

## Gene Section

### Mini Review

# 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.

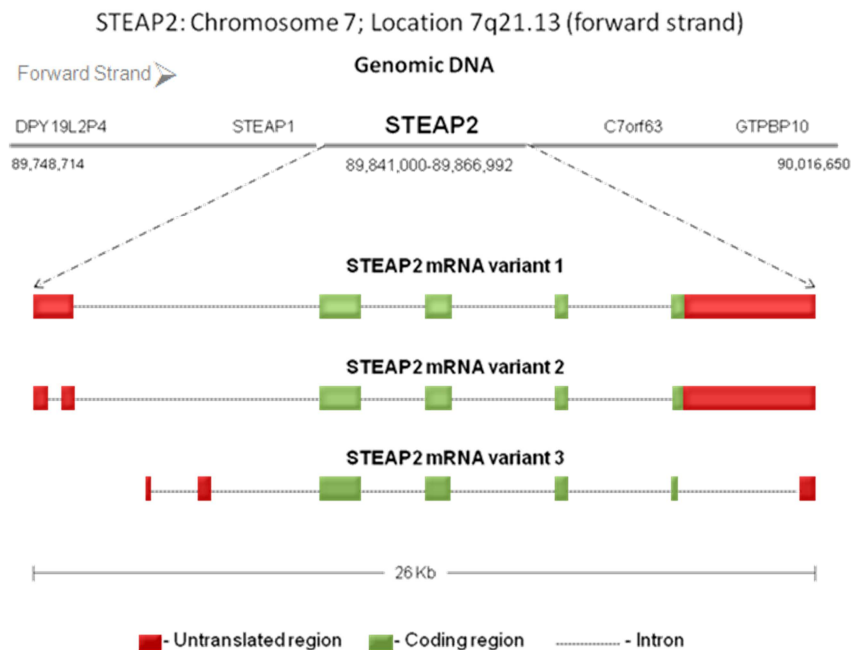


Figure 1. Genomic organization of STEAP2 and its transcripts.

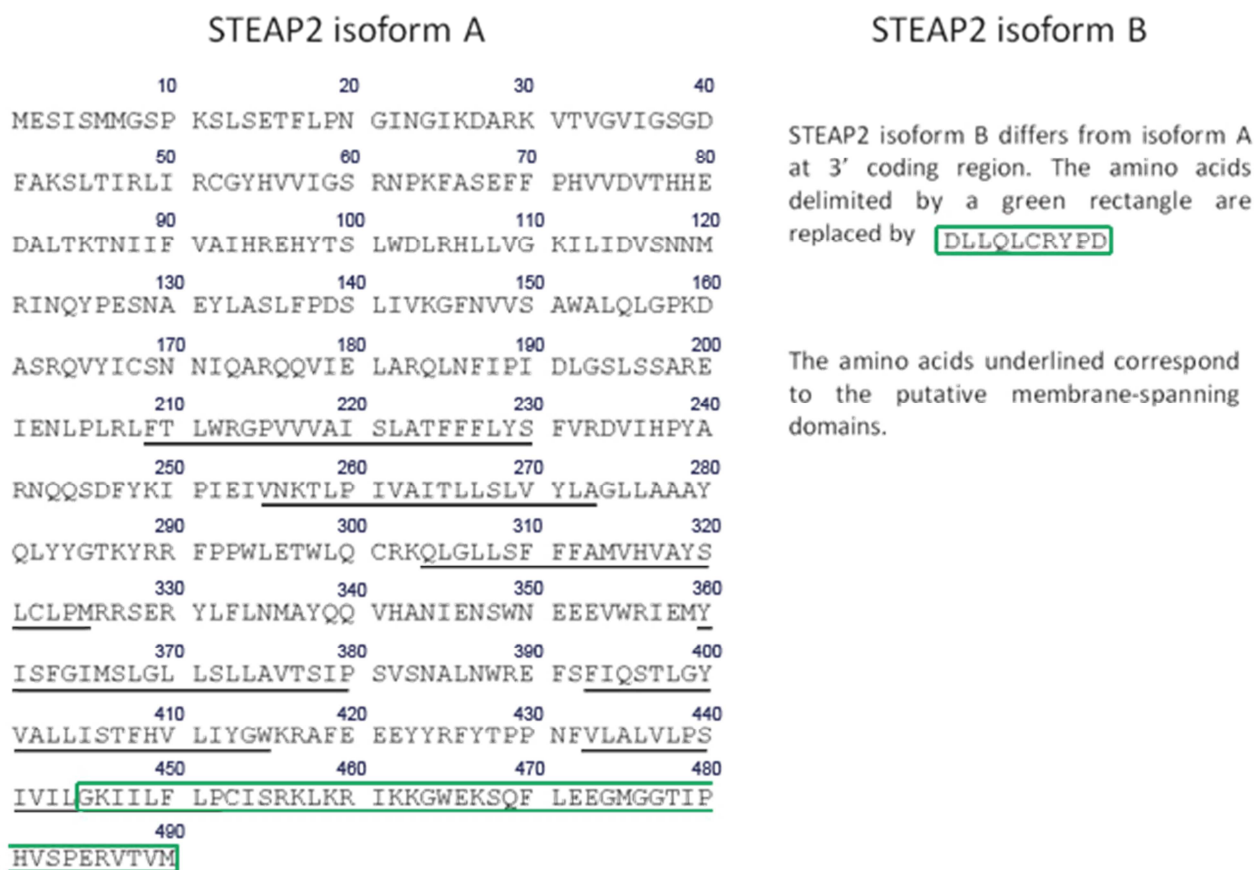


Figure 2. Amino acids sequence of STEAP2 isoform A and B (Korkmaz et al., 2002).

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; Vaghjani 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

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