

Gene Section

Mini Review

RHOB (ras homolog gene family, member B)

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Published in Atlas Database: February 2007

Online updated version: <http://AtlasGeneticsOncology.org/Genes/RHOBID42108ch2p24.html>

DOI: 10.4267/2042/38445

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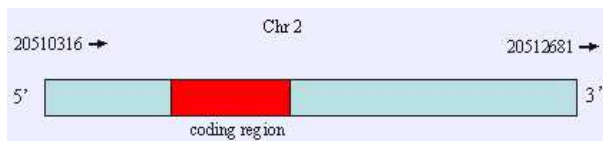
Identity

Hugo: RHOB

Other names: ARH6; ARHB; H6; RHOH6

Location: 2p24.1

DNA/RNA



Description

The gene encompasses 2,366 bps (chr2:20,510,316-20,512,681); 1 exon.

Transcription

The coding sequence (CDS) region is 395.983 bp (588 bp) encoding a protein of 196 aa long.

Protein

Description

Length 196 aa, molecular weight 22123 Da (unprocessed precursor). RhoB protein exists in different geranylgeranylated (RhoB-GG) or farnesylated (RhoB-F) isoforms in cells.

Expression

Widely expressed.

Localisation

Endosome; Late endosome; late endosomal membrane; cell membrane; Also detected at the nuclear margin and in the nucleus. Prenylation specifies the subcellular location of RHOB. In general, the farnesylated form is localized to the plasma membrane while the geranylgeranylated form is localized to the endosome.

Function

Regulator of protein signaling and trafficking:

Plays a pivotal role in the dynamic regulation of the actin cytoskeleton. Involved in intracellular protein trafficking of a number of proteins. Targets PRK1 to endosomes and is involved in trafficking of the EGF receptor from late endosomes to lysosomes. Also required for stability and nuclear trafficking of Akt which promotes endothelial cell survival during vascular development. Identified as a component of outside-in signaling pathways that coordinate Src activation with its translocation to transmembrane receptors.

Negative modifier of cancer progression:

Affects cell adhesion and growth factor signaling in transformed cells. Plays a negative role in tumorigenesis as RhoB deletion increases tumor formation initiated by Ras mutation. Limits the proliferation of transformed cells by facilitating turnover of oncogene c-Myc. Expression levels are dramatically decreased in lung, head and neck, and brain cancer, when tumors become more aggressive.

Modulator of cancer cell apoptosis:

Promotes proapoptotic signaling of regulators involved in cell cycle checkpoints, cell adhesion, vesicle trafficking, MAPK signaling, transcription, and immunity. Mediates apoptosis in neoplastically transformed cells after DNA damage. Is essential for apoptosis and antineoplastic activity of farnesyltransferase inhibitors in a mouse model. Is one of the targets of farnesyltransferase inhibitors which are currently under investigation as cancer therapeutics.

Homology

Member of the ras gene superfamily; rho family; GTP-binding proteins. The RhoA, RhoB, and RhoC proteins form a closely related subgroup that are about 90% identical in amino acid sequence. The sequences of RHOB are highly-conserved between species (from

human to fly). Amino acid sequences of human, mouse and rat are 100% identical while sequence homology between human and chicken is 97% identical.

Implicated in

Lung cancer

Note: RhoB expression is frequently downregulated in lung cancer by multiple mechanisms. Low or no expression of RhoB is more frequently observed in poorly- or moderately-differentiated adenocarcinomas, and indicative of poor patient prognosis.

Head and neck cancer

Note: RhoB expression decreases to undetectable level as tumors become more invasive and poorly differentiated. In contrast, Ki67 (proliferation marker) and RhoA protein levels increase with tumor progression.

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This article should be referenced as such:

Huang M, Laury-Kleintop LD, Prendergast G. RHOB (ras homolog gene family, member B). *Atlas Genet Cytogenet Oncol Haematol*.2007;11(3):217-218.
