



الكلية التقنية الطبية
تقنيات هندسة أجهزة طبية

المرحلة الثانية

كيمياء سريرية

Blood proteins

د. نصر السعدون

Clinical Chemistry /second year

All biochemical tests come under chemical pathology. These are performed on any kind of body fluid, but mostly on serum or plasma

Serum is the yellow watery part of blood that is left after blood has been allowed to clot and all blood cells have been removed. This is most easily done by centrifugation, which packs the denser blood cells and platelets to the bottom of the centrifuge tube, leaving the liquid serum fraction resting above the packed cells. (for 5 min, and with velocity 3500 radiance/min).

Plasma is in essence the same as serum, it contains all of the clotting factors including heparin and fibrinogen. It is obtained by centrifuging the blood without clotting.

Whole blood: This test is not put in the centrifuge and is used in glucose hemoglobin (HbA_{1c}).

A large medical laboratory will accept samples for up to about 700 different kinds of tests Common clinical chemistry tests include:

- a. **Electrolytes: Sodium Potassium, Chloride, Bicarbonate**
- b. **Renal (Kidney) Function Tests: Creatinine Blood urea nitrogen**
 - . **Liver Function Tests: Total protein (serum): Albumin**
 - **Globulins Protein electrophoresis Urine protein**
 - **Bilirubin; direct; Indirect; total**

- **Aspartate transaminase (AST)**
 - **Alanine transaminase (ALT)**
 - **Alkaline phosphatase (ALP)**
- d. **Minerals: Calcium, Magnesium Phosphate, Potassium**
- e. **Blood Disorders: Iron, Transferrin Vitamin B12 vitamin D**

protein importance and its measurement

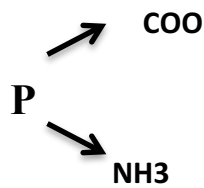
Proteins :are large biological molecules consisting of one or more chains of amino acids. Proteins perform a vast array of functions within living organisms, including catalyzing metabolic reactions, replicating DNA, responding to stimuli, and transporting molecules from one location to another, The name "protein " comes from the Greek word meaning “to be first” proteins are constructions of living matter. first in the sense that they are fundamental

The origin and occurrence:

Protein always are produced in nature by living matter and chiefly by plants Animals may cat proteins but transform them into other types of protein ,but animals have limited powers to synthesis protein. Protein occur in living matter or are associated with living things, they constitute a large part of the solid matter of muscles, tendons . ligament Ne cartilage-hand 20% blood.

Proteins are part of every cell, tissue, and organ in our bodies. These body proteins are constantly being broken down and replaced. The protein in the foods we eat is digested into amino

acids that are later used to replace these proteins in our bodies.
structure of protein:



Protein is found in the following foods: • meats, poultry, and fish eggs nuts and seeds milk and milk products some vegetables, and some fruits

Recommended dietary allowance protein

The human	ages	Grams of protein needed each day
Children ages	1-3	13
Children ages	4-8	19
Children ages	9-13	34
Girls ages	14-18	46
Boys ages	14-18	52
Woman ages	19-70	46
Man ages	19-70	56

الجدول للاطلاع

Protein classification

Blood serum contains two major protein groups: albumin and globulin.

1. ALBUMIN Albumin protein that is made in the liver, It helps to retain elements like calcium, Albumin also acts to regulate the movement of water between the tissues and the bloodstream.

2. GLOBULINS larger in size than albumin. They are divided into three main groups: alpha, beta, and gamma.

a. Alpha-1 globulin. High-density lipoprotein (HDL), the "good" type of cholesterol, which carry the cholesterol and other lipid from the digestive tract to the liver and other body tissues.,

b. Alpha-2 globulin. A protein called haptoglobin, which produced by the liver that binds with hemoglobin.,

c. Beta globulin. Beta globulin proteins help carry substances, such as iron, through the blood stream and help fight infection.

d. Gamma globulin. These proteins are also called antibodies or immune globulins. They help prevent and fight infection. Gamma globulins bind to foreign substances, such as bacteria or viruses, causing them to be destroyed by the immune system. This type of globulin is classified to: IgA, IgD, IgM, IgE, IgG

the laboratory techniques used for separation proteins:

- 1. salt or solvent fractionation: change in solubility , sodium sulphite**
- 2. ultracentrifugation: variation in molecular mass and molecular shape**
- 3. chromatography: difference in size , shape , electrical charge and the rate of flow protein through chromatography media**
- 4. immunochemical**
- 5. electrophoresis: difference in surface electrical charge density**

Measurement of protein:

The serum protein electrophoresis (SPEP) test measures specific proteins in the blood to help identify some diseases. Proteins carry a positive or a negative electrical charge, and they move in fluid when placed in an electrical field. applying power supply with 200 mv and 10-15 mA for 45 min . Serum protein electrophoresis uses an electrical field to separate the proteins in the bloodserum into groups of similar size shape and charge

Electrophoresis is a (fractions) technique used of to different separate into elements blood sample electrophoresis a individual components. Serum protein (SPEP) is a screening test the major blood proteins by separating them into five distinct fractions: albumin, alpha, alpha2, beta, and gamma proteins. Protein

electrophoresis can that measures also performed on urine purpose

The normal values :

Albumin = 4 – 5.5 g/100ml serum

Globulin = 2.2 – 2.7 g/100ml serum

Total protei n = 6.2 – 8.2 g/100ml serum

The clinical signification :

1. hyperproteinamia causes:

A. dehydration

B. Multiple myeloma (due to the formation of myloma protein

2. Hypoproteinemia cause

A. nephritic syndrome

B. sever burns and extensive bleeding