TACSTD1 (tumor-associated calcium signal transducer 1)

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Identity

Hugo: TACSTD1
Other names: EpCAM; Ep-CAM; CD326; CO17-1A; EGP; EGP40; GA733-2; KSA; Ly74; M1S2; M4S1; MIC18; MK-1; TROP1; hEGP-2

Location: 2p21

DNA/RNA

Description
The gene is composed of 9 exons and encompasses.

Transcription
1.528 kb mRNA; 945 bp open reading frame from base pairs 179 to 1123, (NM_002354).

Pseudogene
No pseudogene described so far.

Protein

Description
314 amino acids (aa); 265 aa extracellular domain, 23 aa transmembrane domain, 26 aa intracellular domain; 34-42 kDa glycoprotein; differential glycosylation in tumours versus normal mucosa (Pauli et al., 2003).

Expression
Restricted to epithelia; mainly in simple epithelium and basal membrane cells; strong overexpression in malignancies already at the stage of dysplasia (Litvinov et al., 1996).

Localisation
Plasma membrane; baso-lateral in normal cells; redistribution on entire plasma membrane in vitro and in carcinoma cells.

Function
Homophilic cell-to-cell adhesion molecule (Litvinov et al., 1994); regulation of cadherin-mediated cell-to-cell adhesion (Litvinov et al., 1997); oncogenic signalling molecule, which is over-expressed in a plethora of carcinomas (Baeuerle and Gires, 2007); induces cell proliferation via induction of the proto-oncogene c-myc (Munz et al., 2004); intracellular domain of TACSTD1/EpCAM is mandatory and sufficient for induction of c-myc gene expression; inhibition results in decreased proliferation and invasion (Osta et al., 2004); frequent use as a prognostic marker (Went et al., 2006; Spizzo et al., 2006) and therapeutic target (Baeuerle and Gires, 2007; Riethmüller et al., 1994; Schweizer et al., 2002; Amann et al., 2008; Ruf et al., 2007).

Homology
Retroposon GA733-1; gp50/TROP-2 (Fornaro et al., 1995), single-copy gene localised at chrom 1p32-31 TACSTD2, Accession CAA54801, 323 amino acids, calcium-dependent signalling protein. High homology of TACSTD1/EpCAM to TACSTD2/TROP-2/GA733-1), especially in the extracellular domain including cystein-rich EGF-like domains, conserved region similar to thyroglobulin type I repeat (Thyr I-like repeat).
**Mutations**

**Note:** So far, no mutations of the TACSTD1/epcam gene were described.

**Implicated in**

**Colon cancer**

**Oncogenesis**

EpCAM is strongly overexpressed and was used as a molecular target for monoclonal, therapeutic antibody 17-1A (Panorex©) (RiethMüller et al., 1994).

EpCAM, in a complex with claudin-7, CD44 isoforms, and tetraspanins, is involved in colorectal cancer progression (Kuhn et al., 2007).

**Breast cancer**

**Prognosis**

Increased expression of EpCAM is a marker for poor prognosis and overall survival of patients suffering from node-positive breast cancer (Spizzo et al., 2004).

**Oncogenesis**

EpCAM is strongly overexpressed.

**Ovarian cancer**

**Prognosis**

Increased expression of EpCAM is a marker for poor prognosis and overall survival of patients suffering from ovarian cancer (Spizzo et al., 2006).

**Oncogenesis**

EpCAM is strongly overexpressed.

**Renal cancer (RCC)**

**Prognosis**

Increased expression of EpCAM is a marker for improved prognosis in patients suffering from clear cell RCC and might help to discriminate between chromophobe RCC and oncocytomas (Went et al., 2005).

**Oncogenesis**

EpCAM is strongly overexpressed in chromophobe RCC but not in oncocytomas.

**Head and Neck Squamous Cell carcinomas (HNSCCs)**

**Prognosis**

Expression of EpCAM is a marker for disseminated tumour cells in HNSCCs (Chaubal et al., 1999).

**Oncogenesis**

EpCAM is strongly overexpressed in HNSCCS.

**Esophagus Squamous Cell carcinomas**

**Prognosis**

Increased expression of EpCAM is a marker for decreased relapse-free survival (Stoecklein et al., 2006).

**Oncogenesis**

EpCAM is strongly overexpressed.

**Hepatocyte development**

**Note:** EpCAM is strongly expressed in differentiation hepatocytes and progenitors thereof (Schmelzer et al., 2007; Schmelzer and Reid, 2008).

**Breakpoints**

**Note:** No breakpoints described so far.

**To be noted**

**Note:** The gene name TACSTD1, for Tumour-Associated Calcium Signalling Signal Transducer 1, is highly misleading and inappropriate. EpCAM, alias TACSTD1, is in fact a signal-transducing membrane protein (Munz et al., 2004), however it is involved in calcium-independent homophilic cell-to-cell adhesion (Litvinov et al., 1994). We shall therefore propose to use the term epcam for the gene and EpCAM for the protein (Baeuerle and Gires, 2007).

More recent work described EpCAM as a marker for tumour-initiating cancer stem cells in a variety of entities including colon (Dalerba et al., 2007), pancreas (Li et al., 2007), and breast carcinomas (Al-Hajj et al., 2003).

A symposium on functions and clinical applications of EpCAM was initiated 2006 and will be held every two years. For more details please visit http://www.epcam-symposium.de.

**References**


This article should be referenced as such: