Test Definition: TP

Protein, Total, Serum

Overview

Useful For

Diagnosis and treatment of a variety of diseases involving the liver, kidney, or bone marrow, as well as other metabolic or nutritional disorders

Method Name

Colorimetric

NY State Available

Yes

Specimen

Specimen Type

Serum

Necessary Information

Patient's age and sex are required.

Specimen Required

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 0.5 mL

Collection Instructions:

1. Serum gel tubes should be centrifuged within 2 hours of collection.
2. Red-top tubes should be centrifuged, and the serum aliquoted into a plastic vial within 2 hours of collection.

Forms

If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request (T830) with the specimen.

Specimen Minimum Volume

0.25 mL

Reject Due To

Gross hemolysis	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	
	Frozen	180 days	

Clinical & Interpretive

Clinical Information

Plasma proteins are synthesized predominantly in the liver; immunoglobulins are synthesized by mononuclear cells of lymph nodes, spleen and bone marrow. The 2 general causes of alterations of serum total protein are a change in the volume of plasma water and a change in the concentration of 1 or more of the specific proteins in the plasma. Of the individual serum proteins, albumin is present in such high concentrations that low levels of this protein alone may cause hypoproteinemia.

Hemoconcentration (decrease in the volume of plasma water) results in relative hyperproteinemia; hemodilution results in relative hypoproteinemia. In both situations, concentrations of all the individual plasma proteins are affected to the same degree.

Hyperproteinemia may be seen in dehydration due to inadequate water intake or to excessive water loss (eg, severe vomiting, diarrhea, Addison disease, and diabetic acidosis) or as a result of increased production of proteins. Increased polyclonal protein production is seen in reactive, inflammatory processes; increased monoclonal protein production is seen in some hematopoietic neoplasms (eg, multiple myeloma, Waldenstrom macroglobulinemia, monoclonal gammopathy of undetermined significance).

Reference Values

> or =1 year: 6.3-7.9 g/dL

Reference values have not been established for patients who are <12 months of age.

Interpretation

Mild hyperproteinemia may be caused by an increase in the concentration of specific proteins normally present in relatively low concentration, eg, increases in acute phase reactants and polyclonalimmunoglobulins produced in inflammatory states, late-stage liver disease, and infections. Moderate-to-marked hyperproteinemia may also be due to multiple myeloma and other malignant paraproteinemias, although normal total protein levels do not rule out these disorders. A serum protein electrophoresis should be performed to evaluate the cause of the elevated serum total protein.

Hypoproteinemia may be due to decreased production (eg, hypogammaglobulinemia) or increased protein loss (eg, nephrotic syndrome, protein-losing enteropathy). A serum protein electrophoresis should be performed to evaluate the cause of the decreased serum total protein. If a nephrotic pattern is identified, urine protein electrophoresis should also be performed.

Cautions

The total protein concentration is 0.4 to 0.8 mg/dL lower when the specimen is collected from a patient in the recumbent position.

Clinical Reference

1. Rifai N, Horvath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier, 2018
2. Killingsworth LM: Plasma proteins in health and disease. Crit Rev Clin Lab Sci. 1979;11:1-30

Performance

Method Description

Divalent copper reacts in alkaline solution with protein peptide bonds to form the characteristic purple-colored biuret complex. Sodium potassium tartrate prevents the precipitation of copper hydroxide and potassium iodide prevents auto-reduction of copper. The color intensity is directly proportional to the protein concentration, which can be determined photometrically.(Package insert: Total Protein Gen.2 reagent. Roche Diagnostics; 09/2023)

PDF Report

No

Day(s) Performed

Monday through Sunday

Report Available

Same day/1 to 2 days

Specimen Retention Time

7 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

84155

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
TP	Protein, Total, S	2885-2

Result ID	Test Result Name	Result LOINC® Value
TP	Protein, Total, S	2885-2