

Tikrit University

College of Nursing

Basic Nursing Sciences



Second Year - 2023-2024

Bio Chemistry

ALBUMIN

By: assistant lecturer

Haitham Mejbel Hasan

ALBUMIN

Most of the body's total protein is a combination of albumin and globulins. Albumin, the protein present in the highest concentrations (60% of the TP), is the main transport protein in the body for hormones, therapeutic drugs, calcium, magnesium, heme, and waste products such as bilirubin. Albumin also significantly affects plasma oncotic pressure, which regulates the distribution of body fluid between blood vessels, tissues, and cells. Albumin is synthesized in the liver.

Albumin levels are more useful as an indicator of chronic deficiency than of short-term deficiency.

Human albumin

- Human albumin is a simple protein.
- Found in milk, eggs and plasma.
- Soluble in water.
- Constitutes the major part of (60%) plasma proteins. Synthesized only by liver. Due to its low
- molecular weight and high concentration,
- albumin is responsible for 70-80% of the osmotic pressure of plasma.
- Albumin contains all the essential amino acids in required amounts. It is the best example for complete protein. So it is known as a first class protein, a protein of high biological value

Clinical significance

1- Hyperalbuminemia (Elevated Albumin in the blood) which seen in: Any condition that results in a decrease of plasma water (e.g., dehydration).

2- Hypoalbuminemia (decreased Albumin in the blood) which seen in:

Decreased synthesis by the liver,

b- Genetic analbuminemia (related to genetic inability of the liver to synthesize albumin).

c- Protein loss in case of burn or protein-losing-enteropathy. d- Kidney disease (related to loss from damaged renal tubules).

Abnormal Results Mean

A. Hypoalbuminemia

Hypoalbuminemia is the condition in which the albumin levels in the blood are

lower than normal levels (below 3.5 g / dl). This condition usually occurs after a

decrease in the production of albumin in the liver, which may result from liver cell

injury and damage to albumin production capacity, or may result from a decrease

in the consumption of amino acids, which form the basic units in proteins, due to a

diet. Chronic liver disease, such as chronic viral hepatitis and other liver cirrhosis,

is the most common cause of low levels of albumin in the blood following the

death of hepatic cells and serious damage to the liver's ability to produce

Symptoms associated with liver disease include:

Jaundice, which is yellow skin and eyes

Tiredness (fatigue)

Weight loss

Swelling around your eyes, stomach, or legs

Fever

Vomiting and diarrhea

A low albumin may also be seen in several other conditions, such as:

- Infection
- Burns
- Surgery
- Chronic illness
- Cancer
- Diabetes
- Hypothyroidism
- liver disease
- Inflammation
- Shock
- Malnutrition
- Celiac disease

Principle

- Measurement of albumin is based on its binding to the indicator dye bromocresol green (BCG) in pH 4.1
- Forms a blue-green colored complex.
- The intensity of the blue-green color is directly proportional to the concentration of albumin in the sample.
- It is determined by monitoring light absorbance at 578 nm

PROCEDURE

1- Bring reagents and samples to room temperature

2- Pipette into labelled tubes:

TUBES	Blank	Sample	CAL. Standard
R1.Reagent	2.0 mL	2.0 mL	2.0 mL
Sample	–	10 μ L	–
CAL.Standard	–	–	10 μ L

3- Mix and let the tubes stand 1 minute at room temperature.

4- 4- Read the absorbance (A) of the samples and the standard at 630 nm against the reagent blank. The color is stable for 30 minutes protected

from light

CALCULATIONS

$$\frac{A_{\text{Sample}}}{A_{\text{Standard}}} \times C_{\text{Standard}} = \text{g/dL albumin}$$

Samples with concentrations higher than 6 g/dL should be diluted 1:2 with saline and assayed again. Multiply the results by 2. If results are to be expressed as SI units apply: $\text{g/dL} \times 10 = \text{g/L}$