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Gene Section
Short Communication

MIR30A (microRNA 30a)

Xiao-Bin Lv

Dept of Breast Surgery, Sun-Yat-Sen Memorial Hospital, Sun-Yat-Sen University, Guangzhou, China (XBL)

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Identity

Other names: MIRN30A

HGNC (Hugo): MIR30A

Location: 6q13

Local order: Based on Mapviewer, genes flanking MIR30A oriented from centromere to telomere on 6q13 are:

- B3GAT2, beta-1,3-glucuronyltransferase 2 (glucuronosyltransferase S)
- MIR30C2, microRNA 30c-2
- **MIR30A, microRNA 30a**
- RIMS1, regulating synaptic membrane exocytosis 1
- KCNQ5, potassium voltage-gated channel, KQT-like subfamily, member 5

DNA/RNA

Description

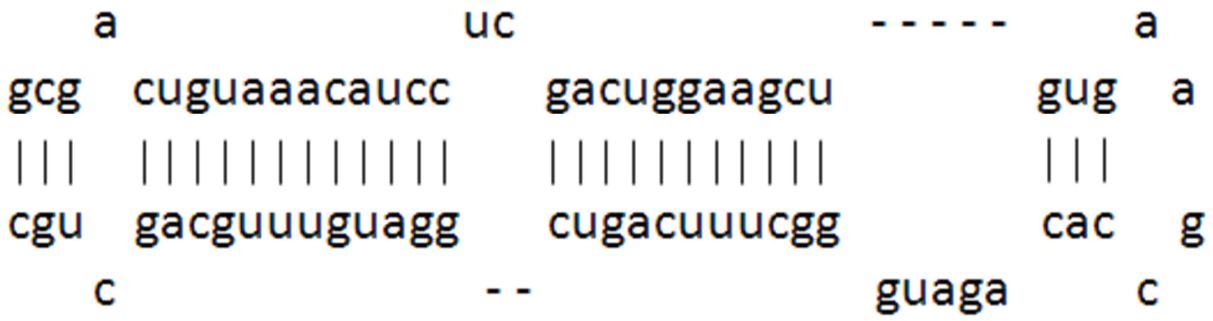
miR-30 microRNA precursor is a small non-coding RNA that regulates gene expression.
Animal microRNAs are transcribed as ~70 nucleotide stem-loop precursor and subsequently processed by the Dicer enzyme to give a mature ~22 nucleotide product.
In this case the mature sequence comes from both the 3' (miR-30) and 5' (mir-97-6) arms of the precursor. The products are thought to have regulatory roles through complementarity to mRNA. A screen of 17 miRNAs that have been predicted to regulate a number of breast cancer associated genes found variations in the microRNAs miR-17 and miR-30c-1, these patients were noncarriers of BRCA1 or BRCA2 mutations, lending the possibility that familial breast cancer may be caused by variation in these miRNAs. Members of the miR-30 family have been found to be highly expressed in heart cells.

Transcription

miRNAs are transcribed by RNA polymerase II as part of capped and polyadenylated primary transcripts (pri-miRNAs) that can be either protein-coding or non-coding. The primary transcript is cleaved by the Drosha ribonuclease III enzyme to produce an approximately 70-nt stem-loop precursor miRNA (pre-miRNA), which is further cleaved by the cytoplasmic Dicer ribonuclease to generate the mature miRNA.
Pre-miR Length: 71 bases.
gcgactgtaa acatcctcga ctggaagctg tgaagccaca gatgggcttt cagtcggatg tttgcagctg c

Pseudogene

No reported pseudogenes.



Protein

Note
miRNAs are not translated into amino acids.

Mutations

Note
Gene mutations have not been described.

Implicated in

Breast cancer

Disease
Overexpression of miR-30a suppressed the migration and invasiveness phenotypes of breast cancer cell lines. Moreover, reduced tumor expression of miR-30a in breast cancer patients was associated with an unfavorable outcome, including late tumor stage, lymph node metastasis, and worse progression (Cheng et al., 2012).

Prognosis
Higher expression levels of hsa-miR-30a-3p, hsa-miR-30c, and hsa-miR-182 were significantly associated with benefit of tamoxifen treatment and with longer PFS (Rodríguez-González et al., 2011).

Colon carcinoma

Disease
miR-30a-5p was shown to be down-regulated in human colorectal cancer compared with normal colon mucosa. Overexpression of miR-30-5p suppresses proliferation colon cancer cell lines by targeting denticleless protein homolog (DTL) (Baraniskin et al., 2012).

Non-small cell lung cancer

Disease
microRNA-30a expression was found inversely proportional to the invasive potential of various NSCLC cell lines, correlating positively with E-cadherin (epithelial marker) and negatively with N-cadherin (mesenchymal marker) expression. Lucerfise reporter assay indicates snail was a potential target of miR-30a (Kumarswamy et al., 2012).

Squamous cell carcinoma

Note
Diagnosis: a 5-microRNA classifier (hsa-miR-210, hsa-miR-182, hsa-miR-486-5p, hsa-miR-30a, and hsa-miR-140-3p) that could distinguish SCC from normal lung tissues (Tan et al., 2011).

Gastric cancer

Prognosis
Li et al identified seven-miRNA signature (miR-10b, miR-21, miR-223, miR-338, let-7a, miR-30a-5p, miR-126) for overall survival (p=0,0009) and relapse-free survival (p=0,0005) of gastric cancer patients (2010).

Thyroid carcinomas

Disease
miR-30a-5p was down-regulated in Thyroid carcinomas in comparison to normal thyroid tissue (Visone, 2007).

Chemotherapy resistance

Note
miR-30a in regulating beclin 1 expression and autophagy reveals a novel function for miRNA in a critical cellular event with significant impacts in cancer development, progression and treatment (Zhu et al., 2009).
miR-30a can sensitize tumor cells to cis-DDP via reducing beclin 1-mediated autophagy and that increasing miR-30a level in tumor cells represents a novel approach to enhance the efficacy of chemotherapy during cancer treatment (Zou et al., 2012).
Imatinib markedly inhibits expression of miR-30a in human CML cells. miR-30a is a potent inhibitor of autophagy by downregulating Beclin 1 and ATG5 expression. miR-30a mimic or knockdown of autophagy genes (ATGs) such as Beclin 1 and ATG5 by short hairpin RNA enhances imatinib-induced cytotoxicity and promotes mitochondria-dependent intrinsic apoptosis.
In contrast, knockdown of miR-30a by antagomir-30a increases the expression of Beclin 1 and ATG5, and inhibits imatinib-induced cytotoxicity (Yu et al., 2012)

References

Visone R, Pallante P, Vecchione A, Cirombella R, Ferracin M, Ferraro A, Volinia S, Coluzzi S, Leone V, Borbone E, Liu CG, Petrocca F, Troncone G, Calin GA, Scarpa A, Colato C, Tallini G, Santoro M, Croce CM, Fusco A. Specific microRNAs are downregulated in human thyroid anaplastic carcinomas. Oncogene. 2007 Nov 29;26(54):7590-5

Zhu H, Wu H, Liu X, Li B, Chen Y, Ren X, Liu CG, Yang JM. Regulation of autophagy by a beclin 1-targeted microRNA, miR-30a, in cancer cells. Autophagy. 2009 Aug;5(6):816-23

Li X, Zhang Y, Zhang Y, Ding J, Wu K, Fan D. Survival prediction of gastric cancer by a seven-microRNA signature. Gut. 2010 May;59(5):579-85

Rodríguez-González FG, Sieuwerts AM, Smid M, Look MP, Meijer-van Gelder ME, de Weerd V, Sleijfer S, Martens JW, Foekens JA. MicroRNA-30c expression level is an independent predictor of clinical benefit of endocrine therapy in advanced estrogen receptor positive breast cancer. Breast Cancer Res Treat. 2011 May;127(1):43-51

Tan X, Qin W, Zhang L, Hang J, Li B, Zhang C, Wan J, Zhou F, Shao K, Sun Y, Wu J, Zhang X, Qiu B, Li N, Shi S, Feng X, Zhao S, Wang Z, Zhao X, Chen Z, Mitchelson K, Cheng J, Guo Y, He J. A 5-microRNA signature for lung squamous cell carcinoma diagnosis and hsa-miR-31 for prognosis. Clin Cancer Res. 2011 Nov 1;17(21):6802-11

Cheng CW, Wang HW, Chang CW, Chu HW, Chen CY, Yu JC, Chao JI, Liu HF, Ding SL, Shen CY. MicroRNA-30a inhibits cell migration and invasion by downregulating vimentin expression and is a potential prognostic marker in breast cancer. Breast Cancer Res Treat. 2012 Aug;134(3):1081-93

Kumarswamy R, Mudduluru G, Ceppi P, Muppala S, Kozlowski M, Niklinski J, Papotti M, Allgayer H. MicroRNA-30a inhibits epithelial-to-mesenchymal transition by targeting Snai1 and is downregulated in non-small cell lung cancer. Int J Cancer. 2012 May 1;130(9):2044-53

Yu Y, Yang L, Zhao M, Zhu S, Kang R, Vernon P, Tang D, Cao L. Targeting microRNA-30a-mediated autophagy enhances imatinib activity against human chronic myeloid leukemia cells. Leukemia. 2012 Aug;26(8):1752-60

Zou Z, Wu L, Ding H, Wang Y, Zhang Y, Chen X, Chen X, Zhang CY, Zhang Q, Zen K. MicroRNA-30a sensitizes tumor cells to cis-platinum via suppressing beclin 1-mediated autophagy. J Biol Chem. 2012 Feb 3;287(6):4148-56

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