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Gene Section
Mini Review

CD109 (CD109 molecule)

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Identity

Other names: CPAMD7, DKFZp762L1111, FLJ38569, FLJ41966, RP11-525G3.1

HGNC (Hugo): CD109

Location: 6q13

Note
CD109 is a glycosylphosphatidylinositol (GPI)-anchored cell-surface glycoprotein and is a member of the alpha-2-macroglobulin/C3,C4,C5 family of thioester-containing proteins.

DNA/RNA

Description

CD109 is a gene of 132.53 kb comprising 33 exons and 32 introns. The 5' part of exon 1 and the 3' part of exon 33 are non-coding.

Transcription

Three splice variants are known. The length of the longest variant is 9464 bp (CDS: 426-4763). mRNA is mainly expressed in skin and testis.

Pseudogene

Not known.

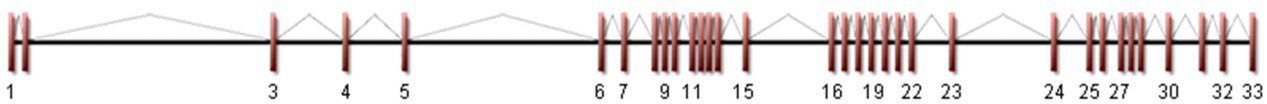
Protein

Description

CD109 is a GPI-anchored cell-surface glycoprotein and is a member of the alpha-2-macroglobulin/C3,C4,C5 family of thioester-containing proteins (Sutherland et al., 1991; Haregewoin et al., 1994; Smith et al., 1995; Lin et al., 2002). The CD109 protein was first identified as a cell-surface antigen detected by a monoclonal antibody raised against the primitive lymphoid/myeloid cell line KG1a (Sutherland et al., 1991). It was also shown that CD109 carries the biallelic platelet-specific alloantigen Gov (Kelton et al., 1990; Smith et al., 1995).

Expression

CD109 is expressed on a subset of fetal and adult $CD34^+$ bone marrow mononuclear cells, mesenchymal stem cell subsets, phytohemagglutinin (PHA)-activated T lymphoblasts, thrombin-activated platelets, leukemic megakaryoblasts, endothelial cells, and some human tumor cell lines, but not on fresh peripheral leukocytes and normal bone marrow leukocytes (Kelton et al., 1990; Murray et al., 1999; Giesert et al., 2003).



Exon-intron structure of CD109 gene. The vertical bars correspond to exons.

Representation of the CD109 protein with localization of recognized domains. CD109 protein is a GPI-anchored protein having signal peptide, Gov antigen, thioester region, and furinase cleavage site.

In normal human tissues other than hematopoietic cells, CD109 is expressed in limited cells including the myoepithelial cells of the mammary, lacrimal, salivary and bronchial glands and the basal cells of the prostate and the bronchial epithelia (Hashimoto et al., 2004; Zhang et al., 2005; Sato et al., 2007; Hasegawa et al., 2007; Hasegawa et al., 2008).
Recently, it has been reported that CD109 is highly expressed in several types of human cancer tissues, in particular squamous cell carcinomas (Hashimoto et al., 2004; Zhang et al., 2005; Sato et al., 2007; Hasegawa et al., 2007; Hasegawa et al., 2008; Järvinen et al., 2008; Hagiwara et al., 2008; Ohshima et al., 2010; Hagikura et al., 2010).

Localisation

Plasma membrane.

Function

CD109 negatively regulates TGF-beta signaling in keratinocytes by directly modulating TGF-beta receptor activity in vitro (Finnson et al., 2006).

Homology

Orthologs: mouse CD109, rat CD109, cow CD109, dog CD109, chicken CD109, hagfish CD109, nematode CD109.
Paralogs: alpha-2-macroglobulin, alpha-2-macroglobulin-like-1, C3, C4, C5, PZP, CPAMD8.

Mutations

Note

A Tyr703Ser polymorphism of CD109 is associated with Gov^{a} and Gov^{b} alloantigenic determination (Schuh et al., 2002).

Implicated in

Various cancer

Note

CD109 is upregulated in squamous cell carcinomas (SCCs) of lung, esophagus, uterus and oral cavity, malignant melanoma of skin, and urothelial carcinoma of urinary bladder (Hashimoto et al., 2004; Zhang et al., 2005; Sato et al., 2007; Hasegawa et al., 2007; Hasegawa et al., 2008; Järvinen et al., 2008; Hagiwara et al., 2008; Ohshima et al., 2010; Hagikura et al., 2010).

Prognosis

The CD109 expression is significantly higher in well-differentiated SCCs of the oral cavity and in low-grade urothelial carcinomas of the urinary bladder than in moderately- or poorly-differentiated SCCs and in high-grade urothelial carcinomas, respectively (Hagiwara et al., 2008; Hagikura et al., 2010).

Alloimmune thrombocytopenic syndromes

Note

Refractoriness to platelet transfusion, post-transfusion purpura, and neonatal alloimmune thrombocytopenia (Smith et al., 1995).

Disease

These diseases are included in alloimmune thrombocytopenic syndromes. Gov$^{a/b}$ platelet alloantigens, which reside in the CD109 protein, are the cause of these 3 diseases.

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