Atlas of Genetics and Cytogenetics in Oncology and Haematology

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# Gene Section
## Short Communication

# CLDN10 (claudin 10)

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## Identity

**Other names:** CPETRL3, OSP-L

**HGNC (Hugo):** CLDN10

**Location:** 13q32.1

## DNA/RNA

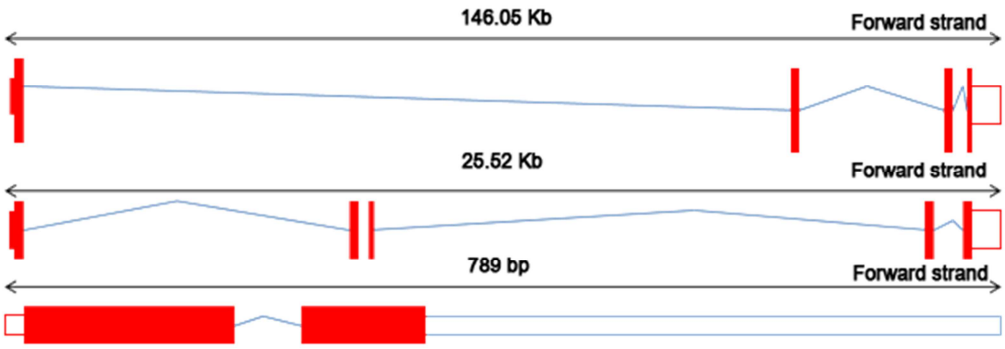
### *Transcription*

Claudin 10 has 3 different transcripts.
NP_878268.1 [NCBI Entrez] claudin-10 isoform a: This variant (a) is the longest transcript and encodes claudin-10 isoform a. Its composition is as follows: exons: 5; transcript length: 2549 bps; translation length: 226 residues.
NP_008915.1 [NCBI Entrez] claudin-10 isoform b precursor: This variant (b) is different from the isoform (a) above in the 5' UTR and 5' coding region. It uses an alternate promoter, compared to variant a. The resulting isoform (b) has a longer and more distinct N-terminus. Its composition is as follows: exons: 5; transcript length: 949 bps; translation length: 228 residues.
NP_001153572.1 [NCBI Entrez] claudin-10 isoform a_i1: This variant (a_v1) uses an alternate in-frame splice site in the 5' coding region, compared to claudin 10 isoform a. The resulting isoform (a_i1) lacks an internal segment near the N-terminus, compared to isoform a. Its composition is as follows: exons: 2; transcript length: 701 bps; translation length: 73 residues AK055855, BG697724, DA636757, DB544708 (source sequences NCBI).

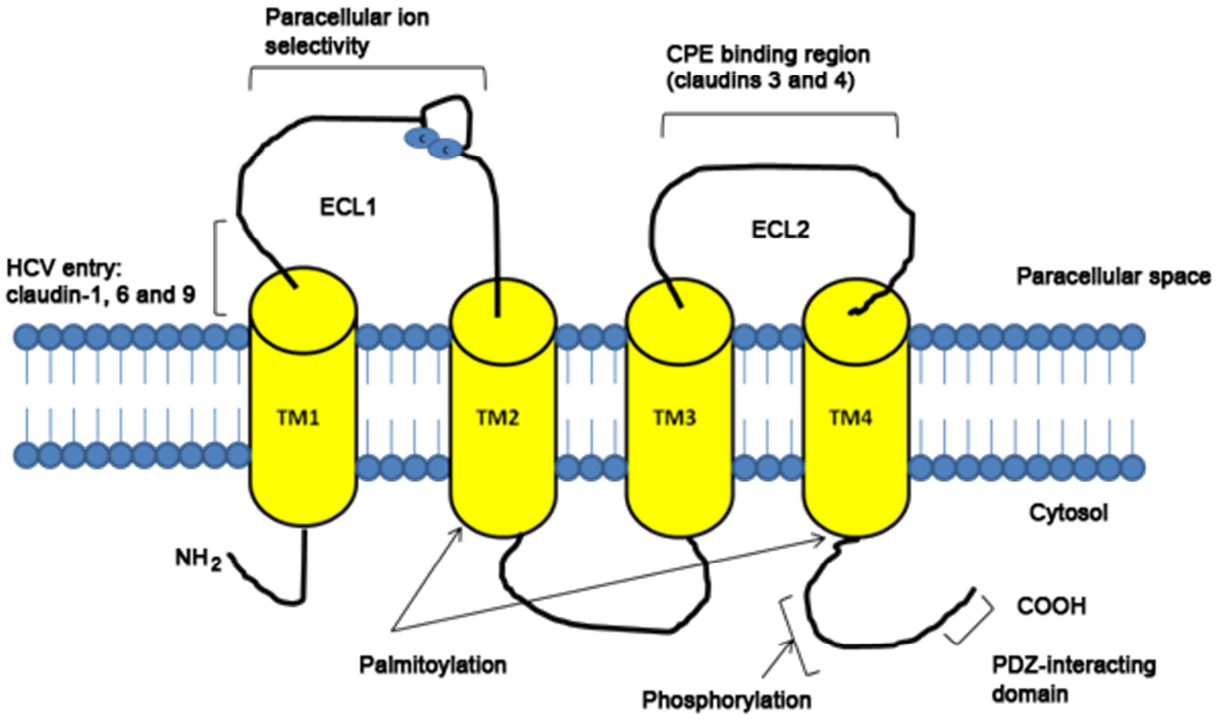
## Protein

**Note**

Claudin 10 plays a major role as a component of tight junctions. CLDN10 encodes a member of the claudin family. Claudins are integral membrane proteins and components of tight junction strands. Tight junction strands function as a physical barrier to prevent solutes and water from passing freely through the paracellular space between epithelial or endothelial cell sheets. They are also critical in maintaining cell polarity and mediating signals. The expression level of this gene is associated with recurrence of primary hepatocellular carcinoma. Six alternatively spliced transcripts encoding different isoforms of CLDN10 have been reported, but not all of them have been recorded.




The three different isoforms of claudin 10; claudin 10 (a), claudin 10 (b) and claudin 10 (a_i1).




The four transmembrane, two extracellular, 3 helical and two cytoplasmic domains of claudin protein.

## Description

228 amino acids. Modified amino acid residue at position 94 is a phosphoserine. Human and mouse isoforms of CLDN10 have been cloned. Claudin-10 shares between 20 and 45% sequence similarity between other claudin family members at the amino acid level, displaying highest sequence similarity to claudin-15.

CLAUDIN10 is a 4-element fingerprint that provides a signature for claudin-10 proteins. The fingerprint was derived from an initial alignment of 2 sequences: the motifs were drawn from conserved regions spanning virtually the full alignment length, focusing on those sections thatcharacterize claudin-10 and distinguish it from other family members - motif 1 lies in the first TM domain; motif 2 resides within in the second TM domain; motifs 3 spans part of the fourth TM domain and part of the C-terminal region; and motif 4 resides within the cytoplasmic C-terminus.

## Expression

At the cell membrane in 85 organs and 13 developmental stages (Bgee)[P78369].

## Localisation

Cell membrane.

## Function

From the KEGG pathway.

Claudin 10 as an integral part of tight junction composition plays an important role in Leukocyte migration.

They are also important components of cell adhesion molecules and serve as a receptor for the HCV virus via their extracellular loop.

hsa04514: Cell adhesion molecules (CAMs)
hsa04530: Tight junction
hsa04670: Leukocyte transendothelial migration
hsa05160: Hepatitis C

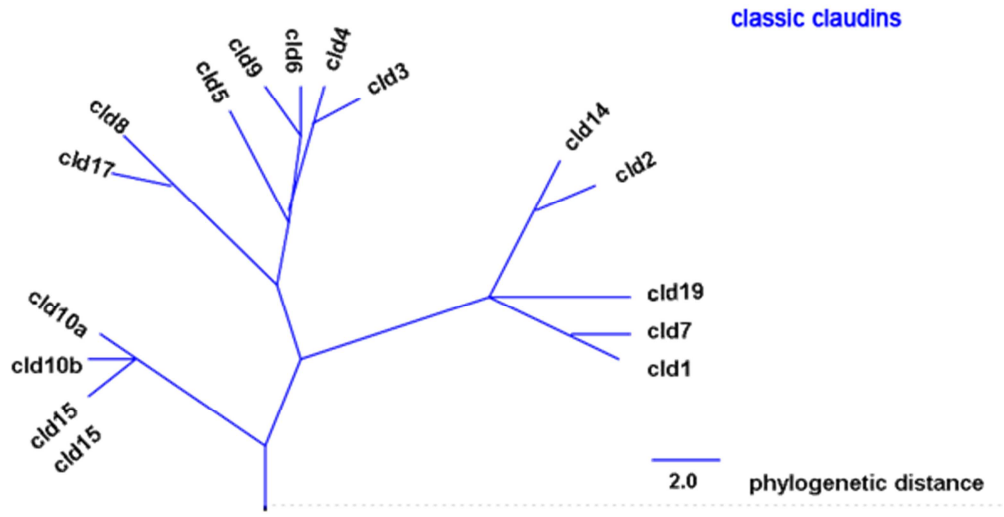
## Homology

The CLDN10 gene is conserved in chimpanzee, dog, cow, mouse, rat, chicken, and zebrafish.

# Mutations

**Note**

Total disease mutations: 0; total SNPs: 5.




Sequence similarity between the various claudins showing that claudin 10 has the highest sequence similarity to claudin 15.

# Implicated in

## *Hepatocellular carcinoma (HCC)*

**Prognosis**

Claudin 10 is highly expressed in patients suffering from HCC and is an independent prognostic survival factor after surgery.

It is closely related to microvessel density and angiogenesis.

## *Ovarian cancer*

**Disease**

Ovarian cancer in a chicken model to be used as a basis to study the relevance of CLDN10 expression in ovarian cancer in humans.

**Prognosis**

Claudin 10 mRNA expression was significantly upregulated in cancerous chicken ovaries with respect to normal ovaries implicating it in the etiology of this disease.

# References

Cheung ST, Leung KL, Ip YC, Chen X, Fong DY, Ng IO, Fan ST, So S.. Claudin-10 expression level is associated with recurrence of primary hepatocellular carcinoma. Clin Cancer Res. 2005 Jan 15;11(2 Pt 1):551-6.

Gunzel D, Stuiver M, Kausalya PJ, Haisch L, Krug SM, Rosenthal R, Meij IC, Hunziker W, Fromm M, Muller D.. Claudin-10 exists in six alternatively spliced isoforms that exhibit distinct localization and function. J Cell Sci. 2009 May 15;122(Pt 10):1507-17. Epub 2009 Apr 21.

Lal-Nag M, Morin PJ.. The claudins. Genome Biol. 2009;10(8):235. Epub 2009 Aug 26. (REVIEW)

Seo HW, Rengaraj D, Choi JW, Ahn SE, Song YS, Song G, Han JY.. Claudin 10 is a glandular epithelial marker in the chicken model as human epithelial ovarian cancer. Int J Gynecol Cancer. 2010 Dec;20(9):1465-73.

Huang GW, Ding X, Chen SL, Zeng L.. Expression of claudin 10 protein in hepatocellular carcinoma: impact on survival. J Cancer Res Clin Oncol. 2011 Aug;137(8):1213-8. Epub 2011 Jun 7.

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