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Editorial Note

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Blood protein as Anti-oxidant

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Anti-oxidant is a substance that protects cells from the damage caused by free radicals (unstable molecules made by the process of oxidation during normal metabolism). Free radicals may play a part in cancer, heart disease, stroke, and other diseases of aging. Antioxidants include beta-carotene, lycopene, vitamins A, C, and E, and other natural and manufactured substances against sunburns and certain types of cancers.

It is well established that free radicals and reactive oxygen species (ROS), nitrogen, and chlorine species contribute to the development of several age-related diseases by inducing oxidative stress and oxidative damage. Oxidative stress is commonly defined as a disturbance in the prooxidant and antioxidant balance leading to damage of lipids, proteins, and nucleic acids . Oxidative stress can result either from low levels of antioxidants and/or from an increased production of reactive species.

What Is Blood Protien?

Blood proteins are proteins present in the blood but not associated physically with blood cells, such as serum albumin, globulins and coagulation factors. Blood proteins can function in various processes such as in transporting metabolites and metals through the bloodstream and in immune system functions.

Proteins of the blood serum

Human blood serum contains about 7 percent protein, two-thirds of which is in the albumin fraction; the other third is in the globulin fraction. Electrophoresis of serum reveals a large albumin peak and three smaller globulin peaks, the alpha-, beta-, and gamma-globulins. The amounts of alpha-, beta-, and gamma-globulin in normal human serum are approximately 1.5, 1.9, and 1.1 percent, respectively. Each globulin fraction is a mixture of many different proteins, as has been demonstrated by immune electrophoresis. In this method, serum from an animal (e.g., a rabbit) injected with human serum is allowed to diffuse into the four protein bands—albumin, alpha-, beta-, and gamma-globulin—obtained from the electrophoresis of human serum. Because the animal has previously been injected with human serum, its blood contains antibodies (substances formed in response to a foreign substance introduced into the body) against each of the human serum proteins; each antibody combines with the serum protein (antigen) that caused its formation in the animal. The result is the formation of about 20 regions of insoluble antigen-antibody precipitate, which appear as white arcs in the transparent gel of the electrophoresis medium. Each region corresponds to a different human serum protein.

Serum albumin is much less heterogeneous (i.e., contains fewer distinct proteins) than are the globulins; in fact, it is one of the few serum proteins that can be obtained in a crystalline form. Serum albumin combines easily with many acidic dyes (e.g., Congo red and methyl orange); with bilirubin, the yellow bile pigment; and with fatty acids. It seems to act, in living organisms, as a carrier for certain biological substances. Present in blood serum in relatively high concentration, serum albumin also acts as a protective colloid, a protein that stabilizes other proteins. Albumin (molecular weight of 68,000) has a single free sulfhydryl (—SH) group, which on oxidation forms a disulfide bond with the sulfhydryl group of another serum albumin molecule, thus forming a dimer. The isoelectric point of serum albumin is pH 4.7.

The progress of an infection is usually associated with marked changes in the serum proteins. There may be an increase in the percentage of the total protein during some stage of the infection, and there is usually a change in the albumin-globulin ratio with an increase in the total globulins. This rise may antedate the development of any resistance by a considerable period of time. The non-protein constituents of the blood show fluctuations with a tendency to rise as the infection progresses. The process of immunization is in almost all instances associated with a definite increase in the globulins of the blood, and in some cases with a complete inversion of the normal albumin-globulin ratio. This may be produced both by living and dead organisms and by bacterial endotoxins. Massive doses usually result in an upset which shows no tendency to right itself during the period of observation.

In this case the changes produced may best be explained by the toxogenic effect produced by the protein split products resulting from the inflammatory condition. Intraperitoneal injections of killed bacteria give rise to a more rapid increase in the serum globulins. The rapidity of the response following intraperitoneal as compared with intravenous injections doubtless stands in intimate relationship to the neutralizing power possessed by the blood serum.

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