Atlas of Genetics and Cytogenetics
in Oncology and Haematology

OPEN ACCESS JOURNAL

INIST-CNRS

Gene Section
Short Communication

DBN1 (drebrin 1)

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Published in Atlas Database: September 2013

Online updated version : http://AtlasGeneticsOncology.org/Genes/DBN1ID51520ch5q35.html
DOI: 10.4267/2042/53637

Abstract

Review on DBN1, with data on DNA/RNA, on the protein encoded and where the gene is implicated.

Identity

Other names: D0S117E

HGNC (Hugo): DBN1

Location: 5q35.3

DNA/RNA

Description

14 exons.

Transcription

Two alternatively spliced isoforms:
- NCBI LOCUS NM_004395 2942 bp corresponds to DBN1a variant,
- NCBI LOCUS NM_080881 3058 bp corresponds to DBN1b variant.

Protein

Description

DBN1 encodes a 71 kDa protein of ~650 amino acids (DBN1a has 649 amino acids, DBN1b has 651 amino acids).

The N-terminus contains an ADF/Cofilin homology domain (Poukkula et al., 2011) followed by a coiled-coil and a helical domain which each contain an actin-binding site (Worth et al., 2013).

The C-terminus contains no identifiable domain structure apart from two Homer binding motifs and can provide intramolecular regulation of F-actin binding (Worth et al., 2013).

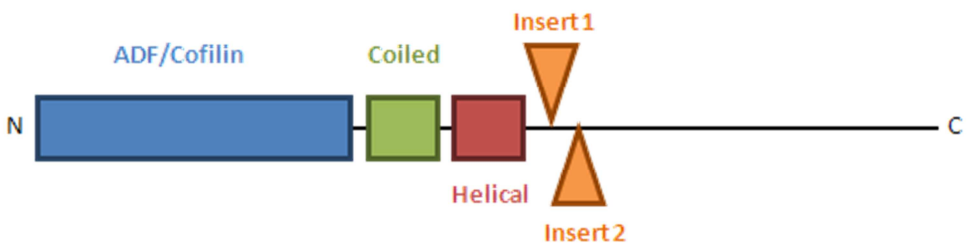
In some species (chick, rat) developmental regulation of the protein occurs such that at the earliest stages of development an embryonic 'E1' isoform is expressed.

This is then downregulated in favour of an 'E2' isoform containing a 43 amino acid insertion which itself is subsequently superseded by the adult 'A' isoform containing a further 46 amino acids insertion adjacent to the previous one (Kojima et al., 1993).

In humans E2 appears to be the predominant isoform.

Expression

DBN1 is widely expressed in the nervous system and is also found in other organs, predominantly kidney, stomach, lung and skin (Dun and Chilton, 2010).



Localisation

DBN1 localises to actin-rich structures within cells such as the leading edge of neuronal growth cones (Geraldo et al., 2008; Dun et al., 2012) and intercellular junctions (Butkevich et al., 2004; Rehm et al., 2013).

Function

At the molecular level, DBN1 stabilises actin filaments (Mikati et al., 2013). It may provide a link between the actin and microtubule networks (Geraldo et al., 2008) and is required for neuronal migration (Dun et al., 2012).

Drebrin function can be regulated by the phosphorylation state of distinct serine residues due to the actions of Cdk5 (Worth et al., 2013) and PTEN (Kreis et al., 2013).

Homology

Drebrin is conserved across vertebrates, especially in the first 300 amino acids containing the ADF/Cofilin homology, coiled-coil and helical domains. The closest relative in invertebrate species is actin-binding protein 1 (ABP1).

Implicated in

Mantle cell lymphoma

Note

Drebrin is a direct target of Sox11 in primary mantle cell lymphomas (Wang et al., 2010).

B-cell precursor acute lymphoblastic leukemia (BCP-ALL)

Note

High levels of drebrin protein expression in BCP-ALL (Vaskova et al., 2011).

Skin tumours (varied)

Note

Drebrin levels are increased compared to control skin samples in basal cell carcinoma, squamous cell carcinoma, melanoma and leiomyosarcoma (Peitsch et al., 2005).

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This article should be referenced as such:

Chilton J. DBN1 (drebrin 1). Atlas Genet Cytogenet Oncol Haematol. 2014; 18(5):299-300.