

Gene Section

Mini Review

NIN (ninein (GSK3B interacting protein))

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Identity

Other names: GSK3B-interacting protein; Glycogen synthase kinase 3 beta-interacting protein; KIAA1565; Ninein centrosomal protein.

HGNC (Hugo): NIN

Location: 14q22.1

Local order: SAV1 (SALvador homolog 1 Drosophila) is more centromeric. C14orf29 (Chromosome 14 Open Reading Frame 29) is more telomeric.

DNA/RNA

Description

31 exons spanning 111.3 Kb on 14q22.1. Transcription is from telomere to centromere.

Transcription

5 alternative transcripts:

Variant 2 encodes the longest isoform ;

Variant 1 contains a different 3' terminal region and the resulting protein has a distinct and shorter C-terminus;

Variant 3 contains also a different 3' terminal region and it encodes isoform 3, with a shorter and distinct C-terminus than variant 2;

Variant 4 differs in the 5' and 3' UTRs, and has multiple differences in the coding region. The resulting isoform 4 contains an additional internal segment, when compared to isoform 2, has a longer and distinct N-terminus, and has a shorter and distinct C-terminus;

Variant 5 has multiple differences in the coding region and 3' UTR, the resulting isoform 5 contains an additional internal segment and has a distinct and shorter C-terminus. Isoform 5 has also been referred to as hNinein-Lm.

4 alternative transcripts in Ensembl 1:

Q9HCK7 corresponding to RefSeq variant 4;

NIN corresponding to RefSeq variant 5;

NIN corresponding to RefSeq variant 4;

NM_182944 corresponding to RefSeq variant 1.

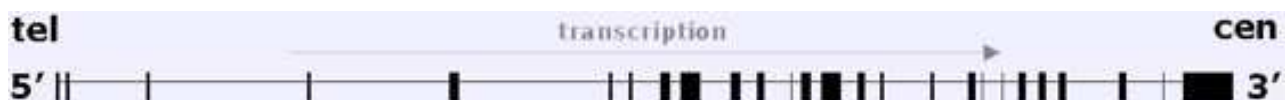
Protein

Note

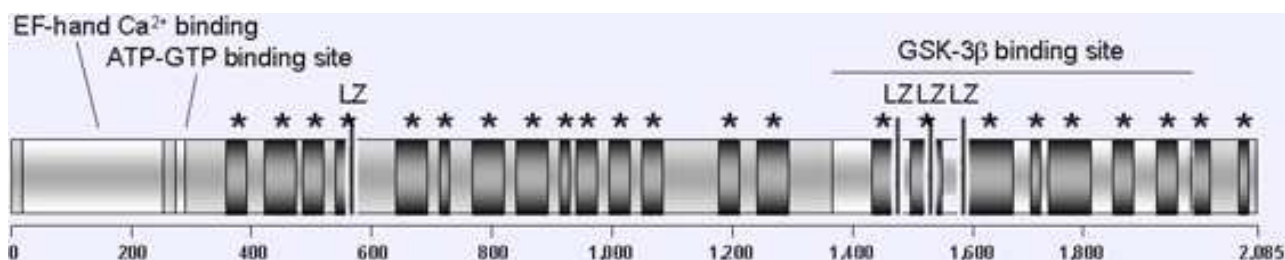
Ninein (GSK3B interacting protein).

Description

Homooligomer. Interacts with GSK3B (GSK3-beta) via its C-terminus domain, it also interacts with C14ORF166 preventing its phosphorylation by GSK3-beta. NIN is a component of the core centrosome. Arranged in a tubular conformation with an open and a closed end within the centrosome. In the mother centrosome, it localizes at both ends of the centrosome tube, including the site of centrosome duplication, while in the daughter centrosome it is present only at the closed end. Requires PCM1 for centrosome localization. In interphase cells, it is localized in the centrosome. Decreases in metaphase and anaphase and reappears in telophase.



Genomic structure of NIN. Black boxes indicate exons.



Schematic representation of NIN. LZ: leucine-zipper domain. Coiled-coil domains are indicated with asterisks.

Expression

Ubiquitous. Highly expressed in heart and skeletal muscle.

Localisation

Centrosome.

Function

The centrosome is the major microtubulin-organizing center (MTOC) in most vertebrate cells. In a typical somatic cell, the centrosome is composed of a pair of centrioles surrounded by a mass of amorphous pericentriolar material (PCM) that may be involved in the complex of Y-tubulin, centrin, pericentrin and ninein. This protein plays an important role as a microtubule minus-end capping, centriole position, anchoring factor and as a centrosome maturation factor. Localization of this protein to the centrosome requires three of its four leucine zippers in the central coiled-coil domain. In addition it has been suggested that ninein could play a role to ensure equal chromosome segregation prior to telophase/cytokinesis in the division cycle.

Homology

It presents homology in various species. It also belongs to ENSF00000001557 protein family.

Mutations

Somatic

t(5;14)(q33;q24) 5' NIN-PDGFRB 3' fusion in a chronic myeloproliferative disorder with eosinophilia.

Implicated in

t(5;14)(q33;q24) , 5q33 myeloproliferative disease

Disease

Chronic myeloproliferative disorder with eosinophilia and skin lesions ("Atypical CML").

Prognosis

Good. Relative mild disease course over at least 13 years. Imatinib mesylate responsive disease.

Cytogenetics

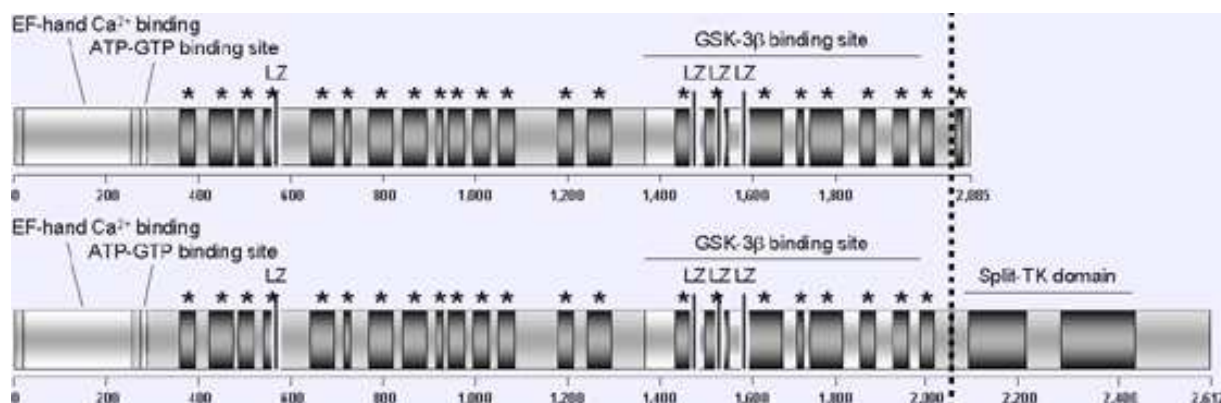
t(5;14)(q33;q24).

Hybrid/Mutated gene

5' NIN-PDGFRB 3'.

Abnormal protein

NIN-PDGFRB.



Schematic representation of the fusion NIN-PDGFRB consequence of the t(5;14)(q33;q24) in a chronic myeloproliferative disorder with eosinophilia. From up to down: PDGFRB, NIN and the putative chimeric NIN-PDGFRB structure. TM, transmembrane domain; TK, tyrosine kinase domain; LZ, leucine-zipper domain. Coiled coil domains on NIN and NIN-PDGFRB are indicated with asterisks.

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