

Gene name: **IL10**

**External Ids for IL10 Gene:** HGNC: [5962](#) NCBI Gene: [3586](#) Ensembl: [ENSG00000136634](#) OMIM®: [124092](#) UniProtKB/Swiss-Prot: [P22301](#)

**NCBI Gene Summary:** The protein encoded by this gene is a cytokine produced primarily by monocytes and to a lesser extent by lymphocytes. This cytokine has pleiotropic effects in immunoregulation and inflammation. It down-regulates the expression of Th1 cytokines, MHC class II Ags, and costimulatory molecules on macrophages. It also enhances B cell survival, proliferation, and antibody production. This cytokine can block NF-kappa B activity, and is involved in the regulation of the JAK-STAT signaling pathway. Knockout studies in mice suggested the function of this cytokine as an essential immunoregulator in the intestinal tract.

**GeneCards Summary:** IL10 (Interleukin 10) is a Protein Coding gene. Diseases associated with IL10 include [Graft-Versus-Host Disease](#) and [Human Immunodeficiency Virus Type 1](#). Among its related pathways are [MIF Mediated Glucocorticoid Regulation](#) and [ADORA2B mediated anti-inflammatory cytokines production](#). Gene Ontology (GO) annotations related to this gene include *cytokine activity* and *interleukin-10 receptor binding*. An important paralog of this gene is [IL20](#).

**UniProtKB/Swiss-Prot Summary:** Major immune regulatory cytokine that acts on many cells of the immune system where it has profound anti-inflammatory functions, limiting excessive tissue disruption caused by inflammation. Mechanistically, IL10 binds to its heterotetrameric receptor comprising IL10RA and IL10RB leading to JAK1 and STAT2-mediated phosphorylation of STAT3 (PubMed:[16982608](#)). In turn, STAT3 translocates to the nucleus where it drives expression of anti-inflammatory mediators (PubMed:[18025162](#)). Targets antigen-presenting cells (APCs) such as macrophages and monocytes and inhibits their release of pro-inflammatory cytokines including granulocyte-macrophage colony-stimulating factor /GM-CSF, granulocyte colony-stimulating factor/G-CSF, IL-1 alpha, IL-1 beta, IL-6, IL-8 and TNF-alpha (PubMed:[11564774](#), [1940799](#), [7512027](#)).

**Cellular localization:** extracellular region.

Interleukin-10 (**IL-10**) is a pivotal anti-inflammatory cytokine encoded by the **IL10** gene. It plays a crucial role in regulating immune responses by inhibiting the production of pro-inflammatory cytokines, thereby maintaining immune homeostasis and preventing excessive tissue damage during inflammatory processes.

**Function in Sepsis:** In sepsis—a severe, systemic inflammatory response to infection—IL-10 serves as a counter-regulatory mechanism to the overwhelming pro-inflammatory milieu. Its primary functions during sepsis include:

- **Modulation of Immune Response:** IL-10 suppresses the production of pro-inflammatory cytokines such as TNF- $\alpha$ , IL-1 $\beta$ , and IL-6, thereby mitigating the hyperinflammatory state characteristic of sepsis.
- **Prevention of Tissue Damage:** By limiting excessive inflammation, IL-10 helps prevent collateral tissue damage, which is crucial for maintaining organ function during sepsis.
- **Induction of Immunosuppression:** While beneficial in controlling inflammation, elevated IL-10 levels can lead to immunosuppression, increasing susceptibility to secondary infections and potentially worsening outcomes in septic patients.

**Diagnostic and Prognostic Role:**

- **Diagnostic Marker:** Elevated serum IL-10 levels have been observed in septic patients, distinguishing them from those with non-infectious inflammatory conditions. However, due to its anti-inflammatory nature, IL-10 is often considered alongside pro-inflammatory markers to improve diagnostic accuracy.
- **Prognostic Indicator:** High IL-10 levels have been associated with increased mortality in sepsis, reflecting the balance between pro- and anti-inflammatory responses. Studies have shown that initial serum IL-10 levels can serve as outcome predictors in pediatric sepsis patients, with higher levels correlating with poorer outcomes.

**Genetic Associations:** Polymorphisms in the IL10 gene have been studied for their potential influence on sepsis susceptibility and outcomes. Meta-analyses suggest that certain IL10 polymorphisms may be associated with an increased risk of sepsis, particularly in specific populations.

**Therapeutic Implications:** Given its dual role in modulating inflammation and inducing immunosuppression, IL-10 presents a complex target for therapeutic intervention in sepsis. Strategies aimed at modulating IL-10 levels must carefully balance the suppression of harmful inflammation with the maintenance of adequate immune function to combat infections.

### Cytokine\_cytokine receptor interaction:

