Atlas of Genetics and Cytogenetics in Oncology and Haematology

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Gene Section
Mini Review

HRAS (Harvey rat sarcoma viral oncogene homolog)

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Identity

Other names: c-Ha-ras 1

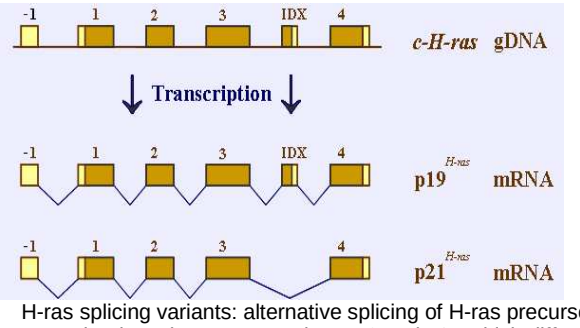
HGNC (Hugo): HRAS

Location: 11p15.5

Probe(s) - Courtesy Mariano Rocchi, Resources for Molecular Cytogenetics.

Note: More on the RAS family is available as a deep insight.

DNA/RNA



H-ras splicing variants: alternative splicing of H-ras precursor mRNA leads to the two transcripts p19 and p21 which differ by the ex- or inclusion of the Intron D exon (IDX); Exons that encode protein are shown as black boxes, untranslated exons as white boxes; the upstream untranslated exon is indicated as Exon -1.

Description

Consists of six exons, spread over 6.6 kb of genomic DNA.

Transcription

Alternative RNA splicing reveals two different transcripts (see Fig); if the intron D exon (IDX) is skipped exon 4 is directly joined to exon 3.

Note
To be quoted is the existence of a pseudogene, c-Ha-ras 2, inactivated, processed pseudogene which is located on chromosome X.

Protein

Description

p19H-ras
170 amino acids; 19kDa; shares a common effector region with regular RAS proteins; absence of residues 152-165, abrogating the GDP/GTP binding, and lack of a cysteine residue in the carboxy-terminus preventing the posttranslational modifications essential for the attachment of RAS proteins to the cytoplasmic membrane.

Expression

p19H-ras is expected to be produced at a much higher level than p21H-ras; the surprising low abundance of p19H-ras could be explained by instability of mRNA or unproductive splicing.

Localisation

Cytoplasmic.

Function

No oncogenic ability; it has been assumed, that p19H-ras might act as a antagonist to p21H-ras; due to the intact effector region it would interact constitutively with candidate effector molecules or regulators such as GAP, thereby suppressing the biological function of

p21H-ras; additionally the expression of p19H-ras was found to limit the production of p21H-ras.

Homology

RAS, RAL, RAC, RHO, RAP, and RAB.

Description

p21H-ras
Regular RAS protein - characterized in the RAS family page.

Expression

Ubiquitously expressed.

Localisation

Anchored to the inner surface of the plasma membrane.

Function

Analogously to other GTP-binding proteins (such as Translation Elongation Factor EFTu or signal transducing G-Proteins) RAS proteins are involved in signal transduction pathways.

Homology

Ras gene family is part of the ras superfamily including the mammalian RAS, RAL, RAC, RHO, RAP, and RAB gene families and the yeast homologs like SEC4 and YPT1 genes; genes encode small monomeric proteins of low molecular mass (20-30 kDa) which share at least 30% homology with RAS proteins.

Implicated in

Tumor (frequency of H-RAS mutations); references in Full Bibliography

Stomach (0-40%)

Urinary bladder (0-65%)

Prostate (0-10%)

Skin (0-45%)

Thyroid (0-60%)

Breast (0-10%)

Head and neck (0-30%)

Endometrium (5%)

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