

Blood Plasma

The fluid portion of the blood, mainly composed of water (90%) but also contains a range of proteins (6.5-8%) and low molecular weight substances (2%). When the blood is separated using centrifugation plasma is viewed as a pale yellow liquid and forms 55% of the total volume of the blood. Plasma holds a key role in the maintaining of osmotic pressure and acts as a transport medium for a range of molecules. Serum is plasma after the removal of clotting factors II, V, VIII and fibrinogen.

Plasma Proteins

Over 100 different types of plasma protein exist but they can be grouped into 3 fractions; Plasma Albumin, Plasma Globulin and Fibrinogen.

Protein	Function	Site of synthesis
Plasma Albumin	<ul style="list-style-type: none">Generates colloid osmotic pressure (3.3 Kpa/ 25-30 mm Hg)Acts as a buffer for blood pHCarrier of fatty acids and Bilirubin	Liver
Plasma Globulin	<ul style="list-style-type: none">α and β specific carriers eg transferrinα and β hemocoagulation factors eg prothrombinγ are immunoglobins, vital role in humoral immunity	α and β in liver γ by lymphocytes
Fibrinogen	Buffering and hemostatic role	Liver

Alternatively it is possible to group plasma proteins according to their function;

Functional Category	Proteins Included	Role
Proteins of the Acute Phase	<ul style="list-style-type: none">InterlukinsClotting FactorsC reactive proteinSerum amyloid A protein	Injury/ Inflammation
Plasma Proteolytic Enzymes	<ul style="list-style-type: none">Kinin SystemComplement systemThrombinPlasmin	Hemostasis/ Inflammation
Plasma Protease Inhibitors	Antithrombin III	Anticoagulation
Carrier Proteins	<ul style="list-style-type: none">TranscobalamincobalaminTransferrinCeruloplasmin	Transport of specific molecules

Low Molecular Weight substances

These substances include K^+ , Na^+ , Ca^{2+} , HCO_3^- , glucose and urea. These molecules and ions all produce osmotic pressure, also in the case of HCO_3^- forms the principle buffering system of the blood. The combined effect of these molecules results in plasma having an osmolarity of 280-290 mOsm/L. This osmolarity is equal to that of 0.9 % saline solution hence its use to hydrate patients intravenously.

Links

Related Articles

Changes in Serum Protein Levels

Blood

Bibliography

POKORNÝ, Prof. MUDr. Jaroslav. *Principles of Homeostasis, Blood, Plasma* [lecture for subject Principles of Homeostasis, Blood, Plasma, specialization Physiology, Medicine Charles University]. Prague. 25.10.2013.

MESCHER, Antony. *Junqueira's Basic Histsology*. 12th edition. 2010. ISBN 9780071271905.

BARRETT, Kim – BOITANO, Scott – BARMAN, Susan, et al. *Ganong's : Review of Medical Physiology*. 23rd edition. 2010. ISBN 9780071270663.