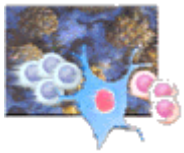
"ACUTE PHASE" PROTEINS



"Acute phase" proteins are the bloodstream proteins, which are associated to the onset of any infection or tissue injury. They may be either increased (*positive*) or decreased (*negative*), and either *pro-inflammatory* or *anti-inflammatory*.

Pro-Inflammatory "Acute Phase" Proteins

C-reactive protein (CRP) is a pentameric protein capable of binding to phosphatidylcholine expressed on the surface of bacteria, and activating complement via a C1q subcomponent, and enhancing phagocytosis through opsonization. An increase in CRP occurs within 2 hours of the onset of inflammation, up to 50,000-fold, and peaks at 48 hours.

Mannose-binding lectin (MBL), an oligomeric protein, belongs to the collectin subgroup of the C-type lectin superfamily. It binds carbohydrate patterns on the surface of bacteria, fungi, viruses, and protozoans, activates complement via the lectin subpathway, a variant of the classical pathway, and may take part in opsonization.

Surfactant protein A (SP-A) and *surfactant protein D (SP-D)* refer to the collectin subgroup of the C-type lectin superfamily, which can recognize molecular patterns. SP-A and SP-D are capable of binding bacterial lipopolysaccharides (LPSs) and fungal glucan and mannose residues, enhancing phagocytosis by means of opsonization, and improving the clearance of lung pathogens.

L-, H- and *M-ficolins*, novel proteins, are related to the collectin subgroup of the C-type lectin superfamily. It is known that they can bind a wide range of

carbohydrate patterns on the microbial surfaces and take part in complement activation via the lectin subpathway.

Cytokines *IL-1β, IL-6, TNF-α* and fragments of activated complement such as *C2a, C3a, C4a,* and *C5a* may also be related to the positive pro-inflammatory "acute phase" proteins.

Anti-Inflammatory "Acute Phase" Proteins

Serum amyloid A (SAA), an apolipoprotein, is a monomer "acute phase" protein, which can turn into a polymer under such a pathological condition as amyloidosis. In acute inflammation, SAA plays a role of an "urgent bandage" on injured tissue. SAA arises within hours after an inflammatory stimulus, and the magnitude of its increase may be enormous.

α_2-macroglobulin, the large serum protein, acts as an antiprotease, downregulator of fibrinolysis, and inhibitor of thrombin. In acute inflammation, the concentration of α_2 -macroglobulin may enhance 5-fold and more.

α_1-antitrypsin can inhibit a wide variety of proteases and protect tissues from injury. In acute inflammation, its concentration can be elevated many-fold. Deficiency of α_1-antitrypsin may be fatal and lead to the loss of lung elasticity and progression of severe emphysema.

Ceruloplasmin is a ferroxidase enzyme that oxidizes iron. Respectively, it inhibits iron uptake by microbes. Furthermore, it carries more than 95% of the total copper in healthy human serum.

Fibrinogen, a component of the coagulation system, is converted by thrombin into fibrin during blood clot formation. In acute inflammation, the coagulation system

protects tissue from bleeding. Fibrinogen may be elevated 1.5-2-fold when any form of acute inflammation occurs.

Haptoglobin binds free hemoglobin released from erythrocytes, which may take place during acute inflammation and thereby prevent loss of iron through the kidneys.