Gene name: **CXCL10** **Previous HGNC Symbols for CXCL10 Gene:** INP10, SCYB10

External Ids for CXCL10 Gene: HGNC: 10637 NCBI Gene: 3627 Ensembl: ENSG00000169245 OMIM®: 147310 UniProtKB/Swiss-Prot: P02778

NCBI Gene Summary: This antimicrobial gene encodes a chemokine of the CXC subfamily and ligand for the receptor CXCR3. Binding of this protein to CXCR3 results in pleiotropic effects, including stimulation of monocytes, natural killer and T-cell migration, and modulation of adhesion molecule expression.

UniProtKB/Swiss-Prot Summary: Pro-inflammatory cytokine that is involved in a wide variety of processes such as chemotaxis, differentiation, and activation of peripheral immune cells, regulation of cell growth, apoptosis and modulation of angiostatic effects (PubMed:11157474, 22652417, 7540647). Plays thereby an important role during viral infections by stimulating the activation and migration of immune cells to the infected sites (By similarity). Mechanistically, binding of CXCL10 to the CXCR3 receptor activates G protein-mediated signaling and results in downstream activation of phospholipase C-dependent pathway, an increase in intracellular calcium production and actin reorganization (PubMed:12750173, 19151743). In turn, recruitment of activated Th1 lymphocytes occurs at sites of inflammation.

Cellular localization: mainly extracellular region.

CXCL10, also known as **C-X-C motif chemokine ligand 10** or **Interferon gamma-induced protein 10 (IP-10)**, is a small cytokine belonging to the CXC chemokine family. Encoded by the **CXCL10** gene located on chromosome 4, it plays a significant role in immune responses, particularly in chemoattraction of immune cells such as monocytes, T cells, natural killer (NK) cells, and dendritic cells. CXCL10 is secreted by various cell types, including monocytes, endothelial cells, and fibroblasts, in response to interferon-gamma (IFN-γ). Its primary function involves binding to the chemokine receptor **CXCR3**, mediating immune cell trafficking to sites of inflammation.

Function in Sepsis: In sepsis—a severe systemic inflammatory response to infection—CXCL10 has been implicated in both the propagation of inflammation and the modulation of immune responses:

- **Inflammatory Amplification:** Elevated levels of CXCL10 have been observed in septic patients, correlating with disease severity. Its interaction with CXCR3 facilitates the recruitment of immune cells to infection sites, potentially exacerbating inflammatory damage.
- **Immune Cell Recruitment:** CXCL10's role in attracting T cells and NK cells is crucial for pathogen clearance. However, excessive recruitment can lead to tissue damage and contribute to organ dysfunction in sepsis.

Pathways Involved in Sepsis:CXCL10 is involved in several key pathways during sepsis:

- **Type I and II Interferon Signaling:** Its expression is induced by interferons, linking it to antiviral and inflammatory responses.
- **NF-κB Pathway:** CXCL10 can influence the NF-κB signaling pathway, affecting the inflammatory process during sepsis.

Diagnostic and Prognostic Role:

- **Diagnostic Marker:** Elevated serum levels of CXCL10 have been proposed as potential biomarkers for severe infections, including sepsis. Studies suggest that high CXCL10 levels may aid in the early diagnosis of sepsis and could be indicative of disease severity.
- **Prognostic Indicator:** Increased CXCL10 concentrations have been associated with higher mortality rates in septic patients, suggesting its potential utility in prognostication.

Therapeutic Implications:Given its role in sepsis pathophysiology, CXCL10 presents as a potential therapeutic target:

- **Neutralization Strategies:** Animal studies have demonstrated that neutralizing CXCL10 can improve survival in sepsis models, indicating that targeting this chemokine may mitigate excessive inflammation.
- **Modulation of Immune Responses:** Therapeutic interventions aimed at modulating CXCL10 levels could potentially balance immune responses, enhancing pathogen clearance while reducing collateral tissue damage.