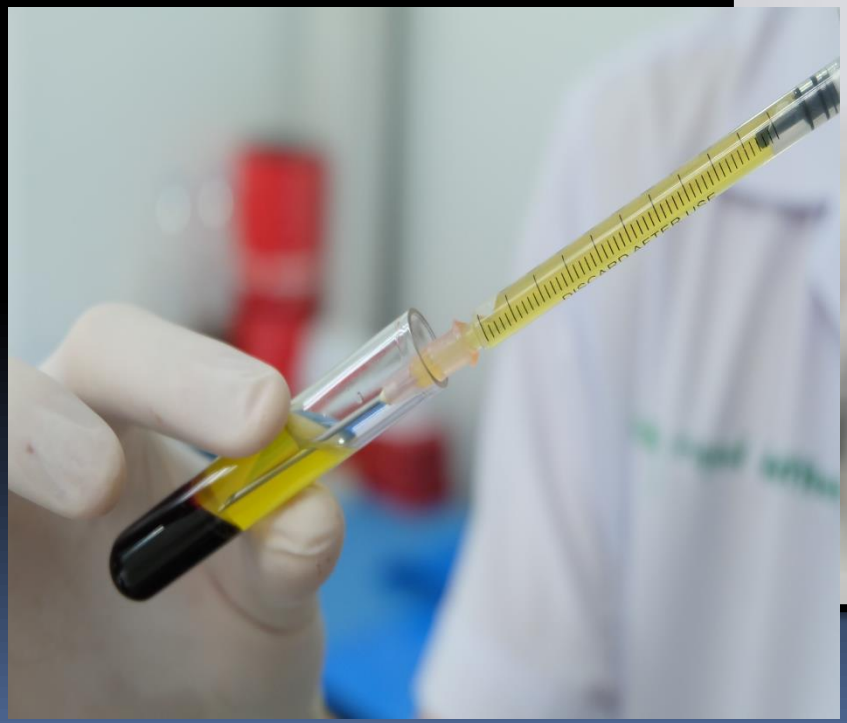
General Physiology
Plasma protein



Prepared and Presented by:

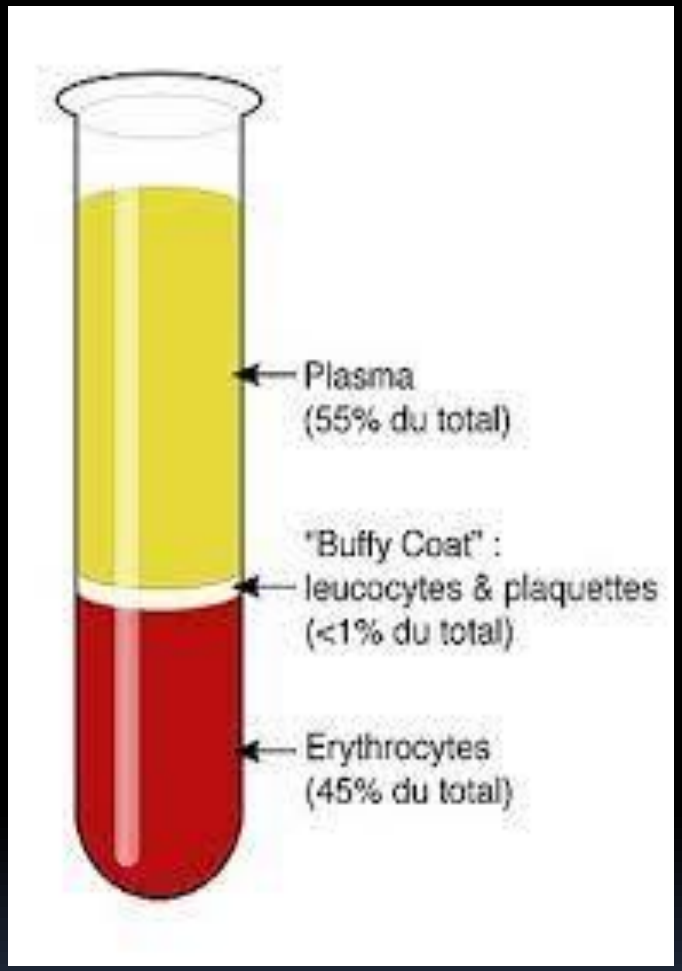
Lecturer Dr/ Ayad AbdElSalam
Assist. Lecturer Dr/ Ghadeer Talib

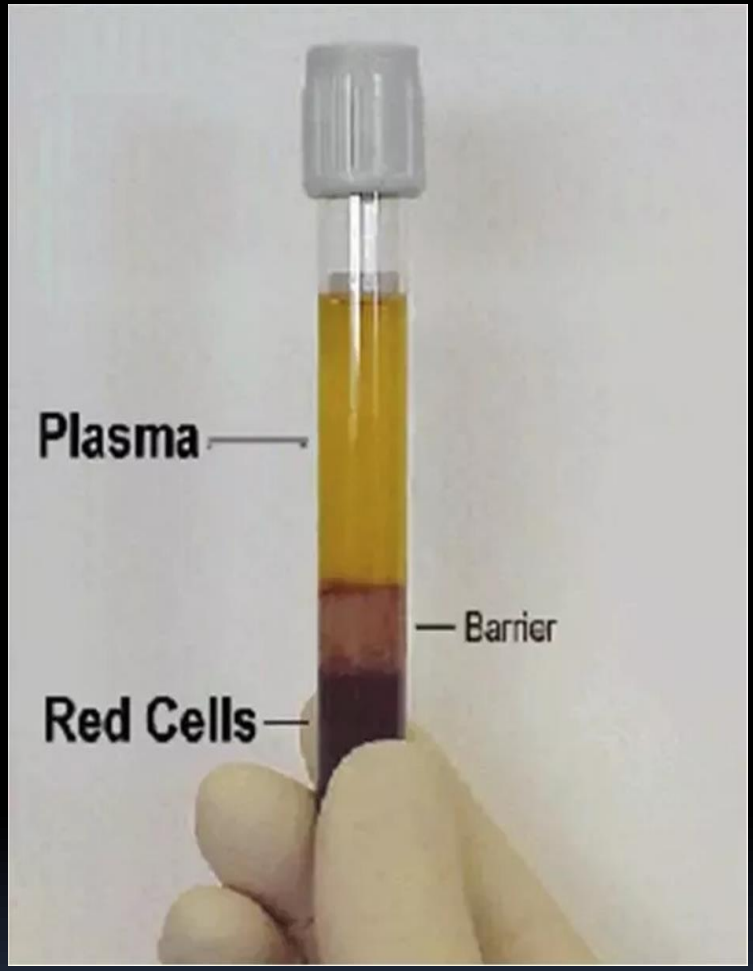
Teaching of Physiology
College of Technology & Health Sciences
Radiological Techniques Department

Blood plasma is a homogenous liquid the pale yellow colored liquid component of blood that normally holds the blood cells in suspension.

It makes up about 55% of the body's total blood volume. It is the intravascular fluid part of the extracellular fluid (all body fluids outside the cells).

Plasma contains about 90 percent water, with 10 percent being made up of ions, proteins, dissolved gases, nutrient molecules, and wastes.


Plasma
(55% du total)
"Buffy Coat" :
leucocytes & plaquettes
(<1% du total)
Erythrocytes
(45% du total)


Plasma
Barrier
Red Cells

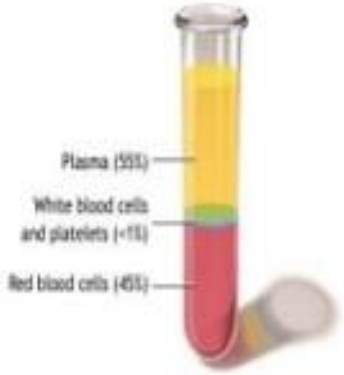
Plasma vs. serum

•**Plasma** is the liquid, cell-free part of blood, that has been **treated with anti-coagulants**.

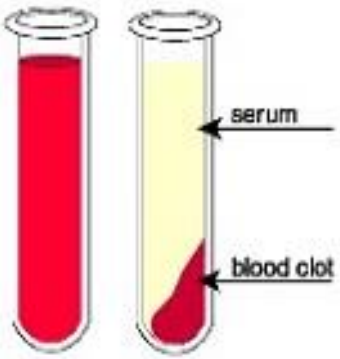
Serum is the liquid part of blood **AFTER coagulation**, therfore devoid of clotting factors as fibrinogen.

Anticoagulated

Clotted



•serum= plasma - fibrinogen



Plasma carry nutrients, hormones, and proteins to the different parts of the body.
It also carries away the waste products of cell metabolism from various tissues to the organs responsible for detoxifying and/or excreting them.

In addition, plasma is the vehicle for the transport of the blood cells through the blood vessels.

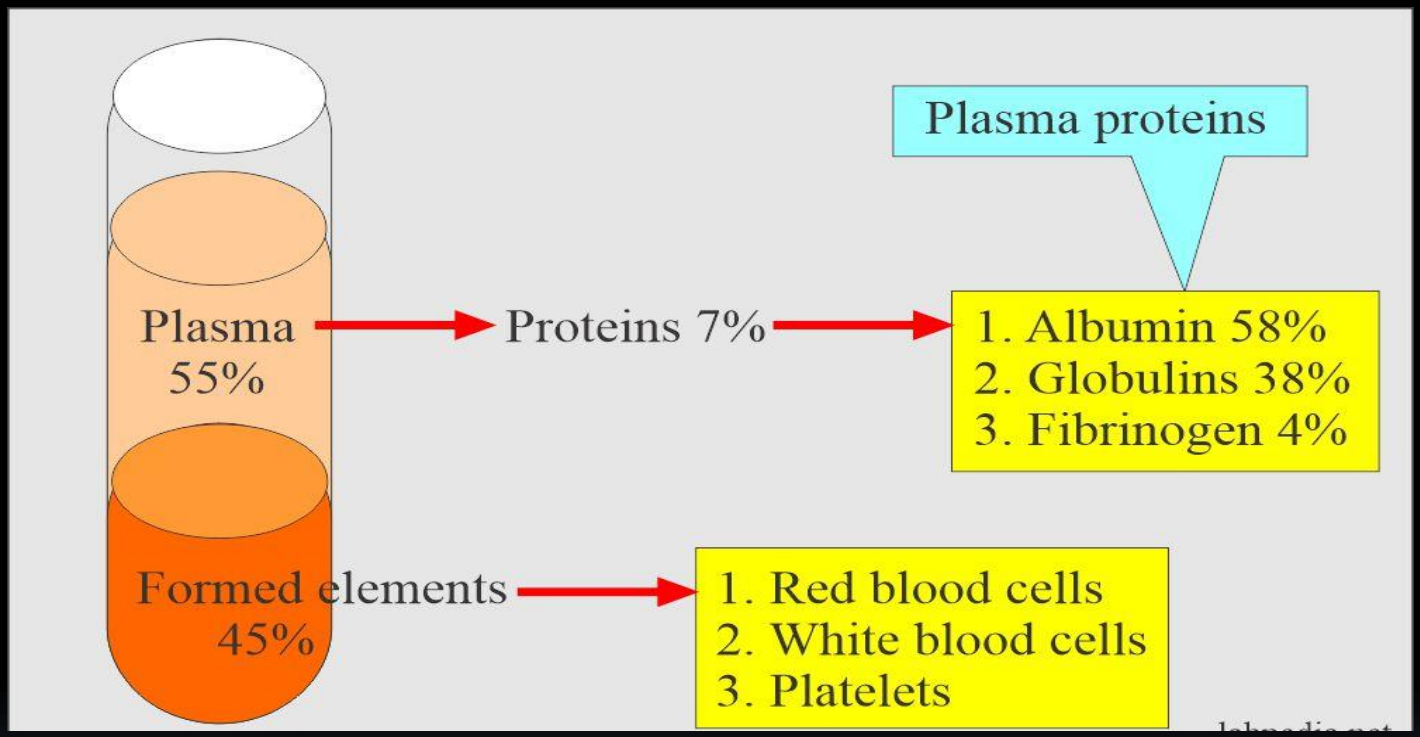
The pH and osmotic pressure of blood are maintained by the plasma ions, proteins, and other molecules.

Plasma Proteins

Plasma proteins are proteins present in the blood plasma and are produced by the liver.

Normally, total plasma proteins in human adults range in concentration from 6 to 8 g/dl (dl = deciliter).

Plasma proteins are the most abundant substances in the plasma and are present in three major types, namely, albumin, globulins, and fibrinogen.


Plasma proteins
Plasma
55%
Proteins 7%
1. Albumin 58%
2. Globulins 38%
3. Fibrinogen 4%
Formed elements
45%
1. Red blood cells
2. White blood cells
3. Platelets

- ✓ Major types of plasma proteins present in the plasma are

1. Albumin – Provides colloidal osmotic pressure in plasma which prevents plasma loss from capillaries
2. Globulin – responsible for body's natural and acquired immunity
3. Fibrinogen- forms blood clots that help repair leaks in the circulatory system

Albumin

Albumin helps maintain the colloid osmotic pressure of the blood. It is the smallest in size among the plasma proteins but makes up the largest percentage. The colloid osmotic pressure of the blood is important in maintaining a balance between the water inside the blood and that in the tissue fluid, around the cells. When the plasma proteins are deficient, the water in the plasma seeps out into the space around the blood vessels and may result in interstitial edema, a feature of liver disorders, kidney disease and malnutrition, for instance. Albumin also helps transport many substances such as drugs, hormones, and fatty acids. Albumin, is normally present at an average concentration of 3.5 – 5.0 gm/dl.

Globulins

Globulins are of three types, alpha, beta, and gamma, from smallest to largest. Gamma-globulins are called antibodies. The alpha globulins include the high-density lipoproteins (HDL) which are important in carrying fats to the cells for building various substances as well as for energy metabolism. HDL is best known for its role in preventing plaque formation by keeping cholesterol in transport within the blood. Low-density lipoproteins (LDL) are beta globulins which transport fat to the cells for steroid and cell membrane synthesis. It also promotes cholesterol plaque formation which is a risk factor for arterial and heart disease.

Antibodies or gamma globulins are also called immunoglobulins. There are five major groups of immunoglobulins in the serum, which are IgA, IgG, IgM, IgD & IgE. They are produced by the B lymphocytes, a subset of the immune cells.

Antibodies are responsible for the body's humoral immune function, recognizing pathogens via specific receptors and neutralizing them by various mechanisms.

Fibrinogen

Fibrinogen is an important soluble plasma clotting factor precursor, which is converted to a threadlike protein called fibrin on contact with a sticky surface.

The fibrin threads formed in this way trap platelets to form the primary platelet clot on which a stable blood clot is formed by the process of coagulation.