STEAP2 (six transmembrane epithelial antigen of the prostate 2)

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**Identity**

**Other names:** IPCA-1, IPCA1, PCANAP1, PUMPCn, STAMP1, STMP

**HGNC (Hugo):** STEAP2

**Location:** 7q21.13

**DNA/RNA**

**Description**

Human STEAP2 gene was identified by using subtraction and cDNA arrays hybridizations in benign prostate hyperplasia and PC-3 prostate cancer cell line (Porkka et al., 2002). This gene is a member of the STEAP family and encodes a multi-pass membrane protein.

**Transcription**

The main STEAP2 transcript (variant 1) contains 5 exons and encodes a protein with 490 amino acids. The variant 2 differs from variant 1 in the 5′ UTR, but encodes the same protein. The variant 3 differs in the 5′ UTR, 3′ UTR and 3′ coding region compared to variant 1, resulting in a protein (isoform B) with unique C-terminus.

![Figure 1. Genomic organization of STEAP2 and its transcripts.](image-url)
The lengths of these transcripts are:
- Variant 1: 6932 kb transcript; 1470 bp ORF,
- Variant 2: 6708 kb transcript; 1470 bp ORF,
- Variant 3: 2320 kb transcript; 1362 bp ORF.

Protein

**Note**

Members of this family are characterized by a six transmembrane helical domains.

**Description**

The main isoform (STEAP2 isoform A) is encoded by variant 1 and variant 2 mRNA. This isoform contains 490 amino acids (NCBI: NP_694544.2), 60 kDa and contains six transmembrane helical domains (figure 2). The variant 3 mRNA encodes a protein (STEAP2 isoform B) that is shorter and has a unique C-terminus, compared to isoform A. However, none study has identified this isoform in in vitro or in vivo, yet. This putative isoform contains 454 amino acids (NCBI: NP_001035756.1), a 52 kDa and six transmembrane helical domains (figure 2).

**Expression**

STEAP2 is expressed exclusively in the epithelial cells of the prostate. In relation to prostate cell lines, STEAP2 is highly expressed in androgen receptor-positive cancer cell line LNCaP, CWR22 and CWR22R (Korkmaz et al., 2002). Regarding to human tissues, STEAP2 is mainly expressed in prostate, but also in heart, brain, kidney, pancreas, ovary, fetal liver, colon, duodenum, ileum, liver, lung, stomach, thymus, choroid plexus and mesenchymal stem cells (Korkmaz et al., 2002; Ohgami et al., 2006; Vaghjiani et al., 2009).

**Localisation**

STEAP2 is localized mainly at plasma membrane, but also in trans-Golgi network and vesicular tubular structures (Korkmaz et al., 2002).

**Function**

Recently, it was demonstrated that STEAP2 acts as ferrireductase and cupric reductase, stimulating cellular uptake of both iron and copper (Ohgami et al., 2006). Moreover, its localization also suggests an important role in secretory/endocytic pathways (Korkmaz et al., 2002). Furthermore, it was demonstrated that STEAP2 contains a domain associated to apoptosis and cancer, suggesting its involvement in cell cycle regulation (Sanchez-Pulido et al., 2004).
Homology

STEAP2 is known to have orthologs in chimpanzees, dogs, cows, mice, rats, chickens and even fish (NCBI: Homologene). Additional putative orthologs are likely in a variety of different species and can be viewed via Ensembl.

Mutations

Note

A great variety of single nucleotide polymorphisms (SNPs) have been identified, but its clinical significance remains unknown (NCBI: SNPs). No STEAP2 mutations have been collected in the COSMIC database.

Implicated in

Prostate cancer

Note

STEAP2 is highly expressed in androgen receptor-positive prostate cancer cell line LNCaP, but not in the androgen receptor-negative prostate cancer cell lines PC-3 and DU-145. However, STEAP2 expression is not significantly regulated by androgens in prostate cancer cells (Korkmaz et al., 2002). In human prostate tissues, STEAP2 is expressed exclusively in the epithelial cells of the prostate and its expression is significantly increased in prostate tumours compared with normal glands (Korkmaz et al., 2002). Moreover, STEAP2 expression is higher in both untreated primary and hormone-refractory prostate carcinomas than in benign prostate hyperplasias, suggesting an important role in prostate cancer progression. As a cell-surface antigen, STEAP2 is a potential diagnostic or therapeutic target in prostate cancer (Porkka et al., 2002).

References


Vaghjiani RJ, Talma S, Murphy CL. Six-transmembrane epithelial antigen of the prostate (STEAP1 and STEAP2)-differentially expressed by murine and human mesenchymal stem cells. Tissue Eng Part A. 2009 Aug;15(8):2073-83

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