

Protein electrophoresis

General:

The total protein fraction of plasma consists of >100 known proteins. Albumin, α 1-, α 2- and β -globulins are synthesized in the liver, the proteins of gamma-globulin by plasma cells.

The following tests are available:

- **Protein, total, in serum**

Indication: Increased ESR, proteinuria, edema, polyuria, chronic kidney and liver diseases, diarrheas, trauma, shock, burn injuries, malnutrition.

Material: 1 ml serum

Stability: 1 month at 2 to 8°C

TAT: same day, FML

Method: photometry

Units: g/dl

Ref.- range: see report

Note: standing: up to 10% protein concentration increase (orthostasis)

- **Protein, total, in urine**

General:

Proteinuria is the leading symptom of kidney disorders. Most kidney disorders show selective or non-selective multi-secretion of plasma proteins. The level of proteinuria correlates with the extent of kidney damage (exception: Minimal-Changes-Nephritis).

Material: 10 ml urine

Preanalytics: 24-hours collected urine, please indicate quantity

Stability: 7 days at 2 to 8°C

TAT: same day, FML

Method: turbidimetry

Units: mg/24h

Ref.- range: 28 - 141

Note: Please note that bacterial growth in 24h urine is a common cause of increased protein values. Please store at cool temperature (4-8 degrees celsius)

- **Protein, total, in CSF**

General:

CSF protein concentration is - given a normal blood/CSF barrier - approx. 1/80 to 1/100 of the serum concentration. About 80% of the physiological CSF proteins originate from blood, whereby the smaller proteins such as albumin, acidic α 1-antitrypsin, hemopexin, α 2-glycoprotein and transferrin dominate. Proteins of brain tissue, e.g. prealbumin, are detectable only in traces under 0.05 and have no diagnostic significance. The protein percentage in CSF increases during barrier disturbances. Immunoglobulins can be locally produced (multiple sclerosis see **Immunofixation** for oligoclonal bands!). The blood/CSF barrier of the newborn is more permeable than that of the adult.

Indication: meningitis, suspicion of multiple sclerosis

Material: 1 ml CSF

Stability: 7 days at 2 to 8°C

TAT: same day, FML

Method: turbidimetry

Units: mg/24h

Ref.- range: 15-45

- **Protein, total, in dialysate[^]**

Material: 2 ml dialysate

TAT: same day, FML

Method: photometry

- **Protein, total, in aspirate[^]**

Material: 2 ml aspirate

TAT: same day, FML

Method: photometry

• **Protein electrophoresis**

Indication: Diagnosis of dysproteinemia, diagnosis and follow up of inflammatory reactions, malignant tumors, protein loss syndromes, antibody deficiency, suspicion of monoclonal gammopathy, protein malnutrition.

Preanalytics: 1 ml serum, 1 ml whole blood, 10 ml urine, 3 ml CSF, no plasma, no EDTA plasma or heparin blood

Material: different body fluids to be examined (serum, whole blood, urine, CSF see below)

TAT: 5-7 days*

Method: electrophoresis

Units: relative %age

| disorder | albumin | alpha1-globulins | alpha2-globulins | beta-globulins | gamma-globulins |
|---|-----------|------------------|------------------|----------------|-----------------|
| <i>acute infection</i> | decreased | increased | increased | increased* | - |
| <i>burn injuries</i> | decreased | increased | increased | - | increased |
| <i>chronic infection</i> | decreased | - | increased* | - | increased |
| <i>carcinoma</i> | decreased | increased* | increased | - | increased* |
| <i>malignant lymphoma</i> | decreased | - | increased* | - | increased |
| <i>chronic aggressive hepatitis</i> | decreased | - | degraded | - | increased |
| <i>hepatic cirrhosis</i> | decreased | - | - | - | increased |
| <i>obstruction of the biliary tract</i> | - | - | increased | increased | - |
| <i>nephrotic syndrome</i> | decreased | increased | increased | increased | - |
| <i>plasmocytoma</i> | decreased | M | M | M | M |
| <i>pregnancy</i> | decreased | increased | increased | increased | - |

* : increased some of the cases;

M : M gradient in the range of the globulins;

- : unchanged.

In the individual fractions the following proteins are found

| alpha-1-globulins: | alpha-2-globulins: | beta-globulins: | gamma-globulins: |
|--|---|---|----------------------------------|
| a-1-lipoprotein (HDL) a-1-glycoprotein a-1-antitrypsin | a-2-macroglobulin haptoglobin pre-b-lipoprotein | transferrin, LDL, complement components | immunoglobulins G, A, M, D, E |

- **Protein SDS electrophoresis in urine**

Material: 10 ml urine

TAT: 7-10 days*

Method: electrophoresis

For complete list of laboratory test offered at Freiburg Medical Laboratory, please visit
<http://www.fml-dubai.com/parameter-listings/>