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Gene Section
Short Communication

INGX (inhibitor of growth family, X-linked, pseudogene)

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Abstract

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

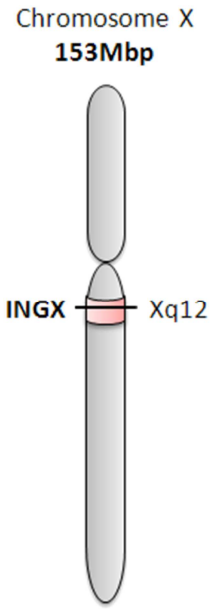
Identity

Other names: ING1-like, ING2

HGNC (Hugo): INGX

Location: Xq13.1

DNA/RNA



Chromosomal localization of the INGX gene in Homo sapiens.

Description

The sex chromosome linked INGX gene, homolog to ING1 has been cloned for the first time by Jäger et al., 1999.

The five human ING genes and the pseudogene INGX have been mapped to six different chromosomes.

In addition, ING genes are located close to the telomeric region except for ING3 and INGX. This gene has been localised on the human X chromosome at locus Xq13.1 close to the centromeric region (He et al., 2005).

Transcription

INGX gene has three transcripts and a unique exon. The sequence of this exon shares 72% of identity with exon 2 of ING1. RT-PCR analysis shows that INGX mRNA is expressed in normal tissue (brain, colon, testis, kidney, liver and breast). However, some tumor cell lines like melanoma or breast cancer showed a loss of INGX mRNA (Jäger et al., 1999).

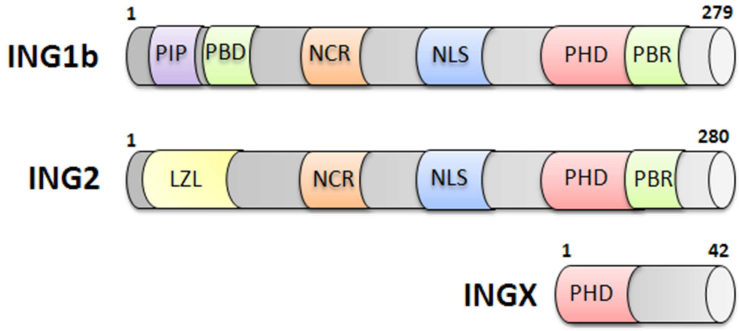
Pseudogene

INGX is the pseudogene of ING1 (He et al., 2005).

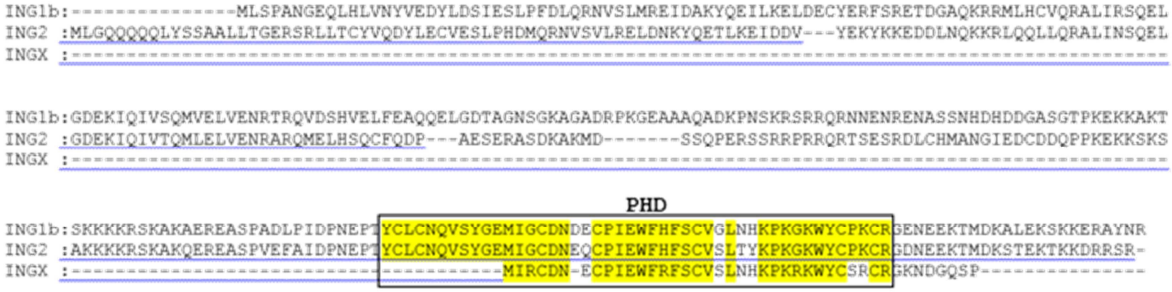
Protein

Description

The amino acid sequence alignment of human ING proteins revealed several conserved regions: a leucine-zipper-like-region (LZL), a novel conserved region (NCR), a nuclear localization signal (NLS), a plant homeo domain (PHD) and a polybasic region (PBR).



A schematic representation of the different domain of ING1b, ING2 and INGX protein.



Amino acid sequences alignment of ING1b, ING2 and INGX. Plant homeo domain (PHD) is indicated by box.

The ING proteins are characterized by the presence of a highly conserved PHD in their C-terminal part. This domain is commonly found in proteins involved in chromatin modification (Bienz, 2006; Mellor, 2006).

ING proteins are characterized by their PHD domain which is highly conserved. The longest ORF in INGX gene is only 129 bp length and would encode a predicted amino acid sequence of 42 amino acids, but there is no report about an INGX protein produced from a transcript. This INGX sequence has a high homology degree with the PHD amino acid sequence. INGX protein would have a partial PHD domain (He et al., 2005).

Localisation

At present, there is no proof about the existence of the production of an INGX protein. Moreover, the predicted protein would not have a nuclear localization sequence (NLS) like the other members of the ING family. It could thus be located in the cytoplasm unlike the other ING proteins (for review, Guérillon et al., 2013).

Function

The tumor suppressor ING genes are lost or misregulated in different types of human tumors. Unfortunately, few data about INGX are available. We actually know that INGX, unlike the other ING, is highly truncated. So it would be interesting to determine if it has the potential to act in a dominant negative manner (He et al., 2005).

Homology

In databanks, INGX is also referred as ING1-like.

Implicated in

Melanoma and breast cancer

Note

Several studies have shown that ING proteins are involved in critical cellular processes such as senescence, apoptosis, DNA repair, growth regulation, cell migration (for review, Guérillon et al., 2013). In tumor, ING expression is mostly lost at mRNA level (For review: Guérillon et al., 2013 and Ythier et al., 2008). Jäger et al., 1999 have shown a loss of INGX mRNA in some tumor cell lines like melanoma or breast cancer.

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