 2/3 complex, subunit 3, 21kDa	Actin filaments/cell motility/migration	0.004	1.66
NM_000377	WAS	Wiskott-Aldrich syndrome (eczema-thrombocytopenia)	Cell motility/migration/ G-protein signalling	0.004	-2.88
NM_001175	ARHGDI B	Rho GDP dissociation inhibitor (GDI) B	Actin filaments/cell motility/G-protein signalling	0.004	-15.29
NM_002754	MAPK13	Mitogen-activated protein kinase 13	Kinases and phosphatases/ G-protein signalling	0.007	-2.75
NM_033389	SSH2	Slingshot homolog 2 (Drosophila)	Actin filaments/ kinases and phosphatases	0.008	-2.04
NM_000381	MID1	Midline 1 (Opitz/BBB syndrome)	Microtubules	0.009	-2.41
NM_014376	CYFIP2	Cytoplasmic FMR1 interacting protein 2	Actin filaments/ cell projection/ cell shape, size, polarity/ morphogenesis/ G-protein signalling	0.009	-1.37
NM_003885	CDK5R1	Cyclin-dependent kinase 5, regulatory subunit 1 (p35)	Cell projections/ cell motility/migration/ kinases and phosphatases	0.010	-1.96
NM_005219	DIAPH1	Diaphanous homolog 1 (Drosophila)	Actin filaments/ G-protein signalling	0.011	-5.41
NM_002480	PPP1R12A	Protein phosphatase 1, regulatory (inhibitor) subunit 12A	Cell projections/ kinases and phosphatases	0.012	-1.81
NM_003253	TIAM1	T-cell lymphoma invasion and metastasis 1	G-protein signalling	0.013	-1.65
NM_053025	MYLK	Myosin light chain kinase	Calmodulin/calcineurin/ kinases and phosphatases	0.015	-1.71

NM_017737	FBNP1L	Formin binding protein 1-like	Actin filaments	0.018	-2.12
NM_003160	AURKC	Aurora kinase C	Cell cycle and cell division/ kinases and phosphatases	0.020	-2.40
NM_012418	FSCN2	Fascin homolog 2, actin-bundling protein, retinal	Actin filaments	0.020	-6.94
NM_003688	CASK	Calcium/calmodulin-dependent serine protein kinase	Actin filaments, calmodulin/ calcineurin/ kinases and phosphatases	0.024	-1.55
NM_006340	BAIAP2	BAI1-associated protein 2	Cell projections/ cytoskeleton adaptor activity	0.025	-2.73
NM_002576	PAK1	P21 protein (Cdc42/Rac)-activated kinase 1	Cytoskeleton adaptor activity/ kinases and phosphatases	0.029	-1.46
NM_145753	PHLDB2	Pleckstrin homology-like domain, family B, member 2	Microtubules	0.035	-1.99
NM_004935	CDK5	Cyclin-dependent kinase 5	Cell projections/ cell motility/migration/ kinases and phosphatases	0.043	-1.52
NM_004954	MARK2	MAP/microtubule affinity-regulating kinase 2	Kinases and phosphatases/ cell shape, size, polarity, morphogenesis	0.044	-2.33
NM_033118	MYLK2	Myosin light chain kinase 2	Calmodulin/calcineurin/ cell shape, size, polarity, morphogenesis/ kinases and phosphatases	0.047	-3.92
NM_002444	MSN	Moesin	Cell projections/ cell motility/migration/ cytoskeleton adaptor activity	0.053	1.66

### ATXN3 loss of function perturbs the 4R/3R tau ratio in SH-SY5Y cells

Tau is a neuronal microtubule-associated protein of known relevance for the morphology, differentiation and survival of neurons, and is involved in central pathways of several neurodegenerative disorders (Reviewed in [48-50]). Considering this and taking into account the importance of a balanced ratio of 4R/3R tau isoforms in neurons, we next analyzed mRNA levels of these isoforms in ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells. We found a significant decrease (4.7 fold decrease,  $p=7.4 \times 10^{-11}$ ) of the 4R tau isoform in ATXN3<sup>shRNA</sup> cells (Figure 1A), but no alteration of the 3R tau isoform ( $p=0.270$ ) as compared with SCR<sup>shRNA</sup> control cells (Figure 1B), leading to an altered 4R/3R tau ratio (Figure 1C).

Interestingly, overexpression of a catalytically inert version of ATXN3 in SH-SY5Y cells (ATXN3\_C14A) recapitulated the alterations on tau isoform expression seen in cells with silenced ATXN3, leading to decreased expression of total tau (5.7 fold decrease,  $p=3.7 \times 10^{-6}$ ) (Figure 1D), decreased 4R tau expression (4.4 fold decrease,  $p=1.1 \times 10^{-5}$ ) (Figure 1E) with no alterations on the 3R tau isoform (Figure 1F), and decreased 4R/3R tau ratio ( $p=0.0088$ ) (Figure 1G).



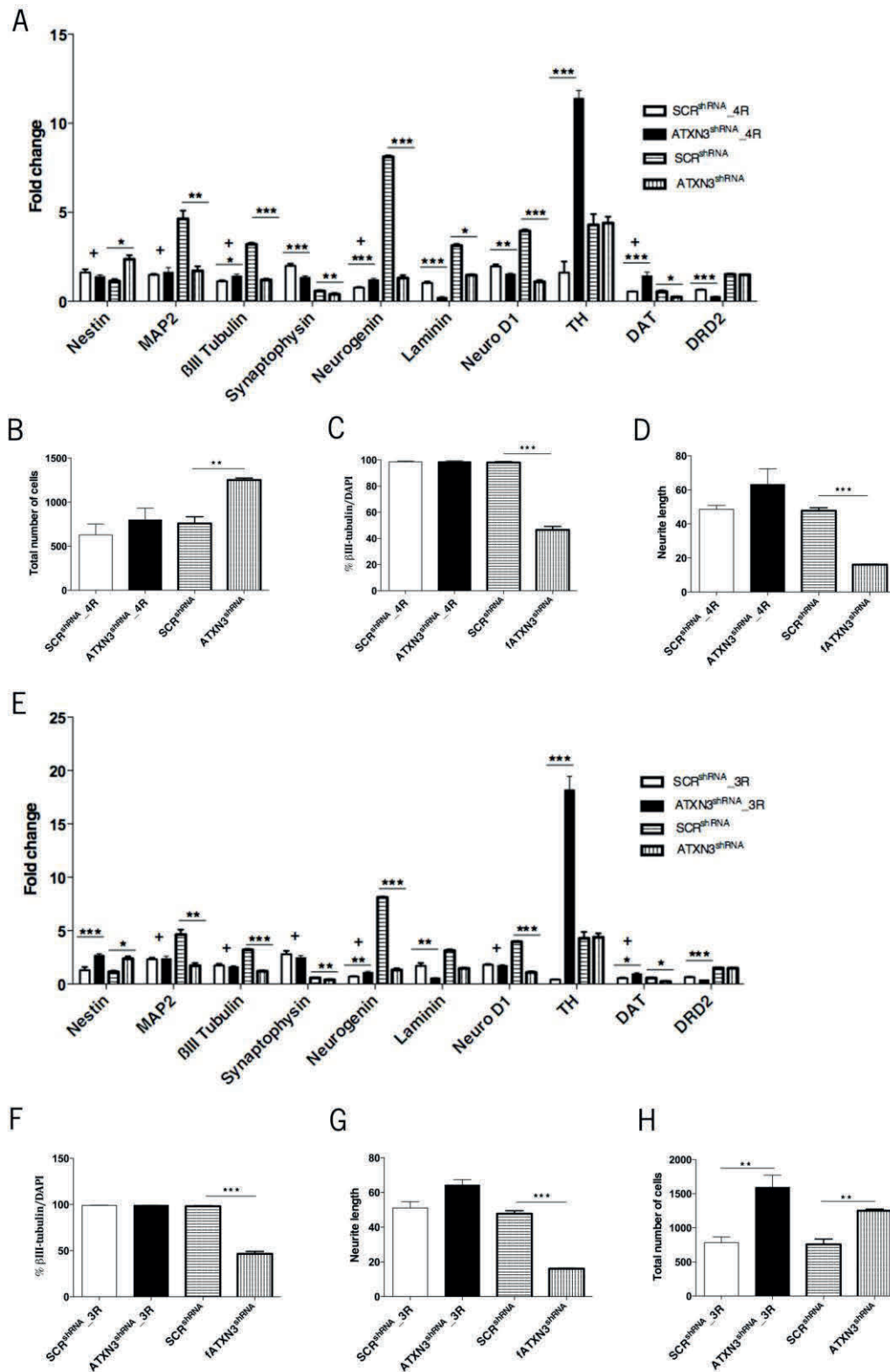
**Figure 1.** Disruption of 4R/3R tau ratio in ATXN3<sup>shRNA</sup> cells. (A) Depletion of ATXN3 lead to decreased transcripts levels of 4R tau and (B) no alterations in the mRNA levels of the 3R tau isoform. (C) ATXN3<sup>shRNA</sup> cells showed a significant decrease of the 4R/3R tau ratio comparing with the SCR<sup>shRNA</sup> controls. ATXN3\_C14A cells present (D, E) decreased mRNA levels of tau and 4R tau isoform, (F) no alterations in 3R tau expression and (G) decreased 4R/3R tau ratio. 4R/3R tau ratio was obtained by dividing 4R and 3R tau mRNA levels. \*\*p<0.01; \*\*\*p<0.001.

### Normalizing the levels of 4R tau isoform partially rescues the neuronal phenotype of ATXN3<sup>shRNA</sup> cells

Besides the cytoskeleton deregulation, depletion of ATXN3 seems to perturb the differentiation process in neuronal cells, as we have previously described [41]: after induction of differentiation by RA treatment, ATXN3<sup>shRNA</sup> cells keep their proliferative activity (in spite of a parallel increase in cell death) and show decreased expression of several differentiation markers. Considering that the balance between tau isoforms is important for neuronal development (Reviewed in [51]) and that the 4R isoform suppresses proliferation and promotes neuronal differentiation [52],



we hypothesized that the deregulation of the 4R/3R tau ratio might be contributing to the neuronal phenotype observed in ATXN3<sup>shRNA</sup> cells. In order to test this hypothesis, we overexpressed the 3R or 4R tau isoforms in ATXN3<sup>shRNA</sup> cells (ATXN3<sup>shRNA</sup>\_3R and ATXN3<sup>shRNA</sup>\_4R, respectively) (Figure S1) and evaluated their ability to differentiate into neuronal cells upon RA treatment. Indeed, the expression levels of several neuronal differentiation markers (MAP2,  $\beta$ III-tubulin, neurogenin and DAT), which we had previously identified as reduced in cells lacking ATXN3 [41], were comparable between ATXN3<sup>shRNA</sup>\_4R and SCR<sup>shRNA</sup>\_4R cells and the increased expression of Nestin, a marker for proliferative cells [53] was also rescued by 4R tau isoform overexpression (Figure 2A). Accordingly, and in contrast with the observations in cells lacking ATXN3, the number of cells was similar between ATXN3<sup>shRNA</sup>\_4R and SCR<sup>shRNA</sup>\_4R ( $p=0.422$ ) 7 days after induction of differentiation with RA (Figure 2B). Additionally, the number of  $\beta$ III-tubulin positive cells was not significantly different among the two cell lines ( $p=0.8727$ ) and thus restored if we compare them with those of cells after ATXN3 silencing (fATXN3<sup>shRNA</sup>) (Figure 2C). The average neurite length was also restored in ATXN3<sup>shRNA</sup>\_4R cells as compared with fATXN3<sup>shRNA</sup> cells ( $p=1.7 \times 10^{-10}$ ) (Figure 2D). Interestingly, although we observed that increasing the levels of the 3R isoform of tau also ameliorated the neuronal phenotype of ATXN3<sup>shRNA</sup> cells in terms of expression of differentiation markers (Figure 2E), neuronal maturation (Figure 2F) and neurite length (Figure 2G), it did not abolish the proliferative activity of ATXN3<sup>shRNA</sup>\_3R upon RA treatment, as shown by the increased number of cells ( $p=0.0083$ ) (Figure 2H) and the increased expression of Nestin ( $p=0.0006$ ) (Figure 2E).



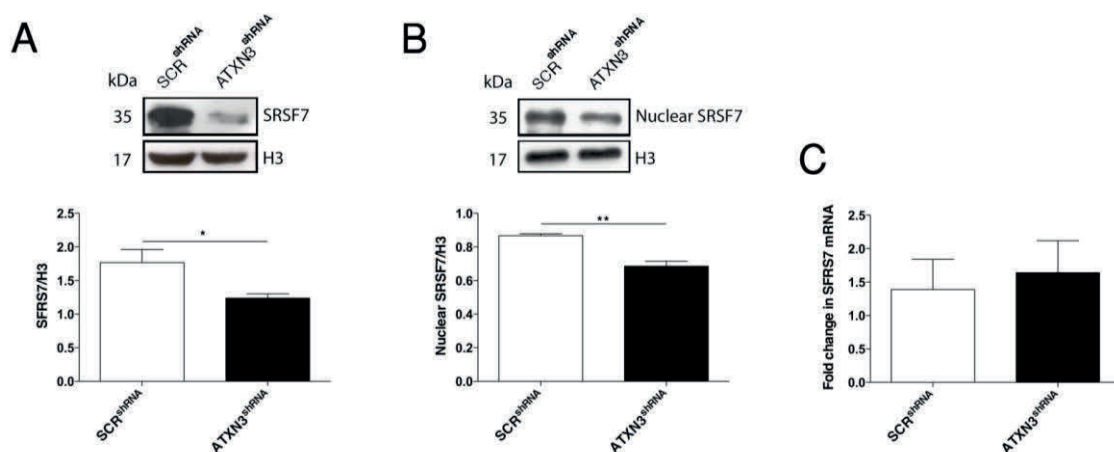
**Figure 2.** Overexpression of 4R tau ameliorates the phenotype of ATXN3<sup>shRNA</sup> cells. (A) mRNA levels of several neuronal markers analyzed in ATXN3<sup>shRNA</sup> cells were normalized by overexpression of 4R tau. mRNA levels were normalized to *HMB5* gene (B) After RA treatment the number of ATXN3<sup>shRNA</sup>\_4R cells was similar to the number of SCR<sup>shRNA</sup>\_4R cells. (C) Overexpression of 4R tau rescued the expression of βIII-tubulin and (D) the average length of neurites in cells lacking ATXN3. (E) Overexpression of 3R tau had a milder effect on the expression of differentiation markers, (F)

neuronal maturation, and (G) neurite length, and (H) no effect on the proliferative activity of ATXN3<sup>shRNA</sup> cells upon RA treatment. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ . + corresponds to rescued expression.

### Cells lacking ATXN3 show decreased levels of SFRS7 (9G8), a protein involved in the splicing of *tau* exon 10

Taking into account the altered 4R/3R tau ratio in ATXN3<sup>shRNA</sup> cells, and considering the involvement of ATXN3 in proteolytic pathways we assessed the levels of SFRS7, a splicing regulator of *tau*, in these cultures. ATXN3<sup>shRNA</sup> cells presented decreased levels of SFRS7 protein compared with the SCR<sup>shRNA</sup> controls ( $p = 0.025$ ) (Figure 3A), suggesting that in the absence of ATXN3, SFRS7 is being more degraded. Because SFRS7 normally presents a nuclear localization, we performed cell fractionation and analyzed the levels of SFRS7 in the nuclear fraction. As shown in Figure 3B, this assay confirmed the reduced levels of SFRS7 in ATXN3<sup>shRNA</sup> cells in comparison with the control cells ( $p = 0.001$ ). The expression of SFRS7 was undetectable in the cytoplasmic fraction (data not shown).

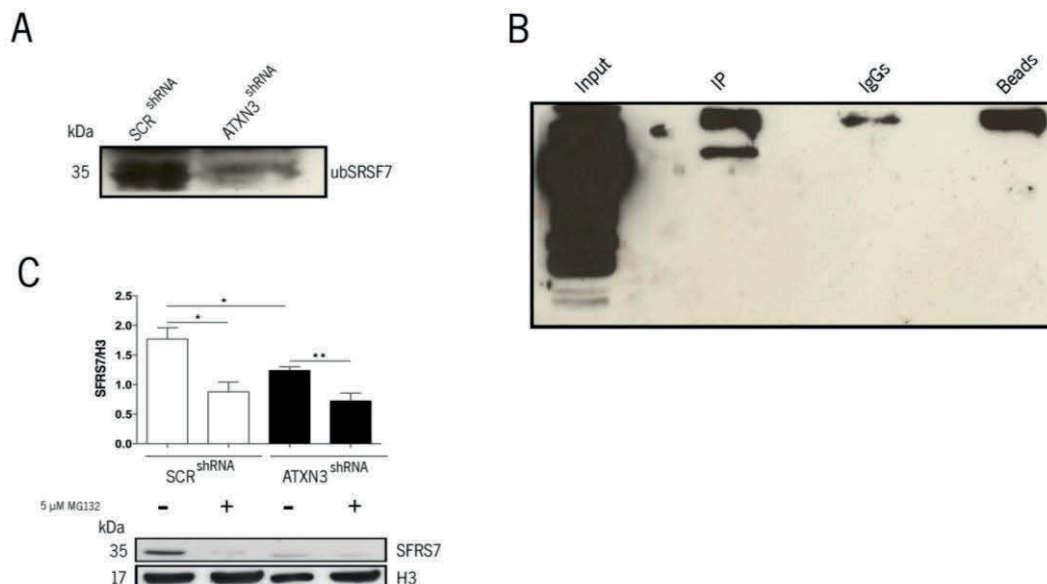
To define whether ATXN3 affects the expression of SFRS7 at the protein or mRNA level, we extracted total RNA from ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells and performed qRT-PCR to determine the levels of *SFRS7* transcripts. No significant differences ( $p = 0.712$ ) were observed between the two cell lines (Figure 3C), suggesting that the effect of ATXN3 depletion on SRSF7 levels occurs at the protein level.



**Figure 3.** ATXN3<sup>shRNA</sup> cells show decreased SFRS7 protein levels. (A) Western-blot analysis showed a downregulation of both total and (B) nuclear SFRS7 levels in ATXN3<sup>shRNA</sup> cells. The results were normalized for H3. Relative band density for each protein was analyzed. (C) No significant differences were observed in the mRNA levels of *SFRS7* between the ATXN3<sup>shRNA</sup> cells and the SCR<sup>shRNA</sup> controls. mRNA levels were normalized to the *HMBIS* gene. \* $p < 0.05$ ; \*\* $p < 0.01$ .

**SFRS7 (9G8), a protein involved in the splicing of Tau exon 10, is a candidate substrate of ATXN3's DUB activity**

Considering the decreased levels of SFRS7 associated with the loss of function of ATXN3, we next analyzed the ubiquitylation levels of this splicing factor. For this, we performed a pulldown of polyubiquitylated proteins using Agarose-TUBEs 2, followed by immunoblotting against the SFRS7 protein. As shown in Figure 4A, we detected decreased levels of ubiquitylated forms of SFRS7 in ATXN3<sup>shRNA</sup> cells as compared with the scrambled control cells (SCR<sup>shRNA</sup>) (p=0.02). Given these observations, we hypothesized that SFRS7 could be a substrate of the DUB activity of ATXN3. To test this hypothesis, we first verified whether these two proteins interact in the context of neuronal cells. Co-immunoprecipitation using protein extracts from differentiated Wild type SH-SY5Y cells confirmed the interaction between ATXN3 and SFRS7, which is compatible with the hypothesis of SFRS7 being a substrate of ATXN3 in neurons (Figure 4B). To further explore the relevance of this interaction in the regulation of SFRS7 stability, we measured the levels of SFRS7 upon proteasome inhibition. In this condition, however, we found a similar downregulation of SFRS7 in ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells (Figure 4C). Indeed, as proteasome inhibition leads to a heat shock response [54], a blockade of splicing and a global downregulation of splicing factors have been described in cells exposed to proteasome inhibition [55], and this may be hampering our analysis of the possible link between ATXN3 degradation of SFRS7 by the UPS.

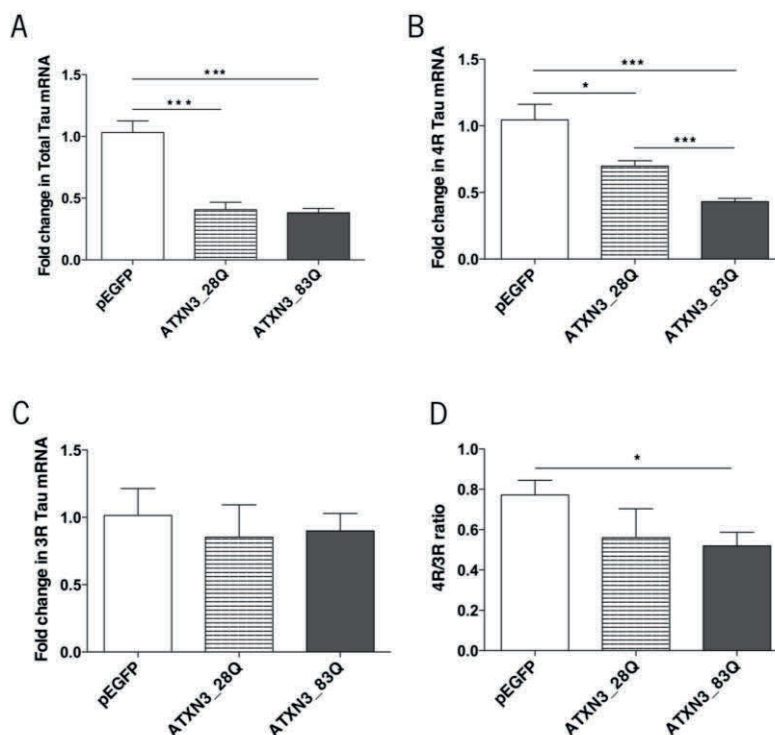


**Figure 4.** Decreased levels of polyubiquitylated SFRS7 (9G8) in ATXN3<sup>shRNA</sup> cells. (A) Western-blot analysis after capture of polyubiquitylated proteins confirmed the decrease in polyubiquitylated forms of SFRS7 in ATXN3<sup>shRNA</sup> cells. (B) Human ATXN3 co-immunoprecipitates with SFRS7. (C) Western-blot analysis showed that the levels of SFRS7 decreased at similar levels both in ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells upon MG132 treatment. Relative band density for each protein was analyzed. The results were normalized for H3.

### Pathogenic ATXN3 causes similar molecular alterations as silencing

In order to determine if the presence of an expanded polyglutamine (polyQ) tract within ATXN3 would lead to a modification of the activity of this protein in *MAPT* splicing regulation, altering the 4R/3R tau ratio, we analyzed a SH-SY5Y cell line expressing a version of ATXN3 bearing 83 glutamines (ATXN3\_83Q). Interestingly, we found that expression of ATXN3\_83Q leads to a similar alteration on the expression of tau isoforms as that observed in cells lacking ATXN3 or expressing a catalytic mutant version of this protein: i) decreased expression of tau (2.7 fold decrease,  $p=7.5 \times 10^{-6}$ ) (Figure 5A), ii) decreased expression of 4R tau isoform (2.4 fold decrease,  $p=8.1 \times 10^{-5}$ ) and no alterations on the 3R tau isoform (Figure 5B and 5C, respectively), and iii) a decrease of the 4R/3R tau ratio ( $p=0.0313$ ) (Figure 5D).

However, it is important to mention that the overexpression of the Wild type ATXN3 (ATXN3\_28Q) also caused some degree of perturbation (Figure 5), pointing to the importance of a tight regulation of ATXN3 dosage in neurons. These results suggest that the polyQ expansion caused a perturbation of the normal function of ATXN3 in neuronal cells.

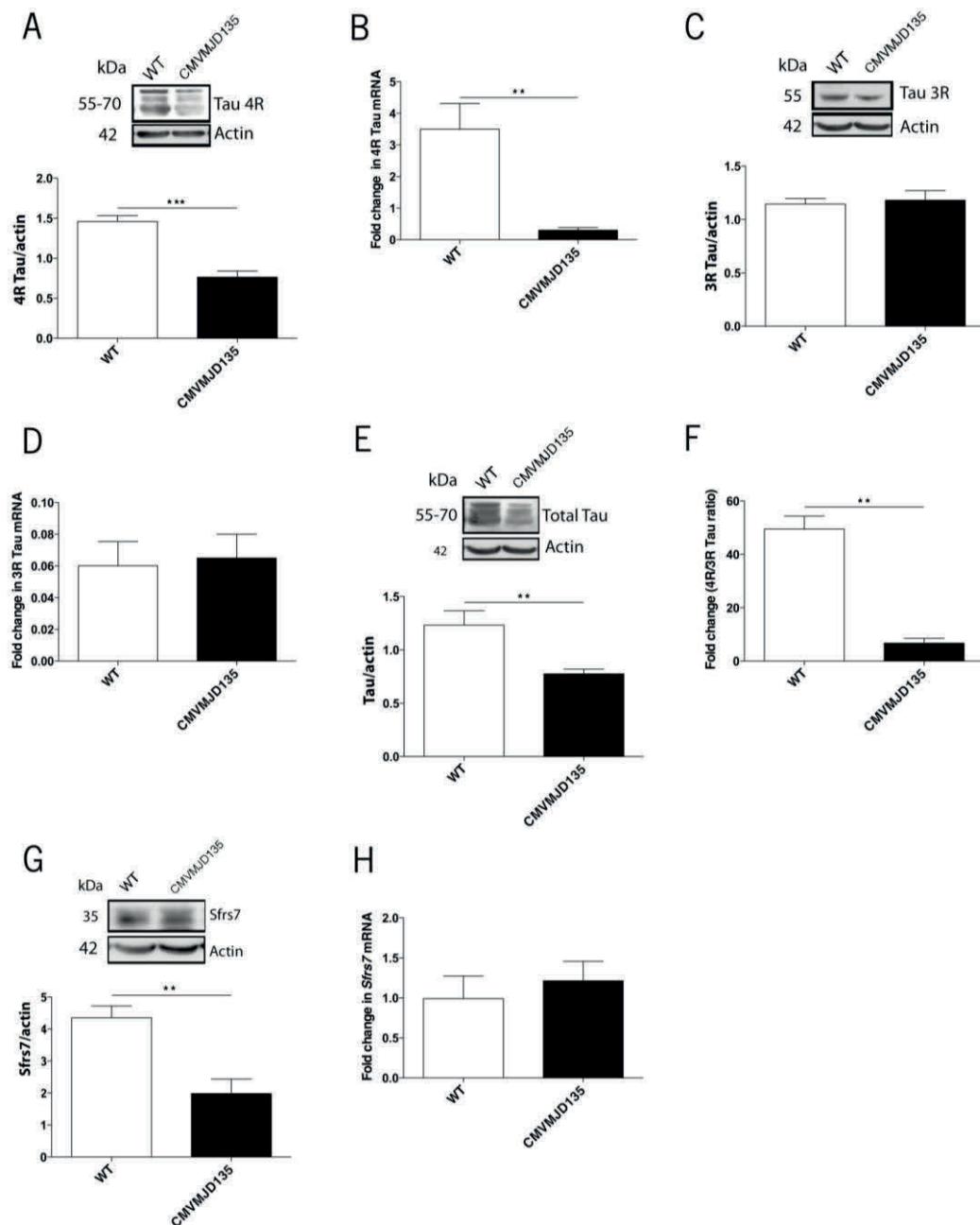


**Figure 5.** PolyQ expansion in ATXN3 affects tau splicing in neuronal cells. (A, B) Expression of ATXN3\_C14A led to decreased mRNA levels of tau and 4R tau isoform, (C) no alterations in 3R tau expression and (D) decreased 4R/3R tau ratio. mRNA levels were normalized to the *HMBS* gene. \*\* $p < 0.05$ ; \*\*\* $p < 0.001$ .

### **Deregulation of tau splicing in the context of Machado-Joseph disease**

Considering that a partial loss of function of the expanded ATXN3 might be contributing to the pathogenesis of MJD, as has been suggested for other polyQ disorders [56-58] we analyzed the 4R/3R tau ratio in the brains of transgenic mice expressing human expanded ATXN3 with 135 glutamines (CMVMJD135) [45], a mouse model of MJD. Similarly to what we have observed in neuronal cells lacking ATXN3 or overexpressing the expanded protein, we found a significantly decreased expression of the 4R tau isoform in the brainstem (an affected brain area) of CMVMJD135 mice both at protein level ( $p=2.8 \times 10^{-5}$ ) and mRNA level (3.7 fold decrease,  $p=7 \times 10^{-5}$ ) comparing with the Wild type (WT) littermate controls (Figure 6A and 6B, respectively), but no alterations of the 3R tau isoform expression (Figure 6C and 6D). The decreased expression of 4R tau led to a decreased protein level of total Tau in CMVMJD135 mice ( $p=0.0049$ ) comparing with the WT animals (Figure 6E) and an altered 4R/3R tau ratio (Figure 6F). Moreover, as seen in ATXN3<sup>shRNA</sup> cells, we found a downregulation of Sfrs7 protein level in CMVMJD135 mice as compared with the WT controls ( $p=0.0093$ ) (Figure 6G), but no alterations at the mRNA level (Figure 6H).

All together, these results suggest that the interaction of ATXN3 with SFRS7 and its impact on molecular pathways regulating tau splicing may be relevant in the pathogenesis of MJD.



**Figure 6.** Deregulation of tau splicing in CMVMJD135 mice. (A, B) CMVMJD135 mice presented a decrease in the protein and mRNA levels of 4R tau but (C, D) no statistically significant differences in the protein and mRNA levels of 3R tau in CMVMJD135 mice comparing with WT controls. (E) Expression of mutant human ATXN3 led to statistically decreased levels of total tau and (F) a disruption of the 4R/3R tau ratio in the brainstem of transgenic mice. (G) CMVMJD135 mice showed decreased levels of Sfrs7 but (H) no alterations in the expression of *Sfrs7* at the mRNA level. mRNA levels were normalized to the *HPRT* gene. Relative band density for each protein was analyzed. The results were normalized for actin levels. \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

## **DISCUSSION**

Tau is an important microtubule-binding protein in neurons. Abnormalities in tau expression and a disruption of *MAPT* exon 10 splicing have been suggested to play an important role in several neurodegenerative disorders [15-18]. Considering our observation of tau expression deregulation in ATXN3<sup>shRNA</sup> cells, we hypothesized that the 4R/3R tau ratio could be disrupted. Indeed, while it has been described that the normal adult human brain expresses approximately equal levels of 4R and 3R tau isoforms [3, 5], we found that loss of function of ATXN3 disrupts this balance in SH-SY5Y cells exposed to a differentiation stimulus (RA), leading to a decreased 4R/3R tau ratio, that seems to be caused by decreased levels of SFRS7, a splicing regulator known to modulate inclusion of *tau* exon 10 [28, 29]. While this work was being done, an article was published showing an increased 4R/3R tau ratio in the brains of subjects with HD, which seemed to be related with alterations in SFRS6, another known modulator of tau exon 10 splicing [59], strengthening the idea that an imbalance of tau isoforms might be contributing for the pathology of several neurodegenerative diseases, including polyQ diseases. In addition to that, ATXN3<sup>shRNA</sup> cells presented increased relative levels of the 3R tau isoform, which correlates with the immature phenotype of these cells that we previously described [41], since the 3R is the predominant tau isoform in undifferentiated SH-SY5Y cells [60, 61]. Importantly, normalizing the levels of 4R tau isoform partially ameliorates the neuronal phenotype of ATXN3<sup>shRNA</sup> cells in terms of expression of differentiation markers, neuronal maturation and neurite length. Taking into account that loss of function of ATXN3 deregulated the levels of SFRS7 at the protein level, we hypothesized that this splicing factor could be a substrate of the DUB activity of ATXN3, which could modulate its degradation. In line with that, we observed that ATXN3 co-immunoprecipitated with SFRS7, suggesting that these two proteins are molecular partners in neuronal cells. Moreover, the fact that SFRS7 was captured using the Agarose-TUBEs that have high affinity for polyubiquitin chains [62] suggests that this splicing factor is polyubiquitylated and thus might be degraded through the UPS. Trying to explore if this interaction could be indicative that ATXN3 is modulating the degradation of SFRS7 through the proteasome, we measured the levels of this protein upon proteasome inhibition; unexpectedly, we found similarly reduced levels of this splicing factor in ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells. Additionally, in the absence of proteasome inhibition, ATXN3<sup>shRNA</sup> cells presented decreased amounts of polyubiquitylated forms of SFRS7. Although we found no data in the literature specifically relating SFRS7 expression and MG132 treatment, it is known that proteasome inhibition elicits a stress response, globally repressing transcription and mRNA processing, including splicing. This stress induction may explain



our unexpected result, since *SFRS7* is a heat shock suppressed gene [63-65]. Further experiments using conditions leading to milder proteasome inhibition may help overcome this technical limitation, which is hindering the clarification of the mechanism of *SFRS7* reduction in cells lacking ATXN3.

As mentioned before, *SFRS7* has been involved in the splicing of tau exon 10, playing an important role in the regulation of the 4R/3R tau ratio balance [28, 29]. The effect of *SFRS7* on tau splicing initially appears to be controversial on the literature: while some authors refer that it acts as a tau exon 10 splicing enhancer [66], others state that it suppresses tau exon 10 inclusion [28, 29]. A unifying explanation is that the function of *SFRS7* acting as a splicing silencer or enhancer is cell-type dependent. In this perspective, Van Abel and co-workers reported that *SFRS7* acts as a tau splicing enhancer in the same type of cells that we have used in this study [66]; they observed a decreased 4R/3R tau ratio upon downregulation of *SFRS7* in these cells, both of which we also observed in cells lacking ATXN3. Interestingly, we also found a decreased 4R/3R tau ratio as well as decreased protein levels of *Sfrs7* in affected brain regions of 45 weeks-old CMVMJD135 mice as compared with their littermate controls. At this age, the transgenic animals display an overt phenotype resembling behavioral and pathological characteristics present in human patients [45]. Thus, the observed deregulation of tau splicing suggests that this mechanism may be contributing to MJD pathogenesis, as it does to other neurodegenerative disorders albeit in the opposing sense concerning 4R relative abundance. However, it still remains to clarify whether this change occurs before symptoms or if it is a consequence of the disease progression. Considering that we observed a similar phenomenon using cells lacking ATXN3 and cells expressing a catalytic mutant of the protein, it is reasonable to think that the DUB activity of ATXN3 is important in this process and that the polyQ expansion might cause a partial loss of this normal function of the protein, contributing to MJD pathogenesis. Future work should allow us to verify the relevance of these findings and to unravel how the imbalance of 4R/3R tau isoforms ratio leads to neurodegeneration. One possible scenario is that it leads to altered microtubule dynamics, which causes multiple subsequent intracellular alterations such as pathogenic disruption of axonal transport, a hypothesis that we are currently assessing.

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## **Chapter 4**

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**Loss of function of ATXN3 alters the ubiquitome of neuronal cells negatively impacting on the splicing process**



## **Loss of function of ATXN3 alters the ubiquitome of neuronal cells, negatively impacting on the splicing process**

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### **ABSTRACT**

Ubiquitylation is a tightly controlled process that has been shown not only to mediate protein degradation, but also to modulate protein function and subcellular localization, playing a crucial role in the function and development of the nervous system. Deubiquitylating (DUB) enzymes have been recognized as central players in the maintenance of the correct ubiquitylation/deubiquitylation balance in cells. Ataxin-3 (ATXN3) is a protein with DUB activity mutated in Machado-Joseph disease (MJD). To date, besides the involvement of ATXN3 in the Ubiquitin-proteasome pathway (UPP) and its potential involvement in transcription regulation and DNA repair, its normal cellular functions remain mostly unknown and few substrates of its DUB activity have been identified. In this work, in the attempt to identify potential targets of the DUB activity of this protein, we characterized the ubiquitome of neuronal cells lacking ATXN3 (ATXN3<sup>shRNA</sup> cells) by mass spectrometry. We found that a large proportion of the proteins with altered polyubiquitylation in ATXN3<sup>shRNA</sup> cells were known to be involved in RNA post-transcriptional modification, namely splicing factors. Using transcriptomic analysis and reporter minigenes we confirmed that splicing was globally altered in cells lacking ATXN3. Among the mRNA targets with altered splicing were those of genes encoding components of the spliceosome itself, involved in ubiquitin mediated proteolysis, in axon guidance and in the MAPK signaling pathway. These findings lead us to propose that ATXN3 plays a role in splicing regulation in neurons, a novel function for this protein.

### **INTRODUCTION**

Ubiquitylation is a highly dynamic biochemical modification in which an Ubiquitin (Ub) moiety is attached to a protein. This process is catalyzed by the sequential actions of a Ub-activating enzyme (E1), Ub-conjugating enzymes (E2) and Ub-protein ligases (E3) that bind Ub to different

lysine (K) residues in the substrate, resulting in mono or poly Ub chains (Reviewed in [1]). Ubiquitylated substrates are then recognized by proteins containing Ubiquitin binding domains and directed to different fates. Different types of polyubiquitin (polyUb) chains are thought to be functionally linked to different fates. For example, K48 usually targets proteins for proteasomal degradation, which is initiated when a minimum of four ubiquitins is reached [1], while K63-linked polyUb regulates protein activation, subcellular localization or degradation in lysosome (autophagy) and is known to be relevant for DNA repair (Reviewed in [2]). Ubiquitylation and proteolysis by the ubiquitin-proteasome pathway (UPP) are now recognized as important mechanisms in the nervous system as this proteolytic pathway is known to degrade misfolded or short-lived regulatory proteins (Reviewed in [3-5]). Impairment of the UPP has been connected to several neurodegenerative diseases such as Alzheimer's (Reviewed in [6]), Parkinson's (Reviewed in [7]) and Huntington's (Reviewed in [8]) diseases. However, recent findings showing an accumulation of K63-linked polyubiquitin chains in neurodegenerative diseases suggest that the involvement of ubiquitylation in signaling pathways not related to protein control, such as autophagy, may also contribute to disease [9-11].

Ubiquitin signaling has also been recently implicated in the regulation of splicing, that plays key roles in many processes important for the development and function of the nervous system, such as synaptogenesis, neurite outgrowth, axon guidance, ion channel activity and long-term potentiation (Reviewed in [12-14]). Ubiquitin and Ub-like proteins have been shown to co-purify with splicing complexes [15, 16] and ubiquitylated splicing factors have been identified in a proteomic screen [17]. Like most post-transcriptional modifications, ubiquitylation is a reversible signal and is counterbalanced by deubiquitylating (DUB) enzymes that remove Ub from target proteins and recycle the free Ub pool. Thus, the action of DUBs has a major impact on the ubiquitylated proteome (also known as ubiquitome). Ataxin-3 (ATXN3) is a protein with DUB activity known to be involved in Machado-Joseph Disease (MJD), a neurodegenerative disorder of adult onset caused by the expansion of a polyglutamine (polyQ) tract in this protein. A crucial step towards the understanding of ATXN3 function was the discovery of its DUB activity *in vitro* [18]. ATXN3 is able to cleave Ub from polyubiquitylated substrates, both with K48, K63 or mixed linkages [18-20], to interact with the ubiquitin-like protein NEDD8 [21], with subunits of the proteasome [18, 22], with VCP/p97 [19, 20], with UBXN5 [23] and with the E3 ligases Parkin [24] and CHIP [25]. Although these enzymatic activities of ATXN3 strongly suggest a role for the protein in the UPP, the biological consequences of these functions have not been extensively characterized yet and the substrates of



its action are not known, namely in neurons. In this work, we used Tandem ubiquitin binding entities (TUBES) [26] to purify polyubiquitylated proteins from a neuronal cell line lacking ATXN3, with the goal of identifying candidate targets of its DUB activity. Among the proteins found to have altered polyubiquitylation patterns in cells lacking ATXN3, a large proportion were proteins involved in RNA transport and processing, indicating that ATXN3 might be regulating these processes in neurons, a hypothesis that we validated using reporter minigenes and transcriptomic analysis.

## **MATERIALS AND METHODS**

### **Cell culture**

The human neuroblastoma SH-SY5Y cell line (ATCC number CRL-2266) was transfected with a shRNA sequence targeting *ATXN3* or a scrambled shRNA sequence as described elsewhere [27]. Stably infected cell lines were cultured in a 1:1 mixture DMEM/F-12 nutrient (Invitrogen) supplemented with 10% (v/v) Fetal Bovine Serum (FBS) (Biochrom), 2mM glutaMAX (Invitrogen), 100 U/mL penicillin, 100 µg/mL streptomycin and 25 ng/mL puromycin (Sigma Aldrich). The cells were maintained in a humidified 37°C/95%-air/5%-CO<sub>2</sub> incubator. The medium was changed every two days. Differentiation was induced by 0.1 µM all-trans-retinoic acid (RA) (Sigma Aldrich) in opti-MEM (Invitrogen) supplemented with 0.5% FBS for 7 days. The medium was replaced every two days.

### **Pulldown of polyubiquitylated proteins**

Cells treated with RA were lysed by sonication on ice in lysis buffer (50 mM Tris-HCl pH 7.5, 0.15 M NaCl, 1mM EDTA, 1% NP-40, 10% Glycerol, complete protease inhibitors (Roche) and 50µM UB/UBI protease inhibitor PR-619 (LifeSensors)). After lysis, 2 mg of total protein extract were incubated with 100 µL of pre-equilibrated Agarose-TUBEs (LifeSensors), overnight at 4°C on a rocking platform. Sedimented beads were washed 3 times with washing buffer (20 mM Tris pH 8.0, 0.15 M NaCl, 0.1% Tween-20) before being eluted with 1x SDS sample buffer (62.5mM Tris-HCl pH 6.8, 10% glycerol, 2% SDS, Bromophenol Blue). Eluted proteins were immediately boiled at 98°C for 15min and run in a 10% SDS-PAGE gel.

### **Immunoblotting**

Cells treated with 0.1  $\mu$ M RA for 7 days were pelleted and frozen in liquid nitrogen. Proteins eluted from TUBEs were resolved in 10% SDS-PAGE gels and then transferred to a nitrocellulose membrane. After incubation with the FK2 anti-ubiquitin primary antibody (1:2000, Millipore) overnight at 4°C, membranes were incubated with secondary antibody for 1 hour at room temperature (anti-mouse, 1:10000, Bio-Rad). Antibody binding was detected by chemiluminescence (Clarity kit, Bio-Rad).

### **Digestion of proteins from preparative 1D-PAGE gel**

The 1D PAGE LC-MS/MS approach was used for protein identification as previously described [28]. Eluted proteins were separated using 1.5mm and 10% SDS-PAGE gels. The quality of purification was controlled by Coomassie Brilliant Blue g-250 (Sigma) staining before MS analysis. Gel image was acquired the Gel Doc™ EZ system (Bio-rad). After Coomassie staining, all the visible blue-stained protein spots were manually excised from the gel. The gel pieces were destained overnight at room temperature using 50% acetonitrile in 25 mM ammonium bicarbonate buffer, pH 8.5, and then dehydrated with 100% acetonitrile. The shrunken pieces were then re-swollen in 50 mM ammonium bicarbonate buffer, dehydrated in 100% acetonitrile and dried in a speedvac® concentrator (Savant) for 30 min. The gel pieces were rehydrated in 60  $\mu$ L of 20  $\mu$ g/mL Trypsin (Promega) in 50 mM ammonium bicarbonate solution and incubated for 2h at 55°C. The gel pieces were then incubated with 0.1% trifluoroacetic acid in 50% acetonitrile for 20 min at room temperature in order to extract the remaining peptides from the gel. The tryptic peptides were dried in a speedvac for 2 h.

### **Liquid chromatography-tandem mass spectrometry (LC-MS/MS)**

After re-dissolution in 17  $\mu$ L 0.1% acetic acid, samples were separated on a capillary C18 column using a nano LC-ultra 1D plus HPLC system (Eksigent) and analyzed on-line with a electrospray LTQ-Orbitrap Discovery mass spectrometer (Thermo Fisher Scientific). MS/MS spectra were searched against a human database (uniprot\_sprot, 2010\_01) with the ProteinPilot™ software (version 3.0; AB-sciex) using the Paragon™ algorithm (version 3.0.0.0 [29]) as the search engine. The detected protein threshold (unused protscore (confidence)) in the software was set to 0.10 to achieve 20% confidence and the proteins identified were grouped to minimize redundancy.

Peptides with “unused” values  $< 2$  have low confidence and were excluded from analysis. The “unused” value is defined in the handbook of ProteinPilot as a sum of peptide scores from all the non-redundant peptides matched to a protein. Peptides with confidence of  $\geq 99\%$  would have a peptide score of 2. Tryptic peptides shared by multiple proteins were assigned to the winner protein.

### **RNA extraction and Array hybridization**

Total RNA was isolated from ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells using an miRNeasy mini kit (Qiagen) and quality assessment was achieved using RNA 6000 Nano labchip (Bioanalyzer, Agilent) and by a Nanodrop spectrophotometer (Thermo). Total RNAs RIN values were between 8.7 and 9.3 (average: 9.17). Affymetrix Human Transcriptome Array 2.0 ST arrays were hybridized according Affymetrix recommendations using the Ambion WT protocol (Life technologies, France) and Affymetrix labelling and hybridization kits. Raw data, transcript data and exon data were controlled with Expression console (Affymetrix).

### **Microarray data analysis**

Affymetrix Human Transcriptome Array 2.0 ST dataset analysis was performed using the GenoSplice technology ([www.genosplice.com](http://www.genosplice.com)). Data were normalized using quantile normalization. Background corrections were made with antigenomic probes and probes were selected according to their %GC, cross-hybridization status and potential overlap with repeat region as previously described [PMID:23861464, PMID:23321315, PMID:23284676]. Only probes targeting exons and exon-exon junctions annotated from FAST DB® transcripts (release fastdb\_2013\_2) were selected [PMID:16052034, PMID:17547750]. Only probes with a DABG P value  $\leq 0.05$  in at least half of the arrays were considered for statistical analysis [PMID:23861464, PMID:23321315, PMID:23284676]. Only genes expressed in at least one compared condition were analyzed. To be considered to be expressed, the DABG P-value had to be  $\leq 0.05$  for at least half of the gene probes. We performed an unpaired Student's t-test to compare gene intensities between ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> cells. Genes were considered significantly regulated when fold-change was  $\geq 1.5$  and P-value  $\leq 0.05$  (unadjusted P-value). Analysis at the splicing level was first performed taking into account only exon probes ('EXON analysis) in order to potentially detect new alternative events that could be differentially regulated (i.e., without taking into account exon-exon junction probes). Analysis at the splicing level was also performed by taking into account exon-exon junction probes ('SPLICING PATTERN analysis) using the FAST DB® splicing pattern annotation (i.e., for each gene, all possible

splicing patterns were defined and analyzed. All types of alternative events can be analyzed: Alternative first exons, alternative terminal exons, cassette exon, mutually exclusive exons, alternative 5' donor splice site, alternative 3' acceptor splice sites and intron retention). EXON and SPLICING PATTERN analyses were performed using unpaired Student's t-test on the splicing-index as previously described [PMID:23861464, PMID:23321315, PMID:23284676]. Results were considered statistically significant for unadjusted P-values  $\leq 0.05$  and fold-changes  $\geq 1.5$  for SPLICING PATTERN analysis and unadjusted P-values  $\leq 0.05$  and fold-changes  $\geq 2.0$  for EXON analysis. Gene Ontology (GO), KEGG and REACTOME analyses of differentially regulated genes were performed using DAVID [PMID:19131956].

### **Plasmid purification**

Hybrid minigene reporter plasmids pyPY, AdML and  $\alpha$ -globulin [30, 31] were kindly provided by Prof. Juan Valcárcel (Centre de Regulació Genòmica (CRG), Barcelona). Top10 competent cells (Invitrogen) were transformed with 100 ng of plasmid DNA, according to the recommended protocol. Briefly, the cells were incubated with the constructs on ice for 30 min followed by heat shock at 42°C for 1 min. After incubation on ice for 2 min, 500  $\mu$ L of LB medium was added to the cell vial and incubated at 150 rpm for 60 min at 37°C. Cultures were grown overnight at 37°C in LB/ampicillin plates. The next day, one colony was inoculated in LB/ampicillin (100 mg/mL) at 37°C overnight. Plasmid extraction was carried out using the ZR Plasmid Miniprep™ (Zymo Research) according with the manufacturer's protocol. DNA concentration was determined using Nanodrop (Alfagene) and integrity verified by running 200 ng in an agarose gel.

### **Cell transfection**

$4 \times 10^5$  cells per well were plated in gelatin-coated 6 well plates and incubated 24 h. Before transfection, the culture medium was changed to DMEM/F-12-AA without antibiotics and supplemented with 5% FBS. Cell were transfected with 200ng of the reporter plasmids using Lipofectamine® 2000 Transfection Reagent (Invitrogen) according with the manufacturer's instructions. Briefly, reporter plasmid minigenes and the transfection reagents were appropriately diluted in Opti-MEM medium separately and incubated for 5 min at room temperature. The mixed reagents were then incubated at room temperature for 20 min allowing the formation of transfection complexes. The cells were then incubated for 24 h with the transfection mix.

**Semi-quantitative PCR**

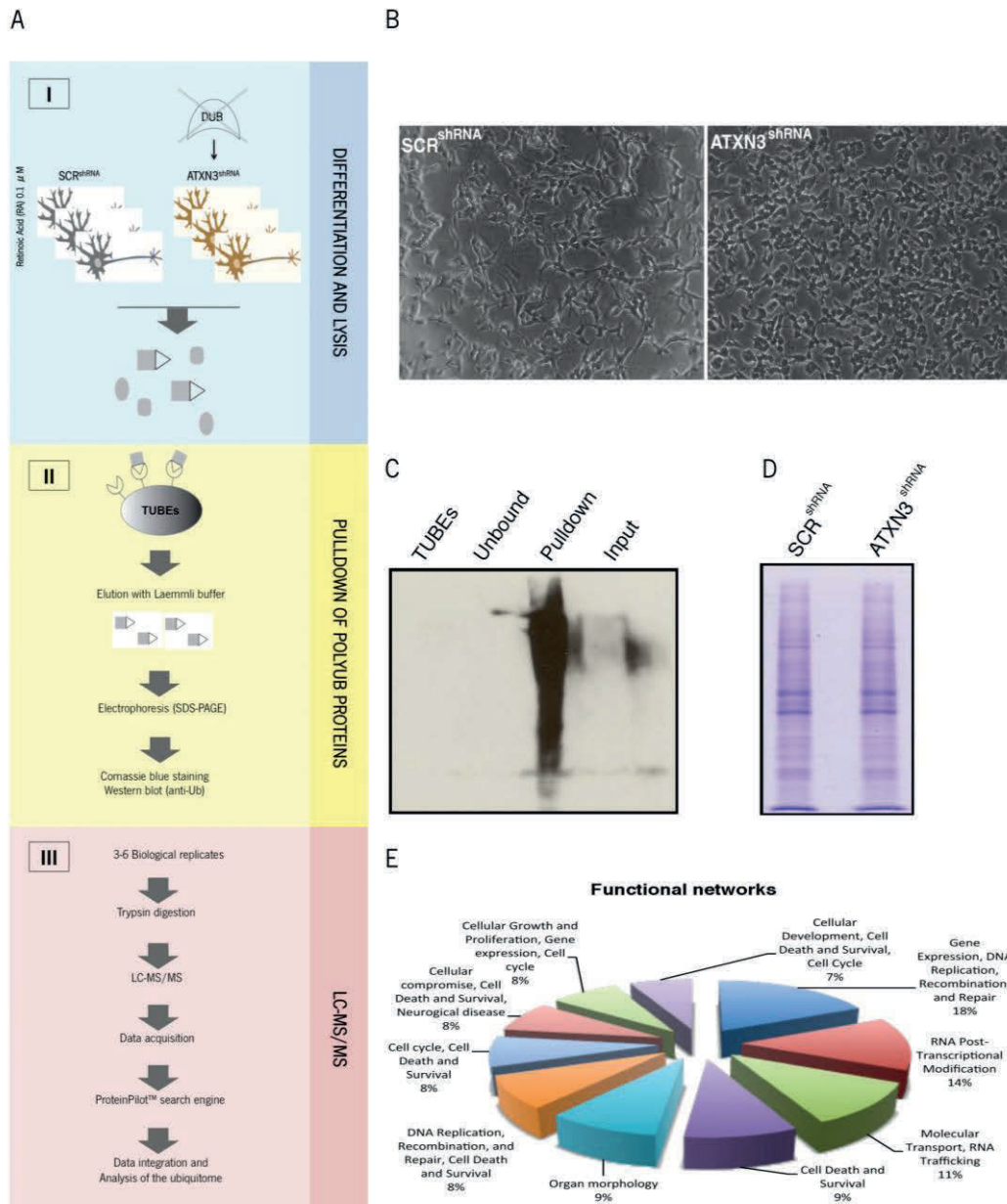
PCR amplification of pyPY, AdML and  $\alpha$ -globin reporter genes was carried out using Taq DNA Polymerase (Thermo Fisher Scientific) following the manufacturer's protocol. The cycling conditions were: 95°C for 5 min followed by 24 cycles of denaturing at 95°C for 1 min, annealing at 60°C for 45 sec, extension at 72°C for 1 min and final extension at 72°C for 5 minutes. The primers used are listed in Table A1. The PCR product was run in a 2% agarose gel. Gel analyses and splicing efficiency calculations were performed using Image Lab software (Bio-Rad).

**Statistical analysis**

Comparison between the different cell lines was performed using t-test in the GraphPad prism version 5.0 software. For real-time quantitative PCR data, the same approach was used and results were presented using the  $\Delta\Delta C_t$  method, as described before [32]. A critical value for significance of two-tailed  $p < 0.05$  was used throughout the study.

**RESULTS****Pulldown of the ubiquitome of ATXN3<sup>shRNA</sup> cells using Tandem Ubiquitin Binding Entities (TUBEs) and identification of polyubiquitylated proteins by LC-MS/MS**

In order to identify variations in the ubiquitome in neuronal cells lacking ATXN3 (ATXN3<sup>shRNA</sup> cells) [27], we used a recently developed methodology that combines Tandem Binding Ubiquitin Entities (TUBEs) with mass spectrometry (TUBEs-LC-MS/MS) [26]. Figure 1 summarizes the steps followed for the purification and identification of the polyubiquitylated proteins in ATXN3<sup>shRNA</sup> and SCR<sup>shRNA</sup> control cells. The integration of the data and the comparison between the proteins identified in ATXN3<sup>shRNA</sup> versus SCR<sup>shRNA</sup> cells resulted in a list of proteins with altered polyubiquitylation in cells lacking ATXN3; among these are potential direct targets of the DUB activity of ATXN3, i.e., putative ATXN3 substrates.



**Figure 1.** Experimental design – purification of polyubiquitylated proteins using TUBEs. (A-I, B) RA-treated SH-SY5Y cells (with silenced ATXN3 or not) were lysed and protein extracts were incubated with TUBEs. (A-II) TUBEs-captured proteins were recovered with Laemmli buffer and analyzed by (C) comassie blue staining of the polyubiquitylated proteins purified using TUBEs run in a 1-D SDS-PAGE gel or (D) western blot with anti-ubiquitin FK2 antibody. (A-III) Polyubiquitylated proteins were trypsin digested and identified by LC-MS/MS. (E) After acquisition, data were processed and integrated in functional networks. Adapted from [33].

In each pull-down experiment, around 1200-1300 proteins were identified. When the results of all the independent experiments were merged, we observed that many of these proteins were sporadically detected across the different experiments. For the remaining analysis, these proteins were excluded, reducing the list to about 615 proteins. From these polyubiquitylated proteins,

around 193 proteins showed altered levels in ATXN3<sup>shRNA</sup> cells comparing with the SCR<sup>shRNA</sup> controls ( $p < 0.05$ ) (Table 1).

Curiously, the majority of these polyubiquitylated proteins were absent (44.04%) or showed decreased polyubiquitylation levels (24.35%) in ATXN3<sup>shRNA</sup> cells. The proteins found to have altered polyubiquitylation levels in ATXN3<sup>shRNA</sup> cells were analyzed (enrichment analysis) using Ingenuity Pathways Analysis software (IPA, Ingenuity systems®) and can be grouped in 10 functional networks, including: (i) Gene expression, DNA replication, recombination and repair (17.7%), (ii) RNA post-transcriptional modification (13.3%), (iii) Molecular transport, RNA trafficking (10.8%), (iv) Cell death and survival (8.9%), and (v) Organ morphology (8.9%) (Figure 1E). The fact that a significant proportion of the proteins with altered polyubiquitylation in ATXN3<sup>shRNA</sup> cells are involved in RNA post-transcriptional modification, around 8% of them being splicing factors (Table 1), suggested to us that ATXN3 could be playing a role in this cellular process.

**Table 1.** Differences in polyubiquitylated proteins identified by TUBEs-MS in SH-SY5Y cells lacking ATXN3. List of polyubiquitylated proteins with altered levels in RA-treated ATXN3<sup>shRNA</sup> cells as compared with the SCR<sup>shRNA</sup> controls ( $p < 0.05$ ). These proteins were detected in at least 3 independent experiments. The values are the average of “unused” values given by the Proteinpilot algorithm. The absent “unused” values indicate the (near) complete absence of the polyubiquitylated protein. In red and green are proteins with increased and decreased polyubiquitylated levels, respectively. \$ indicates splicing factors.

Name	Average unused values		
	SCR <sup>shRNA</sup>	ATXN3 <sup>shRNA</sup>	p value
<b>Network 1 – Gene expression, DNA replication and repair</b>			
PGRMC1 (Membrane-associated progesterone receptor)	2.01	Absent	1.12E-14
RANBP2 (E3 SUMO-protein ligase)	Absent	2.02	6.16E-06
NASP (Nuclear autoantigenic sperm protein)	2.01	Absent	6.21E-06
PURB (Transcriptional activator protein Pur-beta)	2.01	Absent	6.22E-06
EHMT2 (Uncharacterized protein)	2.01	Absent	6.22E-06
CAP1 (Adenylyl cyclase-associated protein 1)	2.02	Absent	5.54E-05
TNPO1 (Transportin-1)	2.02	Absent	9.80E-05
DR1 (Protein Dr1)	Absent	2.04	3.00E-04
TRIM28 (Transcription intermediary factor 1-beta)	6.94	3.16	2.00E-03
EIF6 (Eukaryotic translation initiation factor 6)	3.80	5.80	2.00E-03
PLEC (Plectin)	Absent	13.96	4.00E-03

#### Chapter 4. Ataxin-3 and splicing

SNRPN (Small nuclear ribonucleoprotein-associated protein N)	5.3	8.01		5.00E-03
SFRS9 (Serine/arginine-rich splicing factor 9)	7	11.51	\$	7.00E-03
HDAC2 (Histone deacetylase 2)	8.35	3.97		9.00E-03
POLR2E (DNA-directed RNA polymerases I, II, and III subunit)	4.01	2.29		1.00E-02
HSP90B1 (Endoplasmic)	12.18	5.2		1.00E-02
SMARCB1 (Integraseinteractor 1b protein)	3.02	Absent		2.00E-02
UBC (Ubiquitin C splice variant)	12.91	9.03		2.00E-02
SKIV2L2 (Superkillerviralicidic activity 2-like 2)	5.18	Absent	\$	3.00E-02
FUS (RNA-binding protein)	11.88	6.9	\$	3.00E-02
HNRNPK (Heterogeneous nuclear ribonucleoprotein K)	7.21	12.73	\$	3.00E-02
FLOT1 (Flotillin-1)	3.27	Absent		4.00E-02
CBX5 (Uncharacterized protein)	3.51	Absent		4.00E-02
GNB2L1 (Guanine nucleotide-binding protein subunit beta-2)	6.26	Absent		4.00E-02
SMARCC2 (SWI/SNF complex subunit SMARCC2)	9.22	6.44		4.00E-02
TPM3 (Isoform 2 of Tropomyosin alpha-3 chain)	18.68	7.76		4.00E-02
C14orf166 (UPF0568 protein)	3.18	8.34		4.00E-02
ATRX (Transcriptional regulator)	5.31	13.08		4.00E-02
GAPDH (Glyceraldehyde-3-phosphate dehydrogenase)	17.00	11.55		5.00E-02

#### Network 2 – RNA pot-transcriptional modification

RPS10 (RPS10-NUDT3 protein)	2.37	Absent		6.22E-06
C1QBP (Complement 1Q subcomponent-binding protein)	Absent	4.42		8.00E-04
BPTF (Nucleosome-remodeling factor subunit)	2.08	Absent		1.00E-03
PRPF8 (Pre-mRNA-processing-splicing factor 8)	44.08	73.98	\$	1.00E-03
SFRS5 (Serine/arginine-rich splicing factor 5)	4.18	9.73	\$	5.00E-03
EMD (Emerin)	Absent	3.47		9.00E-03
HMGB3 (Uncharacterized protein)	3.84	2.18		1.00E-02
NUP205 (Nuclear pore complex protein)	8.3	30.67		1.00E-02
PRKCA (Protein kinase C alpha type)	2.37	Absent		2.00E-02
HNRNPA1P10 (Heterogeneous nuclear ribonucleoprotein A1)	7.8	Absent		2.00E-02
LRPPRC (Leucine-rich PPR motif-containing protein)	4.5	2.08		2.00E-02
AQR (Intron-binding protein aquarius)	8.71	12.1		2.00E-02
CAPZA1 (F-actin-capping protein subunit alpha-1)	2.37	Absent		3.00E-02
EEF1B2 (Elongation factor 1-beta)	3	Absent		3.00E-02
RPL9 (60S ribosomal protein L9)	Absent	4.42		3.00E-02
RPL18 (Uncharacterized protein)	2.37	Absent		4.00E-02
SRRT (Serrate RNA effector molecule)	3.25	2.02		4.00E-02
RBMX (Heterogeneous nuclear ribonucleoprotein G)	18.01	12.08	\$	4.00E-02
CNTN1 (Contactin-1)	Absent	4.42		4.00E-02



THOC2 (THO complex subunit)	2.78	5.21	6.00E-02
IARS (Uncharacterized protein)	Absent	4.42	8.00E-02

**Network 3 – Molecular transport, RNA trafficking**

DBN1 (Uncharacterized protein)	2.01	Absent	6.22E-06
UQCRC2 (Cytochrome b-c1 complex subunit 2)	4.04	Absent	1.38E-05
CANX (Calnexin)	4.05	Absent	2.00E-04
SPTBN1 (Spectrin beta chain)	6.34	3.01	1.00E-03
CALR (Calreticulin)	3.32	Absent	2.00E-03
KIF5C (Kinesin heavy chain isoform 5C)	7.65	Absent	2.00E-03
PSMA4 (Proteasome subunit alpha type-4)	2.13	4.7	2.00E-03
RAE1 (Uncharacterized protein)	<2	5.77	2.00E-03
CAND1 (Cullin-associated NEDD8-dissociated protein 1)	3.52	Absent	3.00E-03
YWHAG (14-3-3 protein gamma)	6.61	2.71	5.00E-03
PDIA3 (Protein disulfide-isomerase A3)	14.60	6.66	1.00E-02
NUP107 (Nuclear pore complex protein)	2.48	5.51	1.00E-02
NUP160 (Nuclear pore complex protein)	2.63	7.87	1.00E-02
PTPLAD1 (Butyrate-induced transcript 1)	3	Absent	3.00E-02
PSMC5 (26S protease regulatory subunit 8)	2.82	Absent	4.00E-02
CTPS (CTP synthase 1)	5	Absent	4.00E-02

**Network 4 – Cell death and survival**

PSME2 (Uncharacterized protein)	2.01	Absent	1.78E-16
GPI (Glucose-6-phosphate isomerase)	4.84	Absent	1.54E-05
ASNS (Asparagine synthetase)	2.81	Absent	2.00E-04
ESYT1 (Uncharacterized protein)	2.04	Absent	2.00E-04
ATAD3A (ATPase family AAA domain-containing protein 3A)	3.61	Absent	8.00E-04
ANXA5 (Annexin A5)	2.08	Absent	1.00E-03
HSPH1 (Heat-shock protein 105 kDa)	2.09	Absent	2.00E-03
RCC1 (Regulator of chromosome condensation)	4.93	3.47	2.00E-03
HSPD1 (60 kDa heat shock protein)	20.74	9.12	2.00E-03
PRDX1 (Uncharacterized protein)	Absent	6.71	2.00E-02
VARS (Valyl-tRNA synthetase)	2.73	Absent	4.00E-02
EIF4A1 (Eukaryotic initiation factor 4A-I)	7.52	3.45	4.00E-02
RARS (Isoform Monomeric of Arginyl-tRNA synthetase)	3.21	Absent	5.00E-02
RPL21 (60S ribosomal protein L21)	Absent	7.91	5.00E-02

**Network 5 – Organ morphology**

TBL2 (Uncharacterized protein)	Absent	2.01	7.59E-14
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#### Chapter 4. Ataxin-3 and splicing

PROSC (Prolinesynthetase co-transcribed)	2.04	Absent	1.19E-13
GSR (Glutathione reductase)	2.01	Absent	6.22E-06
BCLAF1 (Bcl-2-associated transcription factor 1)	2.19	Absent \$	4.71E-05
PFKM (6-phosphofructokinase)	3.84	Absent	3.00E-03
PDIA6 (Protein disulfide-isomerase A6)	17.24	12.22	4.00E-03
NAP1L1 (Nucleosome assembly protein 1-like 1)	15.76	10.35	7.00E-03
CKB (Creatine kinase B-type)	8.32	3.98	1.00E-02
AHCY (Adenosylhomocysteinase)	4.00	Absent	3.00E-02
PAICS (Multifunctional protein ADE2)	5.32	Absent	3.00E-02
UBA1 (Ubiquitin-like modifier-activating enzyme 1)	8.38	4.57	3.00E-02
RFC4 (Uncharacterized protein)	Absent	3.01	3.00E-02
MDH2 (Malate dehydrogenase)	11.14	5.87	4.00E-02
MYH10 (Uncharacterized protein)	48.70	62.36	4.00E-02

#### Network 6 - DNA replication, recombination and repair, cell death and Survival

ATXN10 (Ataxin-10)	2.01	Absent	1.78E-16
SNRPB2 (U2 small nuclear ribonucleoprotein B)	Absent	2.01	3.26E-11
SFRS2 (Splicing factor arginine/serine-rich 2)	Absent	2.16 \$	5.36E-11
RBM8A (RNA-binding protein 8A)	Absent	4.01	1.56E-06
MDC1 (Uncharacterized protein)	Absent	2.01	6.22E-06
SFRS7 (Serine/arginine-rich splicing factor 7)	7.45	5.29 \$	8.00E-04
NHP2 (Uncharacterized protein)	Absent	2.12	3.00E-03
TFAP2B (Isoform 2 of Transcription factor AP-2-beta)	7.60	3.37	2.00E-02
MAP1B (Microtubule-associated protein 1B)	11.14	6.12	2.00E-02
CRKL (Crk-like protein)	Absent	4.705	2.00E-02
CAD (Uncharacterized protein)	3.56	Absent	4.00E-02
VIM (Vimentin)	12.20	27.61	4.00E-02

#### Network 7 - Cell cycle, Cell death and survival

CS (Citrate synthase)	2.01	Absent	1.78E-16
UBXN1 (UBX domain-containing protein 1)	2.01	Absent	1.78E-16
TUBA4A (Tubulin alpha-4 chain)	4.05	Absent	3.00E-03
SAFB (Uncharacterized protein)	6.01	6.32	4.00E-03
ACLY (Uncharacterized protein)	2.2	Absent	8.00E-03
BRD1 (Bromodomain-containing protein 1)	2.65	Absent	1.00E-02
SON (Isoform C of Protein SON)	4.15	9.79	1.00E-02
PHB2 (Prohibitin-2)	22.15	6.71	2.00E-02
PRPF40A (Pre-mRNA-processing factor 40 homolog A)	7.17	10.6 \$	2.00E-02
PHB (Prohibitin)	13.05	4.96	3.00E-02

HSP90AB1 (Heat shock protein HSP 90-beta)	28.70	18.89	3.00E-02
WDR3 (WD repeat-containing protein 3)	15.65	9.64	4.00E-02

**Network 8 - Cellular compromise, Cell death and survival**

MYL6 (Myosin light polypeptide 6)	Absent	2.01	7.60E-14
ENO2 (Enolase)	2.02	Absent	6.16E-06
ERLIN2 (Uncharacterized protein)	Absent	2.01	2.48E-05
RPL23A (60S ribosomal protein)	4.16	2.23	5.63E-05
CLIC1 (Chloride intracellular channel protein 1)	3.39	Absent	1.00E-03
ATAD2B (ATPase family AAA domain-containing protein 2B)	4.15	Absent	1.00E-03
ATP5B (ATP synthase subunit beta)	15.65	13.16	7.00E-03
CDK5 (Cyclin-dependent kinase 5)	4.25	2.67	9.00E-03
SPTAN1 (Spectrin alpha chain)	19.02	12.18	2.00E-02
SPIN1 (Spindlin-1)	Absent	2.85	2.00E-02
GNAO1 (Guanine nucleotide-binding protein G(o) subunit alpha)	Absent	4	4.00E-02

**Network 9 - Cellular growth and proliferation, Gene expression, Cell cycle**

GNAL (Guanine nucleotide-binding protein G(olf) subunit alpha)	Absent	2.07	2.05E-10
EIF3L (Eukaryotic translation initiation factor 3)	2.01	Absent	6.22E-06
EIF3B (Uncharacterized protein)	2.01	Absent	6.22E-06
TMEM33 (Transmembrane protein 33)	Absent	2.01	6.22E-06
RAB5C (Uncharacterized protein)	3.35	Absent	9.71E-05
SIX6 (Homeobox protein)	2.02	Absent	9.80E-05
RPA1 (Replication protein A 70 kDa)	4.73	Absent	2.00E-02
COPA (Coatomer subunit alpha)	5.69	Absent	2.00E-02
MAB21L1 (Protein mab-21-like 1)	6.16	Absent	2.00E-02
RAB1B (Ras-related protein)	Absent	3.17	2.00E-02
RBM12B (RNA-binding protein 12B)	6.09	7.91	2.00E-02

**Network 10 . Cellular development, Cell death and survival, Cell cycle**

RBM10 (RNA-binding protein 10)	Absent	2.02	4.78E-19
CCT8 (T-complex protein 1 subunit theta)	6.42	Absent	5.72E-08
TCP1 (T-complex protein 1 subunit alpha)	6.01	Absent	2.77E-06
PSMA1 (Proteasome subunit alpha type-1)	2.01	Absent	6.22E-06
MAP1S (BPY2 interacting protein 1)	Absent	2.04	5.43E-05
GLTSCR2 (Uncharacterized protein)	2.02	Absent	9.80E-05
CCT5 (T-complex protein 1 subunit epsilon)	2.04	Absent	2.16E-04
GDI1 (Rab GDP dissociation inhibitor alpha)	4.77	Absent	9.16E-04

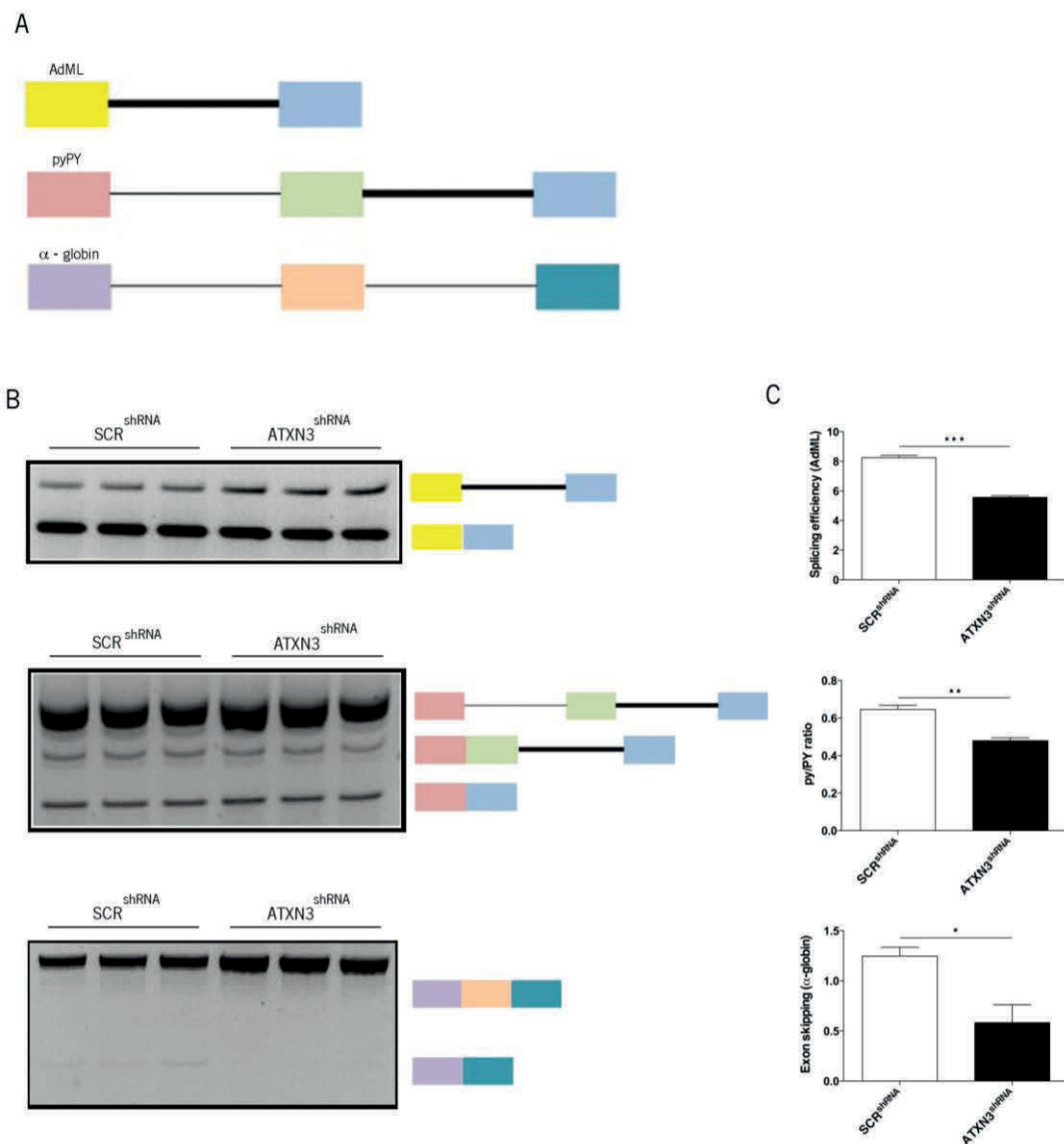
#### Chapter 4. Ataxin-3 and splicing

TUBB2C (Tubulin beta-2C chain)	20.31	Absent	4.76E-02
CCT4 (T-complex protein 1 subunit delta)	5.16	2.46	4.78E-02
<b>Other</b>			
CUTA (Isoform A of Protein CutA)	Absent	2.01	7.59E-14
GNAI3 (Guanine nucleotide-binding protein G(k) subunit alpha)	Absent	2.01	7.59E-14
TRAP1 (Uncharacterized protein)	2.04	Absent	6.58E-13
ABT1 (Activator of basal transcription 1)	Absent	2.02	2.34E-12
PSMA8 (Proteasome subunit alpha type-7-like)	2.03	Absent	7.71E-12
POTEE (POTE ankyrin domain family member E)	Absent	2.02	7.49E-11
C9orf114 (Uncharacterized protein)	4.01	Absent	1.56E-06
SEPT7 (Uncharacterized protein)	2.01	Absent	6.21E-06
HMBOX1 (Uncharacterized protein)	2.01	Absent	6.21E-06
GLOD4 (CGI-150 protein)	2.01	Absent	6.22E-06
DDX41 (DEAD-box protein abstrakt variant)	2.01	Absent	6.22E-06
DDX56 (ATP-dependent RNA helicase)	2.05	Absent	2.38E-05
PSMA8 (Uncharacterized protein)	Absent	2.01	2.48E-05
TOMM22 (Mitochondrial import receptor subunit)	Absent	4.59	2.54E-05
HIST2H2BD (Histone H2B type 2-D)	Absent	2.77	9.17E-05
BLVRA (Biliverdinreductase A)	2.7	Absent	2.00E-04
ACTL6B (Actin-like protein 6B)	Absent	2.525	3.00E-04
LUC7L (Putative RNA-binding protein Luc7-like 1)	2.68	Absent	5.00E-04
CHMP5 (Charged multivesicular body protein 5)	3.02	Absent	6.00E-04
ISOC1 (Isochorismatase domain-containing protein 1)	3	Absent	7.00E-04
RPL24 (60S ribosomal protein L24)	5.97	2.32	2.00E-03
ABCF1 (ATP-binding cassette sub-family F member 1)	2.75	Absent	3.00E-03
BMS1 (Ribosome biogenesis protein)	5.64	9.42	4.00E-03
PDS5B (Sister chromatid cohesion protein)	4.13	15.82	4.00E-03
PSMD1 (26S proteasome non-ATPase regulatory subunit 1)	3.80	Absent	5.00E-03
DIMT1 (Probable dimethyladenosinetransferase)	3.29	Absent	6.00E-03
WDR75 (WD repeat-containing protein 75)	10.98	8.46	7.00E-03
DDX10 (Probable ATP-dependent RNA helicase)	7.60	3	1.00E-02
DPM1 (Uncharacterized protein)	2.61	6.08	1.00E-02
SLC25A11 (Mitochondrial 2-oxoglutarate/malate carrier)	2.04	6.56	1.00E-02
FN3K (Fructosamine-3-kinase)	2.32	Absent	2.00E-02
ZNF828 (ZNF828 Zinc finger protein 828)	3.05	Absent	2.00E-02
DDX49 (Probable ATP-dependent RNA helicase)	4.32	2.06	2.00E-02
EIF5B (Eukaryotic translation initiation factor 5B)	3.97	10.36	2.00E-02
RTL1 (Retrotransposon-like protein 1)	3.51	Absent	3.00E-02

RANP1 (Uncharacterized protein)	8.63	4.17	3.00E-02
DHX8 (Uncharacterized protein)	Absent	3.01	3.00E-02
MYEF2 (Myelin expression factor 2)	5.58	2.89	4.00E-02
HMGA1 (High mobility group protein HMG-I/HMG-Y)	3.85	3.1	4.00E-02
PELP1 (Proline-, glutamic acid-, leucine-rich protein 1)	6.83	11.12	4.00E-02

### **Absence of DUB ATXN3 leads to a deregulation of the splicing machinery in neuronal cells**

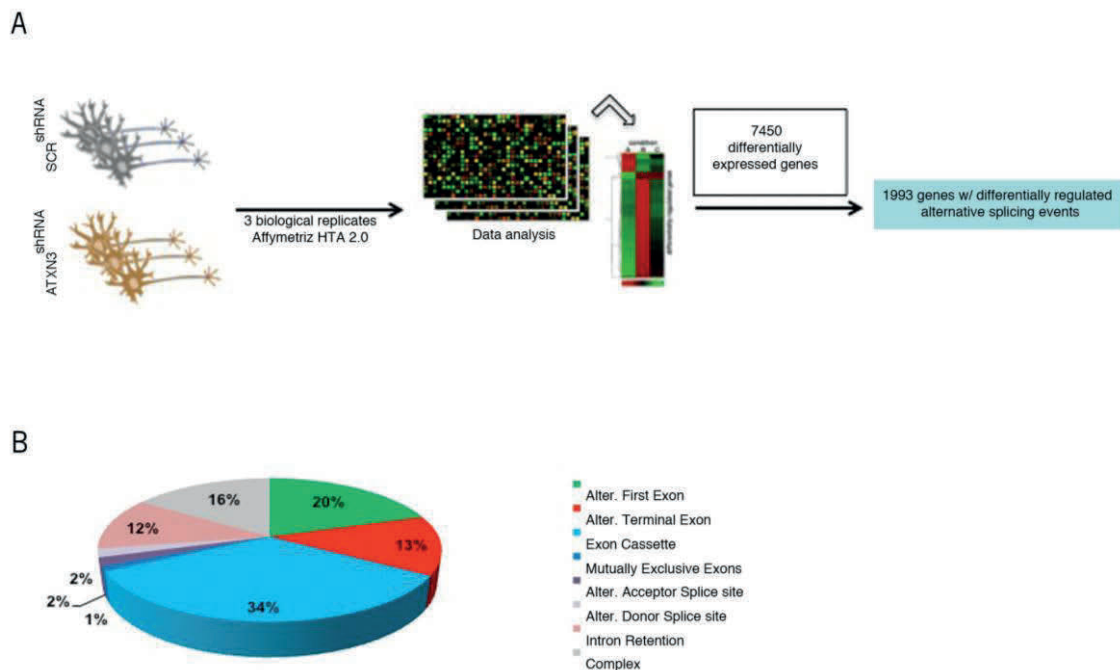
Given the altered ubiquitylation of splicing factors in ATXN3<sup>shRNA</sup> cells, we hypothesized that absence of ATXN3 could lead to a global deregulation of the pre-mRNA splicing process. To address this, we used three hybrid minigene reporter plasmids: the  $\alpha$ -globin minigene for which the alternative splicing (exon skipping) is indicative of the performance of regulatory splicing factors such as hnRNP and SF proteins, the AdML minigene representing constitutive/strong splicing events, and the pyPY minigene, representing splicing events with alternative competing 3' acceptor sites/splice sites [30, 31] (Figure 2A). As shown in Figure 2B and C, knockdown of ATXN3 significantly altered the processing of the 3 splicing reporters, suggesting a general deregulation of the splicing machinery.



**Figure 2.** Efficacy of RNA processing assessed by splicing reporter minigenes in ATXN3<sup>shRNA</sup> cells. (A) Schematic representation of the splicing reporter minigenes used for cell transfection. Exons are represented as colored boxes and introns by black lines. The AdML minigene contains one intron, giving rise to two bands: the upper band corresponds to the unspliced transcript, the lower band to the spliced product. The pyPY minigene contains two alternative splice sites originating three bands: an upper band corresponding to the unspliced transcript, a middle band corresponding to the splicing of the weak py tract and a lower band corresponding to the splicing product of the strong PY tract. The pyPY minigene contains two alternative 3' splice sites associated with polypirimidine (Py) tracts with different strengths. The weak Py tract (py) is represented by thin black lines and the strong Py tract (PY) by a thick black line. The α-globin minigene contains two introns and a set of G triplets in intron 2 that promote the recognition of the 5' splice site leading to skipping of exon 2. (B, C) Semi-quantitative analysis of minigene alternative splicing showed a decreased efficiency of splicing in ATXN3<sup>shRNA</sup> cells. Schemes for the splicing products are indicated on the right. \*p<0,05; \*\*p<0,01; \*\*\*p<0,001.

### Microarray analysis of alternative splicing in ATXN3<sup>shRNA</sup> cells

To further explore the putative involvement of ATXN3 in splicing and in alternative splicing regulation in neuronal cells, we performed microarray analysis (Figure 3A) using specific arrays that contain additional probes for exon/exon junctions. In agreement with our hypothesis, a large proportion of the 7450 differentially expressed genes (43%) presented differentially regulated alternative splicing events (Table A2) in RA-treated ATXN3<sup>shRNA</sup> cells. The most prevalent alternative event types were related with exon cassettes (34%) and usage of alternative first exons (20%) (Figure 3B).



**Figure 3.** Experimental design – microarray analysis of alternative splicing. (A) Affymetrix Human Transcriptome Array 2.0 ST analysis were used to assess perturbation of global splicing patterns in RA-treated ATXN3<sup>shRNA</sup> cells. (B) Distribution of the differentially regulated alternative splicing events in ATXN3<sup>shRNA</sup> cells. Three independent biological replicates were used for analysis.

KEGG pathway analysis of the genes with differentially regulated alternative splicing events identified 22 significant pathways (Table 2).

**Table 2.** KEGG pathway analysis of genes with altered splicing in ATXN3<sup>shRNA</sup> cells. The genes identified on the KEGG pathway analysis presented at least one differentially regulated exon/splicing pattern in ATXN3<sup>shRNA</sup> cells.

Pathway description (KEGG)	Number of genes in the pathway	Number of altered genes	p value
Nucleotide excision repair	44	21	1.24E-04
Adherens junction	77	30	1.40E-04
Spliceosome	126	42	1.93E-04
Ubiquitin mediated proteolysis	137	43	3.16E-04
Endometrial cancer	52	21	5.37E-04
Neurotrophin signaling pathway	124	38	1.23E-03
Axon guidance	129	39	1.39E-03
Pathogenic Escherichia coli infection	57	22	2.03E-03
Endocytosis	184	52	3.36E-03
Prostate cancer	89	30	4.20E-03
RNA degradation	57	20	5.01E-03
Ribosome	87	28	6.12E-03
Pathways in cancer	328	79	7.35E-03
Focal adhesion	201	52	1.25E-02
MAPK signaling pathway	267	64	1.79E-02
Apoptosis	87	25	2.26E-02
VEGF signaling pathway	75	22	2.70E-02
Colorectal cancer	84	24	2.75E-02
Pancreatic cancer	72	21	3.30E-02
Type I diabetes mellitus	42	17	3.45E-02
Fc gamma R-mediated phagocytosis	95	27	3.53E-02
Selenoamino acid metabolism	26	10	3.71E-02
Alzheimer's disease	163	40	4.49E-02

Intriguingly, one of the top KEGG pathways was the spliceosome itself ( $p=0.000193$ ) with 33% of the genes involved in the pathway presenting altered splicing events in ATXN3<sup>shRNA</sup> cells (Figure 4A). Some of these genes were also differentially expressed and had altered ubiquitylation in ATXN3<sup>shRNA</sup> cells (Table 1 and Figure 4A). Other relevant pathways were the ubiquitin mediated proteolysis, neurotrophin signaling, axon guidance, focal adhesion and MAPK signaling pathway, as well as the link to AD (Table 2). We next analyzed the candidate splicing factors related to the deregulated splicing events in ATXN3<sup>shRNA</sup> cells. Remarkably, around 6% of the proteins presenting altered polyubiquitylation levels in ATXN3<sup>shRNA</sup> cells while showing no alterations at the transcription level, were identified in the bioinformatic analysis of the microarray data as predicted regulators of genes with a differentially regulated exon/splicing pattern in these cells. Among these, four splicing factors did not present alterations in expression nor differentially regulated exons, but showed





regulated in ATXN3<sup>shRNA</sup> at the alternative splicing (blue/black), total mRNA expression (white/red), both alternative splicing and total mRNA expression (blue/red) and ubiquitylation (green dot) level. (B) Venn diagram showing overlapping of splicing factors presenting globally altered expression, differentially regulated exons and altered polyubiquitylation levels in ATXN3<sup>shRNA</sup> cells.  $p \leq 0.05$ .

## **DISCUSSION**

Ubiquitin signaling is now widely recognized as a fundamental molecular mechanism controlling a broad range of intracellular events in the nervous system (Reviewed in [5, 34, 35]). Taking into account the importance of DUB enzymes in maintaining the ubiquitylation balance, we focused on the characterization of the ubiquitome of neuronal cells lacking ATXN3 [27]. Using TUBE<sub>s</sub>, that enable the pulldown of polyubiquitylated proteins without further genetic manipulation or inhibition of the proteasome [26], in combination with LC-MS/MS, we were able to consistently identify around 615 proteins per condition, which seems to be a yield comparable to those described in other studies [33, 36]. Among the proteins identified, approximately one third presented altered levels of polyubiquitylation in ATXN3<sup>shRNA</sup> cells. Curiously, the majority of these proteins presented decreased levels of polyubiquitylation, suggesting that normally ATXN3 might be preventing their degradation for instance by editing the substrate's ubiquitylation and preventing its degradation. Therefore, when ATXN3 is silenced, the ubiquitin signaling is not removed, which may result in an increased degradation of the targeted protein. We have previously shown that absence of ATXN3 causes a decrease of the polyubiquitylated forms of  $\alpha 5$ -integrin, a potential substrate of ATXN3 DUB activity, in parallel with a decrease of the total levels of this protein [27, 37].

The fact that a significant proportion of the proteins with altered polyubiquitylation levels in ATXN3<sup>shRNA</sup> cells were splicing factors and proteins involved in RNA processing, led us to raise the hypothesis that ATXN3 could be playing a role in the pre-mRNA splicing process in neuronal cells. Indeed, the relative concentration of splicing factors and heterogeneous nuclear ribonucleoproteins (hnRNPs) have been shown to regulate alternative splicing (Reviewed in [38]). When we assessed general splicing effectiveness in cells depleted of ATXN3 using artificial reporter minigenes, we found a reduction in reporter splicing, further suggesting the involvement of ATXN3 in the regulation of the splicing machinery. Additionally, genome wide microarray analysis of splicing events revealed that absence of ATXN3 leads to an alteration in the pattern of alternative splicing events in a large number of genes in neuronal cells, including genes encoding spliceosome components, but also genes related with protein degradation, adhesion, axon guidance and signaling pathways. These findings are interesting, since we have previously described that absence of ATXN3 leads to

impairment in neuronal differentiation and adhesion, and deregulates the degradation of target proteins [27]. Significantly, a portion of predicted regulators of those genes were found to have altered levels of polyubiquitylation in our proteomic analysis, the majority of them being Serine/arginine (SR)-rich phosphoproteins. Proteins of the SR family are key players in the control of alternative splicing, regulating the selection of alternative sites (Reviewed in [39, 40]). Protein kinases such as AKT that are involved in the phosphorylation of SR and hnRNP, usually acting as antagonists of SR proteins in alternative splicing process, were also found to have altered ubiquitylation patterns in our study [41]. Interestingly, we have previously observed that the phosphatidylinositol 3-kinase (PI3K)/AKT signaling pathway was deregulated in ATXN3<sup>shRNA</sup> cells [27]. While the majority of the identified SR factors were predicted to regulate a large number of genes (Supplementary Table A2), the serine/arginine-rich splicing factor 2 (SFSR2) was predicted to regulate the Tripartite motif 36 (TRIM36) gene. TRIM36 is an E3 ubiquitin ligase [42, 43] that mediates ubiquitylation and subsequent proteasomal degradation of target proteins and was also reported to be associated with the microtubule cytoskeleton [44, 45] and to regulate cell cycle [45]. As we have previously observed that ATXN3<sup>shRNA</sup> cells showed a disruption of the cytoskeletal network and that they keep proliferating even after being induced to differentiate, it would be interesting to dissect the contribution of SFSR2 and TRIM36 to this phenotype.

Overall, our data suggest that ATXN3 is involved in splicing regulation probably through the modulation of the ubiquitylation of splicing factors. This regulatory role may be mediated through the DUB activity of ATXN3 by modulating activation, degradation and/or subcellular localization of splicing factor, or may be an indirect result of the modulation of E3 ligases specific for these targets. It remains to be seen whether this finding is also relevant for the neurodegeneration observed in MJD. Recently, several pieces of evidence have suggested an association between perturbation of alternative splicing and several neurodegenerative disorders, including AD, HD, PD, SMA and ALS (Reviewed in [46-48]). For example, it was described that several ataxia-causing proteins interact with splicing factors [49]. Also, the RNA-binding protein TDP-43 has been found to be the major component of the characteristic inclusions seen in a number of neurodegenerative diseases [50-52]. Sun and colleagues have shown that expression of mutant ATXN3 bearing an expanded polyQ tract in HeLa cells alters the ability of the subnuclear domains known as Cajal bodies to participate efficiently in small nuclear ribonucleoprotein (snRNP) biogenesis pathway and reduces the efficacy of splicing of reporter genes, and suggested that this was a consequence of the disruption of the normal function of ATXN3 in the UPS [53]. This possibility should be further explored in neuronal

**Chapter 4.** Ataxin-3 and splicing

cells and animal models expressing expanded ATXN3. This should contribute to our understanding whether the role of ATXN3 in splicing is important for MJD pathogenesis.

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## **Chapter 5**

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**General Discussion and Future Perspectives**





## 5.1 The neuronal function(s) of ATXN3

The precise physiological role(s) of ATXN3 are still poorly identified. This is particularly true when focusing on its biological function in neurons. However, the selective neuronal degeneration observed in MJD highlights the importance of determining what is ATXN3 doing in neurons, for our understanding of the pathogenic mechanism(s). We chose the SH-SY5Y human neuroblastoma cell line as a model to generate mutant cell lines of ATXN3 knockdown, to gain insight into the physiological function of ATXN3 in neuronal cells. Interestingly, ablation of ATXN3 function in these cells led to a clear phenotype, which will be discussed in the following sections.

### 5.1.1 Defining the ubiquitome of SH-SY5Y ATXN3 KD cells

As mentioned above, although it has been demonstrated that ataxin-3 is a DUB enzyme, its substrates remain mostly unidentified. To date, it was only demonstrated that ataxin-3 deubiquitylates CHIP [1] and parkin both *in vitro* and in cells [2], and it most likely regulates the ubiquitylation and degradation of  $\alpha$ 5-integrin [3, 4]. However, the fact that Atxn3 KO mice present increased total levels of ubiquitylated proteins [5] suggests that ataxin-3 may regulate the ubiquitylation status of many proteins.

Typically, researchers study the fate of a single Ub substrate, characterize its mode of recognition and ubiquitylation, and study its regulation under variable pathophysiological conditions. In this study, taking into account the suggested diversity of substrates for ATXN3, we took an integrated approach based on mass spectrometry. There are at least three confounding factors that could limit this approach: (i) only a small percentage of a given protein is ubiquitylated in the steady state, (ii) the enzymatic action of DUBs decrease the levels of ubiquitylated proteins upon cell lysis, and (iii) the existence of ub-like proteins. To overcome these limitations, we used a recently described methodology based in Tandem Ubiquitin Binding Entities (TUBEs) to isolate

polyubiquitylated proteins from our cell lines depleted for ATXN3 and compare them to control cells. This strategy presents the following advantages over the classical approaches: TUBEs (i) protect polyubiquitylated proteins against DUBs and the proteasome, (ii) do not require the presence of chemical inhibitors, addition of tags, protein overexpression or genetic manipulations, (iii) reduce the effects on Ub chain architecture, and (iv) specifically recognize polyUB chains and no other Ub-like proteins [6, 7].

From this experiment, we have successfully identified 615 ubiquitylated proteins, from which 193 were present at altered levels in ATXN3 KD cells, some of which may constitute candidate substrates of ATXN3's DUB activity.

### **5.1.2 The balance of ubiquitylation and ATXN3**

Because ubiquitylation has been shown to play a crucial role in the regulation of neuronal development, differentiation and function, it needs to be tightly controlled (Reviewed in [8]). Thus, loss of DUB enzymes and consequent disruption of the ubiquitylation homeostasis might disturb neuronal function, by altering the stability of individual proteins, leading to neuronal dysfunction. In agreement with this hypothesis, we found that silencing of ATXN3 in neuronal cells led to an alteration of the polyubiquitylation in 32% of the identified proteins in our TUBES-LC-MS/MS approach (Chapter 4). Curiously, the majority of these proteins showed decreased abundance in the polyubiquitylated protein fraction in ATXN3 KD cells, and we showed that proteasome inhibition leads to an accumulation of such proteins (Chapter 2). This suggests that ATXN3 might be preventing the degradation of these proteins. One good example is ITGA5. We have shown that ATXN3 interacts with ITGA5 [3] and normally acts to inhibit ITGA5 degradation, affecting its steady-state levels; when ATXN3 is silenced, more ubiquitylated ITGA5 accumulates in the cell (detectable only upon proteasome inhibition), and ITGA5 is extensively degraded causing defects in cell

adhesion and deregulation of downstream cascades (Chapter 2). Interestingly, this regulatory mechanism seems to be important for different cellular types, since our team has shown before that rescue of Itga5 from proteasomal degradation by mouse Atxn3 is essential for muscle cell differentiation *in vitro* [3]. Another finding illustrating this concept is the decreased levels of SFRS7 that are observed in ATXN3 depleted cells (Chapter 3). In this case, technical limitations excluded the confirmation of SFRS7 as a target of direct regulation by ATXN3, as the inhibition of the proteasome leads to a general inhibition of splicing factors expression. Optimization of this assay is ongoing. However, the possibility remains that SFRS7 and other proteins can also be indirect targets of the DUB activity of ATXN3. It is possible that ATXN3 is modulating the activity of E3 ligases for these substrates and this way controlling their degradation. In line with that, ATXN3 was already shown to regulate the activity of some E3s, such as Parkin [2] and CHIP [9]. In the case of ITGA5, at least one E3 ligase was already identified that coordinates its degradation by the proteasome – Cbl [10]. To better understand the regulation of ITGA5 by ATXN3, it would be valuable to determine whether ATXN3 interacts directly with the intracellular domain of this protein and deubiquitylates it *in vitro*, or whether it interacts with and regulates Cbl activity.

Alternatively, many of these molecular alterations may also occur due to cellular compensatory mechanisms and/or be a consequence of other cellular changes due to the absence of ATXN3. In this case, overexpression of an ATXN3 version lacking the cysteine 14 residue (ATXN3\_C14A), critical for its DUB activity [11] allows us to dissociate the ubiquitome changes induced by the absence of ATXN3 (and cellular compensations induced by this absence) from the ones associated with the abolishment/perturbation of its DUB activity.

Looking at the overall changes in the ubiquitome of neuronal cells lacking ATXN3, it seems evident that ATXN3 is contributing (either direct or indirectly) to the regulation of proteasomal

degradation of many diverse substrates and can be participating in different biological pathways. Grouping the proteins with altered levels of polyubiquitylation in ATXN3 mutant cells, we found that a significant number were involved in: i) gene expression, ii) RNA post-transcriptional modifications, iii) molecular transport and RNA trafficking, and iv) cell death and survival, classes that were in concordance with other findings, which supports the importance of the ubiquitylation balance for cellular homeostasis. This will be discussed in the next sections.

### **5.1.3 Splicing and ATXN3**

The fact that a significant proportion of the proteins with altered polyubiquitylation levels in ATXN3 cells were splicing factors and proteins involved in RNA processing caught our attention. Recently, the use of new technologies such as exon arrays and RNA-seq to study the human transcriptome have revealed an association between alternative splicing and a number of neurodegenerative disorders, including AD, HD, PD, Spinal Muscular Atrophy (SMA), Amyotrophic lateral sclerosis (ALS) and Frontotemporal lobar degeneration (FTDP-17) (Reviewed in [12-15]). For example, mutations in presenilin 1 (PSEN1) and presenilin 2 (PSEN2), proteins involved in AD pathology, lead to the formation of aberrant transcripts bearing in frame insertions or lacking exon 4, resulting in increased  $\beta$ -amyloid levels, causally linked to AD [16-18]. Also, mutant Huntingtin (htt), the disease-protein involved in HD, was shown to affect alternative splicing of the BDNF gene, in a transgenic mouse model of HD [19]. Recently, it was shown that mutant HTT alters alternative splicing of tau exon 10 causing a deregulation of the 4R/3R tau isoform ratio and total tau content, a phenomenon that seems to be playing a role in HD pathogenesis [20]. The alteration of FUS-regulated RNA processing has also been proposed as a key event in ALS (Reviewed in [21-23]). The skipping of exon 7 of survival motor neuron (SMN) gene leads to a truncated and highly unstable protein resulting in SMA [13]. The RNA-binding protein TDP-43 is a major component of inclusions characteristic of a number of neurodegenerative conditions [24-26]. Although not yet explored in

detail, interaction of several ataxia-causing proteins with splicing factors have also been described, namely for proteins linked to SCA2, 8, 10 and 12 (Reviewed in [27]).

Indirect pieces of evidence suggest that ubiquitylation may regulate splicing: i) Ub and Ub-like proteins co-purify with splicing complexes [28, 29], ii) ubiquitylated splicing factors have been identified in proteomic studies [30], iii) several protein domains related to the UPS were found in key spliceosome proteins [31-34], iv) essential splicing factors as Prp19 and Prp8 have Ub ligase activity *in vitro* [31, 35, 36], and v) Ub mutants (I44A) with diminished capacity for protein-protein interactions strongly inhibit splicing *in vitro* [37]. Additionally, the relative concentration of splicing factors and heterogeneous nuclear ribonucleoproteins (hnRNPs) have been shown to regulate alternative splicing (Reviewed in [38]). Considering that ATXN3 is an Ub hydrolase, we hypothesized that it could also be playing a role in the regulation of pre-mRNA processing.

Indeed, we have shown that ATXN3 interacts with the splicing factor SRSF7, a protein acting on the alternative splicing of tau mRNA. Additionally, we demonstrated that absence of ATXN3 leads to a deregulation of tau exon 10 alternative splicing, perturbing the 3R/4R tau isoform ratio (Chapter 3). We further demonstrated that this effect might be relevant for MJD pathogenesis, since we have observed similar events in cells overexpressing mutant ATXN3 and in the brain of a transgenic mouse model of MJD. Interestingly, overexpression of the 4R isoform in cells lacking ATXN3, rescued some of the phenotypic abnormalities of these cells, described in Chapter 2. This result prompted us to ask whether the potential role for ATXN3 in the pre-mRNA splicing process was specific for the *MAPT* gene or if absence of ATXN3 could have a global impact on splicing machinery. Interestingly, we found that knockdown of ATXN3 significantly reduced the efficacy of the processing of three hybrid minigene reporters, suggesting a global deregulation of the splicing process in the cell (Chapter 4). In addition to this, by performing microarray analysis of alternative

splicing, we uncovered dramatic changes in alternative splicing (mostly exon cassettes and usage of alternative first exons) in neuronal cells lacking ATXN3. Remarkably, several proteins presenting altered polyubiquitylation levels in ATXN3 mutant cells were identified in the bioinformatic analysis of the microarray data as predicted regulators of splicing genes with an altered splicing pattern in these cells, namely SFRS2, 5, 7 and 9. Among them, SFRS2 caught our attention because it was predicted to regulate the tripartite motif 36 (*TRIM36*) gene. TRIM36 is an E3 Ub ligase reported to regulate cell cycle [39] and to be associated with the microtubule cytoskeleton [40]. As we have observed that absence of ATXN3 causes a disruption of the cytoskeleton network and that mutant cells have an abnormal proliferative activity (Chapter 2), it would be interesting to evaluate the contribution of TRIM36 to this phenotype. Furthermore, KEGG pathway analysis of the microarray data identified several genes with altered alternative splicing patterns belonging to Ub mediated proteolysis, neurotrophin signaling, axon guidance, focal adhesion and MAPK signaling pathways, as well as linked to AD, which would also be interesting to further explore.

In line with our observations, Sun and colleagues have shown that expression of mutant ATXN3 (bearing an expanded polyQ tract) disturbs the biogenesis of small nuclear ribonucleoproteins (snRNPs) and reduces the efficacy of splicing reporter genes in HeLa Cells [41]. It would be interesting to further explore if this novel role of ATXN3 is also relevant for the neurodegeneration observed in MJD, by analyzing this process in primary cultures of neuronal cells and in affected brain regions of animal models expressing expanded ATXN3. If this were the case, it would also be interesting to determine whether the splicing alterations were age-related (since MJD is a late onset disease) and if they could correlate with the symptoms and neurodegeneration present in MJD patients. Indeed, it was reported that age-related splicing changes occur in healthy individuals and that this event may constitute a link between aging and neurodegeneration in AD

[42]. The tissue-specific splicing patterns could also provide a key to neurospecificity in MJD and other neurodegenerative diseases.

Other pathways enriched in our analysis were pathways related with cancer and nucleotide excision repair (NER). Indeed, several recent reports have been demonstrating a link between alteration of splicing profiles and cancer [43-45]. It is thought that altered activity, expression levels or even mutations of splicing regulators may be associated with tumor progression and to contribute to metastases formation [46]. Interestingly, in the last few years a tight connection between SRSFs and cancer has been demonstrated. Also, although some aspects of the relationship between DNA repair mechanisms and alternative splicing have not been fully explained, a link between mRNA metabolism and genomic stability has been provided by the following observations: i) the mRNA splicing pattern of crucial genes is altered in DNA damage response [47], ii) the intracellular distribution of splicing factors changes following genotoxic damage (Reviewed in [48, 49]), iii) DNA damage inhibits transcription [48, 49], and iv) mRNA stability is affected by DNA damage (Reviewed in [50]).

Therefore, understanding how alternative splicing factors can contribute to disease and, in turn, the splicing pattern alterations in pathological conditions can be valuable for the discovery of novel targets for therapies of diverse diseases, including several types of cancer and neurodegenerative disorders.

### **5.1.4 Cell structure, cytoskeleton and ATXN3**

Neurons are highly dependent on a well-structured dynamic cytoskeleton network. The neuronal cytoskeleton is essential for the maintenance of the structural integrity of the neuron, neurite outgrowth and axonal transport, as well as cell-cell interactions and cell connections with extracellular matrix (ECM) components. Therefore, although the initiators of neuronal dysfunction may differ, disruption of the neuronal cytoskeleton has been suggested to be a common feature

contributing to neurodegeneration in several diseases, including polyQ diseases (Reviewed in [51-54]). For example, mutations in the cytoskeletal protein  $\beta$ -III spectrin were shown to cause SCA5. Also, abnormal aggregates of cytoskeletal components such as intermediate filament proteins and microtubule-associated proteins (MAPs) (e.g. tau) have been identified as neuropathological signatures of many neurodegenerative diseases. Although there was no data so far regarding cytoskeletal involvement in MJD, the demonstration that ATXN3 interacts with alpha-tubulin [55] suggested to us that this protein could play a role in cytoskeleton regulation. Indeed, subsequent studies from our lab and others further supported this hypothesis: i) large proportions of ataxin-3 molecular partners identified in Yeast-two hybrid and pull down screenings are cytoskeleton components [56, 57], ii) ataxin-3 interacts with HDAC6, which mediates post-transcriptional modifications of cytoskeleton proteins (Reviewed in [58]), iii) ATXN3 is a MAP [55], iv) ATX-3 KO *C. elegans* have a significant transcriptional deregulation of cytoskeleton proteins [59], and v) ATXN3 KD leads to obvious cytoskeleton defects and abnormal cell morphology in C2C12 and HeLa cells [3, 55]. But could this function be important also for the nervous system? Could ATXN3 be involved in cytoskeleton organization and cell structure maintenance also in neuronal cells? In this work, we showed that absence of ATXN3 lead to a deregulation of the cytoskeleton network of SH-SY5Y cells, which was associated with an abnormal morphology and reduced branching (Chapter 2). Although the increased degradation of ITGA5 and consequent alteration of the signaling to the cytoskeleton can partially explain this cellular phenotype, we believe that silencing of ATXN3 perturbs several different pathways that may contribute to this cellular phenotype. Indeed, we found that in the absence of ATXN3 many genes controlling cytoskeleton biogenesis and reorganization were differentially transcribed impacting, for example, on cell projections, G-protein signaling, cell motility/migration, cell cycle and division and cell shape. One of the genes that caught our attention was the *MAPT* gene, which was significantly downregulated in the mutant cells (Chapter 3). This



finding, together with the observations that i) ATXN3 interacts with SFSR7 in SH-SY5Y neuronal cells, ii) absence of ATXN3 disturbed tau splicing – ATXN3 mutant cells presenting reduced levels of the 4R tau isoform, iii) normalizing the levels of the 4R isoform partially rescued the phenotype of the KD cells, and iv) overexpression of ITGA5 did not rescue the levels of tau, suggest that deregulation of tau expression may also contribute for the abnormal morphology and cytoskeleton disorganization observed in ATXN3 KD cells. Furthermore, because ATXN3 is known to interact with dynein, a stabilizer of the microtubules [58], it would be valuable to determine whether the localization/function of this protein may be perturbed in the absence of ATXN3, originating a disorganization of the cytoskeleton. Recently, it has been proposed that some MAPs also function to decrease oxidative stress in neurons, for example by protecting the microtubules from degradation [60, 61]. Considering that ATXN3 is a MAP, it would be interesting to clarify if it has this particular function, and if it could have a neuroprotective role. But how is ATXN3 regulating the cytoskeleton network? We have previously shown that the levels of the major cytoskeletal components were not altered in absence of ATXN3, making it unlikely that they are direct substrates of ATXN3 DUB activity [55]. However, in this work we showed that ATXN3 is modulating the degradation or the expression of other proteins important for a correct cytoskeletal organization, such as ITGA5 and tau isoforms. Supporting the relevance of the DUB activity of ATXN3 for these cellular functions, we have shown that overexpression of a catalytic deficient version of ATXN3 (C14A) recapitulated the alterations both on ITGA5 degradation (Chapter 2) and tau expression (Chapter 3).

Finally, we asked whether the presence of the polyglutamine expansion within ATXN3 could also lead to similar alterations. Indeed, we found decreased levels of both ITGA5 and tau as well as decreased expression of 4R tau isoform both in neuronal cells overexpressing an expanded ATXN3 and in the nervous system of MJD mice (Chapters 2 and 3). In addition, neurons isolated from the DRG of the CMVMJD135 transgenic mice displayed a drastic reduction in neurite length, as we have

observed in the cells lacking ATXN3. Together, these findings not only suggest that a disruption of the cytoskeleton network may be contributing for the neurodegeneration observed in MJD, but also that a partial loss of the normal cellular function(s) of ATXN3 may contribute for MJD pathogenesis.

### **5.1.5 Cell signaling and ATXN3**

As discussed above, ATXN3 is regulating the degradation of ITGA5, impacting on cytoskeleton organization. But it seems that not only the cytoskeleton is affected in the absence of ATXN3, since our work revealed that ATXN3 KD cells appear to have reduced adhesion to fibronectin, which may be explained by the lower levels of ITGA5 (Chapter 2). Interestingly, and in agreement with this finding, HeLa and C2C12 cells and neurons of *Atn3* KO mice also display low levels of integrin subunits in the absence of ataxin-3, in association with low cell-cell interconnectivity [3, 55] (Chapter 2). Besides participating in cell attachment to other cells and to the ECM, integrins also play a role in the transduction of signals from ECM components, the so-called “outside-in” signaling. This integrin-mediated signal transduction is achieved through a variety of intracellular protein kinases and adaptor molecules. We found that low expression of ITGA5 in ATXN3 KD cells was associated with a decrease in the CDK5/p35 complex activity and a change on its subcellular localization, and consequently, to a deregulation of the PI3K/AKT and ERK pathways. The inhibition of CDK5 activity has been shown to impair neuronal differentiation, function and survival (Reviewed in [62-69]). Interestingly, CDK5 has been proposed as a candidate for a therapeutic target for AD due to its role as a mediator of tau hyperphosphorylation [70]. As we observed a deregulation of tau expression in the absence of ATXN3, it would be interesting to assess tau phosphorylation in this situation. Additionally, we also found that silencing of ATXN3 leads to a decreased activation of the small GTPases Rac1 and Rho family, which compromised cell cycle and actin cytoskeleton regulation as well as increased motility.

In agreement with an involvement of ATXN3 in cell signaling pathways, is the deregulation of the ubiquitylation levels of a variety of substrates observed in the absence of ATXN3 (Chapter 4). It would be important now to determine which of these proteins are direct substrates of ATXN3. ATXN3 was shown to have DUB activity against K48, K63 and mixed polyUb linkages [1]. While usually K48-linked polyUb chains target protein for proteasomal degradation, K63 chains regulate, among other processes, protein activation and/or subcellular localization (Reviewed in [71, 72]). This may indicate that besides modulating protein degradation, ATXN3 may also regulate activation of specific substrates. Importantly, the UPS has emerged as a crucial mechanism for the normal nervous system development and function (Reviewed in [73, 74]). Therefore, it would be of interesting to i) determine whether ATXN3 is modulating the degradation of the proteins presenting altered levels of polyubiquitylation, by assessing their levels, or ii) to clarify whether this deregulation reflects an alteration of the subcellular localization and/or activity of these proteins. These experiments could also provide some additional clues about the specificity of the neuronal dysfunction observed in MJD. Nonetheless, we have already determined that cells expressing the expanded ATXN3 also presented decreased levels of ITGA5 and similar alterations on the integrin-mediated signaling. Additionally, the levels of Itga5 in the brainstem and DRG of the transgenic mice were also downregulated, not only confirming the perturbation of ATXN3 normal function by polyQ expansion, but also suggesting that it may be relevant for the disease mechanism.

### **5.1.6 Transcription and ATXN3**

In addition to its role in protein degradation, ataxin-3 has also been proposed to function in transcriptional regulation (see section 1.4.4.1). In order to understand which molecular changes were occurring in the ATXN3 KD cells, we performed a detailed transcriptomic analysis of these cells. Even though our bioinformatic analyses were more focused on the splicing events, we found that a large proportion of genes (7450 genes) were differentially expressed in the absence of ATXN3

(data not shown). Also, previous transcriptomic studies from our lab identified 290 genes altered in ATX-3 KO *C. elegans* [59]. Although a transcriptional repressor role has been attributed to ataxin-3, we found approximately the same proportion of genes up and downregulated in cells depleted of ATXN3. Although it is possible that many of these genes are ATXN3 direct transcriptional targets, these alterations may alternatively be a consequence of cellular compensatory mechanisms or changes in repressor complexes in which ATXN3 does not take part. As an example, it was recently described that the USP15 DUB enzyme regulates the proteasomal degradation of the transcriptional repressor RE1 silencing transcription factor (REST), which is critical both for neuronal differentiation and for activation of the mitotic exit [75]. Therefore, if absence of ATXN3 indirectly perturbs this mechanism of REST stability control by USP15, it will result in a change in transcription that ultimately may be related with an impairment in neuronal differentiation, that we actually observed in ATXN3 KD cells. A way of identifying ATXN3 direct transcriptional targets would be by performing: i) CHIP-seq analysis, ii) CLIP-seq (a method to purify protein-RNA complexes coupled with high throughput sequencing) [76], and/or iii) similar transcriptomic analysis in cells expressing C14A ATXN3. Another possibility is that the observed alterations are a consequence of changes in the levels of transcription factors downstream of ATXN3. Indeed, we found a proportion of transcription factors differentially expressed in ATXN3 KD cells. This observation suggests that these changes may occur at a transcriptomic stage. However, we cannot exclude the possibility that ATXN3 is modulating the degradation of transcription factors, thus impacting on transcription. Indeed, several of the proteins presenting altered polyubiquitylation levels and no alterations at the transcriptional level in ATXN3 KD cells in this study were previously identified as regulators of gene transcription (Chapter 4), which may indicate that ATXN3 is regulating their degradation and/or activity.

Another question that remains to elucidate is: are these transcriptomic changes relevant in the context of MJD? Trying to investigate this, we are already performing transcriptomic analysis in

pre and post symptomatic MJD mice (Silva-Fernandes A. et al., in preparation). Besides finding transcriptomic changes associated with disease progression, we also aim to look for overlapping changes between silencing of ATXN3 and overexpression of the expanded protein. This, in turn, may help to further elucidate how a partial loss of the normal function of ATXN3 on transcriptional regulation may contribute to disease.

### **5.1.7 Neuronal differentiation and ATXN3**

One of the most striking effects of ATXN3 silencing in SH-SY5Y human cells was the impairment of the differentiation process. We found that mutant cells fail to progress toward a mature phenotype, as after RA treatment (normally a neuronal differentiation stimulus) they present: i) deficient inhibition of the proliferative activity, ii) increased expression of Nestin and decreased expression of several markers for mature neurons, iii) significantly reduced average neurite length, iv) increased number of small filopodia, v) large and flat cell bodies with reduced extensions, vi) severe disruption of the cytoskeleton network, and vii) increased cell migration (Chapter 2).

Interestingly, overexpression of mutant ATXN3 bearing an expanded polyQ tract led to a similar phenotype as the overexpression of a catalytic mutant or the absence of ATXN3. Additionally, neurons from our CMVMJD135 mouse model showed abnormal morphology and neuritic branching, which provides evidence supporting that the polyQ expansion causes a partial loss of the normal function of the protein *in vivo*.

But how does ATXN3 modulate neuronal differentiation? Regarding our results, we hypothesized that ATXN3 prevents the degradation of ITGA5 normally triggered by the activation of FGFR2 by RA [10]. This, in turn, activates the PI3K/AKT and ERK pathways, regulating neuronal morphology and cell adhesion and survival. However, we believe that this is not the only role of ATXN3 on neuronal differentiation. We also found that ATXN3 is involved in the regulation of tau isoform expression, which plays an important role in neuronal differentiation and axonal trafficking.

While we have already found that overexpression of 4R tau isoform partially rescues the neuronal differentiation phenotype of ATXN3 KD cells, it will now be interesting to evaluate whether silencing of ATXN3 or expression of the expanded protein causes an impairment of the axonal transport, which we are currently doing.

### **5.1.8 Other functions of ATXN3 – DNA repair**

Recent data also support a role for ATXN3 in DNA repair. It was found that ATXN3 interacts and activates the Polynucleotide Kinase 3'-Phosphatase (PNKP) – a DNA strand break repair enzyme – suggesting a role for ATXN3 in PNKP-mediated DNA strand breaks repair (Chatterjee et al, 2014, PLoS Genetics, *submitted for publication*). Also, it has been found that the interaction of the DUB ataxin-3 bearing a disease-causing mutation with the polynucleotide kinase 3'-phosphatase (PNKP) – a DNA strand break repair enzyme – inactivates its activity, resulting in persistent accumulation of DNA strand breaks as well as chronic activation of DNA damage-response ataxia telangiectasia mutated (ATM) signaling, which may lead to cell death and neurodegeneration (Gao R, et al, 2014, *submitted for publication*).

## **5.2 Effects of absence of ATXN3 in cells and organisms: discrepancies and communalities**

The fact that the *C. elegans* [59] and mouse ataxin-3 KO models [5, 77] are viable and exhibit no obvious phenotype at basal conditions was initially surprising. One possible explanation is the redundancy of function between ataxin-3 and other Josephin domain containing proteins. While in *C. elegans* another member of the Josephin family exists, Y71H2AR.3 (which, however, does not present a NLS or UIM and was not overexpressed in KO animals), in mouse at least two more, Josd1 and Josd2, and in humans three proteins were described, JOSD1, JOSD2 and ATXN3L. Because all these Josephin proteins are thought to be DUB enzymes [78, 79], it has been proposed

that they compensate for ataxin-3 absence. Additionally, a recent study showed that the DUB activity of JOSD1 is regulated by ubiquitylation through a conformational change at the catalytic site, similarly to ATXN3 [78, 80, 81]. The significance of this redundancy would be strengthened by experiments using double and triple mutants, i.e., mutants lacking ataxin-3 and the Josephin-like proteins, to evaluate their phenotype. To study this hypothesis, we have crossed a KO strain for the Josephin protein with *atx-3* mutants. However, we found no significant differences between *atx-3* KO animals and the double mutants, suggesting that the absence of the Josephin protein does not aggravate the phenotype of *atx-3* mutants (unpublished data).

On the other hand, however, when ATX-3 KO *C. elegans* were challenged with a protein homeostasis stress (heat shock), they showed an enhanced stress response, which was correlated with increased expression of several molecular chaperones, probably an adaptive mechanism to deal with the absence of the DUB activity of ataxin-3 [82].

Contrary to the multicellular organisms, both mouse and human cells depleted of ataxin-3 show clear phenotypes, with severe cytoskeletal defects, increased ubiquitylated foci, increased sensitivity to heat shock [83] and oxidative stress [84]. Moreover, as we have shown in the present work that human neuronal cells depleted for ATXN3 display an abnormal cell morphology, cytoskeletal defects, and an impairment in the differentiation process.

This seems somehow incongruent, but a cellular model is indeed different from a multicellular system. Also, in most studies using cellular models, silencing of ataxin-3 was transiently performed and so, cells might not have time to adjust to this situation, while mouse and worm KO animals may undergo an adaptive process during development. In agreement, in our study, where we used cells stably silenced for ATXN3, we observed a partial recovery in cell morphology and

proliferation rate with multiple passages (Chapter 2). A conditional ataxin-3 KO model would be therefore valuable for a better understanding of these adaptative and compensatory mechanisms.

Nevertheless, we cannot exclude that both mouse and worms have yet undiscovered subtle defects. Indeed, although not yet studied in detail, we found a decreased expression of *Itga5* in neurons of *Atxn3* KO mice, which may be associated with a disruption of the cytoskeletal network and decreased process length as we observed in cells. In line with this, we previously found that *ATX-3* KO *C. elegans* have a significant change in the transcriptomic profile [59], which may be indicative of subtle anomalies not found so far.

Finally, it was interesting that both ataxin-3 mutant cells and worms displayed signs of cellular stress, supporting that there probably exist some common features between cells and organisms.

### **5.3 Relevance of the novel findings and main conclusions of the work**

As described in Chapter 1, Ub signaling is now widely known as a fundamental mechanism controlling a broad range of intracellular events in the nervous system. The reverse process, the removal of the Ub moieties, is carried out by DUBs. Although these enzymes have been recognized as central players in maintaining the correct ubiquitylation balance in cells, their mechanisms of regulation and substrate specificity are poorly understood.

This work added new knowledge about the relevance for neurons of one specific DUB, ataxin-3, and provided evidence for perturbation of this normal function in the context of disease, through a dominant negative effect.



We showed that ATXN3 function is important for neuronal differentiation, as silencing or DUB activity abrogation of this protein has a strong negative impact on cell morphology, leading to altered neurite extension, cytoskeletal disorganization, and altered proliferation and survival of SH-SY5Y cells. At the molecular level, this phenotype was shown to result from an excessive proteasome-dependent degradation of ITGA5 subunit levels in the absence of ATXN3 activity, which was observed both *in vitro* and *in vivo*. ITGA5 is the first ATXN3 substrate identified in neurons. This knowledge may be of relevance for the development of therapeutic strategies. In addition, we also showed that loss of function of ATXN3 leads to a deregulation of tau exon 10 splicing, resulting in a decreased 4R/3R tau ratio, which we demonstrated to be also contributing for the impairment in the differentiation process and the abnormal morphology of the mutant cells. Besides impacting on neuronal maintenance, these cytoskeletal changes can also have a negative impact on axonal transport.

The loss of ATXN3 transcriptional regulation role may also have caused significant changes in the transcriptomic profile in our cellular model, an aspect we did not dissect in detail in this work. Because neurons are a highly sensitive and specific cell type, and their function needs to be precisely regulated, these transcriptional changes can be extremely deleterious if they also occur in the context of human expanded polyQ-related disease.

Through its DUB activity, ATXN3 seems to function in regulating the ubiquitome in cells. We found that silencing of ATXN3 in SH-SY5Y cells causes a deregulation of the polyubiquitylation levels of a significant number of target proteins. These proteins are good candidates for being targets of the DUB activity of ATXN3 and, depending on their function and relevance for the cell, can also be

potential therapeutic targets. Among the proteins found to have altered polyubiquitylation patterns in the absence of ATXN3, a large proportion were proteins involved in RNA post-transcriptional modification. This data, together with the observation that absence of ATXN3 perturbs alternative splicing and specifically the splicing of tau, suggested to us that ATXN3 could be regulating this process in neurons, a hypothesis that we validated using reporter minigenes and transcriptomic analysis. These findings lead us to propose that ATXN3 plays a role in splicing regulation more globally in neurons, a novel function for this protein.

### **5.3.1 Ataxin-3 in the disease context: gain or loss of function?**

This work was based on the idea that the study of the normal molecular and physiological function of ATXN3 is also important for the understanding of the pathogenic mechanism. Currently, studies in several polyQ diseases support the combinatory pathogenic model of gain and loss of function. In this way, for example, the identification of the ubiquitome in cells expressing expanded ataxin-3 may be an important contribution for the understanding of the pathogenic mechanism. This can also help to explore the proposed gain and loss of function model, given that ataxin-3's interactions with its substrates can either be gained or lost in the context of disease. The functional study of these interactions and the involvement of ataxin-3 in the suggested pathways can thus give important insights into the pathogenic mechanism and can also help to explain the selective neurodegeneration observed in MJD, which might be correlated with the stability and expression of the specific substrates, or with tissue-specific splicing patterns.

Indeed, our data supports this line of thought: the role of ATXN3 in regulating ITGA5 stability, here described, was shown not only to be relevant in physiological conditions for neuronal differentiation but also to be potentially involved in MJD pathogenesis. Interestingly,  $\alpha$ 5-integrin subunit is known to be a key regulator of the actin cytoskeleton, and also to be implicated in the

regulation of spine morphogenesis, synapse formation and synaptic plasticity. According to this evidence, we may speculate that the reduced levels of  $\alpha 5$ -integrin subunit and the reduced branching found in the presence of expanded ATXN3, both *in vitro* and *in vivo*, may be impairing synaptic plasticity thus contributing for MJD pathology.

Also consistent with this hypothesis, we found that both silencing of ATXN3 or expression of an expanded version led to a deregulation of tau exon 10 splicing, also with effect on neuronal morphology and differentiation. This is another evidence that partial loss of the normal function(s) of ataxin-3 might be contributing for MJD. In addition, these results also establish a link between two key proteins involved in different neurodegenerative diseases. Curiously, a relation between ataxin-3 and proteins associated with other neurodegenerative diseases, including Parkin [2], CHIP [81] and SOD1 [85], has already been observed, suggesting that there may exist common pathogenic mechanisms.

Altogether, these data support the idea that we should not look at MJD exclusively as a gain of function disease. Even though it is well established that the polyQ expansion triggers the disease, a partial loss of the cellular DUB activity(ies) of ATXN3 through dominant-negative effects, may also modulate and contribute for disease progression and the specificity of neurodegeneration.

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## **Appendices**

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**Table A1.** List of primers used in this study.

<b>Name</b>	<b>Forward (5'-3')</b>	<b>Reverse (5'-3')</b>
pyPY	TGAGGGGAGGTGAATGAGGAG	TCCACTGGAAAACCGCGAAG
py	AGGCTTTGAGAACCTGTGGA	AACCGCGAGCTTGAACAG
PY	AGGCTTTGAGAACCTGTGGA	TGAGAGTCATTTACCTTGAACA
AdML	GTCGACGACACTTGCTCAAC	AAGCTTGCATGCAATCAGTAG
$\alpha$ -globulin	GTCGACGACACTTGCTCAAC	AAGCTTGCATGCAATCAGTAG

**Table A2.** Genes with altered splicing in ATXN3<sup>shRNA</sup> cells. List of genes with altered splicing in RA-treated ATXN3<sup>shRNA</sup> cells as compared with the SCR<sup>shRNA</sup> controls. Genes were considered significantly regulated when fold-change was  $\geq 1.5$  and  $p \leq 0.05$ . The predicted upstream regulators of the splicing events are listed (based on SpliceAid-F database).

				Prediction of upstream regulator
Gene Symbol	Alter. Event Type	Fold change	p-value	Splicing Factor Symbol(s)
FAM213B	Intron Retention	2.26	3.80E-05	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, SC35, YB-1, ZRANB2
DFFB	Alter. Acceptor Site	1.89	7.42E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e3-4)	1.62	6.48E-03	
	Exon Cassette	1.62	6.48E-03	
UBE4B	Exon Cassette	1.76	5.84E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KIF1B	Alter. First Exon (e1-11,e14-16,e18-25,e27-30)	3.09	5.15E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e26)	3.35	1.24E-04	
CLCN6 // NPPA-AS1	Alter. Terminal Exon (e4)	1.64	4.79E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.58	1.44E-03	
DDI2 // RSC1A1	Alter. Terminal Exon (e5)	1.96	1.46E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MST1P2	Alter. Acceptor Site	1.82	9.58E-03	hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, Nova-2, SC35, YB-1
CDC42	Exon Cassette	1.92	9.06E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZBTB40	Intron Retention	2.60	1.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
SRRM1	Exon Cassette	2.05	9.02E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.53	3.54E-06	
WDTC1	Intron Retention	1.66	1.84E-03	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PHACTR4	Exon Cassette	2.14	1.16E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
YTHDF2	Intron Retention	1.70	3.06E-03	ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, TIA-1, TIAL1, YB-1
EPB41	Alter. Terminal Exon (e14)	1.90	4.36E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.84	3.93E-05	
ZCCHC17	Exon Cassette	1.58	5.62E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HDAC1	Alter. Terminal Exon (e6)	1.58	5.06E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.61	1.10E-03	
S100BPB	Exon Cassette	2.10	2.04E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AGO3	Alter. Terminal Exon (e7-8)	1.67	3.67E-05	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	5.99	5.80E-05	
PPIE	Alter. Donor Site	2.28	1.79E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.93	4.10E-03	
	Intron Retention	2.01	1.04E-04	
CCDC30	Mutually Exclusive Exons (e9-11,e13-15)	2.06	6.60E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF691	Intron Retention	1.66	1.36E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, KSRP, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1

AKR1A1	Exon Cassette	1.54	6.03E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.66	2.56E-04	
RAD54L	Complex	1.58	9.76E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ZYG11B	Exon Cassette	2.08	3.90E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SGIP1	Exon Cassette	8.34	2.00E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FPGT//FPGTTNN I3K//TNNI3K	Alter. Terminal Exon (e22)	1.77	8.94E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ACADM	Exon Cassette	1.52	1.76E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FNBP1L	Intron Retention	2.18	2.42E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
AMY2B // RNPC3	Alter. First Exon (e17-18)	1.81	4.77E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PRPF38B	Alter. Terminal Exon (e5-6)	1.67	2.24E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.59	2.98E-04	
AHCLY1	Alter. Acceptor Site	1.54	1.46E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
STRIP1	Intron Retention	1.56	5.30E-03	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuD, Nova-1, SRp20, TIA-1, TIAL1, YB-1
RAP1A	Exon Cassette	1.61	1.46E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DDX20	Intron Retention	1.69	1.08E-02	ETR-3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, SRp20, TIA-1, TIAL1, YB-1
RBM8A	Intron Retention	2.55	2.30E-03	ETR-3, HTra2beta1, SC35
PIAS3	Intron Retention	1.67	2.12E-03	ETR-3, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), MBNL1, Nova-1, SC35, SRp20, TIA-1, TIAL1, YB-1
YPS45	Intron Retention	2.05	8.84E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, TIA-1, TIAL1, YB-1
SETDB1	Intron Retention	1.66	4.14E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PIPSK1A	Exon Cassette	1.96	1.28E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PSMB4	Intron Retention	1.89	9.24E-04	ETR-3, hnRNP I (PTB), hnRNP P (TLS), Nova-1, SC35, YB-1
RIAD1	Alter. First Exon (e1-5)	6.53	5.60E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CHTOP	Alter. Terminal Exon (e3)	1.72	7.62E-04	
INTS3	Intron Retention	1.52	1.61E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
HAX1	Intron Retention	2.05	1.63E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, RBM5, SC35, TIA-1, TIAL1, YB-1
SLC50A1	Exon Cassette	1.59	1.28E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
USP21	Intron Retention	1.89	7.40E-04	ETR-3, Fox-1, Fox-2, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, RBM5, Sam68, SC35, YB-1
NDUFS2	Intron Retention	1.82	3.36E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, KSRP, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1
UHMK1	Intron Retention	1.60	6.06E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, YB-1, ZRANB2
MPZL1	Exon Cassette	3.71	1.01E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DCAF6	Exon Cassette	1.59	2.23E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SOAT1	Exon Cassette	1.81	4.84E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TSEN15	Exon Cassette	2.10	1.04E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CD46	Exon Cassette	1.73	4.30E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYT14	Complex (e2-4)	1.84	1.06E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VASH2	Alter. Terminal Exon (e9-11)	1.59	2.08E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.59	9.62E-03	
RPS6KC1	Intron Retention	2.54	9.59E-05	ETR-3, hnRNP A1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, YB-1, ZRANB2
PROX1	Complex	3.00	2.29E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MARK1	Exon Cassette	1.73	1.69E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP,

Appendices

				MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
COG2	Intron Retention	1.51	5.80E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1
GNPAT	Exon Cassette	1.65	4.70E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LGALS8	Exon Cassette	2.00	3.64E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1
SLC35E2B	Alter. Terminal Exon (e6)	1.60	7.64E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.63	1.83E-04	
WRAP73	Intron Retention	1.79	5.83E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, SC35, SRp30c, TIA-1, TIAL1, YB-1
CTNNBIP1	Alter. First Exon (e1-2,e4)	2.90	1.08E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e2,e4-7)	1.83	4.60E-04	
EXOSC10	Intron Retention	1.79	1.17E-04	CUG-BP1, ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTRA2beta1, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1
CASP9	Alter. Acceptor Site	1.62	1.13E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp20, YB-1
MFP2	Intron Retention	3.86	1.45E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2
AKR7A2	Alter. Terminal Exon (e3)	1.60	2.84E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HP1BP3	Alter. Acceptor Site	1.75	1.66E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e3)	1.72	1.05E-03	
RAP1GAP	Complex (e2,e4)	2.29	5.01E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C1orf63	Alter. Acceptor Site	1.61	5.84E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2
STMN1	Intron Retention	2.03	1.21E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SRSF4	Exon Cassette	2.35	1.37E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.36	3.03E-04	
BAI2	Alter. First Exon (e2-4)	1.61	1.02E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BSDC1	Intron Retention	1.97	4.79E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FHL3	Intron Retention	1.58	2.95E-02	ETR-3, hnRNP K, hnRNP P (TLS), MBNL1, SC35, SF1, YB-1
EBNA1BP2	Intron Retention	2.44	4.97E-04	ETR-3, Fox-1, Fox-2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, YB-1
HYI	Intron Retention	2.00	1.43E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, SC35, SRp30c, TIA-1, TIAL1, YB-1
POMGNT1	Intron Retention	2.31	5.16E-03	hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, MBNL1, Nova-1, SC35, TIA-1, TIAL1, YB-1, ZRANB2
FAF1	Exon Cassette	1.75	1.33E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EPS15	Alter. First Exon (e1-8,e10-13)	1.74	1.81E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e9)	1.64	8.46E-03	
LRP8	Exon Cassette	1.55	9.70E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HSPB11	Intron Retention	1.57	6.56E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
CDCP2 // CYB5RL	Alter. Terminal Exon (e6,e7-10)	1.91	1.16E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.64	1.32E-02	
	Exon Cassette	1.91	1.98E-02	
MYSM1	Intron Retention	1.86	3.06E-03	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
ITGB3BP	Alter. Terminal Exon (e8)	1.87	1.06E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.91	1.85E-04	
ZRANB2	Intron Retention	1.56	6.04E-03	ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, KSRP, Nova-1, PSF, Sam68, SF1, SRp20, TIA-1, TIAL1, YB1
ZZZ3	Intron Retention	1.54	6.94E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FUBP1	Exon Cassette	1.57	1.65E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, HuD, Nova-1, RBM5, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.63	7.92E-05	
TTL7	Exon Cassette	1.65	2.38E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DDAH1	Alter. First Exon (e4)	2.16	3.84E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DBT	Alter. Acceptor Site	1.64	4.54E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2

EXTL2	Exon Cassette	2.20	1.69E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DPH5	Exon Cassette	2.14	1.23E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OLFM3	Alter. First Exon	2.28	2.00E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	13.23	2.78E-06	
DRAM2	Complex	12.17	2.95E-07	ETR-3, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	12.01	2.95E-07	
RSBN1	Exon Cassette	2.16	1.12E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TRIM33	Alter. Terminal Exon (e16)	1.66	6.12E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.82	3.48E-03	
NOTCH2	Exon Cassette	5.23	8.60E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
APH1A	Intron Retention	1.67	2.50E-03	hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ARNT	Exon Cassette	1.67	2.38E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CDC42SE1	Intron Retention	1.62	2.56E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2alpha, HTra2beta1, KSRP, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
VPS72	Complex	1.78	2.84E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1
JTB	Intron Retention	1.67	1.30E-03	ETR-3, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, Nova-1, SC35, TIA-1, TIAL1
SHC1	Alter. First Exon (e2)	3.28	7.76E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GBA // GBAP1	Alter. First Exon (e1)	3.17	4.61E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
YY1AP1	Exon Cassette	1.50	2.62E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CCT3	Exon Cassette	2.20	1.98E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.54	1.14E-02	
ARHGFE11	Intron Retention	1.67	4.06E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
IGSF9	Exon Cassette	2.28	5.23E-04	ETR-3, FMRP, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TSL), HTra2beta1, KSRP, Nova-1, SC35, YB-1, ZRANB2
USF1	Alter. First Exon (e1)	2.41	6.04E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
B4GALT3	Intron Retention	1.58	6.36E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ASTN1	Alter. Acceptor Site	2.90	6.36E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, Nova-1, Nova-2, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1
FAM129A	Alter. Term Exon (e3,e4,e8-13)	3.74	3.50E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.90	1.76E-02	
TRMT1L	Exon Cassette	2.02	1.33E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PLEKHA6	Exon Cassette	7.80	9.62E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e10)	3.42	7.59E-05	
ANGEL2	Alter. First Exon (e1)	1.89	1.66E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e4)	2.75	1.86E-03	
ESRRG	Complex (e10)	5.07	4.53E-06	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	5.07	4.53E-06	
NVL	Exon Cassette	1.60	4.01E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WDR26	Exon Cassette	1.51	7.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MRPL55	Complex	2.04	5.58E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, MBNL1, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
	Exon Cassette	1.73	3.65E-04	
TAF5L	Alter. Terminal Exon (e4)	1.62	5.64E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TTC13	Exon Cassette	1.83	8.29E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NID1	Exon Cassette	1.73	7.00E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RGS7	Complex (e7-8)	1.66	2.98E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha,

Appendices

				HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
OPN3	Alter. Donor Site	1.79	2.02E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OPN3	Alter. First Exon (e1-2)	2.33	3.69E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF692	Complex	1.55	2.94E-03	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, KSRP, MBNL1, Nova-1, RBM5, SC35, TIA-1, TIAL1
	Intron Retention	1.86	1.36E-04	
FBXO18	Alter. First Exon (e4-5)	2.04	1.16E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CACNB2	Mutually Exclusive Exons (e11)	2.25	9.75E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MLLT10	Exon Cassette	1.59	1.12E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BMI1//COMMDD3	Intron Retention	1.61	6.08E-05	ETR-3, hnRNP A1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1
SPAG6	Exon Cassette	2.96	5.65E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MYO3A	Alter. First Exon (e1-33)	1.86	1.55E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZEB1	Alter. First Exon	2.18	1.78E-02	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MAPK8	Complex	2.71	1.04E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e7)	5.44	1.34E-06	
	Exon Cassette	2.90	5.01E-04	
PHYHIPL	Exon Cassette	2.60	1.36E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VPS26A	Exon Cassette	1.84	1.67E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SEC24C	Exon Cassette	1.67	1.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.75	3.25E-04	
ZSWIM8	Alter. Terminal Exon (e1-2)	1.59	1.02E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VDAC2	Exon Cassette	2.09	1.19E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
ZMIZ1	Exon Cassette	3.18	3.45E-04	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
BTAF1	Alter. Donor Site	2.70	7.80E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, YB-1, ZRANB2
AS3MT/C10orf32	Alter. First Exon (e7)	1.70	3.92E-05	hnRNP E1, hnRNP E2, SC35, SRp30c, TIA-1, TIAL1
SFR1	Intron Retention	2.52	4.63E-04	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1, ZRANB2
MXI1	Exon Cassette	2.32	1.96E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VTI1A	Exon Cassette	1.62	1.10E-02	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TRUB1	Complex	1.83	1.83E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WDR11	Intron Retention	1.67	6.85E-04	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, SC35, SF1, SRp20, SRp30c, YB-1, ZRANB2
TACC2	Exon Cassette	2.68	5.60E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PLEKHA1	Exon Cassette	1.71	6.37E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SF2/ASF, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.76	6.37E-04	
BCCIP	Alter. Terminal Exon (e6)	2.16	3.69E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LRRC27	Exon Cassette	2.26	1.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DIP2C	Alter. Terminal Exon	1.68	1.76E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SEPHS1	Alter. Donor Site	2.07	6.99E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e6)	2.17	6.48E-03	
	Exon Cassette	1.90	3.24E-04	
ABI1	Exon Cassette	1.54	4.19E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1,



				Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
ANKRD26	Exon Cassette	1.51	6.49E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF438	Exon Cassette	3.02	1.20E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ITGB1	Exon Cassette	1.83	1.77E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF37BP	Intron Retention	1.68	6.82E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ERCC6 // ERCC6-PGBD3 //	Intron Retention	1.53	2.12E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZWINT	Intron Retention	2.15	5.41E-04	ETR-3, hnRNP P (TLS), HTra2beta1, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM13C	Alter. Terminal Exon (e13-14)	2.42	1.10E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RTKN2	Exon Cassette	1.81	7.60E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RUFY2	Alter. First Exon (e1)	1.84	4.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LRRC20	Alter. First Exon (e2)	1.52	1.03E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CAMK2G	Exon Cassette	1.67	5.00E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.60	9.82E-04	
	Exon Cassette	2.08	1.54E-03	
ATAD1	Exon Cassette	1.59	9.14E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ACTA2	Exon Cassette	2.47	6.23E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SORBS1	Alter. Acceptor Site	3.57	2.42E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	3.60	1.61E-04	
	Exon Cassette	1.59	4.83E-04	
ARHGAP19 // SLIT1	Alter. Terminal Exon (e21,e22-27,e29-54)	1.92	1.06E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
POLL	Alter. Terminal Exon (e7)	1.60	4.78E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LDB1	Alter. Terminal Exon (e11)	2.31	7.56E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NT5C2	Exon Cassette	2.01	1.22E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.00	1.78E-04	
SORCS1	Alter. Terminal Exon (e25)	1.53	1.70E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e2)	1.62	2.83E-04	
SMNDC1	Intron Retention	1.58	4.00E-03	ETR-3, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SF2/ASF, SRp20, YB-1, ZRANB2
BBIP1	Alter. Terminal Exon (e4)	1.96	9.74E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.41	1.42E-04	
	Exon Cassette	1.71	1.95E-05	
C10orf118	Alter. Acceptor Site	1.81	1.80E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
TIAL1	Alter. Terminal Exon (e12)	1.83	4.38E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.22	2.17E-04	
NSMCE4A	Intron Retention	1.71	4.01E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
OAT	Alter. Acceptor Site	1.71	1.92E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STK32C	Alter. First Exon	3.01	1.35E-07	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM80	Intron Retention	2.18	1.60E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BRSK2	Complex	1.78	1.93E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RRM1	Alter. Donor Site	1.77	1.19E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB1
ILK	Intron Retention	1.61	1.57E-02	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP P (TLS), HTra2beta1, KSRP, SRp30c

Appendices

TEAD1	Complex	2.06	1.02E-03	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.06	1.02E-03	
NAV2	Exon Cassette	2.40	3.40E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DNAJC24	Alter. Terminal Exon (e4-5)	1.70	1.62E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.14	8.40E-04	
	Exon Cassette	2.05	8.40E-04	
HIPK3	Exon Cassette	1.53	8.38E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP I (PTB), HuB, Nova-1, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
KIAA1549L	Exon Cassette	1.87	3.96E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ACCS // EXT2	Alter. Terminal Exon (e19,e20-21,e23-25,e27-33)	1.86	6.72E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PRDM11	Alter. Terminal Exon	1.96	8.33E-05	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DGKZ	Alter. First Exon (e1-29)	1.74	3.32E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TTC9C	Exon Cassette	1.74	8.79E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VEGFB	Alter. Acceptor Site	1.54	2.42E-04	hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, MBNL1, Nova-1, Nova-2, Sam68, SRp30c, TIA-1, TIAL1, YB-1
MUS81	Intron Retention	1.70	2.62E-03	ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ANKRD13D	Intron Retention	1.64	8.40E-04	ETR-3, hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, SC35, SRp20, SRp30c, YB-1
NDUFB1	Intron Retention	2.62	8.41E-04	hnRNP A1, hnRNP D, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, PSF, SC35, SF2/ASF, SRp30c, YB-1
TPCN2	Exon Cassette	2.16	1.58E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
MRPL48	Exon Cassette	1.60	2.40E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
UVRAG	Exon Cassette	1.96	6.36E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C11orf30	Exon Cassette	1.56	3.95E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMEM126B	Exon Cassette	1.84	1.80E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C11orf73	Alter. Terminal Exon (e6-7)	2.19	1.23E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1
C11orf54	Exon Cassette	1.78	1.48E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DIXDC1	Alter. First Exon (e3-7,e10-12)	1.75	1.02E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SDHD	Exon Cassette	1.77	8.06E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons	2.26	1.62E-03	
NCAM1	Complex (e17-20)	3.21	1.67E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.05	2.36E-05	
VPS11	Complex	2.01	2.77E-04	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
HMBS	Intron Retention	1.73	3.76E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, MBNL1, SRp30c, YB-1, ZRANB2
HINFP	Intron Retention	1.50	8.25E-05	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
ARHGEF12	Exon Cassette	1.51	1.92E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TBCEL	Complex	1.59	4.24E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.70	9.42E-04	
TBRG1	Exon Cassette	1.70	2.32E-05	ETR-3, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2beta1, HuB, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1
STT3A	Exon Cassette	1.95	6.35E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FOXRED1	Alter. Donor Site	1.74	1.74E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ACAD8	Complex	1.51	1.58E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.71	1.33E-02	
RNH1	Alter. Acceptor Site	1.56	3.00E-03	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1)	1.60	3.52E-03	
	Complex	1.71	4.99E-04	
	Exon Cassette	1.54	3.82E-03	

MOB2	Alter. First Exon (e1)	1.99	1.86E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NAP1L4	Exon Cassette	1.54	1.88E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF195	Exon Cassette	2.48	2.16E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
APBB1	Intron Retention	1.64	1.64E-02	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, RBM5, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
ARFIP2	Alter. Acceptor Site	2.00	2.83E-04	
	Alter. Terminal Exon (e3)	1.65	1.80E-04	
	Intron Retention	2.07	7.98E-05	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
DKK3	Alter. First Exon (e1-3)	5.91	4.20E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.53	3.21E-04	
FBX03	Alter. Terminal Exon (e11)	1.99	1.06E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PHF21A	Mutually Exclusive Exons (e16)	5.71	1.07E-07	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AMBRA1	Exon Cassette	1.52	1.45E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LPXN	Exon Cassette	1.53	3.72E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GANAB	Exon Cassette	1.50	7.84E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, RBM5, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
UBXN1	Intron Retention	2.01	7.64E-05	
	Intron Retention	2.92	2.81E-04	
	Intron Retention	2.25	8.44E-04	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, Nova-1, Sam68, SC35, SF2/ASF, SRp30c, TDP43, TIA-1, TIAL1, YB-1
SNHG1//SNORD22	Intron Retention	1.70	3.84E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP P (TLS), HuB, KSRP, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2
RELA	Alter. Acceptor Site	2.73	4.56E-04	
	Intron Retention	2.34	7.51E-05	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), PSF, SC35, SRp30c, YB-1
SUV420H1	Exon Cassette	1.77	1.14E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NUMA1	Alter. First Exon (1-6)	1.79	8.78E-04	
	Complex	1.64	4.43E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.34	2.25E-05	
CTSC	Alter. Donor Site	2.03	2.16E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
MRE11A	Alter. Terminal Exon	1.52	5.95E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CWC15	Intron Retention	1.94	9.80E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, HTra2beta1, HuB, Nova-1, Sam68, SC35, TIA-1, TIAL1
CADM1	Alter. First Exon (e1-10)	1.86	1.06E-03	
	Exon Cassette	2.60	3.89E-06	
	Mutually Exclusive Exons	1.92	1.44E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM218	Alter. Acceptor Site	1.56	3.01E-02	
	Complex (e1-3)	2.23	2.11E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.17	3.03E-04	
ETS1	Complex	1.68	2.66E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.53	2.31E-05	
ARHGAP32	Intron Retention	2.15	3.98E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DYRK4	Alter. Term Exon (e10,e11-16)	1.57	2.66E-03	
	Exon Cassette	1.95	3.96E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CD9	Alter. First Exon	2.29	2.24E-05	
	Alter. Terminal Exon	2.81	1.76E-03	
	Complex (e3-7)	3.21	1.68E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PTMS	Alter. Acceptor Site	2.64	4.99E-04	
	Alter. First Exon (e1)	1.90	8.19E-04	ETR-3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, KSRP, MBNL1, Nova-1, Nova-2, PSF, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ATN1//C12orf57	Intron Retention	1.85	1.21E-04	ETR-3, hnRNP P (TLS), HuB, KSRP, Nova-1, SC35, SRp30c, TIA-1, TIAL1

Appendices

FAM66C	Exon Cassette	1.73	7.45E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GABARAPL1	Complex	2.05	3.28E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.52	1.70E-03	
ATF7IP	Alter. First Exon (e1)	2.29	5.59E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FGFR10P2	Alter. Terminal Exon (e5)	2.38	1.78E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.60	5.98E-05	
CCDC91	Exon Cassette	2.24	2.36E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BICD1	Complex	1.92	1.88E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.92	1.02E-02	
IRAK4	Exon Cassette	1.50	3.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARID2	Exon Cassette	1.96	5.90E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PFKM	Intron Retention	3.04	1.86E-03	ETR-3, hnRNP I (PTB), hnRNP P (TSL), MBNL1, Nova-1, Nova-2, SRp30c, YB-1, ZRANB2
SPATS2	Exon Cassette	2.84	6.64E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LETMD1	Exon Cassette	1.62	2.49E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EIF4B	Exon Cassette	2.24	1.02E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RAB5B	Complex	1.85	4.78E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ERBB3	Complex	2.46	2.42E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MYL6	Alter. Terminal Exon (e7-8)	1.90	8.75E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, KSRP, MBNL1, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.65	9.60E-04	
NABP2	Alter. First Exon (e1)	1.63	2.72E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), KSRP, Nova-1, Sam68, SC35, SRp20, YB-1, ZRANB2
	Alter. Acceptor Site	2.56	6.92E-03	
DTX3	Intron Retention	2.20	5.97E-04	ETR-3, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, HTra2beta1, HuB, KSRP, Nova-1, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
	Complex	1.74	1.60E-02	
ARHGEF25 // SLC26A10	Complex	1.74	1.60E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp30c, YB-1, ZRANB2
	Exon Cassette	1.89	5.20E-03	
SRGAP1	Alter. Terminal Exon (e10)	1.50	1.10E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TBC1D30	Alter. Terminal Exon (e14-16)	1.90	1.10E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HELB	Exon Cassette	1.58	1.01E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP LL, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FRS2	Exon Cassette	1.80	1.04E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CNOT2	Intron Retention	1.84	1.08E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LGR5	Complex	2.43	1.20E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYT1	Complex	1.58	9.99E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MRPL42	Exon Cassette	3.45	8.84E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PLXNC1	Alter. First Exon	1.89	5.98E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VEZT	Exon Cassette	2.33	8.80E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
VEZT	Exon Cassette	1.72	5.62E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e4-5)	2.24	1.56E-04	
TMPO	Complex	4.45	3.79E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.45	3.79E-04	
SLC25A3	Intron Retention	1.55	2.10E-03	CUG-BP1, ETR-3, FMRP, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2

PARPBP	Exon Cassette	1.75	2.08E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RIC8B	Exon Cassette	1.95	1.64E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
UBE3B	Complex	1.51	1.17E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.80	3.88E-03	
IFT81	Exon Cassette	1.83	2.78E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
ERP29	Exon Cassette	2.04	1.40E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
SETD8	Alter. First Exon (e1)	1.52	4.48E-03	ETR-3, FMRP, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1
ZNF10 // ZNF268	Complex	1.65	2.50E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DCP1B	Exon Cassette	1.71	1.94E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FOXMI	Exon Cassette	2.06	3.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PARP11	Exon Cassette	2.08	1.50E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TNFRSF1A	Alter. First Exon (e1,e3,5-6,8-11)	1.74	3.16E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LM03	Alter. First Exon (e3)	7.88	7.84E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CAPRIN2	Exon Cassette	2.22	3.35E-06	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Htra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
DENND5B	Exon Cassette	1.89	1.98E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KIF21A	Exon Cassette	2.62	4.43E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
HDAC7	Exon Cassette	2.06	1.20E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.09	7.62E-03	
	Complex	1.68	6.00E-04	
MCRS1	Intron Retention	1.60	2.22E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP K, hnRNP P (TSL), HuB, Nova-1, Nova-2, SC35, TIA-1, TIAL1, YB-1, ZRANB2
LIMA1	Alter. First Exon (e1-3)	2.05	2.84E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CSAD	Exon Cassette	1.60	6.86E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CALCOCO1	Intron Retention	1.73	1.97E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
CBX5	Alter. First Exon (e1)	1.60	5.52E-03	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ITGA5	Exon Cassette	3.03	7.38E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, Srp20, TIA-1, TIAL1, YB-1, ZRANB, CUG-BP1, ETR-3, Fox-1, Fox-2
	Alter. First Exon (e1)	3.71	2.17E-05	
GTSF1	Alter. First Exon (e1)	3.71	2.17E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, Srp20, TIA-1, TIAL1, YB-1, ZRANB2
RNF41	Exon Cassette	1.54	9.98E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
CS	Exon Cassette	2.07	2.20E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
DCTN2	Complex (e4)	2.22	3.34E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
KBIP	Complex (e1-2)	2.10	1.39E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.19	3.45E-04	
SART3	Intron Retention	1.82	1.24E-03	ETR-3, hnRNP C1, hnRNP I (PTB), Htra2beta1, HuB, KSRP, Nova-1, SC35, Srp20, TIA-1, TIAL1, YB-1
GIT2	Exon Cassette	4.53	9.24E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
C12orf76	Complex	2.14	1.14E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.86	4.41E-04	

Appendices

ATXN2	Complex	1.68	9.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.52	6.04E-03	
TBX3	Exon Cassette	2.63	3.67E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
RPLP0	Intron Retention	1.65	9.19E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Sam68, SC35, YB-1
RSRC2	Alter. Donor Site	2.07	3.12E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.55	6.52E-03	
CDK2AP1	Alter. First Exon (e1)	1.55	2.21E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, YB-1, ZRANB2
EIF2B1	Alter. Terminal Exon (e5)	1.52	2.16E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
SCARB1	Exon Cassette	3.91	4.69E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC15A4	Exon Cassette	1.97	5.82E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RIMBP2	Exon Cassette	2.07	1.81E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZMYM2	Exon Cassette	1.89	2.12E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
IFT88	Complex	1.53	2.58E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.52	1.30E-03	
POLR1D	Complex	1.66	5.02E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GPR180	Exon Cassette	2.71	4.94E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARHGEF7	Alter. First Exon (e1)	2.86	3.63E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.11	3.89E-05	
CDC16	Intron Retention	1.61	5.02E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
DCLK1	Alter. Terminal Exon (e8)	2.49	1.24E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MTRF1	Intron Retention	1.83	5.84E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), HTra2beta1, HuB, HuD, KSRP, Nova-1, SC35, SRp20, TIA-1, TIAL1, YB-1
SUCLA2	Alter. First Exon (e1-2,e5)	1.56	8.90E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DHRS12	Exon Cassette	1.59	6.80E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MRPS31P5 // THSD1P1	Complex	2.60	1.17E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DOCK9	Alter. Acceptor Site	2.40	4.45E-04	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
TMTC4	Alter. Terminal Exon (e15)	2.27	3.61E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GAS6	Alter. First Exon (e1-2,e4)	1.67	2.72E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RASA3	Exon Cassette	1.99	3.46E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PARP2	Alter. Donor Site	5.19	1.14E-06	hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
OXA1L	Intron Retention	2.16	4.31E-06	ETR-3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Nova-1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
DHRS2	Alter. Acceptor Site	3.21	1.88E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1-5)	3.29	3.29E-06	
IRF9 // RNF31	Alter. Terminal Exon (e29-31)	1.68	1.56E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AKAP6	Alter. First Exon (e1-2)	1.81	4.92E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PRPF39	Exon Cassette	1.69	2.50E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, Nova-1, Sam68, YB-1
SAMD4A	Exon Cassette	2.06	2.41E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KTN1	Exon Cassette	1.71	1.84E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Intron Retention	1.81	1.84E-03	
PRKCH	Alter. First Exon (e1-11)	5.88	1.83E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZBTB1	Exon Cassette	1.93	1.62E-02	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha,

				HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CHURC1 // FNTB	Exon Cassette	1.91	4.78E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FUT8	Complex (e3-4)	1.61	4.40E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP L, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.61	4.40E-04	
GPHN	Exon Cassette	2.19	6.13E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GALNT16	Complex	1.60	1.55E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SRSF5	Alter. Acceptor Site	1.94	8.24E-04	
	Alter. Terminal Exon (e6,e7-9)	1.80	5.59E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.24	7.90E-05	
RBM25	Intron Retention	1.63	2.13E-02	hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
PTGR2 // ZNF410	Alter. Donor Site	2.05	5.10E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.05	5.10E-03	
PAPOLA	Intron Retention	1.63	2.46E-02	CUG-BP1, ETR-3, hnRNP C1, hnRNP I (PTB), HuB, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
EVL	Alter. Terminal Exon (e14)	1.86	8.22E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MARK3	Exon Cassette	2.42	4.11E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
APOPT1 // KLC1	Alter. Donor Site	1.69	4.75E-04	
	Alter. Terminal Exon (e19-23)	1.82	1.37E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	3.63	1.61E-05	
	Exon Cassette	1.90	2.83E-04	
SIVA1	Intron Retention	1.60	4.94E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ADSSL1	Alter. First Exon (e2-3)	1.70	1.80E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CCNB1IP1	Exon Cassette	2.07	3.36E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HNRNPC	Complex	2.29	1.40E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.99	7.16E-04	
AJUBA // HAUS4	Alter. Terminal Exon (e1-9)	3.76	1.56E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C14orf93	Complex (e2-3)	2.03	5.03E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TINF2	Intron Retention	1.54	9.14E-03	ETR-3, hnRNP C1, HuB, HuD, MBNL1, SC35, TIA-1, TIAL1, YB-1
SDR39U1	Intron Retention	1.53	5.72E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, HuB, KSRP, Nova-1, Nova-2, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BAZ1A	Exon Cassette	1.97	6.99E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SAV1	Exon Cassette	1.76	3.39E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NIN	Exon Cassette	3.68	5.00E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PYGL	Exon Cassette	9.18	2.67E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DDHD1	Alter. Terminal Exon (e12)	3.16	6.15E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.76	2.57E-04	
GCH1	Alter. Terminal Exon (e5)	1.80	2.07E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.82	1.38E-03	
RTN1	Exon Cassette	2.95	1.24E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AREL1	Exon Cassette	1.93	2.72E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NEK9	Intron Retention	1.54	9.52E-03	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuD, KSRP, Nova-1, Sam68, SC35, SRp30c, YB-1, ZRANB2
GALC	Alter. First Exon (e1-2)	4.70	2.83E-06	
EML5	Exon Cassette	2.40	1.18E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, PSF, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2

Appendices

SMEK1	Alter. Terminal Exon (e8)	1.53	4.21E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.51	4.61E-04	
MOK	Exon Cassette	1.51	1.27E-02	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.61	2.18E-03	
XRCC3	Exon Cassette	2.99	1.28E-03	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.43	2.48E-03	
C14orf2	Complex	2.43	2.48E-03	
	Exon Cassette	2.43	2.48E-03	
EMC4	Complex (e5)	2.16	3.76E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e5)	2.16	3.76E-04	
SRP14AS1	Alter. Terminal Exon (e3-4)	1.59	6.36E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RAD51	Exon Cassette	1.81	8.79E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TUBGCP4	Exon Cassette	1.57	5.08E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
HYPK // SERF2	Alter. Acceptor Site	1.79	2.74E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.91	2.48E-03	
CTDSP2	Complex	1.69	5.05E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SORD	Alter. Acceptor Site	1.87	7.84E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SEMA6D	Exon Cassette	2.55	4.18E-06	9G8, CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GALK2	Exon Cassette	1.88	6.20E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e2-4)	1.70	1.16E-03	
TCF12	Exon Cassette	5.09	8.28E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1-3)	2.83	1.64E-05	
TPM1	Complex	4.27	2.41E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.59	2.41E-05	
USP3	Alter. First Exon (e1-2)	1.69	7.45E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LRRC49	Exon Cassette	3.26	1.01E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
PML	Alter. Terminal Exon (e5-10)	1.52	2.00E-02	
	Complex	1.51	1.04E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.52	1.57E-02	
SCAMP5	Mutually Exclusive Exons (e2)	5.63	3.86E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
COMMD4	Intron Retention	1.69	1.42E-03	hnRNP P (TLS), KSRP, SC35, SRp30c, YB-1
C15orf27	Alter. First Exon (e1-11)	2.59	3.40E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
IREB2	Intron Retention	2.00	3.50E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PSMA4	Intron Retention	1.94	3.78E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZFAND6	Alter. First Exon (e1-2,e5-7)	1.69	3.90E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.17	4.02E-03	
AKAP13	Exon Cassette	3.89	9.02E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FANCI	Complex	1.65	1.03E-02	
	Intron Retention	1.65	1.98E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC03A1	Alter. First Exon (e1-4)	3.21	4.01E-05	
	Alter. Terminal Exon (e16-17)	7.53	5.98E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	8.28	5.98E-05	
CHD2//MIR3175	Intron Retention	1.85	1.53E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, YB-1, ZRANB2
GABRB3	Exon Cassette	3.97	8.40E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF,



					RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TJP1	Exon Cassette	2.33	1.18E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
C15orf57 // MRPL42P5	Alter. Donor Site	2.03	7.96E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1	
EHD4	Complex	1.50	5.44E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
VPS39	Complex	2.21	2.14E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
TTBK2	Exon Cassette	2.06	1.50E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
PPIP5K1	Complex	1.65	1.09E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, YB-1, ZRANB2	
MYEF2	Intron Retention	2.10	3.02E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP P (TLS), HuB, Nova-1, Nova-2, SC35, TIA-1, TIAL1, YB-1, ZRANB2	
DMXL2	Exon Cassette	1.76	2.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
	Alter. Terminal Exon	4.94	8.32E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, YB-1, ZRANB2	
SLTM	Intron Retention	1.56	1.17E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, SC35, SRp20, SRp30c, YB-1, ZRANB2	
CA12	Exon Cassette	1.59	1.43E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
CSNK1G1 // KIAA0101	Alter. Terminal Exon (e5)	2.49	1.55E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
IGDCC4	Alter. First Exon (e1-18)	3.50	1.78E-05	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
DPP8	Exon Cassette	2.20	3.56E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
MYO9A	Exon Cassette	2.23	8.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
PKM	Complex	1.67	9.02E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
ADPGK	Exon Cassette	1.52	5.16E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
WDR61	Intron Retention	1.66	3.70E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, PSF, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2	
CHRN4	Alter. Donor Site	2.40	1.76E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1	
MFGE8	Exon Cassette	2.18	4.71E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
PEX11A	Exon Cassette	2.35	1.81E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
AP3S2/C15orf38	Exon Cassette	1.59	5.70E-03	MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
PRC1	Complex	1.62	2.88E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
	Exon Cassette	1.73	1.18E-03	SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
RHOT2	Intron Retention	1.78	7.36E-03	ETR-3, hnRNP I (PTB), hnRNP P (TLS), MBNL1, Nova-1, SRp30c, YB-1, ZRANB2	
UBE2I	Exon Cassette	1.95	1.56E-04	ETR-3, hnRNP A1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
TELO2	Complex (e13-15)	1.52	7.57E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp30c, YB-1, ZRANB2	
MAPK8IP3	Intron Retention	9.59	1.68E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
C16orf59	Intron Retention	2.00	1.56E-02	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, PSF, SC35, SF2/ASF, SRp30c	
MGRN1	Exon Cassette	2.51	6.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
MKL2	Intron Retention	2.79	2.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1	
	Alter. First Exon (e14)	1.55	2.29E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2	
	Exon Cassette	2.07	2.80E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2	
TAOK2	Alter. Terminal Exon (e16-17)	1.67	3.30E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
CORO1A	Intron Retention	1.88	3.16E-03	ETR-3, hnRNP LL, hnRNP P (TLS), HuB, SC35, YB-1	
STX4	Intron Retention	1.87	9.61E-04	ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), Nova-1, SC35, YB-1, ZRANB2	
FUS	Intron Retention	2.82	8.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
ORC6	Alter. Terminal Exon (e4)	2.32	3.00E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP	

Appendices

				MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CYLD	Exon Cassette	1.85	5.34E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC6A2	Exon Cassette	4.03	4.23E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
COQ9	Intron Retention	1.55	5.60E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, SC35, TIA-1, TIAL1, YB-1
GPR56	Complex (e7)	3.50	2.42E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.19	1.50E-03	
NDRG4	Alter. Acceptor Site	2.54	3.48E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e8)	1.82	3.67E-05	
	Exon Cassette	1.86	2.19E-04	
SETD6	Intron Retention	1.60	5.72E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
FAM65A	Complex	1.62	3.48E-03	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1
EDC4	Intron Retention	1.71	4.38E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP I (PTB), hnRNP K, HuB, KSRP, Nova-1, SC35, TIA-1, TIAL1, YB-1
NFATC3	Alter. First Exon (e3)	2.06	1.07E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NFAT5	Exon Cassette	1.96	4.34E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNRF1	Exon Cassette	2.11	6.04E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NUDT7	Exon Cassette	2.56	1.96E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MAP1LC3B	Exon Cassette	2.13	2.82E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
JPH3	Alter. Terminal Exon (e3)	1.72	2.60E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZC3H18	Exon Cassette	2.65	1.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TRAPPC2L	Complex	1.61	5.56E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TUBB3	Alter. First Exon (e3-8)	14.05	2.20E-07	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	11.53	4.37E-05	
	Exon Cassette	4.69	1.71E-05	
C16orf13	Intron Retention	1.79	2.43E-05	Fox-1, Fox-2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, SC35, SRp20, SRp30c, YB-1
RNPS1	Exon Cassette	1.78	1.39E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ROGDI	Intron Retention	2.01	1.32E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), Nova-1, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1
NAGPA	Exon Cassette	1.56	1.54E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), MBNL1, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1
TVP23A	Alter. Acceptor Site	3.14	1.50E-06	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TXNDC11	Complex (e1-2)	2.31	2.80E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KIAA0430	Intron Retention	3.21	4.75E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CDIPT	Intron Retention	2.10	2.82E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KCTD13	Complex	1.81	2.92E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
DOC2A	Alter. Term Exon (e14,e15-18)	1.95	3.04E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Donor Site	2.24	8.45E-04	
C16orf93	Alter. Acceptor Site	2.61	1.42E-04	
	Alter. Terminal Exon (e4-9)	1.93	2.12E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.83	9.82E-03	
ZNF423	Alter. First Exon (e1-4)	2.46	2.61E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BBS2	Intron Retention	1.57	1.92E-02	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DYNC1L12	Intron Retention	1.78	3.72E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM96B	Intron Retention	1.58	5.60E-05	hnRNP I (PTB), hnRNP P (TLS), Nova-1, RBM5, SC35, SRp30c, YB-1, ZRANB2
ACD	Intron Retention	1.94	2.42E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Nova-1, TIA-1, TIAL1
MTSSL1	Complex	1.55	3.02E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1,

					HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
COG4	Intron Retention	2.04	1.94E-03		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, Nova-1, Sam68, SC35, SRp20, YB-1, ZRANB2
AP1G1	Exon Cassette	1.60	4.19E-04		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF821	Exon Cassette	2.01	4.20E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RFWD3	Exon Cassette	1.76	1.50E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMEM170A	Alter. First Exon (e1)	1.56	4.24E-05		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZDHC7	Exon Cassette	2.34	6.33E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DPH1 // OVCA2	Intron Retention	1.67	2.10E-03		ETR-3, hnRNP A1, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SGSM2	Exon Cassette	1.68	4.17E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Intron Retention	1.70	3.46E-03		
RABEP1	Exon Cassette	1.76	2.11E-02		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RPAIN	Intron Retention	2.15	3.77E-05		ETR-3, hnRNP A1, hnRNP P (TLS), HuB, MBNL1, Nova-1, SC35, YB-1, ZRANB2
ELP5	Alter. Terminal Exon (e6)	2.58	5.23E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CD68 // EIF4A	Intron Retention	2.24	1.37E-04		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), SC35, SRp20, TIA-1, TIAL1, YB-1
CNTR0B	Intron Retention	1.65	4.01E-04		ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1
MAP2K4	Exon Cassette	2.49	2.76E-03		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C17orf76-AS1	Complex (e2-3)	1.66	7.91E-05		
	Exon Cassette	1.71	2.29E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.01	3.84E-05		
MPRI1	Exon Cassette	1.52	7.57E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LLGL1	Intron Retention	2.16	2.15E-02		ETR-3, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, SC35, SF2/ASF, SRp30c, YB-1, ZRANB2
EPN2	Exon Cassette	1.76	8.42E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KSR1	Exon Cassette	1.63	9.65E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ERAL1	Complex	1.87	4.90E-03		ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ADAP2	Exon Cassette	1.86	1.04E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NF1	Exon Cassette	4.86	9.84E-05		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMUB2	Exon Cassette	2.26	6.79E-04		9G8, ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1
C17orf104	Alter. Terminal Exon	2.90	2.21E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NSF // NSFPP1	Complex	1.85	1.32E-02		CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NFE2L1	Exon Cassette	1.54	2.14E-03		ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PKD2	Alter. First Exon (e1,e4)	2.44	4.63E-04		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SPATA20	Intron Retention	1.52	2.15E-04		ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Nova-1, Nova-2, RBM5, Sam68, SC35, TIA-1, TIAL1, YB-1
LUC7L3	Intron Retention	2.20	4.41E-04		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PSMC5	Intron Retention	1.82	1.16E-04		ETR-3, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
PITPNC1	Exon Cassette	1.77	1.74E-03		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BPTF	Alter. Terminal Exon (e32)	1.83	1.99E-05		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.77	1.36E-04		
PRKAR1A	Alter. Donor Site	1.50	8.43E-04		9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e3)	1.66	3.66E-03		
COG1	Exon Cassette	1.53	4.48E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
RPL38	Alter. Terminal Exon (e3)	1.88	1.52E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35,

Appendices

				SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SNHG16	Complex	2.38	1.94E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MGAT5B	Exon Cassette	2.05	2.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CCDC40	Alter. First Exon (e1-7)	2.10	7.42E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e11,e13)	1.94	1.20E-03	
NARF	Exon Cassette	1.73	1.14E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Intron Retention	2.45	1.77E-04	
GLOD4	Complex	1.84	2.50E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
C17orf85	Complex	1.97	1.53E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC25A11	Intron Retention	1.51	5.02E-03	hnRNP P (TSL), HTra2beta1, HuB, KSRP, TIA-1, TIAL1, YB-1
CAMTA2	Exon Cassette	1.52	1.16E-03	ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), KSRP, Nova-1, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DLG4	Alter. First Exon (e1-3,e5)	3.62	2.98E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PLSCR3 // TMEM256	Alter. First Exon	1.57	4.37E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF18	Alter. First Exon (e2-4)	1.57	2.13E-05	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CDRT4 // TYP23C	Alter. Terminal Exon (e6)	2.00	5.36E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.88	2.88E-03	
NCOR1	Exon Cassette	2.36	1.70E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC46A1	Exon Cassette	1.86	1.43E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ALDOC	Alter. Donor Site	1.59	7.19E-04	ETR-3, hnRNP A1, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, Nova-1, SC35, TIA-1, TIAL1, YB-1, ZRANB2
SDF2	Complex	1.77	1.04E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM222B	Complex (e2)	1.76	1.16E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.76	1.16E-03	
PHF12	Complex	2.16	1.72E-03	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MYO18A // TIAF1	Exon Cassette	3.55	6.77E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYNRG	Alter. Donor Site	2.57	4.28E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.81	3.63E-06	
DDX52	Intron Retention	1.92	1.14E-02	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TSL), HuB, KSRP, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1
MIEN1	Intron Retention	1.70	5.96E-05	hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, Nova-1, Nova-2, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MED24	Alter. First Exon (e1)	1.60	3.05E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Complex	2.39	1.18E-03	
	Exon Cassette	2.39	1.18E-03	
KRT222//SMARCE1	Exon Cassette	5.92	8.48E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LEPREL4	Alter. First Exon (e1)	2.14	2.98E-04	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), KSRP, PSF, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PSMC3IP	Alter. Donor Site	2.17	7.84E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.17	7.79E-04	
ETV4	Alter. First Exon (e1-4)	3.67	8.54E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, Nova-1, RBM5, SC35, SRp30c, YB-1, ZRANB2
	Exon Cassette	7.00	2.00E-05	
MPP3	Intron Retention	2.92	1.08E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GPATCH8	Exon Cassette	2.37	6.74E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PLEKHM1	Exon Cassette	1.86	4.04E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KANSL1	Exon Cassette	2.35	3.62E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1

SPAG9	Alter. First Exon (e1-4)	6.50	8.88E-08	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.68	2.50E-03	
MBTD1	Exon Cassette	2.13	6.03E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.62	4.80E-03	
SRSF1	Intron Retention	1.73	6.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ICAM2	Alter. Donor Site	4.98	2.63E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e1)	5.13	4.04E-04	
PLEKHM1P	Alter. Donor Site	1.56	1.12E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.43	1.15E-04	
AMZ2P1	Intron Retention	2.20	9.01E-04	ETR-3, hnRNP C1, hnRNP I (PTB), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SRp20, YB-1
HN1	Exon Cassette	1.83	1.22E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
UNC13D	Intron Retention	3.98	2.61E-04	ETR-3, KSRP, PSF, SC35, SRp30c, YB-1
FBF1 // MRPL38	Complex	1.64	7.62E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ACOX1	Complex	1.64	4.82E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
EXOC7	Alter. Acceptor Site	2.70	1.68E-02	
	Alter. Terminal Exon (e4)	1.62	7.01E-04	
	Complex	2.36	8.85E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.99	1.90E-05	
	Intron Retention	1.73	1.10E-02	
CYTH1	Exon Cassette	1.96	6.63E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CSNK1D	Alter. First Exon (e1,e3)	1.56	1.02E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.50	6.19E-04	
ANKRD12	Alter. Terminal Exon (e12-16)	1.72	5.78E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.52	2.06E-03	
GREB1L	Exon Cassette	2.41	5.05E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF271	Complex	2.03	4.18E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.90	4.18E-04	
C18orf25	Exon Cassette	1.84	5.48E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RNF165	Exon Cassette	1.88	1.76E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ELAC1 // SMAD4	Exon Cassette	2.80	5.01E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
POLI	Intron Retention	1.87	3.60E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF532	Alter. First Exon (e1,e6-10,e12)	1.77	3.63E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TNFRSF11A	Exon Cassette	1.88	2.62E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ATP9B	Exon Cassette	1.51	4.88E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NFATC1	Exon Cassette	2.62	3.13E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LAMA1	Complex	2.99	9.39E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF519	Exon Cassette	1.52	4.94E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ESCO1	Exon Cassette	1.84	1.72E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM241	Exon Cassette	1.53	8.63E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SS18	Exon Cassette	2.77	6.96E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZSCAN30	Alter. Donor Site	1.59	1.76E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD,

Appendices

				KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATP5A1	Alter. Donor Site	2.50	5.66E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MBD1	Complex	1.52	2.98E-04	
	Exon Cassette	1.53	2.98E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP P (TLS), KSRP, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TCF4	Alter. First Exon (e1-2,e4-20,e23)	3.27	5.47E-07	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CBLN2	Alter. First Exon (e1-3)	2.80	5.76E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CIRBP	Intron Retention	1.89	2.15E-04	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HuB, KSRP, MBNL1, RBM5, SC35, SF2/ASF, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NFIC	Exon Cassette	1.55	2.11E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HMG20B	Intron Retention	2.61	1.92E-03	hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, Nova-1, Nova-2, SC35, TIA-1, TIAL1, YB1
ATCAY	Alter. First Exon (e3-4,e6-15,e17)	2.69	9.52E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	3.45	8.08E-05	
MAP2K7	Exon Cassette	1.88	2.39E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
SNAPC2	Alter. First Exon (e2)	1.64	6.28E-03	hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, KSRP, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1
ZNF317	Intron Retention	1.52	7.72E-03	ETR-3, Fox-1, Fox-2, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
PIN1	Exon Cassette	1.67	1.40E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
DNM2 // QTRT1	Intron Retention	2.07	4.40E-04	
	Mutually Exclusive Exons (e22)	1.52	7.18E-04	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SMARCA4	Complex	1.86	9.08E-03	
	Exon Cassette	1.86	9.08E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ANKLE1/BABAM	Intron Retention	1.63	5.06E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, SC35, SF2/ASF, YB-1, ZRANB2
MAU2	Intron Retention	1.77	2.50E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP I (PTB), hnRNP P (TLS), KSRP, SC35, SRp30c, YB-1, ZRANB2
ZNF257	Exon Cassette	2.78	1.60E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF254	Alter. First Exon (e1-2,4,e11-12)	1.89	2.56E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF507	Alter. Terminal Exon (e4)	1.69	3.06E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FXYD5	Alter. First Exon (e1-5)	2.97	3.51E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LSR	Exon Cassette	2.69	3.82E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HKR1	Exon Cassette	1.79	9.24E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SPINT2	Exon Cassette	4.10	1.68E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HNRNPUL1	Alter. Donor Site	1.86	1.76E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF574	Alter. First Exon (e3)	1.81	2.58E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF283	Alter. Terminal Exon (e7)	1.59	1.40E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PVR	Alter. Donor Site	1.97	1.42E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1
CLASRP	Alter. First Exon (e1-11)	1.50	6.20E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PPP5C	Intron Retention	1.84	4.16E-03	ETR-3, Fox-1, Fox-2, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), MBNL1, Nova-1, TIA-1, TIAL1
SNRNP70	Complex	2.24	6.21E-04	
	Exon Cassette	2.45	3.45E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PRMT1	Alter. Donor Site	3.66	4.45E-04	
	Alter. First Exon (e1-4)	1.96	1.73E-05	CUG-BP1, ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.55	1.28E-03	
ZNF480	Exon Cassette	1.63	3.72E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR,

				KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MYADM	Alter. First Exon (e2)	1.80	8.99E-04	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
CNOT3	Intron Retention	1.58	6.98E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
RPS9	Alter. Donor Site	1.81	1.32E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.79	2.48E-03	
RPL28	Alter. Terminal Exon (e3)	1.99	5.64E-04	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF542	Alter. First Exon (e2)	3.35	5.80E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, Nova-1, SC35, SRp30c, TIA-1, TIAL1
	Complex	3.51	4.15E-04	
ZNF551	Exon Cassette	1.71	1.44E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF135	Exon Cassette	2.50	3.64E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MFS12	Complex	1.72	1.36E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PTPRS	Exon Cassette	2.59	4.00E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF266	Intron Retention	2.50	5.00E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, Nova-1, Nova-2, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TYK2	Complex (e6-7)	1.88	3.63E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EPOR // RGL3	Complex	1.98	4.99E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STX10	Intron Retention	2.07	3.59E-04	ETR-3, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, YB-1, ZRANB2
GIPC1	Exon Cassette	1.94	1.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NOTCH3	Exon Cassette	2.29	3.05E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, YB-1, ZRANB2
RAB3A	Alter. First Exon (e1)	2.29	1.57E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, SC35, SRp20, SRp30c, YB-1, ZRANB2
	Intron Retention	1.56	1.02E-03	
C19orf12	Exon Cassette	1.79	5.40E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF565	Alter. First Exon (e1,e4)	1.75	1.58E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.75	2.36E-03	
ZNF260	Complex	2.59	4.78E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.41	3.45E-04	
ZNF571	Exon Cassette	2.02	2.22E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF573	Exon Cassette	1.74	7.53E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HNRNPL	Exon Cassette	2.32	1.02E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FBXO17//SARS2	Intron Retention	1.82	1.55E-04	Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HuB, Nova-1, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF780B	Exon Cassette	2.26	9.12E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
AKT2	Exon Cassette	1.76	1.14E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RTN2	Exon Cassette	1.81	6.45E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PIHL1D1	Alter. Acceptor Site	3.02	1.72E-05	ETR-3, hnRNP A1, hnRNP I (PTB), hnRNP P (TLS), HuB, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
NOSIP	Complex	2.54	4.40E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYT3	Alter. First Exon (e1-2)	1.50	6.02E-03	9G8, ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ZNF615	Exon Cassette	2.03	7.80E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF83	Alter. First Exon (e1.3,e8)	2.09	1.90E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.03	8.12E-05	
ZNF611	Exon Cassette	3.38	1.99E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF415	Exon Cassette	9.39	2.33E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1,

Appendices

					Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF667	Alter. First Exon (e1-2)	5.77	2.13E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF772	Exon Cassette	1.55	5.29E-07		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
ZNF550	Exon Cassette	2.35	2.08E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF606	Alter. Terminal Exon	2.01	1.58E-03		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.54	3.12E-03		
ZNF329	Exon Cassette	2.44	1.64E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RNF144A	Alter. First Exon (e1)	4.83	1.77E-06		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HPCAL1	Alter. First Exon (e1,e3-5)	2.16	7.69E-05		CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FAM228A // FAM228B	Complex (e4)	2.14	2.40E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.64	8.26E-03		
CENPO	Complex	1.54	5.64E-05		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KHK	Exon Cassette	2.17	4.39E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SNX17	Exon Cassette	1.57	2.14E-03		ETR-3, hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, PSF, SC35, SRp30c, TIA-1, TIAL1, YB-1
BRE	Exon Cassette	1.99	5.28E-03		CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPP1CB // SPDYA	Complex	1.66	5.32E-03		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.37	1.03E-04		ETR-3, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, HuB, KSRP, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2
NDUFAF7	Intron Retention	2.37	1.03E-04		
EML4	Exon Cassette	9.66	2.44E-05		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MTA3	Alter. Terminal Exon	2.20	1.63E-04		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PAPOLG	Exon Cassette	1.58	8.70E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.66	1.98E-02		
KIAA1841	Complex (e18-19)	1.81	4.33E-05		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CEP68	Alter. First Exon (e1)	3.00	1.10E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.51	1.43E-04		
	Exon Cassette	1.71	3.28E-03		
MEIS1	Intron Retention	1.94	4.38E-03		hnRNP C1, hnRNP I (PTB), Nova-1, SRp20, SRp30c, YB-1, ZRANB2
NAGK	Intron Retention	1.66	2.65E-04		ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MPHOSPH10	Alter. Terminal Exon (e5)	1.56	8.40E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF638	Alter. Acceptor Site	2.41	8.03E-04		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.43	8.90E-03		
TTC31	Intron Retention	1.70	2.38E-03		hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTra2alpha, HTra2beta1, HuB, MBNL1, RBM5, SC35, SRp30c, YB-1
ELMOD3	Exon Cassette	2.02	9.44E-04		ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.60	1.11E-02		
CIAO1	Intron Retention	1.75	1.19E-04		ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp30c, YB-1, ZRANB2
ITPR1L1	Exon Cassette	2.12	7.66E-05		ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB1
INPP4A	Alter. Donor Site	2.39	2.02E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MAP4K4	Alter. Terminal Exon (e18-33)	2.31	5.39E-04		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BCL2L11	Complex (e3,e9-13)	1.73	1.50E-03		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.91	3.06E-03		
POLR1B	Exon Cassette	2.35	5.62E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2



DBI	Complex (e2-3)	2.30	4.58E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.28	6.60E-04	
PKP4	Alter. Terminal Exon (e17)	1.93	4.36E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DNAJC10	Complex	1.85	1.54E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
CARF	Exon Cassette	1.56	6.26E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FASTKD2	Intron Retention	1.66	1.79E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PIKFYVE	Alter. Terminal Exon (e13)	1.83	3.64E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MAP2	Exon Cassette	3.56	1.94E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SPAG16	Complex (e1)	1.82	1.74E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PLCD4	Alter. Terminal Exon (e11)	2.54	6.05E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.67	9.88E-03	
BCS1L	Complex	1.57	4.00E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZFAND2B	Alter. Terminal Exon (e8)	1.92	2.16E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, YB-1, ZRANB2
DNAJB2	Intron Retention	1.87	4.60E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ASIC4	Intron Retention	3.53	1.91E-05	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Nova-1, SC35, SRp30c, YB-1
STK11IP	Intron Retention	1.73	2.03E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, Nova-1, SC35, TDP43, TIA-1, TIAL1, YB-1
NYAP2	Exon Cassette	1.74	3.40E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RHBDD1	Exon Cassette	1.79	5.56E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MFF	Exon Cassette	1.59	3.99E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GIGYF2	Alter. Terminal Exon (e8)	1.57	1.88E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1,e3-20,e23)	2.78	2.16E-04	
LRRFIP1	Alter. Terminal Exon (e21)	4.06	5.00E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e6)	1.81	1.18E-03	
ATG4B	Exon Cassette	1.68	8.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SH3YL1	Alter. First Exon (e2)	2.77	3.00E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
KIDINS220	Exon Cassette	2.30	1.38E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SMC6	Exon Cassette	1.66	2.05E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SDC1	Alter. First Exon (e1-2,e4-6)	1.53	1.28E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PUM2	Exon Cassette	1.75	1.26E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DNAJC27	Exon Cassette	1.97	2.02E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DNMT3A	Alter. First Exon (e1)	2.85	4.72E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DTNB	Exon Cassette	1.58	1.14E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HADHA	Alter. Terminal Exon	2.93	5.96E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PREB	Intron Retention	1.65	2.84E-03	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
GTF3C2	Exon Cassette	1.75	2.44E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
EIF2B4	Intron Retention	1.74	1.60E-03	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, YB-1
SUPT7L	Intron Retention	3.24	3.89E-05	ETR-3, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, SC35, YB-1
SOS1	Exon Cassette	2.98	4.96E-07	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP,

Appendices

				MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MAP4K3	Exon Cassette	1.57	4.21E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
THUMP2	Exon Cassette	1.52	6.80E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PREPL	Complex	1.71	1.71E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.03	2.60E-04	
PIGF	Exon Cassette	1.87	1.00E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ASB3 // GPR75	Alter. Donor Site	1.58	4.98E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SMEK2	Exon Cassette	1.76	4.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, KSRP, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PUS10	Exon Cassette	1.54	8.63E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
FAM161A	Exon Cassette	1.58	2.40E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CCT4	Complex	1.63	1.63E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.71	4.21E-04	
FAM136A	Complex	2.03	2.58E-04	
	Exon Cassette	1.85	3.99E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RTKN	Alter. First Exon (e1)	2.59	2.07E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CCDC142 // MRPL53	Alter. First Exon (e1-8)	1.58	3.20E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AUP1	Intron Retention	1.69	8.63E-04	ETR-3, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
SNRNP200	Exon Cassette	1.73	6.79E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ANKRD36B	Exon Cassette	1.52	2.28E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CLASP1	Exon Cassette	3.97	1.69E-05	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons	4.88	1.69E-05	
BIN1	Exon Cassette	1.84	1.04E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ERCC3	Intron Retention	1.70	1.76E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HuB, MBNL1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CACNB4	Alter. Termin Exon (e12-15,e17)	1.62	1.02E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.70	5.64E-03	
PRPF40A	Exon Cassette	3.71	9.84E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
BAZ2B	Complex	1.58	2.39E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KCNH7	Alter. Terminal Exon (e10-19)	3.18	1.63E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LRP2	Alter. First Exon (e1-50)	2.19	7.98E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GPR155	Exon Cassette	2.49	2.63E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ATF2	Alter. Terminal Exon (e9)	1.75	4.59E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.97	2.42E-05	
PRKRA	Exon Cassette	2.27	2.16E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, TIA-1, TIAL1, YB-1, ZRANB2
ORMDL1	Intron Retention	1.77	2.86E-03	ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, MBNL1, Nova-1, SRp20, TIA-1, TIAL1, YB-1
PGAP1	Exon Cassette	1.77	8.20E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CLK1 // PPL3	Alter. Acceptor Site	1.93	6.56E-03	
	Alter. First Exon (e1-3,5-8,10-11)	1.82	7.01E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.98	4.42E-03	
ALS2	Alter. Terminal Exon (e23)	1.55	3.68E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2

ABCA12	Exon Cassette	1.68	6.20E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OBSL1	Alter. Terminal Exon (e9)	1.57	7.76E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PAX3	Alter. Term Exon (e6-8,e10-11)	1.75	8.84E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FARSB	Exon Cassette	1.68	4.39E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DOCK10	Exon Cassette	2.08	2.81E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
NDUFA10	Intron Retention	1.87	2.45E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SEC23B	Complex	1.57	1.16E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EPB41L1	Alter. First Exon (e3-6)	1.53	2.50E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e3-7,e9)	2.21	1.44E-04	
SRSF6	Exon Cassette	2.23	4.93E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
STK4	Alter. Terminal Exon (e2,e10)	1.52	8.16E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PCIF1	Intron Retention	1.54	6.13E-05	hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SRp30c, YB-1
ARFGF2	Exon Cassette	1.53	7.28E-03	ETR-3, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
DDX27	Intron Retention	1.56	2.48E-02	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, YB-1
ZFAS1	Exon Cassette	2.79	4.80E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NELFCD	Alter. Donor Site	1.74	8.60E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, SC35, YB-1, ZRANB2
	Intron Retention	2.15	3.57E-04	
LSM14B	Alter. Acceptor Site	1.83	5.02E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e6)	1.97	5.44E-03	
	Exon Cassette	2.01	1.62E-03	
ARFGAP1	Intron Retention	1.62	6.96E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, SC35, YB-1
TCEA2	Complex	1.72	5.22E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.22	1.82E-05	
LINC00266-1/MYT1/PCMTD	Alter. Terminal Exon (e21-25)	2.70	3.51E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.44	4.01E-06	
TBC1D20	Intron Retention	1.99	6.86E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SNRPB	Exon Cassette	2.20	4.22E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB
IDH3B	Intron Retention	1.80	1.20E-02	ETR-3, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, SC35, TIA-1, TIAL1, YB-1
CPXM1	Complex	2.73	9.39E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), MBNL1, Nova-1, SC35, SRp20, SRp30c, YB-1
PCED1A	Intron Retention	2.11	3.24E-03	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Nova-1, RBM5, SRp20, SRp30c, YB-1
SLC4A11	Alter. Acceptor Site	1.76	1.83E-04	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
NAPB	Alter. First Exon (e1-3)	1.64	1.08E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon	2.12	3.83E-04	
	Exon Cassette	1.56	1.16E-02	
BCL2L1	Complex	1.95	4.84E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.20	4.21E-04	
UQQC	Alter. Terminal Exon (e8)	1.87	3.76E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.62	3.30E-03	
CPNE1 // NFS1 // RBM12	Alter. Terminal Exon (e21-38)	1.53	5.80E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.62	2.02E-03	
	Exon Cassette	1.75	3.44E-03	
	Intron Retention	2.95	9.27E-07	
RBM39	Exon Cassette	1.90	1.34E-03	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DSN1	Intron Retention	1.64	4.06E-03	ETR-3, hnRNP C1, HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
SNHG17	Alter. First Exon (e1-3)	1.57	1.14E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e2)	1.62	4.36E-03	

Appendices

	Complex	2.16	5.45E-07	
	Exon Cassette	1.78	1.34E-03	
	Intron Retention	1.95	2.56E-03	
ELMO2	Intron Retention	1.51	1.48E-03	CUG-BP1, ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PREX1	Intron Retention	2.12	1.80E-04	hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, Nova-1, SC35, SRp20, SRp30c, YB-1
TMEM189//UBE2V1	Alter. First Exon (e1,3,e5-7,e15)	1.94	1.26E-03	
	Complex	2.18	2.60E-03	
	Exon Cassette	2.18	2.49E-03	
	Mutually Exclusive Exons (e11,e14)	2.18	2.49E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DIDO1	Alter. Term Exon (e7-8,e17-18)	1.56	4.28E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ARFRP1	Alter. First Exon (e1)	1.56	4.68E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), KSRP, MBNL1, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1
USP25	Exon Cassette	1.61	1.88E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
USP16	Intron Retention	1.55	3.75E-02	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP DL, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, Nova-1, RBM5, Sam68, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
ITSN1	Exon Cassette	2.39	4.24E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PCBP3	Alter. Terminal Exon (e12-16)	2.25	1.52E-05	
	Exon Cassette	2.82	5.02E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MCM3AP-AS1	Alter. Terminal Exon (e5)	1.82	2.14E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PRMT2	Exon Cassette	1.71	2.99E-04	ETR-3, hnRNP A1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
APP	Exon Cassette	5.04	1.05E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SCAF4	Alter. Terminal Exon (e19)	1.55	2.76E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ATP50/CRYZL1//DONSON	Alter. Acceptor Site	1.64	8.16E-04	9G8, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZBTB21	Exon Cassette	1.52	2.26E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
U2AF1	Alter. First Exon (e1)	1.59	1.69E-02	
	Intron Retention	1.58	6.34E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
HSF2BP	Exon Cassette	1.61	2.33E-02	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DGCR8	Intron Retention	2.11	1.40E-03	ETR-3, Fox-1, Fox-2, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MED15	Complex	1.58	5.18E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC2A11	Alter. Terminal Exon	1.56	6.18E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
SGSM1	Exon Cassette	3.67	2.19E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MTFP1//SEC14L2	Complex	1.52	1.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TUG1	Exon Cassette	1.56	6.78E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LIMK2	Alter. First Exon (e1-2)	1.54	6.19E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TIMP3	Complex	1.63	2.19E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MCM5	Intron Retention	1.52	1.38E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1
MPST	Intron Retention	1.76	8.45E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SGSM3	Alter. First Exon (1-17)	1.56	5.02E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

RBX1 // XPNPEP3	Exon Cassette	1.94	4.79E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PANX2	Exon Cassette	1.92	5.66E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BID	Alter. First Exon (e2,e4-7)	1.61	1.66E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e4-6)	1.66	1.20E-03	
	Exon Cassette	2.03	5.64E-05	
DGCR2 // DGCR11	Complex (e2)	1.52	3.24E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TRMT2A	Intron Retention	1.52	4.18E-04	ETR-3, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, Nova-1, Nova-2, SC35, YB-1, ZRANB2
YPEL1	Complex	2.57	8.96E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PRAME	Alter. First Exon (e1)	3.60	1.52E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.64	2.25E-05	
FAM211B	Alter. Donor Site	1.76	4.75E-06	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, YB-1, ZRANB2
HPS4	Intron Retention	1.77	2.70E-03	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, SC35, TIA-1, TIAL1, YB-1
THOC5	Exon Cassette	1.62	7.38E-03	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, Nova-1, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
PATZ1	Alter. Terminal Exon (e4)	1.67	2.43E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.58	1.08E-03	
CSNK1E	Alter. Terminal Exon (e8)	2.24	8.44E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DDX17	Intron Retention	5.12	1.11E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RPL3	Alter. Acceptor Site	4.77	5.71E-05	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, KSRP, Nova-1, Sam68, SC35, SRp30c, YB-1, ZRANB2
MKL1	Exon Cassette	1.83	1.80E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC25A17	Exon Cassette	2.90	6.62E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RANGAP1	Alter. First Exon (e1,e6)	1.80	6.30E-03	9G8, CUG-BP1, ETR-3, FMRF, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CENPM	Complex (e4)	1.85	9.56E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KIAA0930	Alter. First Exon (e4)	2.42	6.57E-04	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, SC35, SF2/ASF, SRp30c, YB-1
HDAC10 // MAPK12	Alter. Terminal Exon (e13)	1.95	3.99E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DENND6B	Intron Retention	2.51	1.41E-04	ETR-3, hnRNP P (TLS), SC35, YB-1
RABL2B	Alter. Donor Site	1.66	1.12E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1
	Alter. Donor Site	1.66	1.12E-02	
	Intron Retention	1.68	2.34E-03	
CNTN4	Alter. First Exon (e1-3,e6-8)	2.97	1.43E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LRRN1	Alter. First Exon (e1)	6.09	7.65E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SETD5	Complex	1.87	4.35E-04	ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1
IL17RC	Complex	1.62	5.77E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.97	3.04E-04	
	Exon Cassette	1.62	1.18E-03	
NR2C2	Intron Retention	2.72	4.20E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RAB5A	Exon Cassette	1.91	6.98E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CMTM8	Exon Cassette	1.71	2.91E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
OXSRI	Exon Cassette	1.87	4.14E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
XYLB	Alter. Terminal Exon (e18)	1.60	2.93E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARIH2	Exon Cassette	1.80	5.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1,

Appendices

					HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RBM5 // RBM6	Complex	1.68	9.08E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
	Intron Retention	1.98	1.66E-03		
TEX264	Exon Cassette	1.63	4.00E-04	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
PDE12	Intron Retention	1.74	4.57E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1	
RPP14	Alter. First Exon (e1,e3)	1.55	1.12E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
PXK	Exon Cassette	1.53	7.96E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
KCTD6	Alter. First Exon (e2)	1.58	6.44E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
EPHA3	Alter. Terminal Exon (e9-19)	2.01	2.05E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
NIT2	Complex	1.62	1.18E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
C3orf52	Exon Cassette	1.53	3.66E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
UMPS	Exon Cassette	2.61	1.09E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
IFT122	Intron Retention	1.57	3.39E-04	ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP P (TLS), KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1	
CEP63	Exon Cassette	1.58	1.01E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
FAIM	Mutually Exclusive Exons (e3)	2.18	1.99E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
ZBTB38	Alter. First Exon (e1-5,e7,e9)	2.24	1.75E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
RNF7	Complex	1.67	2.02E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
	Exon Cassette	1.67	2.02E-02		
TSC22D2	Exon Cassette	1.83	8.21E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
GFM1	Exon Cassette	1.78	8.52E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1	
IQCJ // SCHIP1	Exon Cassette	6.05	3.73E-07	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
SMC4	Intron Retention	1.54	1.33E-02	ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, PSF, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
MYNN	Exon Cassette	1.65	2.20E-03	ETR-3, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1, ZRANB2	
EIF2B5	Intron Retention	1.67	1.79E-04	ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), MBNL1, Nova-1, Nova-2, SC35, TIA-1, TIAL1, YB-1	
EIF4A2	Alter. Terminal Exon (e10)	2.61	4.12E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
LPP	Alter. First Exon	1.91	4.37E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
CCDC50	Exon Cassette	1.81	5.68E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
OPA1	Exon Cassette	2.12	1.32E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
CRBN	Intron Retention	1.76	1.60E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, YB-1	
VGLL4	Alter. First Exon (e1-6)	2.93	4.50E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
DPH3	Complex	1.84	9.00E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
	Exon Cassette	1.91	5.21E-04		
SLC4A7	Exon Cassette	1.76	1.34E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
EOMES	Alter. Acceptor Site	1.54	4.50E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2	
	Complex	1.90	3.04E-04		
CLASP2	Alter. First Exon (e1-7,e20-21)	3.52	6.48E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2	
	Complex	3.90	3.42E-03		

LRRFIP2	Exon Cassette	2.60	2.40E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
IP6K2	Alter. Terminal Exon (e9-11)	1.55	7.96E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.61	1.84E-04	
QRICH1	Exon Cassette	1.62	5.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
QARS	Alter. Acceptor Site	2.54	1.36E-03	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2
CAMKV	Complex	1.68	2.14E-03	ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, Nova-1, Nova-2, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
PCBP4	Exon Cassette	2.15	2.05E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, PSF, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.68	3.43E-04	
NT5DC2	Alter. Donor Site	1.58	9.56E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PBRM1	Exon Cassette	1.59	7.18E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CADPS	Alter. First Exon (e1-6,e8-14,e16-21,e60-27,e29-31)	2.65	9.98E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FOXP1	Complex (e14,e17)	1.53	1.72E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.53	1.02E-03	
	Intron Retention	1.62	2.94E-02	
PDZRN3	Alter. First Exon (e1-3,e7)	6.25	7.62E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CCDC14	Intron Retention	2.00	5.06E-03	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, HuB, Nova-1, Sam68, TDP43, YB-1, ZRANB2
GATA2	Intron Retention	3.27	3.84E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ASTE1	Exon Cassette	1.64	1.21E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
ACAD11/NPHP3	Intron Retention	2.29	1.81E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, MBNL1, Nova-1, Sam68, SC35, YB-1, ZRANB2
STAG1	Alter. Terminal Exon (e10)	1.86	1.30E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.15	1.01E-02	
CCNL1	Intron Retention	1.52	4.18E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
B3GALNT1	Exon Cassette	3.63	4.20E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PHC3	Alter. Terminal Exon (e4)	1.60	4.46E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NCEH1	Exon Cassette	1.52	1.02E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TBL1XR1	Alter. First Exon (e1-2)	1.53	5.00E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.79	2.30E-03	
CLDN1	Complex (e2-4)	5.08	1.24E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NCBP2	Intron Retention	2.46	1.85E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1
KIAA0226	Exon Cassette	2.46	3.08E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KIAA0226	Intron Retention	2.22	1.14E-03	ETR-3, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TSL), HuB, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
FAM114A1	Complex	1.93	1.04E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KLHL5	Alter. First Exon (e2)	2.50	2.21E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.19	7.95E-05	
LIMCH1	Exon Cassette	3.52	1.40E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GUF1	Exon Cassette	2.09	8.35E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1
DCUN1D4	Exon Cassette	4.06	1.90E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
REST	Alter. First Exon (e1)	2.46	2.44E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e5-12)	2.09	3.61E-04	
	Complex	2.38	8.03E-04	
	Mutually Exclusive Exons	2.41	7.43E-04	
NPFFR2	Alter. First Exon (e1)	14.72	1.03E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P

Appendices

				(TLS, HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MTHFD2L	Alter. Terminal Exon (e16)	1.80	2.70E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.86	2.50E-03	
THAP6	Alter. Terminal Exon (e4)	1.54	2.43E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PRDM8	Alter. First Exon (e2-7)	2.60	6.24E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
THAP9	Exon Cassette	1.63	2.76E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AFF1	Alter. First Exon (e1-3)	2.08	1.86E-05	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TET2	Exon Cassette	1.61	1.30E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
APIAR	Exon Cassette	1.77	1.24E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EXOSC9	Intron Retention	1.84	1.39E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, Nova-1, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
INTU	Exon Cassette	1.55	1.23E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ARHGAP10	Alter. First Exon (e1-18)	1.54	4.62E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ARFIP1	Exon Cassette	2.45	7.76E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TRIM2	Alter. First Exon	2.04	3.99E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e6-7)	2.15	7.17E-04	
GUCY1B3	Exon Cassette	4.09	3.07E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, PSF, RBM5, SC35, YB-1
ETFDH	Exon Cassette	1.94	2.72E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FNIP2	Intron Retention	1.74	3.56E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CEP44	Alter. Donor Site	2.72	2.54E-06	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CYP4V2	Intron Retention	1.86	2.24E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
RNF212	Exon Cassette	2.94	2.03E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM128	Intron Retention	1.55	1.05E-02	ETR-3, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RAB28	Exon Cassette	2.26	1.59E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1-13)	1.60	4.54E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATP8A1	Mutually Exclusive Exons (e7)	1.56	2.90E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FRYL	Alter. Terminal Exon (e5)	1.62	8.80E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NUP54	Exon Cassette	1.98	2.44E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RASGEF1B	Exon Cassette	2.59	8.35E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HNRNPD	Exon Cassette	3.92	1.18E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HNRNPDL	Exon Cassette	2.01	3.38E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HPSE	Complex	2.29	6.24E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.18	3.87E-05	
WDFY3	Exon Cassette	1.60	3.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPM1K	Exon Cassette	1.72	9.70E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM13A	Alter. First Exon (e1-9,e11-23)	2.71	7.62E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2



UNC5C	Exon Cassette	4.29	3.77E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ADH5	Alter. Terminal Exon (e6)	2.34	1.56E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DNAJB14	Alter. Terminal Exon (e2-5)	1.90	5.95E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MANBA	Exon Cassette	1.90	1.08E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC9B2	Alter. Terminal Exon (e13)	1.95	6.12E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TBCK	Exon Cassette	1.79	1.52E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TBCK	Exon Cassette	2.47	2.97E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
LEF1	Exon Cassette	2.74	6.41E-04	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PITX2	Exon Cassette	2.02	5.91E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C4orf21	Alter. Terminal Exon (e22-31)	1.54	7.70E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SORBS2	Complex (e6-8)	9.13	1.62E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	7.86	8.41E-05	
BRIX1	Intron Retention	1.86	5.80E-03	ETR-3, HuB, Nova-1, Sam68, TIA-1, TIAL1
SLC1A3	Complex	2.97	1.93E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C7	Alter. First Exon	5.42	1.60E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.78	7.46E-03	
MAP3K1	Intron Retention	1.98	1.11E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, HuB, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1
GPBP1	Exon Cassette	1.91	5.40E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SREK1	Exon Cassette	2.68	7.65E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.67	2.16E-02	
OCLN	Complex (e4)	1.67	1.94E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.62	2.21E-04	
FCHO2	Alter. First Exon (e1-17,e12-17)	1.53	1.62E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ARHGEP28	Alter. Terminal Exon (e16-38)	1.59	3.84E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RASA1	Complex	1.65	2.90E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.08	2.96E-03	
PPIP5K2	Exon Cassette	2.24	5.81E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
PHF15	Alter. First Exon (e1)	1.58	9.48E-03	
	Alter. Terminal Exon (e12-13)	1.98	1.98E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.75	2.08E-03	
DDX46	Exon Cassette	2.42	6.52E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
	Intron Retention	1.67	1.87E-02	
MATR3 // SNHG4	Alter. First Exon (e1-4,e6-7)	2.27	3.45E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e4)	2.48	6.34E-05	
WDR55	Intron Retention	2.02	1.59E-04	ETR-3, Fox-1, Fox-2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, Nova-2, SRp20, YB-1, hnRNP H2, SC35, SRp30
HARS2	Intron Retention	2.74	3.77E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PCDHGA1-12/3/PCDHGB1-7/PCDHGC3-5	Alter. Donor Site	2.75	1.78E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ARHGAP26	Alter. Donor Site	1.58	8.86E-03	
	Complex (e23-24)	1.59	5.85E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.59	5.85E-04	
CPLX2	Alter. First Exon (e1-2,e4-6)	2.07	1.18E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P

Appendices

	Complex	2.69	1.18E-03	(TLS, HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TSPAN17	Intron Retention	1.55	1.50E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, YB-1
UNC5A	Exon Cassette	5.59	3.97E-05	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TRIM41	Intron Retention	1.92	4.98E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP P (TLS), MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BRD9	Complex	1.54	5.76E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MYO10	Complex (e1-3)	2.97	6.04E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZFR	Intron Retention	1.81	3.24E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SF1, TIA-1, TIAL1, YB-1, ZRANB2
NADK2	Exon Cassette	1.98	9.17E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PDE4D	Exon Cassette	3.91	1.95E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GUSBP9	Exon Cassette	1.78	4.90E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM161B	Exon Cassette	1.62	4.14E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NR2F1-AS1	Exon Cassette	1.78	1.50E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ELL2	Complex	3.34	8.14E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NUDT12	Intron Retention	1.62	3.59E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MCC	Alter. First Exon (e1-3)	4.52	7.60E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e19)	1.96	6.96E-04	
CEP120	Complex	1.67	5.02E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FBN2	Alter. Term Exon (e15,e17-43)	1.58	2.50E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.43	4.56E-04	
HINT1	Alter. Donor Site	1.88	7.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.15	6.24E-05	
FNIP1 // RAPGEF6	Alter. First Exon (e1-2,e20-24)	3.70	7.42E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CDKL3 // PPP2CA	Alter. Terminal Exon (e11-14,e17)	1.68	1.19E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM13B	Exon Cassette	1.70	1.30E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HARS	Intron Retention	1.88	1.02E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, SC35, SRp20, SRp30c, YB-1, ZRANB2
GNPDA1	Complex	1.74	2.24E-04	
	Intron Retention	1.61	1.92E-03	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAXDC2	Exon Cassette	1.67	7.99E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CCNJL	Exon Cassette	4.13	6.21E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C5orf54	Exon Cassette	2.82	3.04E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RNF44	Intron Retention	1.97	2.76E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, TIA-1, TIAL1, YB-1, ZRANB2
DBN1	Intron Retention	1.69	4.02E-04	hnRNP I (PTB), hnRNP P (TLS), PSF, SC35, YB-1
DDX41	Intron Retention	2.96	3.52E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, Nova-2, SC35, SRp20, YB-1
CLK4	Intron Retention	2.03	3.25E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, TIA-1, TIAL1, YB-1
FLT4	Alter. Acceptor Site	2.64	1.60E-03	hnRNP E1, hnRNP E2, hnRNP P (TLS), KSRP, Nova-1, SC35, SRp20, SRp30c, YB-1, ZRANB2
DUSP22	Intron Retention	2.27	1.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
JARID2	Alter. First Exon (e1-4)	3.00	1.83E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MYLIP	Exon Cassette	1.70	2.08E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2

BTN2A3P	Alter. Acceptor Site	1.96	4.22E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
BTN2A1	Alter. First Exon (e1-7,e10)	2.89	5.92E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZSCAN16	Alter. Terminal Exon (e3)	1.50	1.40E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.01	3.54E-03	
HLA-F	Alter. Terminal Exon (e5-6,e8-9)	1.81	3.61E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNRD1	Intron Retention	1.56	3.80E-04	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPP1R11	Exon Cassette	1.70	4.70E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, MBNL1, Nova-1, PSF, RBM5, SC35, TIA-1, TIAL1, YB-1
DDR1	Alter. Acceptor Site	1.65	2.52E-03	ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), KSRP, Nova-1, Nova-2, PSF, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1
PHF1	Intron Retention	2.14	1.30E-03	hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP P (TLS), HTra2beta1, KSRP, SC35, TIA-1, TIAL1, YB-1, ZRANB2
ANKS1A	Exon Cassette	1.58	1.90E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF76	Alter. Terminal Exon (e10)	1.74	2.38E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PPARD	Alter. Terminal Exon (e9-10)	1.69	7.66E-05	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MAPK14	Mutually Exclusive Exons (e9)	1.90	3.74E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SRSF3	Exon Cassette	1.87	3.77E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
POLR1C	Intron Retention	1.66	1.36E-03	ETR-3, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
TMEM63B	Exon Cassette	3.97	2.38E-06	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
EFHC1	Intron Retention	2.66	2.50E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
FAM135A	Alter. First Exon (e1-10,e12-15)	1.67	4.37E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.30	2.01E-04	
KCNQ5	Exon Cassette	1.67	9.79E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BCKDHB	Exon Cassette	1.79	2.40E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RWDD2A	Intron Retention	2.50	1.09E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ORC3	Exon Cassette	2.30	4.26E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GRIK2	Exon Cassette	6.77	6.27E-05	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FOXO3	Alter. First Exon (e2)	14.11	1.57E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TRAF3IP2-AS1	Alter. Terminal Exon (e2-5)	2.18	7.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.70	2.42E-04	
RNF146	Complex	1.50	1.16E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.08	1.84E-05	
MYB	Complex (e10-12)	1.72	1.62E-03	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.36	7.45E-04	
STXBP5	Exon Cassette	2.61	2.22E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OPRM1	Complex	2.35	4.04E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.74	6.79E-04	
ARID1B	Exon Cassette	1.79	1.50E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
QKI	Intron Retention	1.59	6.56E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TFAP2A	Alter. First Exon (e3)	3.37	2.77E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.16	2.17E-05	
KIF13A	Exon Cassette	2.22	1.78E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TDP2	Alter. Donor Site	1.53	5.78E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2

Appendices

TRIM27	Intron Retention	1.70	4.40E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPP1R18	Alter. First Exon (e1)	2.48	3.41E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CCHCR1	Alter. Terminal Exon (e16)	1.72	2.63E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, YB-1, ZRANB2
	Complex	2.06	4.54E-03	
HLA-C	Complex	2.25	4.50E-06	hnRNP P (TLS), KSRP, Nova-1, Nova-2, SC35, SF2/ASF, SRp20, SRp30c, YB-1
BAG6	Alter. First Exon (e1)	1.82	1.57E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), KSRP, MBNL1, RBM5, SC35, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HLA-DOB // TAP2	Alter. First Exon (e1-11)	2.00	1.12E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e18-20)	1.59	1.10E-02	
	Complex	2.10	3.54E-05	
HLA-DMA	Alter. Terminal Exon (e2,e4-6)	2.67	2.94E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e2)	3.07	4.48E-05	
	Intron Retention	2.10	1.43E-04	
RXRB	Alter. Terminal Exon (e7)	1.64	1.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.78	4.16E-04	
VPS52	Alter. Terminal Exon (e13)	1.77	8.21E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.32	7.89E-05	
WDR46	Complex (e2-3)	1.96	2.04E-05	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2alpha, HTra2beta1, KSRP, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
	Intron Retention	2.32	8.56E-04	
RGL2	Exon Cassette	1.58	6.36E-04	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp30c, YB-1, ZRANB2
	Intron Retention	2.12	8.42E-04	
CUTA	Alter. First Exon (e1)	1.61	2.76E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Nova-1, RBM5, Sam68, SC35, YB-1, ZRANB2
	Complex	1.51	2.60E-03	
YIPF3	Intron Retention	1.88	3.71E-05	ETR-3, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, YB-1
	Alter. First Exon (e1-3)	1.62	2.36E-03	
DST	Complex	3.40	1.48E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.65	7.99E-05	
SNAP91	Exon Cassette	6.09	2.15E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MAP3K7	Exon Cassette	1.52	3.00E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.72	1.96E-03	
PNISR	Intron Retention	1.53	1.49E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, Nova-1, Sam68, SC35, YB-1
	Intron Retention	1.53	1.49E-02	
HACE1	Exon Cassette	1.86	8.36E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MICAL1 // ZBTB24	Alter. Terminal Exon (e2)	1.69	1.74E-03	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.31	4.80E-04	
WASF1	Exon Cassette	1.56	5.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HDCC2	Exon Cassette	1.68	4.83E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ECHDC1	Exon Cassette	1.91	9.16E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PTPRK	Complex	2.52	1.83E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.58	3.92E-05	
AHI1	Exon Cassette	1.53	1.08E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
BCLAF1	Exon Cassette	3.81	3.62E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HYMA1 // PLAGL1	Alter. Donor Site	1.77	4.58E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e8-19)	3.09	3.16E-04	
	Exon Cassette	1.97	3.58E-05	
EPM2A	Alter. First Exon (e2)	1.68	7.76E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SYNE1	Alter. First Exon (e1-6,e8-15,e19-88,e90-133,e135)	1.58	3.62E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

PDE10A	Complex (e5)	2.17	1.66E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DLL1	Alter. Terminal Exon (e5-11)	3.05	1.22E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PSMG3-AS1	Exon Cassette	1.53	5.64E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NUDT1	Alter. First Exon (e2-3)	1.75	7.02E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
WIPI2	Exon Cassette	1.62	1.12E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RAC1	Exon Cassette	3.26	3.80E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KLHL7	Alter. Terminal Exon (e6-7)	2.15	6.04E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FAM221A	Exon Cassette	3.31	9.40E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KLHL7	Alter. Terminal Exon (e6)	2.15	6.04E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KLHL7	Alter. Terminal Exon	2.12	4.82E-04	HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FAM221A	Exon Cassette	3.31	9.40E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPIA	Exon Cassette	2.21	1.34E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
UPP1	Alter. Acceptor Site	2.04	5.14E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
UPP1	Exon Cassette	1.66	6.83E-04	Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF138	Exon Cassette	1.78	7.56E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STAG3L4	Exon Cassette	1.77	1.56E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
AUTS2	Exon Cassette	1.68	7.60E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WBSR22	Intron Retention	1.62	5.06E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HuB, KSRP, SC35, TIA-1, TIAL1, YB-1, ZRANB2
ELN	Complex	1.57	4.63E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ELN	Exon Cassette	3.75	2.56E-04	PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GTF2IRD1	Intron Retention	1.51	4.04E-03	ETR-3, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, YB-1
MAG12-AS3	Exon Cassette	2.39	5.44E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DMTF1	Alter. Acceptor Site	1.58	2.87E-02	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, TDP43, TIA-1, TIAL1, YB-1
ADAM22	Alter. Terminal Exon (e29)	1.53	6.17E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GTPBP10	Exon Cassette	2.41	4.78E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF655	Alter. Terminal Exon (e4-7)	2.67	4.84E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNHIT1	Exon Cassette	1.66	2.42E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PMPCB	Intron Retention	2.16	2.21E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
DLD	Alter. Acceptor Site	1.65	2.68E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
ST7 // ST7-OT3	Alter. First Exon (e1)	4.12	1.54E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ST7 // ST7-OT3	Alter. Terminal Exon (e25)	2.26	7.15E-04	hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ST7 // ST7-OT3	Exon Cassette	2.56	8.78E-04	HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NAA38	Intron Retention	1.69	2.70E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CALU	Exon Cassette	1.59	7.94E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
NDUF82	Exon Cassette	1.79	2.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GSTK1	Intron Retention	1.56	6.56E-03	ETR-3, hnRNP I (PTB), hnRNP P (TLS), Nova-1, Nova-2, SRp30c, TIA-1, TIAL1, YB-1

Appendices

CASP2	Intron Retention	2.33	7.81E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ATP6V0E2	Exon Cassette	1.59	9.00E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
INSIG1	Exon Cassette	1.71	3.38E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RNF32	Exon Cassette	1.56	2.63E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ICA1	Exon Cassette	2.80	1.50E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
ETV1	Alter. First Exon (e4-8)	1.70	9.97E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.97	5.67E-05	
TRA2A	Intron Retention	1.85	2.30E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, YB-1
HNRNPA2B1	Intron Retention	1.93	3.20E-04	ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, PSF, Sam68, SC35, TIA-1, TIAL1, ZRANB2
ELMO1	Complex (e19)	6.02	3.51E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
COA1	Alter. First Exon (e1-2,4,6,e8-10)	1.60	2.65E-02	
	Alter. Terminal Exon (e9)	1.70	2.16E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.61	1.23E-04	
POLM	Intron Retention	1.65	1.62E-02	hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), Nova-1, Nova-2, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CAMK2B	Exon Cassette	1.81	2.23E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FIGL1	Intron Retention	1.85	5.18E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP P (TLS), HTra2beta1, HuB, MBNL1, Nova-1, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DDC	Exon Cassette	2.23	2.01E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PMS2P4	Alter. Acceptor Site	1.82	2.55E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e5-6)	2.13	1.64E-03	
TMEM120A	Intron Retention	1.84	1.81E-04	hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Nova-2, SC35, SRp20, SRp30c, YB-1
MAGI2	Alter. First Exon (e1,e3,e6-7)	1.69	1.62E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KIAA1324L	Alter. First Exon	3.19	4.78E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon	1.72	1.10E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ABCB1	Complex	1.61	1.50E-03	
SGCE	Exon Cassette	2.70	8.94E-07	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PON2	Complex (e2)	1.65	1.80E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Acceptor Site	2.35	1.06E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EPHB4	Alter. Donor Site	1.64	1.10E-02	ETR-3, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RABL5	Intron Retention	1.91	7.28E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
PNPLA8	Complex (e3-5)	1.81	1.54E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.90	1.05E-04	
DPAGT1	Intron Retention	1.52	6.56E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, Nova-1, Nova-2, SC35, SRp20, TIA-1, TIAL1, YB-1
AASS	Exon Cassette	1.93	8.37E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CHCHD3	Exon Cassette	1.87	3.16E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HIPK2	Alter. Acceptor Site	2.63	4.66E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EZH2	Intron Retention	1.53	6.28E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB1
ZNF746	Complex	1.58	9.18E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF767	Exon Cassette	1.93	4.85E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CDK5	Intron Retention	2.72	3.70E-06	hnRNP F, hnRNP H1, hnRNP H2, RBM5, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SMARCD3	Intron Retention	1.90	7.85E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PRKAG2	Complex (e7)	1.50	1.56E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

KMT2C	Intron Retention	1.57	2.20E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FDFT1	Alter. First Exon (e1)	2.86	1.55E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATP6V1B2	Intron Retention	1.82	9.99E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BNIP3L	Alter. First Exon (e2)	2.30	3.80E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FZD3	Exon Cassette	2.43	2.37E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HMBOX1	Complex	2.08	6.00E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	3.86	2.30E-05	Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NRG1	Complex (e6-10)	2.53	1.08E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.10	2.45E-04	Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TACC1	Alter. Terminal Exon (e8,e10,e12-21)	2.45	8.36E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AP3M2	Exon Cassette	1.60	2.98E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1
CHCHD7	Exon Cassette	2.06	5.05E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1
CSPP1	Exon Cassette	1.68	5.94E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
STMN2	Alter. First Exon (e1)	2.43	5.97E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	10.17	1.83E-05	Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LRRCC1	Alter. Donor Site	2.21	2.25E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OTUD6B	Exon Cassette	1.66	5.36E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OXR1	Alter. First Exon (e1-11,e13)	2.32	2.22E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.49	4.56E-06	Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ENY2	Intron Retention	2.27	4.04E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp30c, TIA-1, TIAL1, YB-1
RPL23AP53	Exon Cassette	2.08	8.08E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM167A	Alter. First Exon (e2,e4)	2.11	5.76E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STMN4	Exon Cassette	5.15	2.80E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp20, SRp30c, YB-1
KIF13B	Exon Cassette	2.15	2.54E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FUT10	Alter. Terminal Exon (e5)	1.56	1.10E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PLAT	Complex	5.33	1.20E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), Htra2beta1, HuB, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
RPS20	Alter. First Exon (e1-4)	1.68	1.17E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
COPS5	Intron Retention	1.65	9.76E-04	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
EYA1	Alter. Acceptor Site	3.42	1.81E-05	
	Complex	3.39	1.81E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP K, HuB, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
	Intron Retention	4.49	1.81E-05	
STAU2	Alter. Terminal Exon (e18)	1.55	9.21E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
IL7	Complex (e6)	1.79	1.62E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.03	1.62E-03	Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C8orf59	Exon Cassette	1.51	2.02E-04	9G8, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RUNX1T1	Exon Cassette	2.21	1.08E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TRIQC	Complex (e6)	1.92	3.64E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.97	3.64E-03	Htra2alpha, Htra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF706	Alter. First Exon (e2)	1.51	8.59E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Htra2alpha, Htra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35,

Appendices

	Exon Cassette	1.92	8.24E-05	SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KLF10	Alter. First Exon (e1)	2.60	3.92E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
VPS28	Intron Retention	1.96	2.67E-07	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), KSRP, Nova-1, RBM5, SC35, SRp30c, YB-1, ZRANB2
PRSS3	Alter. First Exon (e1,e3)	25.11	1.24E-06	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NUDT2	Exon Cassette	1.58	2.66E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GALT	Intron Retention	1.87	8.61E-04	hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), SC35, SRp30c, YB-1, ZRANB2
RUSC2	Alter. Donor Site	1.89	1.00E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CREB3	Intron Retention	1.74	2.02E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SF2/ASF, TIA-1, TIAL1, YB-1
	Exon Cassette	1.65	2.61E-04	
RMI1	Complex (e1-2)	2.09	1.66E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NTRK2	Alter. Terminal Exon (e20-22)	1.65	6.77E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1-3)	1.57	8.98E-04	
ANKRD19P	Alter. Terminal Exon (e11-12)	2.65	2.59E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PTPDC1	Alter. Terminal Exon (e8)	1.66	1.00E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ERCC6L2	Exon Cassette	1.75	6.85E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CCDC180	Alter. First Exon (e1-12,e14-15)	2.00	6.39E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MSANTD3 // TMEFF1	Alter. Terminal Exon (e5-6)	2.11	5.66E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SMC2	Exon Cassette	1.74	3.34E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MRRF	Complex	2.34	6.37E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.22	1.19E-04	
MVB12B	Alter. Terminal Exon (e8)	2.37	5.96E-05	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GARNL3	Exon Cassette	2.42	5.78E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CERCAM	Complex	1.64	1.66E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP LL, hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ODF2	Exon Cassette	2.34	3.40E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FUBP3	Exon Cassette	1.55	1.09E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GRIN1	Alter. Terminal Exon (e20-21)	2.53	9.64E-04	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Exon Cassette	2.20	9.79E-04	
CBWD1	Alter. Terminal Exon (e4)	1.56	1.87E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.55	4.99E-04	
MPDZ	Exon Cassette	1.55	1.10E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LINGO2	Complex (e3-5)	5.74	1.96E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.34	1.96E-06	
DCTN3	Intron Retention	2.64	2.59E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C9orf41	Exon Cassette	1.61	5.04E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GKAP1	Exon Cassette	1.96	4.64E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZCCHC6	Intron Retention	1.54	2.94E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SEMA4D	Alter. First Exon (e1-17,e19)	1.95	2.30E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P



				(TLS, HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NOL8	Exon Cassette	3.07	3.78E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
SLC35D2	Exon Cassette	1.63	8.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TRIM14	Alter. Terminal Exon (e9-10)	2.61	2.26E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LPAR1	Alter. First Exon (e2-3)	2.85	1.44E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CDC26 // FKBP15	Alter. First Exon (e20-34)	1.59	4.64E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
POLE3	Intron Retention	1.67	7.96E-05	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
AKNA	Alter. First Exon (e1-5)	1.82	5.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FBXW2	Alter. Donor Site	1.95	1.11E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ANGPTL2	Complex	2.59	3.90E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SH2D3C	Complex	4.79	6.45E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.84	2.98E-04	
RAPGEF1	Exon Cassette	1.59	1.88E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DDX31	Alter. First Exon (e1-2)	1.54	2.68E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GBGT1 // RALGDS	Alter. Donor Site	2.19	2.09E-05	
	Alter. First Exon (e2-7, e9)	1.88	1.10E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.21	1.97E-05	
SEC16A	Exon Cassette	1.57	6.64E-04	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ABCA2	Intron Retention	1.87	1.16E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP P (TLS), KSRP, RBM5, SC35
	Alter. First Exon (e1-5)	1.52	2.80E-03	
NSMF	Complex	2.94	4.11E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.73	3.58E-04	
	Intron Retention	1.63	1.90E-03	
PPEF1	Alter. First Exon (e1-3)	4.83	3.37E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DDX3X	Alter. Terminal Exon (e4)	1.58	4.40E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KRBOX4	Complex (e5-6)	2.49	1.34E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.42	1.34E-03	
CDK16	Intron Retention	1.91	1.67E-02	hnRNP D, hnRNP E1, hnRNP E2, hnRNP P (TLS), KSRP, Sam68, SC35, YB-1
USP11	Alter. Donor Site	1.98	9.78E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.18	1.91E-02	
HDAC6	Intron Retention	1.58	1.68E-03	hnRNP P (TLS), KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1
PQBP1	Intron Retention	1.54	7.72E-03	hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, Nova-1, SC35, YB-1
NUDT10	Alter. First Exon (e1)	2.55	1.72E-07	ETR-3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), KSRP, MBNL1, Nova-1, PSF, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
MAGED1	Alter. First Exon (e1)	5.02	2.32E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.54	9.86E-03	
XAGE1D	Complex	2.71	1.98E-07	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
MAGED2	Intron Retention	1.84	4.22E-04	ETR-3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, PSF, SC35, SRp30c, YB-1, ZRANB2
TRO	Alter. Donor Site	2.02	1.88E-03	ETR-3, hnRNP A1, hnRNP E1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, RBM5, SC35, SF2/ASF, SRp30c, YB-1, ZRANB2
NLGN3	Alter. First Exon (e1-3)	2.30	3.75E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.89	1.28E-03	
NONO	Exon Cassette	2.51	2.21E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OGT	Alter. Acceptor Site	1.63	1.68E-03	
	Alter. Terminal Exon (e4-6)	1.82	8.47E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DOCK11	Exon Cassette	1.85	2.24E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1,

Appendices

					Nova-1, Nova-2, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZBTB33	Exon Cassette	1.90	8.76E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STAG2	Complex (4e4-15)	1.66	5.58E-03		CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STAG2	Exon Cassette	2.37	2.04E-05		CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FMR1	Exon Cassette	1.82	6.17E-04		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB1
RPL10	Intron Retention	1.88	1.58E-04		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, PSF, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
GD11	Intron Retention	2.02	1.02E-04		ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, PSF, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MID1	Alter. First Exon (e1,e3,e14-15)	3.01	1.15E-04		9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.88	2.38E-04		
	Exon Cassette	2.07	2.01E-04		
MAP7D2	Complex	1.52	1.04E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.56	2.92E-03		
TAB3	Intron Retention	1.82	1.17E-02		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF182 // ZNF630	Exon Cassette	1.70	5.26E-03		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYP	Intron Retention	1.51	4.78E-03		ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, PSF, SC35, SRp30c, YB-1, ZRANB2
FAM120C	Alter. Terminal Exon (e2)	2.33	1.20E-03		9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FGD1	Intron Retention	1.54	5.41E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Nova-1, Nova-2, RBM5, SC35, SF2/ASF, YB-1, ZRANB2
FAM104B	Alter. Donor Site	1.70	4.48E-03		ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ZC4H2	Alter. First Exon (e1)	2.26	6.01E-05		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.46	7.62E-04		
	Intron Retention	1.82	3.98E-03		
BRWD3	Exon Cassette	1.87	2.80E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RPS6KA6	Exon Cassette	3.29	7.45E-04		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ARMCX2	Alter. Donor Site	1.74	1.11E-02		ETR-3, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, SC35, TIA-1, TIAL1, YB-1
ZMAT1	Exon Cassette	1.57	2.73E-02		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MORF4L2	Exon Cassette	1.56	2.94E-03		ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NUP62CL	Exon Cassette	1.88	1.76E-04		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KLHL13	Alter. First Exon (e1-4)	2.86	1.02E-04		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CUL4B	Alter. First Exon (e1-2)	1.91	1.44E-03		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CUL4B	Intron Retention	1.84	4.86E-03		ETR-3, hnRNP C1, HuB, MBNL1, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1
AIFM1	Alter. First Exon (e1-2,e4-10)	1.52	1.22E-02		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.89	6.31E-05		
	Exon Cassette	4.52	7.35E-04		
HS6ST2	Alter. First Exon (e1-2)	1.73	3.15E-04		CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CSAG4 // MAGEA2B	Complex	2.16	1.52E-03		ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, SC35, SRp20, SRp30c, YB-1, ZRANB2
	Exon Cassette	1.61	2.64E-03		
HAUS7 // TREX2	Alter. Terminal Exon (e8)	2.18	1.85E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NAA10	Intron Retention	1.65	3.84E-04		ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), RBM5, SC35, TIA-1, TIAL1
MECP2	Complex (e1,e3)	1.62	7.02E-03		CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CMC4 // MTCP1	Complex	1.61	2.56E-04		ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

CTGLF9P // PARG	Alter. Terminal Exon (e18-25)	1.74	4.32E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CTGLF9P // PARG	Alter. Terminal Exon (e18-25)	1.85	3.99E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.20	1.40E-04	(TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LINC01001	Exon Cassette	1.69	1.82E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
GTF2IRD2	Alter. Terminal Exon (e3,e6-8)	1.72	2.60E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.65	1.65E-02	
	Intron Retention	1.50	1.46E-03	
ZNF26	Exon Cassette	1.81	3.32E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF302	Complex	1.61	1.84E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
RABGGTB	Complex	1.52	3.80E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TDP43, TIA-1, TIAL1, YB-1
C1orf85	Complex	2.33	8.27E-05	ETR-3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Exon Cassette	2.31	8.27E-05	
FAS	Exon Cassette	1.91	8.36E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C11orf80 // RCE1	Alter. First Exon (e1,e4-15)	1.64	4.60E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.04	5.95E-05	(TSL), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
ALG9 // CRYAB // FDxACB1	Alter. First Exon (e6)	1.77	2.66E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPHLN1	Alter. First Exon (e1,e3-8)	1.56	1.16E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.10	1.19E-04	
LRRC23	Complex	1.51	8.62E-03	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
TRIM13	Intron Retention	1.77	4.21E-05	ETR-3, Fox-1, Fox-2, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CLK3	Intron Retention	1.77	3.58E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, PSF, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
IPW//SNORD116	Intron Retention	4.18	3.01E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
CCNDBP1	Alter. Terminal Exon (e10-11)	1.56	2.20E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB1
	Intron Retention	1.71	3.34E-03	
MAPT	Alter. First Exon (e1-3)	2.29	1.39E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ABCA5	Exon Cassette	2.16	3.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF583	Alter. First Exon (e1-3)	2.02	7.64E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CARD8	Intron Retention	1.60	5.18E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.27	8.10E-05	
WDR6	Alter. Acceptor Site	1.95	8.25E-04	
	Complex (e4)	2.32	1.06E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.41	8.06E-05	
CNR1	Complex (e2,e4)	5.98	4.16E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	5.98	4.16E-04	
ERAP1	Alter. First Exon (e2)	1.80	7.01E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e20)	2.16	2.14E-03	
RAB24	Intron Retention	1.87	1.12E-02	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, KSRP, RBM5, SC35, SRp30c, YB-1
APBB3	Intron Retention	1.98	8.55E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, Nova-1, RBM5, SC35, SRp30c, YB-1, ZRANB2
POLR2J2 // RASA4 // UPK3BL	Exon Cassette	2.47	1.12E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NSUN5P1//TRIM 73/74	Intron Retention	2.12	3.36E-03	ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, KSRP, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
NSUN5	Intron Retention	2.42	6.76E-04	ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP P (TSL), HTra2beta1, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ARF5	Intron Retention	1.66	9.61E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e22-23,e36)	1.69	7.61E-04	
HCG18	Exon Cassette	1.53	1.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD,

Appendices

				KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FBXL6	Intron Retention	2.00	1.96E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, KSRP, MBNL1, Nova-1, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
WASH3P	Alter. First Exon (e1-2)	2.10	4.76E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.57	2.71E-02	
	Exon Cassette	1.92	2.68E-03	
GPR161	Alter. First Exon (e1-2,e6)	1.63	1.05E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AHNAK	Alter. Terminal Exon (e5-7)	1.84	4.36E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FXYD2 // FXYD6	Exon Cassette	1.95	1.63E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FAM101A // ZNF664	Exon Cassette	1.54	1.04E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GPR19	Alter. First Exon (e1-2)	6.22	1.61E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RRN3P1	Alter. First Exon (e3-8)	1.59	1.32E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC7A5P1	Alter. First Exon (e1)	1.74	1.15E-02	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NPIP3 // SLC7A5P2	Alter. First Exon (e11)	1.52	2.10E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TPM3P9 // ZNF761	Alter. First Exon (e1,e4-6)	1.52	1.10E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARL17B	Alter. Terminal Exon (e5)	2.70	1.14E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C1orf32/RPL17	Complex	1.53	2.80E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-2, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1
OAZ1	Intron Retention	2.37	3.16E-04	hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), Nova-1, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CALR3/CHERP/ MED26/SLC35E	Exon Cassette	1.73	4.98E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ANKRD36	Exon Cassette	1.54	1.12E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SCLY // UBE2F	Exon Cassette	1.62	5.20E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FIP1L1	Alter. Acceptor Site	1.71	1.83E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.83	4.02E-04	
	Intron Retention	1.83	4.02E-04	
MFSD8	Exon Cassette	2.32	3.64E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GTF2H4//VAR52	Intron Retention	1.70	9.26E-03	ETR-3, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
MCM9	Alter. Terminal Exon	1.68	1.18E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MRPS24 // URGCP	Alter. First Exon (e1,e4-5)	1.64	5.30E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ADCY10P1 // NFYA	Complex	2.73	2.26E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARMCX5 // GPRASP2	Alter. Acceptor Site	1.68	5.74E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2, Fox-1, Fox-2
	Complex (e3)	2.70	9.97E-05	
	Exon Cassette	2.70	9.97E-05	
WAC	Complex (e5)	1.55	3.16E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.55	2.66E-02	
	Intron Retention	1.73	1.39E-02	
RBM26	Intron Retention	1.69	2.82E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AKT1S1 // IL411 // NUP62	Alter. First Exon (e2-4,e19,e22)	1.74	4.02E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.56	6.40E-04	
	Intron Retention	2.55	2.43E-04	
COX17 // POPDC2	Exon Cassette	2.04	2.97E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e4-5)	2.36	1.22E-04	

CSNK2B // LY6G5B	Complex (e3-4,9-10)	1.58	4.00E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e3-4)	1.52	2.01E-04	
	Exon Cassette	1.65	6.26E-05	
GMDS-AS1	Intron Retention	2.06	1.57E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.58	9.04E-04	
	Alter. First Exon (e1-2)	1.72	6.63E-04	

**DOWNREGULATION OF SPLICING INDEX**

AGTRAP	Exon Cassette	1.78	3.70E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
VPS13D	Complex (e40)	1.75	5.88E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.74	5.88E-03	
PDPN	Exon Cassette	5.20	2.14E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RCC1 // SNHG3	Exon Cassette	2.03	9.70E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SERINC2	Exon Cassette	1.78	1.38E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, Nova-1, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1
ADC	Alter. First Exon	1.73	1.25E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1
DNALI1	Alter. Terminal Exon	2.33	1.28E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PTPRF	Exon Cassette	7.31	3.01E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DMAP1	Alter. Acceptor Site	1.70	2.58E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.21	2.36E-04	
NSUN4	Alter. First Exon (e1)	2.95	2.30E-03	ETR-3, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, TIA-1, TIAL1, YB-1
OSBPL9	Complex (e16)	2.07	9.38E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.17	9.38E-04	
TCEANC2	Exon Cassette	1.92	1.72E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PDE4B	Alter. First Exon (e1-9)	6.11	9.61E-07	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e3-4)	7.15	1.67E-05	
SRSF11	Alter. First Exon (e1-3)	2.69	8.43E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.50	3.70E-05	
LPHN2	Alter. First Exon (e1-6)	2.41	1.57E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.80	6.99E-04	
PRKACB	Alter. First Exon (e1,e7)	1.67	6.59E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SH3GLB1	Exon Cassette	4.73	4.43E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HS2ST1	Alter. First Exon (e2-7)	1.94	1.71E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KIAA1324	Complex	1.53	3.26E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AMPD2	Exon Cassette	1.57	1.90E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MOV10	Alter. First Exon (e1)	2.64	1.34E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.54	4.64E-03	
	Intron Retention	1.59	8.60E-03	
	Exon Cassette	1.58	6.74E-03	
TRIM46	Complex	1.58	1.72E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SF2/ASF, SRp30c, TDP43, TIA-1, TIAL1, YB-1
	Exon Cassette	1.93	8.02E-04	
RGS4	Complex	2.46	2.41E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, Nova-1, Nova-2, Sam68, SC35, TIA-1, TIAL1, YB-1
PBX1	Exon Cassette	1.59	1.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RABGAP1L	Alter. Terminal Exon (e32-37)	2.65	9.60E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM163A	Alter. Terminal Exon (e8-9)	14.59	1.87E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DHX9 // NPL	Alter. First Exon (e1,4-6,9-12-15)	1.86	1.34E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB,

Appendices

	Exon Cassette	2.10	3.88E-03	HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SMG7	Exon Cassette	2.17	4.33E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
RGL1	Exon Cassette	1.54	5.19E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PLA2G4A	Exon Cassette	1.84	1.01E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CAMSAP2	Exon Cassette	2.07	1.58E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SHISA4	Complex	2.59	8.55E-04	hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, Nova-2, SC35, SRp30c, YB-1
NFASC	Alter. Terminal Exon (e21,e22-25,e27-29,e34-36)	1.77	1.19E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.03	1.28E-03	
CDK18	Intron Retention	1.53	1.86E-02	SC35, SRp20, YB-1
	Alter. Donor Site	3.86	6.05E-05	
CD55	Exon Cassette	4.69	3.34E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	3.86	6.05E-05	
PSEN2	Exon Cassette	1.85	1.16E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF678	Exon Cassette	1.81	5.38E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GUK1	Exon Cassette	1.61	4.48E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.51	6.35E-04	
ACTN2	Exon Cassette	2.85	1.12E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp30c, TIA-1, TIAL1, YB-1
KIF26B	Complex	3.79	2.59E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SDF4	Complex	3.77	3.22E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CDK11A/B // GNB1	Exon Cassette	1.95	3.83E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.51	2.09E-02	
ACOT7	Complex	1.59	4.21E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.15	5.95E-05	
RERE	Alter. First Exon (e1-9)	1.56	1.44E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.64	1.18E-03	
RCC2	Alter. First Exon (e1)	1.53	2.15E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
TMEM234	Exon Cassette	1.71	8.41E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MEAF6	Exon Cassette	7.44	1.82E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e7)	5.41	2.42E-05	
LEPRE1	Intron Retention	1.67	2.70E-03	Fox-1, Fox-2, hnRNP P (TLS), HTra2beta1, Nova-1, SC35, SRp30c, YB-1
ATPAF1 // EFCAB14	Exon Cassette	1.94	6.70E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TTC39A	Alter. Terminal Exon (e17-18)	1.56	2.21E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
YIPF1	Exon Cassette	2.14	1.82E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DOCK7	Exon Cassette	2.57	1.16E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WLS	Exon Cassette	5.99	8.34E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DEPDC1	Exon Cassette	2.04	1.10E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MCOLN3	Exon Cassette	4.14	2.85E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMED5	Exon Cassette	2.16	8.32E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC16A1	Complex	1.89	1.06E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

MTMR11	Exon Cassette	1.60	9.80E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ENSA	Alter. Terminal Exon (e5)	1.79	1.83E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SELENBP1	Alter. Acceptor Site	2.23	4.41E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	4.98	8.39E-05	
S100A13	Alter. First Exon (e1-3)	1.81	1.42E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.57	2.02E-04	
TPM3	Alter. First Exon (e5-9)	1.63	3.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.51	1.58E-03	
	Intron Retention	2.38	1.74E-03	
NES	Complex	1.95	2.18E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMCO1	Complex	3.81	2.03E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TNR	Alter. First Exon (e1-2)	2.36	7.78E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KCNT2	Complex	3.12	4.36E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KCNT2	Exon Cassette	2.42	4.36E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
IRF6	Exon Cassette	2.08	3.99E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ENAH	Exon Cassette	1.59	4.44E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMEM63A	Alter. Terminal Exon (e22-26)	2.87	3.84E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AKT3	Complex	2.17	6.37E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HSPA14	Exon Cassette	1.56	2.68E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PTER	Exon Cassette	2.19	2.12E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CDH23	Alter. Acceptor Site	2.39	2.84E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1-27,49-66)	3.63	2.40E-04	
	Alter. Terminal Exon (e34-38)	1.54	3.25E-02	
AGAP11/FAM25A	Intron Retention	2.01	4.00E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, TIA-1, TIAL1, YB-1
SUFU	Alter. Terminal Exon (e13-14)	1.65	6.22E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ADD3	Exon Cassette	4.47	8.44E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SHOC2	Exon Cassette	1.52	1.16E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TCF7L2	Alter. First Exon (e1-3,e5-6,e10)	2.34	2.44E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.67	2.32E-03	
	Mutually Exclusive Exons (e20)	1.86	1.13E-02	
INPP5F	Alter. Terminal Exon (e11-16,e18-22)	2.04	5.23E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PITRM1	Intron Retention	2.91	8.60E-03	ETR-3, Fox-1, Fox-2, hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARHGAP21	Alter. First Exon (e9)	3.61	9.76E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.54	1.53E-05	
EPC1	Complex	1.75	3.64E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NRP1	Alter. Terminal Exon (e11,e13-14)	2.58	1.21E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.73	4.04E-03	

Appendices

ZNF248	Alter. Terminal Exon (e7)	1.56	1.53E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.70	5.28E-03	
MARCH8	Complex	1.80	9.80E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ANK3	Complex (e2)	2.68	1.02E-02	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.39	2.40E-04	
TYSND1	Alter. First Exon (e1-2)	1.54	8.21E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ASCC1	Alter. Donor Site	3.97	1.19E-04	ETR-3, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
P4HA1	Exon Cassette	1.61	3.30E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPP3CB	Exon Cassette	1.70	4.94E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KCNMA1	Alter. First Exon (e1,e8,e10-15)	1.69	7.92E-03	
	Alter. Terminal Exon (e1,5,10-23,25,29-30e32-34,36-39,41)	3.46	5.25E-09	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TCTN3	Intron Retention	1.93	1.80E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
NDUFB8 // SEC31B	Complex	1.98	1.24E-02	ETR-3, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
	Exon Cassette	2.96	3.36E-06	
SH3PXD2A	Alter. First Exon (e1-3,e5-6,e9,e12)	3.55	4.48E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SFXN4	Intron Retention	1.59	1.42E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RGS10	Alter. First Exon	2.80	6.64E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FGFR2	Complex (e15)	6.62	2.42E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.63	5.67E-05	
ATE1	Exon Cassette	1.56	1.02E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MKI67	Exon Cassette	2.46	1.64E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PTDSS2	Alter. First Exon (e1)	1.67	4.79E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CD151	Alter. First Exon (e1,e4)	1.53	1.40E-04	
	Complex	1.51	2.59E-04	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TSPAN4	Alter. First Exon (e1)	1.69	7.05E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.61	7.79E-04	
STIM1	Alter. Donor Site	1.57	6.04E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYT9	Exon Cassette	2.26	2.28E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LDLRAD3	Exon Cassette	1.54	1.18E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DDB2	Complex	1.64	9.77E-04	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, MBNL1, Nova-1, PSF, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.71	9.77E-04	
MADD	Exon Cassette	2.93	3.99E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC39A13	Alter. First Exon (e6-7)	1.58	9.58E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CTNND1 // TMX2	Alter. Acceptor Site	1.71	2.60E-03	
	Complex	1.84	8.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC3A2	Exon Cassette	2.15	2.54E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
RTN3	Exon Cassette	2.95	3.61E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2



FAM89B	Complex	3.00	4.26E-05	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SIPA1	Alter. Terminal Exon (e9-11,e13-19)	2.00	1.43E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CCND1	Complex	3.26	8.20E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPFIA1	Complex	2.37	7.84E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	5.07	2.19E-04	
ATG16L2	Complex	2.18	3.01E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.01	1.38E-04	
TMEM135	Complex	1.57	5.36E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C11orf63	Alter. Terminal Exon (e5-10)	1.55	1.72E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PIDD	Intron Retention	1.59	1.82E-04	ETR-3, Fox-1, Fox-2, hnRNP E1, hnRNP E2, hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
IFITM10	Alter. Donor Site	1.79	1.34E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
H19	Complex (e5)	1.73	2.62E-02	ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, Nova-1, PSF, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1
	Exon Cassette	1.88	3.42E-03	
IGF2 // INS	Alter. First Exon (e1-2,e4-5)	3.98	1.17E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e11-13)	4.90	7.76E-05	
RIC3	Complex	3.15	1.64E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.40	1.64E-04	
CYP2R1	Alter. First Exon (e2)	2.03	2.19E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ABCC8	Exon Cassette	1.73	3.43E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PAX6	Alter. Donor Site	6.28	5.84E-05	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	6.30	3.78E-05	
CD59	Alter. First Exon (e1-3,e6)	2.94	8.48E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FAM168A	Exon Cassette	4.08	4.92E-07	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RAB6A	Exon Cassette	1.86	2.23E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons	2.14	1.70E-03	
XRRA1	Exon Cassette	1.93	3.66E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CCDC90B	Complex	2.41	2.36E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.79	5.97E-04	
PICALM	Exon Cassette	1.59	2.30E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EXPH5	Exon Cassette	1.52	4.00E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC37A4	Alter. First Exon (e1-2)	2.03	1.02E-03	
	Complex	1.73	1.96E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.71	2.40E-03	
MSANTD2	Exon Cassette	1.72	7.63E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PUS3	Exon Cassette	1.78	5.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WNK1	Exon Cassette	2.10	3.95E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ERC1	Exon Cassette	4.10	6.08E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MGST1	Alter. First Exon (e2)	3.66	1.10E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARNTL2	Alter. Donor Site	1.85	5.54E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FGD4	Alter. First Exon (e2)	2.63	5.89E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS),

Appendices

	Alter. Terminal Exon (e21)	2.28	1.92E-03	HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CACNB3	Exon Cassette	2.41	4.95E-04	ETR-3, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
SLC4A8	Alter. Terminal Exon (e10-23,e25-30)	1.58	1.40E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MDM2	Alter. First Exon (e2-3)	3.62	6.60E-07	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.61	1.16E-02	
BTBD11	Alter. First Exon (e1-3)	2.58	2.40E-05	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RPH3A	Alter. First Exon (e2-19)	2.03	3.73E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
P2RX7	Exon Cassette	2.23	4.28E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e5)	1.74	4.07E-05	
RAD52	Alter. Terminal Exon (e2)	2.08	1.85E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC2A14	Alter. First Exon (e3,e8-14)	3.18	1.96E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ITPR2	Alter. Terminal Exon (e27-43,e45-61)	1.80	2.84E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CPNE8	Alter. First Exon (e2)	1.62	1.19E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC38A1	Alter. First Exon (e1)	1.68	3.18E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STAT2	Complex	1.75	1.52E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
R3HDM2 // STAC3	Exon Cassette	1.69	1.00E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, PSF, Sam68, SC35, SRp30c, YB-1, ZRANB2
GNS	Exon Cassette	1.75	3.77E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
OSBPL8	Alter. First Exon (e1-9)	2.14	4.71E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.55	1.61E-05	
	Exon Cassette	2.54	1.61E-05	
SLC6A15	Alter. Terminal Exon (e5)	1.70	3.44E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LTA4H	Complex	3.21	2.01E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CDK17	Intron Retention	1.61	4.17E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ALDH1L2	Alter. Acceptor Site	2.88	7.22E-07	ETR-3, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
TAOK3	Alter. First Exon (e1-8,e10-15)	2.04	1.55E-02	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CAMKK2	Exon Cassette	1.61	1.32E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WASF3	Mutually Exclusive Exons (e7)	1.64	8.22E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EXOSC8	Alter. Acceptor Site	1.94	3.69E-05	
	Intron Retention	1.75	6.38E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
COG3	Alter. Terminal Exon (e13-23)	1.58	9.40E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SETDB2	Exon Cassette	1.54	1.60E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DLEU1	Complex	2.26	9.74E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.04	7.39E-04	
SLAIN1	Alter. First Exon (e2-3)	2.67	1.76E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.76	1.62E-06	
ZIC2	Complex	4.68	3.08E-07	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MCF2L	Complex	2.14	4.60E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2

MTIF3	Alter. First Exon (e1-3)	1.83	8.04E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FLT1	Alter. First Exon (e1-11,e13,e15-16,e18,e21-27,e29-35)	2.16	9.94E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e4-11,e13,e15-16,e18,e21-24,e26-27,e29-35,e37-38)	3.08	2.44E-04	
SUPT20H	Exon Cassette	1.78	6.75E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1
FOXO1 // LINC00598	Alter. First Exon (e2)	2.73	1.60E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TSC22D1	Alter. First Exon (e1)	1.56	1.09E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
COMMD6	Exon Cassette	1.62	1.82E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
COL4A1	Complex	1.66	2.20E-03	ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ANKRD10	Alter. First Exon (e1-3)	2.07	7.18E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.73	1.37E-04	
SCFD1	Exon Cassette	1.56	1.76E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DAAM1	Exon Cassette	1.84	5.84E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
JKAMP	Complex (e1-2)	1.54	1.73E-02	
	Exon Cassette	1.83	1.40E-02	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYNE2	Exon Cassette	2.15	8.79E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPP2R5C	Mutually Exclusive Exons (e3)	1.96	1.08E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MTA1	Exon Cassette	1.60	9.15E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CRIP2	Exon Cassette	2.10	1.85E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HECTD1	Alter. First Exon (e1-3,e6-20,e22-29)	1.60	1.44E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RALGAPA1 // RALGAPA1P	Alter. Terminal Exon (e46)	2.22	1.76E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e20)	2.56	8.83E-04	
NID2	Exon Cassette	3.84	2.03E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TIMM9	Exon Cassette	2.68	1.10E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ACTN1	Alter. First Exon (e1-13)	1.69	1.95E-02	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATXN3	Complex (e2-3,e5-6,e8-11)	1.81	4.14E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.17	7.24E-03	
WARS	Alter. First Exon (e1)	1.50	1.20E-03	9G8, CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.53	1.21E-04	
HSP90AA1	Alter. First Exon (e1-2)	2.95	2.99E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BRF1	Complex	1.64	1.62E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ELK2AP // IGHD // IGHG1	Alter. First Exon (e15-16,e101)	2.78	4.07E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
APBA2	Exon Cassette	2.36	6.84E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C15orf41	Intron Retention	1.61	1.70E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MAPKBP1	Complex (e29-30)	1.75	1.04E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1
CAPN3 // GANC	Alter. First Exon (e30-31,e33-35,e37-42)	1.82	8.81E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NEO1	Alter. Acceptor Site	7.98	1.78E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.31	1.72E-05	

Appendices

PPCDC	Alter. First Exon (e1-2)	1.76	4.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NGRN // TTL13	Complex	1.77	1.39E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WHAMMP3	Exon Cassette	1.51	5.15E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
OCA2	Exon Cassette	1.50	2.62E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HERC2	Alter. First Exon (e1-2,e4,e6-49)	1.72	7.54E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC12A6	Alter. First Exon (e1-3)	3.45	2.19E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZSCAN29	Alter. First Exon (e1)	2.16	1.58E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
MYO5C	Exon Cassette	2.04	7.58E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NEDD4	Exon Cassette	1.82	6.34E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ANXA2	Alter. First Exon (e1-2)	3.44	1.63E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RORA	Complex (e2)	1.99	1.24E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VPS13C	Alter. Terminal Exon (e83)	2.31	2.44E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CELF6 // HEXA // PARP6	Exon Cassette	13.77	5.68E-07	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	3.17	6.36E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
CTSH	Exon Cassette	2.42	8.56E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
SEC11A	Exon Cassette	2.51	1.58E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CIB1	Complex	1.58	2.54E-03	ETR-3, hnRNP I (PTB), hnRNP P (TLS), RBM5, SC35, SRp30c, ZRANB2
RGMA	Alter. First Exon	3.35	5.04E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TTC23	Exon Cassette	1.63	3.94E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e4)	1.52	4.05E-05	MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ABAT	Alter. First Exon (e1)	3.37	2.18E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e5-18)	2.62	3.90E-05	HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.52	3.61E-05	HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C16orf45	Complex	2.23	1.37E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF720	Complex	1.81	1.54E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PLA2G15	Alter. First Exon (e1)	1.88	5.96E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZFP90	Alter. First Exon (e3-6)	1.90	5.78E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CDH1	Alter. First Exon (e1-2)	5.20	1.40E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HAGH	Exon Cassette	1.65	4.95E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZSCAN32	Exon Cassette	1.70	1.34E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RPS15A	Complex	2.06	3.19E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1, ZRANB2
DCUN1D3 // ER12	Alter. Acceptor Site	1.52	2.82E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DNAH3	Alter. Terminal Exon (e46-66)	1.70	2.80E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SULT1A1	Alter. First Exon (e1-4)	2.39	1.99E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

DOK4	Exon Cassette	1.52	1.72E-03	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), KSRP, Nova-1, PSF, RBM5, SC35, TIA-1, TIAL1, YB-1, ZRANB2
PDXDC2P	Exon Cassette	1.71	2.46E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
VAC14	Alter. Terminal Exon (e11-15,e17-21)	1.52	1.47E-02	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CYBA	Complex (e1)	1.72	1.97E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PIEZ01	Complex	3.53	2.57E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ANKRD11	Exon Cassette	1.60	7.96E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ACADVL	Alter. Terminal Exon (e12-22)	3.26	1.06E-03	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CHRN1	Intron Retention	2.37	1.82E-05	
	Intron Retention	1.79	4.58E-04	CUG-BP1, ETR-3, hnRNP C1, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, MBNL1, Nova-1, RBM5, SC35, YB1
ARHGAP44	Exon Cassette	2.73	5.72E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.74	5.72E-03	
TBC1D26 // ZNF286A	Alter. First Exon (e1-6)	1.99	8.24E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e2-8)	3.50	4.96E-04	
	Complex	3.31	2.18E-05	
	Exon Cassette	3.06	2.41E-05	
	Intron Retention	2.12	3.17E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DHR57B	Alter. Terminal Exon (e3)	1.82	7.16E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
WSB1	Alter. First Exon (e1-5)	1.69	2.08E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.74	2.00E-04	
ANKRD13B	Complex	2.16	1.56E-04	ETR-3, hnRNP A1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, MBNL1, Nova-1, PSF, SC35, SRp30c, YB-1, ZRANB2
LRRC37B	Alter. Terminal Exon (e13,e15-18)	1.90	1.06E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ERBB2	Alter. First Exon (e1-8)	1.92	4.12E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon	1.88	8.16E-04	
	Alter. Terminal Exon (e7)	2.26	3.44E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.78	4.24E-03	
CDK5RAP3	Alter. First Exon (e2-6)	1.66	3.64E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ATP5G1	Alter. First Exon (e1)	2.53	5.60E-05	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1
ACSF2	Alter. First Exon (e1-11)	1.74	4.20E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NME1 // NME2	Complex	13.82	3.09E-06	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), Nova-1, SC35, SRp30c, YB-1, ZRANB2
AKAP1	Alter. First Exon (e2)	1.76	5.84E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BCAS3	Exon Cassette	2.72	9.79E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TBX2	Complex	2.08	3.76E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ARSG	Alter. First Exon (e1)	6.15	4.32E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SPHK1	Alter. First Exon (e1-8)	1.69	1.28E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CBX2	Alter. Terminal Exon (e4-5)	1.83	1.20E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ABR	Complex	1.79	1.70E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CDRT1 // TRIM16	Alter. Terminal Exon (e10)	1.76	3.62E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FAM83G	Alter. Terminal Exon (e7)	2.40	1.18E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RDM1	Exon Cassette	1.90	2.20E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD,

Appendices

				KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C17orf58	Alter. Donor Site	1.98	2.58E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
SLC25A19	Alter. First Exon (e1-3)	1.66	2.00E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CANT1	Intron Retention	1.53	2.66E-03	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, RBM5, SF2/ASF, SRp30c, YB-1
TBC1D16	Alter. First Exon (e1-5,7)	1.52	8.64E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MYL12B	Alter. First Exon (e1)	1.51	2.48E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TGIF1	Alter. First Exon (e7)	1.50	2.10E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RBBP8	Alter. First Exon (e2)	2.36	7.66E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF397	Alter. Terminal Exon (e3)	1.61	1.28E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C18orf54	Alter. Donor Site	1.77	1.84E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTRA2beta1, HuB, KSRP, Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Complex	1.97	2.96E-03	
NEDD4L	Alter. First Exon (e1-10)	4.27	1.01E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e7)	1.72	9.72E-05	
	Exon Cassette	1.67	5.64E-04	
COLEC12	Alter. First Exon (e1)	2.79	9.79E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
EPB41L3	Complex (e23-25)	4.96	1.18E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.24	2.20E-04	
DSC3	Exon Cassette	2.25	9.01E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DSC2	Exon Cassette	2.77	2.79E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
INO80C	Exon Cassette	1.55	1.60E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SYT4	Complex	1.99	4.56E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BSG	Alter. First Exon (e2,e4)	1.64	1.64E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FSD1	Complex	1.68	3.95E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTRA2beta1, HuB, KSRP, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PNPLA6	Alter. First Exon (e2,e4)	1.53	6.17E-04	hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, SC35, SRp20, SRp30c, YB-1, ZRANB2
ZNF177 // ZNF559	Alter. Acceptor Site	2.10	3.24E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.79	1.82E-03	
	Intron Retention	2.23	5.62E-03	
SLC44A2	Complex	2.42	1.79E-04	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Exon Cassette	1.93	1.28E-03	
CARM1	Exon Cassette	3.81	3.62E-05	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF69	Alter. First Exon (e1-4,e6)	1.88	3.70E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF136	Exon Cassette	1.53	1.20E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GTPBP3	Alter. Acceptor Site	1.52	1.06E-03	ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e3-4)	1.97	1.20E-02	
	Complex	2.38	3.96E-04	
IFI30 // PIK3R2	Alter. First Exon (e1-19)	13.13	1.89E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF90	Exon Cassette	2.08	8.02E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF85	Alter. First Exon (e1-3)	2.17	5.95E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LTBP4	Alter. First Exon (e1-4)	1.94	5.61E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.53	1.38E-03	
EGLN2 // MIA //	Alter. Terminal Exon (e8-14)	1.62	4.18E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD,

RAB4B				HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BCAM	Complex	1.87	5.60E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, RBM5, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
FCGRT	Alter. Terminal Exon (e6)	1.77	2.23E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MED25	Complex (e9)	1.55	1.29E-02	hnRNP I (PTB), KSRP, MBNL1, Nova-1, Nova-2, SRp30c, YB-1
ZNF610	Exon Cassette	3.48	6.36E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF525 // ZNF765	Mutually Exclusive Exons (e2)	1.64	2.71E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BRSK1	Alter. First Exon (e1-11)	1.67	9.84E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e14-22)	1.59	2.80E-03	
ZNF586//ZNF587/B // ZNF776	Complex	1.51	3.22E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMEM205	Complex	1.67	2.23E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1
ZNF20 //ZNF625	Alter. First Exon (e1-5)	8.44	2.62E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF564 // ZNF709	Alter. Terminal Exon (e6-8)	1.78	8.41E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DMKN	Complex	1.69	1.86E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.06	8.58E-04	
ATP5SL	Exon Cassette	1.56	4.26E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC8A2	Exon Cassette	2.20	3.59E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF28	Alter. First Exon (e1-3)	3.94	1.04E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF320	Alter. Terminal Exon (e10)	1.92	2.82E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF321P // ZNF816	Alter. Terminal Exon (e4-5)	1.86	5.96E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ZNF160	Alter. Acceptor Site	4.64	6.11E-05	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e5-8)	2.87	4.36E-03	
ZNF677	Alter. Terminal Exon (e5)	1.79	9.61E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SYT5	Exon Cassette	5.63	2.13E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, YB-1, ZRANB2
CHMP2A	Complex	1.92	9.97E-04	9G8, ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HTra2beta1, HuB, MBNL1, Nova-1, SC35, SF2/ASF, SRp20, SRp30c, YB-1
COLEC11	Exon Cassette	2.60	4.04E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.67	4.04E-04	
GREB1	Complex	2.48	9.74E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LPIN1	Alter. Terminal Exon (e14-19,e21-29)	1.84	2.03E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.77	1.00E-02	
ABHD1	Exon Cassette	1.65	2.74E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, KSRP, MBNL1, SC35, TIA-1, TIAL1, YB1
ATRAID	Complex (e1)	1.57	3.76E-04	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GPNI // ZNF512	Alter. First Exon (e1-6,e8-15,e19)	1.66	5.18E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC30A6	Exon Cassette	1.64	8.40E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2
PLEKH2	Alter. First Exon (e1-9)	1.82	5.36E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
EPAS1	Alter. First Exon (e1-11)	1.86	1.22E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SPTBN1	Alter. First Exon (e2-3)	1.54	2.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VRK2	Complex	2.86	7.57E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD,

Appendices

	Exon Cassette	2.71	7.57E-05	KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BOLA3-AS1	Complex	1.95	5.84E-03	hnRNP A1, hnRNP K, HuB, Nova-1, SC35, YB-1
	Intron Retention	1.75	1.24E-02	
SULT1C4	Alter. Terminal Exon (e4-7)	2.95	2.19E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.73	3.83E-05	
MERTK	Alter. Terminal Exon (e19-20)	1.67	2.17E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DPP10	Alter. First Exon (e1-6)	1.96	1.82E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GLI2	Complex	2.91	1.56E-03	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
CNTNAP5	Alter. Terminal Exon (e18-24)	2.35	1.01E-02	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.44	8.46E-03	
UGGT1	Alter. Donor Site	1.84	8.24E-07	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.80	2.05E-04	
R3HDM1	Exon Cassette	1.68	1.24E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FMNL2	Complex	1.58	4.24E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.66	4.12E-03	
DYNC1I2	Exon Cassette	8.47	6.10E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RAPGEF4	Alter. First Exon (e1)	3.13	9.24E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.97	1.82E-02	
CDCA7	Exon Cassette	2.02	3.33E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
OSBPL6	Exon Cassette	1.98	1.24E-03	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
COL3A1	Alter. First Exon (e1-47)	2.25	2.16E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NABP1	Exon Cassette	1.98	2.39E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CCDC150	Alter. First Exon (e1-2,e5,e8-12,e14-17,e20-21,e23-25)	1.88	7.37E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.79	1.10E-02	
CASP8	Alter. Termi Exon (e13,16-18)	4.29	5.80E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e4-5)	1.91	2.85E-04	
	Exon Cassette	2.12	8.56E-04	
INPP5D	Alter. First Exon (e1-5)	5.01	2.27E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FAM132B	Alter. First Exon (e1-2)	3.65	1.70E-05	ETR-3, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
MYT1L	Alter. First Exon (e1-2,e4-5)	4.53	5.98E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e25,28)	4.82	8.16E-07	
YWHAQ	Complex	4.22	1.18E-03	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, MBNL1, SC35, SRp30c, YB-1
WDR35	Exon Cassette	5.90	4.14E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
C2orf43	Exon Cassette	1.62	1.38E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATL2	Complex	4.22	5.61E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
NRXN1	Alter. First Exon (e1-3,e5,e8-19,e21,e24-26)	3.59	4.91E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RTN4	Exon Cassette	2.50	6.18E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AAK1	Alter. Terminal Exon (e14-18)	1.64	2.21E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.61	5.77E-05	
ASPRV1 // PCBP1-AS1	Alter. First Exon (e1)	2.09	8.19E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e11)	1.74	9.95E-04	
PCGF1	Alter. First Exon (e1)	1.73	1.02E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
KANSL3	Alter. First Exon (e1)	1.51	3.66E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, HuR, KSRP,



				MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FHL2	Complex	1.80	2.48E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CD302 // LY75	Alter. Terminal Exon (e14-35,e37-41)	1.67	3.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SLC25A12	Exon Cassette	4.01	2.12E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FKBP7	Complex	2.03	1.90E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.99	1.90E-03	
TTN	Exon Cassette	1.92	1.98E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ICA1L	Intron Retention	1.70	3.12E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FN1	Complex	1.79	2.20E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.63	1.18E-06	
ABCB6 // ATG9A	Alter. Terminal Exon (e16,e17-30,e32-35)	1.76	3.18E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SERPINE2	Alter. First Exon (e3-4)	2.34	9.21E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
KIF1A	Complex (e2,e3-38,e40-47)	2.22	1.18E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PRNP	Complex	2.18	6.38E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PLCB1	Alter. First Exon (e2,e4-5,e7)	1.98	6.38E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BTBD3	Alter. First Exon (e2)	1.85	1.57E-02	ETR-3, hnRNP I (PTB), HTra2alpha, HTra2beta1, HuB, Nova-1, Sam68, SC35, YB-1
CBFA2T2	Exon Cassette	1.51	1.24E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AAR2	Complex	1.99	2.02E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RPN2	Exon Cassette	1.87	1.60E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PPP1R16B	Alter. Terminal Exon (e3-12)	3.35	1.64E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GDAP1L1	Alter. First Exon (e2)	5.59	3.22E-07	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.62	8.19E-05	
TTPAL	Alter. First Exon (e1-2)	1.72	8.74E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
DBNDD2 // SYS1	Complex	1.72	6.96E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
UBE2C	Alter. First Exon (e1)	1.77	5.59E-04	9G8, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), KSRP, Nova-1, SC35, SF2/ASF, SRp30c, YB-1, ZRANB2
SLC9A8	Alter. Acceptor Site	2.04	1.24E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1
NPEPL1 // STX16	Alter. First Exon (e9,e12)	1.82	1.66E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GNAS	Alter. First Exon (e2,e8)	1.57	4.40E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e10,e13)	1.52	1.76E-03	
TPD52L2	Exon Cassette	11.59	6.51E-07	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CSNK2A1	Exon Cassette	1.83	6.14E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM230	Complex	1.97	2.32E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp30c, TIA-1, TIAL1, YB-1
SNX5	Alter. First Exon (e1-2)	1.62	2.76E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GGT7	Alter. First Exon (e1-3)	1.94	1.00E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.12	8.38E-04	
STAU1	Exon Cassette	1.66	2.40E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZFP64	Alter. First Exon (e1-5)	3.35	1.36E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS),

Appendices

				HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BTG3	Exon Cassette	1.70	9.18E-04	9G8, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
PSMG1	Exon Cassette	1.66	1.35E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
UBE2G2	Alter. First Exon (e1,e3-5)	1.86	3.59E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TPTEP1	Exon Cassette	1.59	5.82E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
EWSR1	Alter. First Exon (e1-8)	11.13	2.16E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.88	3.80E-03	
NF2	Exon Cassette	1.51	8.62E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
SMTN	Complex	1.56	2.70E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, Nova-1, Nova-2, Sam68, SC35, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.86	3.28E-03	
KCTD17	Complex	1.78	5.04E-04	hnRNP I (PTB), Nova-1, RBM5, SC35, Srp20, TIA-1, TIAL1, YB-1
	Complex	1.53	1.40E-03	
NOL12 // TRIOBP	Alter. First Exon (e1-9,14,16-17)	2.05	9.75E-05	
	Exon Cassette	3.64	5.38E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SYNGR1 // TAB1	Intron Retention	1.86	1.73E-05	
	Intron Retention	2.35	1.00E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, Srp20, Srp30c, TIA-1, TIAL1, YB-1
ARHGAP8 // PRR5	Alter. First Exon (e4-19,e12)	2.99	1.23E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.87	3.36E-04	(TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CRELD2	Intron Retention	1.64	1.56E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, KSRP, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, TDP43, TIA-1, TIAL1, YB-1
CLTCL1	Alter. Donor Site	1.57	8.38E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, Srp20, TIA-1, TIAL1, YB-1
TXNRD2	Alter. First Exon (e3)	1.56	4.21E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PI4KA	Alter. First Exon (e1-32)	1.81	1.70E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GSTT1	Exon Cassette	1.56	1.42E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CHEK2	Exon Cassette	1.51	4.52E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C1QTNF6	Intron Retention	1.98	2.54E-03	ETR-3, FMRP, Fox-1, Fox-2, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, Srp30c, TIA-1, TIAL1, YB-1
DNAL4 // SUN2	Complex	2.24	1.04E-03	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, KSRP, Nova-1, SC35, SF2/ASF, Srp30c, TIA-1, TIAL1, YB-1
ITPR1	Exon Cassette	1.59	1.70E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ARPC4 // TTL3	Alter. Terminal Exon (e5-6)	3.93	1.84E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BTD	Alter. First Exon (e1)	2.20	3.82E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RPL15	Alter. Donor Site	1.73	2.22E-04	
	Complex (e1)	1.75	4.97E-04	hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, TIA-1, TIAL1, YB-1, ZRANB2
MLH1	Intron Retention	1.82	4.58E-03	
	Complex	1.96	1.26E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
GOLGA4	Exon Cassette	3.00	3.91E-05	
	Exon Cassette	2.08	5.63E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, Srp20, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
MYD88	Exon Cassette	1.99	6.14E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, SC35, SF2/ASF, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
EXOG	Complex	2.73	7.36E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, Srp20, TIA-1, TIAL1, YB1
CTNNB1	Complex	1.90	1.18E-03	
	Intron Retention	1.78	8.56E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, Nova-1, Sam68, SC35, Srp30c, TIA-1, TIAL1, YB-1, ZRANB2
NKTR	Alter. First Exon (e1-7)	1.92	5.80E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, Srp20, Srp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.67	4.70E-03	

SACM1L	Alter. First Exon (e1-4,e6-14)	1.58	1.76E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.85	1.34E-03	
	Exon Cassette	1.88	2.40E-03	
DAG1	Alter. First Exon (e1-6)	1.79	1.22E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.50	9.75E-05	
MAPKAPK3	Alter. First Exon (e1-3)	1.97	2.36E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FLNB	Alter. First Exon (e1-26)	1.69	7.46E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.78	2.19E-05	
PTPRG	Alter. First Exon	1.67	4.42E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.84	8.70E-03	
CADM2	Complex	5.40	9.86E-05	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.99	3.78E-05	
PVRL3	Alter. Donor Site	1.82	1.77E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PHLDB2 // PLCXD2	Alter. First Exon (e1-3)	3.88	7.76E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CD200	Exon Cassette	2.03	4.18E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MAATS1	Exon Cassette	3.75	2.08E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PDIA5	Intron Retention	2.31	3.20E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), HuB, Sam68, SC35, TIA-1, TIAL1, YB-1
PPP2R3A	Exon Cassette	2.54	7.53E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	6.58	4.24E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PLS1	Alter. First Exon (e2,e5)	1.70	5.44E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TRPC1	Exon Cassette	1.83	1.58E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AGTR1	Exon Cassette	1.51	4.84E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
GPR160	Exon Cassette	5.14	4.01E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATP11B	Exon Cassette	2.12	1.17E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MAP3K13	Alter. Terminal Exon (e13-19)	1.53	2.63E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LRCH3	Exon Cassette	3.88	1.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TADA3	Complex (e2-4)	1.52	6.82E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ATP2B2	Complex	1.92	4.70E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FGD5-AS1	Alter. Terminal Exon (e4)	1.65	9.56E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RFTN1	Alter. First Exon (e1-6,e8-9)	1.89	1.15E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TOP2B	Alter. First Exon (e1)	2.34	6.63E-04	CUG-BP1, ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), KSRP, MBNL1, Nova-1, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1
GLB1 // TMPPPE	Exon Cassette	1.55	2.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC26A6	Intron Retention	1.54	1.72E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, Nova-2, SC35, SRp30c, YB-, Fox-1, Fox-2
DALRD3	Alter. Acceptor Site	2.68	7.83E-04	
	Complex	3.16	3.17E-04	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
AMT	Complex (e5)	1.82	1.25E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.85	1.44E-04	
MAG1	Exon Cassette	2.56	2.21E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

Appendices

EOGT	Alter. First Exon (e1-2)	1.81	1.04E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.74	6.72E-03	
ABI3BP	Alter. Terminal Exon (e14,e15-31,e36-43)	1.62	2.37E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.05	8.61E-04	
CD47	Alter. Ter Exon (e9,e10-12)	4.44	9.80E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	4.93	2.45E-04	
LSAMP	Alter. Terminal Exon	2.04	9.72E-05	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HEG1	Exon Cassette	1.61	1.34E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
PFN2	Complex	3.38	2.50E-07	ETR-3, Fox-1, Fox-2, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
TNIK	Exon Cassette	3.39	3.53E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, TIA-1, TIAL1, YB-1
DLG1	Exon Cassette	3.81	4.29E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e23)	4.03	2.29E-05	
PIGG	Complex	1.87	1.20E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PCGF3	Exon Cassette	1.82	2.77E-04	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
TMEM175	Alter. Acceptor Site	1.88	2.78E-04	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Nova-1, Nova-2, PSF, SC35, TIA-1, TIAL1, YB-1
FGFR3	Complex	2.08	1.12E-03	ETR-3, hnRNP E1, hnRNP E2, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, SC35, SRp30c, YB-1, ZRANB2
WHSC1	Exon Cassette	1.70	1.02E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM193A	Alter. First Exon (e3-7)	1.90	3.64E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.76	1.66E-03	
ADD1	Alter. Donor Site	2.88	3.94E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	6.87	2.23E-07	
	Alter. First Exon (e2-8)	8.73	2.80E-06	
EXOC1	Exon Cassette	2.38	9.64E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC44A4	Alter. First Exon (e1-5)	3.86	3.55E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.81	2.32E-03	
SHROOM3	Alter. Terminal Exon (e8-11,e13-15)	1.91	1.20E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NPNT	Complex	2.83	1.20E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	11.30	2.24E-05	
CYP2U1	Alter. Terminal Exon (e3-7)	1.69	1.27E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ANK2	Alter. First Exon	3.04	2.44E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	4.37	4.22E-05	
	Exon Cassette	2.49	1.84E-05	
UGT8	Alter. First Exon (e1)	1.52	5.75E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
USP53	Exon Cassette	1.63	2.14E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM144	Intron Retention	2.80	7.38E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, TIA-1, TIAL1, YB-1
CLCN3	Alter. Terminal Exon (e5,e6-15,e17)	1.51	2.38E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HAND2-AS1	Alter. Acceptor Site	1.68	8.78E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	7.13	3.83E-05	
	Exon Cassette	2.89	6.31E-05	
HAUS3 // POLN	Alter. Term Exon (e7-8,23-32)	3.21	8.80E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e19,e20-21)	2.32	6.02E-04	
	Exon Cassette	2.32	6.02E-04	
SEPSECS	Exon Cassette	1.67	3.14E-02	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1
UGDH	Exon Cassette	1.70	2.43E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1,

				Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LIN54	Alter. Donor Site	1.53	6.32E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon	1.53	7.38E-04	
	Exon Cassette	1.65	7.00E-03	
MAPK10	Alter. First Exon (e3)	2.79	7.01E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CAMK2D	Exon Cassette	2.54	4.36E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SCLT1	Alter. First Exon (e1-4,e6,e8-10)	1.83	1.72E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.66	1.45E-04	
SLC10A7	Complex (e7)	1.56	1.40E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PDLIM3	Alter. Donor Site	1.83	1.31E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAT1	Exon Cassette	6.37	4.15E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LINC01021	Complex (e5-7)	13.04	4.11E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	12.45	3.95E-05	
KIF2A	Exon Cassette	5.88	4.26E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SLC30A5	Alter. Acceptor Site	2.03	3.20E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, TIA-1, TIAL1, YB-1, ZRANB2
TNPO1	Alter. First Exon (e1)	2.75	3.22E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BTF3	Complex	1.61	9.18E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TSL), HuB, Nova-1, PSF, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
IQGAP2	Exon Cassette	2.23	2.05E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SCAMP1	Alter. First Exon (e1-7)	5.18	7.66E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PAPD4	Complex (e3)	9.26	3.45E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
VCAN	Exon Cassette	2.62	5.23E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GPR98	Alter. First Exon (e1-22,e24-26,e28-85)	1.54	5.76E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CAST	Alter. First Exon (e2)	4.27	1.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PAM	Exon Cassette	2.12	2.24E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SMAD5	Exon Cassette	1.52	1.02E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TCERG1	Exon Cassette	1.80	5.20E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SAP30L	Complex	1.54	3.30E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.73	3.78E-03	
CNOT8	Complex	1.77	5.81E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NSD1	Intron Retention	1.63	2.97E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP P (TSL), HTra2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF454	Alter. Donor Site	2.75	1.17E-04	
	Alter. First Exon (e1)	8.16	5.70E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.60	9.89E-05	
PPAP2A	Complex (e1-2)	2.08	4.99E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.87	4.22E-04	
P4HA2	Alter. First Exon (e1)	2.91	1.82E-03	ETR-3, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), KSRP, Nova-1, SC35, YB-1, ZRANB2
SPOCK1	Complex (e3)	1.52	3.90E-03	9G8, CUG-BP1, ETR-3, FMRF, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

Appendices

ARAP3	Exon Cassette	1.67	4.44E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FGF1	Complex	2.22	6.39E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.31	5.88E-05	
DPYSL3	Complex	5.80	3.00E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PHYKPL	Complex	1.57	6.56E-03	ETR-3, Fox-1, Fox-2, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, KSRP, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, YB-1, ZRANB2
TFAP2A-AS1	Intron Retention	1.70	8.70E-03	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP P (TLS), KSRP, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
CDKAL1	Alter. Terminal Exon (e8-17)	1.83	1.08E-02	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PRSS16	Exon Cassette	4.45	7.56E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HLA-E	Complex	1.69	7.99E-04	Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), MBNL1, Nova-1, SC35, SRp20, SRp30c, YB-1, ZRANB2
ATAT1	Alter. Terminal Exon (e10-11)	1.53	1.80E-03	
	Complex	1.52	7.61E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.81	3.94E-03	
MSH5-SAPCD1 // SAPCD1	Alter. Acceptor Site	1.71	2.88E-03	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.67	5.61E-04	
SKIV2L	Intron Retention	1.77	1.69E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Donor Site	3.66	1.65E-04	
HLA-DPB1	Alter. Terminal Exon (e2-4)	3.13	1.44E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
HMGA1	Complex	1.96	1.02E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, Nova-1, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	3.20	3.84E-04	
TJAP1	Exon Cassette	4.51	4.14E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.76	7.42E-03	
VEGFA	Alter. First Exon (e1-3)	1.68	2.76E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RIMS1	Alter. First Exon (e7,e10-22,e25,e30)	2.20	5.36E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.66	1.81E-07	
CD109	Alter. Terminal Exon	2.74	3.87E-05	
	Alter. Terminal Exon	2.70	4.39E-05	
	Complex	2.78	3.87E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.74	4.39E-05	
DOPEY1	Alter. First Exon (e1)	1.85	4.78E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C6orf165 // SLC35A1	Alter. First Exon (e1-11)	1.55	2.83E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SOBP	Alter. Terminal Exon (e7-11)	1.65	2.90E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DCBLD1	Alter. First Exon (e1)	8.42	4.95E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SMPDL3A	Alter. First Exon (e1)	4.78	7.65E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.28	1.35E-06	
TPD52L1	Alter. First Exon (e1)	6.09	3.71E-06	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e8-9)	3.59	8.38E-07	
NCOA7	Alter. Acceptor Site	5.14	9.75E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e3,e5,e7-14)	1.96	6.62E-04	
TRMT11	Alter. Terminal Exon (e12-16)	1.58	1.74E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
L3MBTL3	Exon Cassette	5.99	2.64E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
ULBP2	Alter. Terminal Exon (e4-5)	2.23	3.76E-04	ETR-3, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZDHHC14	Alter. Acceptor Site	2.65	1.01E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TMEM181	Alter. First Exon	6.34	1.06E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HUR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

C6orf70	Exon Cassette	2.10	1.60E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATXN1	Complex	2.11	9.78E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.22	2.19E-04	
ZNF204P	Alter. First Exon (e1-3)	1.61	1.74E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GNL1	Complex (e1-7)	1.61	3.78E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HLA-DQB1	Alter. First Exon (e1)	1.78	1.41E-04	ETR-3, Fox-1, Fox-2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
HLA-DMB	Alter. Terminal Exon (e3)	2.20	2.22E-03	
	Exon Cassette	2.44	4.19E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e4)	1.92	1.52E-03	
PEX6	Alter. Terminal Exon (e9,e10-18)	1.58	2.38E-02	ETR-3, Fox-1, Fox-2, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e11-12)	1.55	3.06E-03	
CUL7	Alter. First Exon (e9-10)	1.51	7.85E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.97	5.53E-05	
ENPP5	Exon Cassette	4.01	5.82E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
ME1	Exon Cassette	1.71	2.22E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RARS2	Alter. Donor Site	1.55	1.53E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1)	2.38	4.16E-03	
USP45	Exon Cassette	2.57	3.39E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CDK19	Complex	1.75	1.72E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.71	2.78E-03	
TRAF3IP2	Exon Cassette	1.93	2.12E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FYN	Exon Cassette	3.35	1.22E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Mutually Exclusive Exons (e11)	2.30	1.22E-04	
CEP85L	Alter. First Exon (e4)	1.69	4.96E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
EPB41L2	Complex	7.69	1.85E-05	
	Exon Cassette	9.63	1.71E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e2-3)	2.92	1.64E-04	
	Exon Cassette	2.30	2.96E-04	
ADAT2	Alter. First Exon (e1)	1.94	7.22E-04	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ULBP3	Complex	6.21	4.08E-06	ETR-3, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
SFT2D1	Intron Retention	1.62	1.35E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
PHF10	Alter. Terminal Exon (e12)	1.88	4.36E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
IQCE	Exon Cassette	1.66	1.14E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SDK1	Alter. First Exon (e27-40)	1.53	2.36E-02	
RBAK // RBAKDN // RNF216P1	Alter. Terminal Exon (e15)	1.67	1.54E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PMS2CL	Alter. Terminal Exon (e5-15)	3.23	6.40E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MPP6	Exon Cassette	1.50	1.22E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AQP1 // FAM188 B // INMT	Complex (e27,e31)	2.31	7.57E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BBS9	Exon Cassette	2.32	1.02E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuR, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZMIZ2	Complex	1.69	1.42E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CCM2	Exon Cassette	1.61	5.84E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha,

Appendices

				HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
LANCL2	Complex	1.57	9.64E-03	ETR-3, Fox1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CRCP	Exon Cassette	1.55	3.30E-03	ETR-3, Fox1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RHBDD2	Exon Cassette	1.51	5.78E-04	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TDP43, TIA1, TIAL1, YB1
CCDC146	Alter. First Exon (e1-6)	1.77	1.39E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.69	1.34E-03	
STEAP1	Alter. Terminal Exon (e5)	2.64	1.40E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
STEAP2	Alter. First Exon (e2-3)	2.09	4.41E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
AKAP9	Exon Cassette	2.13	2.40E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
TRIP6	Exon Cassette	2.98	1.78E-04	hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, RBM5, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FOXP2	Alter. Terminal Exon (e18-25)	3.43	7.50E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, K
	Complex (e8-9)	1.75	2.10E-03	
	Exon Cassette	3.68	1.96E-04	
CAV1	Alter. Donor Site	2.99	5.99E-04	ETR-3, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova1, RBM5, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
C7orf55 // LUC7L2	Alter. First Exon (e2,e4)	2.02	4.18E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.73	2.96E-03	
CNTNAP2	Alter. First Exon (e1-17)	9.38	1.78E-08	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NUB1	Alter. Terminal Exon (e9)	1.52	1.99E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PAXIP1-AS2	Alter. Terminal Exon	3.49	4.14E-05	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PDGFA	Alter. First Exon (e1-2)	1.95	5.55E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
PRKAR1B	Alter. First Exon (e1-6,e8-11)	1.70	3.39E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
FTSJ2	Complex	1.72	7.18E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1
RADIL	Exon Cassette	1.79	3.04E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FAM126A	Exon Cassette	1.58	1.02E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
POLR2J4	Alter. Terminal Exon (e9-10,e12-15)	2.15	1.79E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
HUS1	Intron Retention	1.68	7.77E-04	ETR-3, hnRNP C1, hnRNP I (PTB), hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SRp20, SRp30c, TIA-1, TIAL1, YB-1
GUSB	Intron Retention	1.56	7.79E-05	ETR-3, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF2/ASF, SRp20, TIA-1, TIAL1, YB-1, ZRANB2
TBL2	Alter. Acceptor Site	1.66	2.88E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
STX1A	Complex	1.85	2.11E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SEMA3C	Alter. First Exon (e2)	1.64	1.51E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ASNS	Exon Cassette	1.77	1.16E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GAL3ST4/GPC2	Complex	2.03	2.18E-04	CUG-BP1, ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, SC35, SRp30c, TIA-1, TIAL1, YB-1
PMS2P1	Exon Cassette	1.61	3.10E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
C7orf49	Alter. First Exon (e1-4)	1.64	8.56E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
KCNH2	Alter. First Exon (e1-5,e7-16)	3.37	1.22E-06	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	6.20	1.22E-08	



FASTK	Alter. First Exon (e1)	1.59	2.12E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.52	1.14E-02	
PTRPN2	Complex (e1,e4)	1.77	2.52E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ESYT2	Exon Cassette	1.69	9.22E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DPYSL2	Complex	2.43	1.25E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
IKBKB	Exon Cassette	1.74	3.24E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, Nova-1, RBM5, Sam68, SC35, SRp20, TIA-1, TIAL1, YB-1
CLVS1	Alter. First Exon (e1-5)	4.00	1.90E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
VPS13B	Exon Cassette	1.50	1.84E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RIMS2	Exon Cassette	1.95	5.19E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MTUS1	Alter. Terminal Exon (e8-9,e11,e13-20)	1.98	6.94E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ASAH1	Alter. First Exon (e1)	1.72	3.88E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
LZTS1	Complex (e1-2)	2.76	6.18E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FGFR1	Complex	2.62	4.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.58	9.51E-05	
MRPS28 // TPD52	Exon Cassette	3.65	6.44E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
EIF3E	Alter. First Exon (e1)	1.95	9.24E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e6)	1.94	1.26E-02	
	Complex (e2,e5-6)	1.58	9.36E-04	
EEF1D	Complex	8.74	1.30E-06	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	5.26	7.74E-07	
PLEC	Alter. First Exon (e4)	3.38	7.91E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
CYHR1	Alter. First Exon (e2)	1.68	1.50E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), SC35, SF2/ASF, SRp20, SRp30c, YB-1
COMMD5 // ZNF250	Alter. First Exon (e1-5,e7-10)	2.29	2.35E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.69	1.64E-03	
	Exon Cassette	4.72	4.41E-04	
	Mutually Exclusive Exons	2.59	2.52E-03	
CHMP5	Exon Cassette	1.87	5.79E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TJP2	Complex	1.81	6.35E-04	ETR-3, hnRNP A1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp30c, TIA-1, TIAL1, YB-1
C9orf89	Alter. First Exon (e1-2)	1.65	1.12E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DAB2IP	Alter. Acceptor Site	1.56	2.10E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e5-7)	2.06	1.40E-03	
NEK6	Alter. First Exon (e2)	1.54	4.36E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DNM1	Mutually Exclusive Exons (e10)	2.02	3.45E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
COQ4	Alter. First Exon (e2-4)	1.50	2.66E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTra2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.86	1.23E-04	
POMT1	Alter. First Exon (e1,e4)	1.61	1.02E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	1.55	2.24E-03	
KIAA1984 // RABL6	Alter. First Exon (e1-4)	1.97	4.58E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e25-33)	1.77	2.72E-03	
KIAA0020	Alter. Terminal Exon (e3-19)	2.00	2.90E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
RFX3	Exon Cassette	1.57	9.30E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTra2alpha, HTra2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2

Appendices

NFIB	Alter. First Exon (e1,e3)	3.43	1.81E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ELAVL2	Alter. First Exon (e1,e4)	2.63	4.02E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
BAG1	Complex	2.23	5.72E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AQP3	Intron Retention	3.84	2.38E-04	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), Nova-1, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ANKRD18A // FAM95C	Alter. Terminal Exon (e16-18,e20-22)	2.85	5.67E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TMEM2	Alter. First Exon (e20-22)	2.28	1.06E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BICD2	Intron Retention	2.08	2.66E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1
IKBKAP	Alter. First Exon (e1-8)	1.61	1.11E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TOR2A	Intron Retention	2.25	3.51E-05	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), KSRP, MBNL1, Nova-1, RBM5, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
SH3GLB2	Alter. First Exon (e1-7)	1.62	4.78E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	2.17	2.23E-04	MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
FNBP1	Alter. First Exon (e1-10,e12,e14-18,e20)	1.68	5.36E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
TTF1	Exon Cassette	2.57	1.85E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
STS	Alter. First Exon (e2)	1.56	8.81E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MSL3	Alter. First Exon (e1)	1.78	2.18E-04	ETR-3, hnRNP A1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, Nova-1, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. First Exon (e1)	1.64	2.11E-02	
	Intron Retention	2.10	1.18E-03	
PRRG1	Complex	5.72	6.12E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
RRAGB	Exon Cassette	2.04	7.18E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNF711	Exon Cassette	2.10	2.18E-03	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTRA2beta1, HuB, HuD, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2, TDP43
	Intron Retention	1.73	4.45E-02	
CSTF2	Exon Cassette	3.06	5.56E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ALG13	Alter. First Exon (e1)	1.58	1.76E-02	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.09	2.16E-03	
FHL1	Exon Cassette	5.02	3.75E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MTMR1	Alter. First Exon (e2-3,e5-11)	1.82	1.20E-02	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATP2B3	Alter. Terminal Exon (e21,e23)	2.23	3.60E-04	9G8, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.22	1.56E-04	
TAZ	Intron Retention	1.83	1.51E-05	hnRNP P (TSL), RBM5, YB-1
GEMIN8	Alter. First Exon (e1)	1.69	2.50E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TSL), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
AP1S2	Alter. Terminal Exon (e4,e8)	2.05	1.41E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e5)	2.62	5.41E-04	
MAOB	Exon Cassette	1.61	4.86E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SMC1A	Alter. First Exon (e1)	1.77	7.90E-03	ETR-3, hnRNP I (PTB), hnRNP P (TSL), Nova-1, SC35, SF2/ASF, TIA-1, TIAL1, YB-1
ARHGFP9	Complex	1.59	1.71E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
XIST	Alter. Acceptor Site	1.55	1.04E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	4.29	1.10E-03	
GPC3	Alter. First Exon (e1)	12.44	3.56E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TSL), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	5.68	3.53E-05	

ATP11C	Exon Cassette	3.08	4.98E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BCAP31	Alter. First Exon (e3)	1.57	2.12E-05	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Sam68, SC35, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	1.50	1.81E-04	
FAM3A	Exon Cassette	1.73	4.96E-03	ETR-3, hnRNP A1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), KSRP, Nova-1, SC35, SRp20, TIA-1, TIAL1, YB-1
MPP1	Exon Cassette	2.10	7.84E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
TRA/TRAC/TRAV12-1/TRAV20	Alter. Term Exon (e35,144,e152-155)	1.74	1.48E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Intron Retention	1.69	2.16E-02	
LINC00338 // SEC14L1	Alter. Terminal Exon (e8-9,e11-25)	2.34	9.64E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
SDHAP1	Exon Cassette	2.83	3.80E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
GTF2I	Alter. Terminal Exon (e12-35)	1.79	2.06E-05	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CD99	Alter. Terminal Exon (e3-11)	6.59	4.83E-07	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	4.23	2.88E-07	
	Complex	1.83	9.17E-04	
SH3D21	Alter. First Exon (e1-3)	1.84	2.14E-03	ETR-3, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, KSRP, Nova-1, Nova-2, PSF, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1
	Complex	1.59	4.46E-03	
MDM4	Exon Cassette	1.82	1.98E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
PLEKHA5	Alter. First Exon (e1)	1.61	8.84E-03	CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Complex	2.50	3.76E-03	
SLC12A4	Alter. First Exon (e2)	1.59	3.42E-03	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Complex (e22-29)	1.78	3.63E-04	
	Complex	1.76	3.63E-04	
	Exon Cassette	1.81	1.88E-03	
SLC13A3	Alter. First Exon (e1-2)	2.58	5.15E-04	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.84	4.03E-05	
AHRR // PDCD6	Alter. First Exon (e8-12)	3.64	3.40E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	2.02	1.04E-03	
	Intron Retention	2.40	1.36E-03	
ANXA1	Complex (e2-3)	2.19	1.95E-02	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
MKKN1 // MOB3C	Alter. Terminal Exon (e3-5)	1.67	4.22E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
DIP2B	Alter. First Exon (e1-16)	1.77	4.78E-03	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
CHMP4A/P04/M DP1/NEDD8/TM9SF1	Alter. Donor Site	2.14	2.07E-05	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e24,e25-54)	2.05	2.42E-04	
SDHAP3	Alter. Terminal Exon (e4,e6-8)	1.77	3.21E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, KSRP, MBNL1, Nova-1, Nova-2, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
MAST4	Exon Cassette	3.19	2.66E-03	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2beta1, HuB, HuD, KSRP, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
ZNRD1-AS1	Alter. First Exon (e1)	1.51	1.14E-02	ETR-3, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HuB, KSRP, Nova-1, PSF, Sam68, SC35, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
ATF6B	Complex	1.54	2.62E-04	ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF2/ASF, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2
BLOC1S5/EEF1E1/TXNDC5	Alter. First Exon (e6-7,e9,e11)	2.94	5.96E-05	9G8, CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Alter. Terminal Exon (e7,e9,e11-12)	1.82	1.03E-02	
	Exon Cassette	1.60	1.84E-03	
PCSK5	Alter. Terminal Exon (e7-22)	3.29	1.17E-04	9G8, CUG-BP1, ETR-3, FMRP, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP LL, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, HuR, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
	Exon Cassette	3.37	1.06E-03	
SLC16A10	Alter. Terminal Exon (e3)	1.59	7.04E-03	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP DL, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP H3, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, HuD, KSRP, MBNL1, Nova-1, Nova-2, PSF, RBM5, Sam68, SC35, SF1, SF2/ASF, SRp20, SRp30c, TDP43, TIA-1, TIAL1, YB-1, ZRANB2
NBPFF10 // NOTCH2NL	Complex	2.18	6.17E-04	CUG-BP1, ETR-3, Fox-1, Fox-2, hnRNP A1, hnRNP A2/B1, hnRNP C1, hnRNP D, hnRNP E1, hnRNP E2, hnRNP F, hnRNP H1, hnRNP H2, hnRNP I (PTB), hnRNP K, hnRNP P (TLS), HTRA2alpha, HTRA2beta1, HuB, KSRP, Nova-1, Sam68, SC35, SF1, SRp20, SRp30c, TIA-1, TIAL1, YB-1, ZRANB2