

Gene name: **CRP**

External Ids for CRP Gene: HGNC: [2367](#) NCBI Gene: [1401](#) Ensembl: [ENSG00000132693](#)

OMIM®: [123260](#) UniProtKB/Swiss-Prot: [P02741](#)

NCBI Gene Summary: The protein encoded by this gene belongs to the pentraxin family which also includes serum amyloid P component protein and pentraxin 3. **Pentraxins are involved in complement activation and amplification via communication with complement initiation pattern recognition molecules, but also complement regulation via recruitment of complement regulators.** The encoded protein has a calcium dependent ligand binding domain with a distinctive flattened beta-jelly roll structure. It exists in two forms as either a pentamer in circulation or as a non soluble monomer in tissues. It is involved in several host defense related functions based on its ability to recognize foreign pathogens and damaged cells of the host and to initiate their elimination by interacting with humoral and cellular effector systems in the blood. Consequently, the level of this protein in plasma increases greatly during acute phase response to tissue injury, infection, or other inflammatory stimuli. Elevated expression of the encoded protein is associated with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection.

GeneCards Summary: CRP (C-Reactive Protein) is a Protein Coding gene. Diseases associated with CRP include [Appendicitis](#) and [Meningitis](#). Among its related pathways are [Activation of cAMP-Dependent PKA](#) and [Initial triggering of complement](#). Gene Ontology (GO) annotations related to this gene include *calcium ion binding* and *cholesterol binding*. An important paralog of this gene is [APCS](#).

UniProtKB/Swiss-Prot Summary: Displays several functions associated with host defense: it promotes agglutination, bacterial capsular swelling, phagocytosis and complement fixation through its calcium-dependent binding to phosphorylcholine. Can interact with DNA and histones and may scavenge nuclear material released from damaged circulating cells. ([CRP_HUMAN,P02741](#))

Cellular localization: mainly in extracellular.

Full Name: *C-Reactive Protein*

Protein Type: Acute-phase reactant; pentraxin family protein



Biological Function of CRP

CRP is a key molecule in the innate immune system, acting as a soluble pattern recognition receptor (PRR). Its main functions include:

1. Recognizing pathogens and damaged cells:
 - Binds to phosphocholine on the surface of bacteria, fungi, and apoptotic/necrotic cells.
2. Activating the complement system:
 - Via classical pathway by interacting with C1q.
 - Leads to opsonization and enhanced phagocytosis.

3. Modulating immune cell activity:
 - Helps macrophages and neutrophils clear debris and pathogens.
 - May have both pro- and anti-inflammatory effects depending on context and concentration.



How CRP is Regulated:

- Induced by pro-inflammatory cytokines, especially:
 - IL-6 (primary driver)
 - IL-1 β and TNF- α (supporting role)
- Expression rapidly increases:
 - From <1 mg/L to >500 mg/L within 24–48 hours during acute inflammation.
 - Returns to baseline as inflammation resolves.



Role of CRP in Sepsis

CRP is one of the most widely used biomarkers in clinical sepsis evaluation:

Early Sepsis:

- Sharp rise in CRP levels occurs as part of the acute-phase response.
- Helps identify infection-driven inflammation.

Monitoring:

- Serial measurements of CRP can track the effectiveness of antibiotics and recovery.

Limitations:

- CRP is not specific to infection; it also rises in trauma, surgery, and autoimmune diseases.
- It does not distinguish between bacterial and viral infections.



Clinical Relevance of CRP in Sepsis

Diagnostic Role:

- CRP is a core marker in sepsis diagnosis.
- Often used alongside procalcitonin (PCT) or IL-6.

Prognostic Role:

- Persistent elevation or rising CRP levels may indicate:
 - Poor response to therapy
 - Progression to severe sepsis or septic shock
- Falling CRP levels often correlate with recovery.

Clinical Guidelines:

- CRP >100 mg/L is common in bacterial infections.
- Daily decrease in CRP >50% is considered a good prognostic sign.

Supporting Literature

Doi: 10.1007/s001340050715

Doi: 10.1007/s00134-002-1209-6

Doi: 10.1371/journal.pone.0069232

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