Gene name: **VCAM1**

External Ids for VCAM1 Gene: HGNC: 12663 NCBI Gene: 7412 Ensembl: ENSG00000162692 OMIM®: 192225 UniProtKB/Swiss-Prot: P19320

NCBI Gene Summary : This gene is a member of the Ig superfamily and encodes a cell surface sialoglycoprotein expressed by cytokine-activated endothelium. This type I membrane protein mediates leukocyte-endothelial cell adhesion and signal transduction, and may play a role in the development of atherosclerosis and rheumatoid arthritis. Three alternatively spliced transcripts encoding different isoforms have been described for this gene.

GeneCards Summary: VCAM1 (Vascular Cell Adhesion Molecule 1) is a Protein Coding gene. Diseases associated with VCAM1 include Viral Encephalitis and Chronic Venous Insufficiency. Among its related pathways are Blood-Brain Barrier and Immune Cell Transmigration: VCAM-1/CD106 Signaling and Cytokine Signaling in Immune system. Gene Ontology (GO) annotations related to this gene include *integrin binding* and *primary methylamine oxidase activity*. An important paralog of this gene is ROBO1.

UniProtKB/Swiss-Prot Summary: Cell adhesion glycoprotein predominantly expressed on the surface of endothelial cells that plays an important role in immune surveillance and inflammation (PubMed:31310649). Acts as a major regulator of leukocyte adhesion to the endothelium through interaction with different types of integrins (PubMed:10209034). During inflammatory responses, binds ligands on the surface of activated endothelial cells to initiate the activation of calcium channels and the plasma membrane-associated small GTPase RAC1 leading to leukocyte transendothelial migration (PubMed:22970700).

Cellular location: golgi apparatus, endosome, endoplasmic reticulum, cytoskeleton, extracellular, plasma membrane.

Vascular Cell Adhesion Molecule 1 (VCAM-1), encoded by the **VCAM1** gene, is a cell surface sialoglycoprotein belonging to the immunoglobulin superfamily. Primarily expressed on activated endothelial cells, VCAM-1 plays a crucial role in mediating leukocyte-endothelial cell adhesion and signal transduction, facilitating the transmigration of leukocytes to sites of inflammation.

VCAM-1 comprises six or seven immunoglobulin-like domains and is expressed on both large and small blood vessels following stimulation by cytokines such as tumor necrosis factor-alpha (TNF-α) and interleukin-1 (IL-1). Its primary function involves binding to integrins, notably VLA-4 (α4β1) on leukocytes, mediating adhesion and signal transduction essential for immune responses.

In sepsis, a condition characterized by a dysregulated immune response to infection, VCAM-1 expression is upregulated on endothelial cells in response to inflammatory cytokines. This upregulation facilitates increased leukocyte adhesion and transmigration, contributing to endothelial activation and vascular permeability. Elevated levels of soluble VCAM-1 (sVCAM-1) have been associated with the severity of sepsis and may serve as a prognostic indicator.

- **Diagnostic Role:** While sVCAM-1 levels can reflect endothelial activation, their diagnostic utility in sepsis is limited due to the lack of specificity, as elevated levels may also occur in other inflammatory conditions.

- **Prognostic Role:** Studies have indicated that higher sVCAM-1 concentrations correlate with increased severity and mortality in sepsis patients, suggesting its potential as a prognostic biomarker. For instance, research has shown that sVCAM-1 can predict disease severity in children with septic shock.

Given its role in leukocyte recruitment and endothelial activation, VCAM-1 presents a potential therapeutic target. Interventions aimed at inhibiting VCAM-1 function or expression could modulate the excessive inflammatory response observed in sepsis. However, therapeutic strategies must be approached cautiously due to the essential functions of VCAM-1 in normal immune surveillance and tissue homeostasis.

In summary, VCAM-1 is integral to the inflammatory processes in sepsis, with elevated levels associated with disease severity and outcomes. While it holds promise as a prognostic biomarker, further research is necessary to fully elucidate its diagnostic utility and therapeutic potential in sepsis management.

Leukocyte migration: