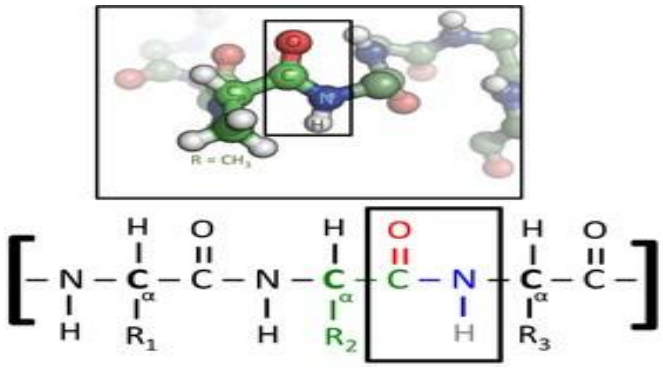
CLINICAL BIOCHEMISTRY

Determination of Total Protein Test

Protein

Proteins are large biological molecules, or macromolecules, consisting of one or more long chains of amino acid residues. Proteins perform a vast array of functions within living organisms, including catalyzing metabolic reactions, replicating DNA, responding to transporting molecules from one location to another.

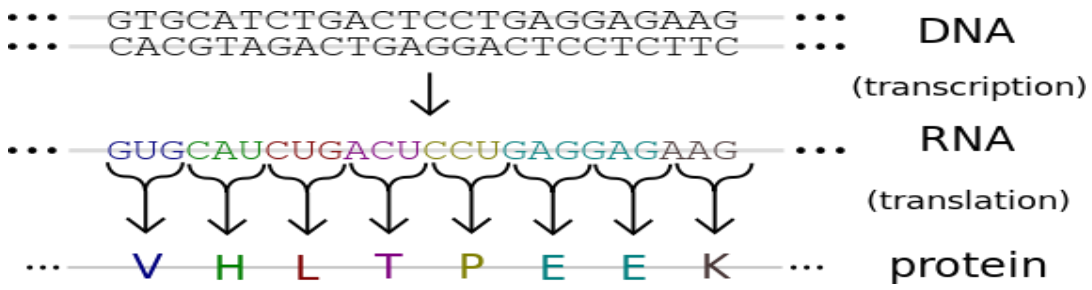


A total serum protein test measures the total amount of protein in the blood. It also measures the amounts of two major groups of proteins in the blood: albumin and globulin.

- **Albumin** is made mainly in the liver. It helps keep the blood from leaking out of blood vessels. Albumin also helps carry some medicines and other substances through the blood and is important for tissue growth and healing.
- **Globulin** is made up of different proteins called alpha, beta, and gamma types. Some globulins are made by the liver, while others are made by the immune system. Certain globulins bind with hemoglobin. Other globulins transport metals. Some types of globulin (such as alpha-1 globulin) also may be measured.

Biosynthesis

Proteins are assembled from amino acids using information encoded in genes. Each protein has its own unique amino acid sequence that is specified by the nucleotide sequence of the gene encoding this protein.



Structure:

Biochemists often refer to four distinct aspects of a protein's structure:

- **Primary structure:** the amino acid sequence. A protein is a polyamide.
- **Secondary structure:** regularly repeating local structures stabilized by hydrogen bonds. The most common examples are the alpha helix, beta sheet and turns.
- **Tertiary structure:** the overall shape of a single protein molecule; the spatial relationship of the secondary structures to one another.
- **Quaternary structure:** the structure formed by several protein molecules (polypeptide chains), usually called protein subunits in this context, which function as a single protein complex.

Total serum protein

Total serum protein	
Total protein:	6.4–8.3 (g/dL) or 64–83 grams per liter (g/L)
Albumin:	3.5–5.0 g/dL or 35–50 g/L
Alpha-1 globulin:	0.1–0.3 g/dL or 1–3 g/L
Alpha-2 globulin:	0.6–1.0 g/dL or 6–10 g/L
Beta globulin:	0.7–1.1 g/dL or 7–11 g/L

High values

High **albumin levels** may be caused by:

- Severe dehydration.

High **globulin levels** may be caused by:

- Diseases of the blood, such as multiple myeloma, lymphoma, leukemia, or hemolytic anemia.
- An autoimmune disease, such as rheumatoid , autoimmune hepatitis.
- Kidney disease.
- Liver disease.

Low values

Low **albumin levels** may be caused by:

- A poor diet (malnutrition).
- Kidney disease.
- Liver disease.
- An autoimmune disease
- Uncontrolled diabetes.
- Hyperthyroidism.
- Heart failure.