Serum Total proteins

- Albumin
- Globulins ($\alpha$, $\beta$, $\gamma$)

<table>
<thead>
<tr>
<th>Albumin</th>
<th>Globulins ($\alpha$, $\beta$, $\gamma$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/3</td>
<td>1/3</td>
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</tbody>
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Synthesized in liver

Total proteins and Albumin
Main Function of total proteins

**Albumin**
- Regulation of the osmotic pressure.
- Transport agent for a wide range of naturally occurring substances (as thyroxine, iron, cortisol) and drugs (as barbiturates).

**Globulins (γ)**
- Defense against infection.
Principle (Biuret's test): Peptide group of proteins + Cu$^{+2}$ ions in CuSO$_4$ (blue) in alkaline medium $\rightarrow$ "violet" complex

Determination of serum total proteins:

Biuret's reagent: CuSO$_4$, NaOH, KI $\rightarrow$ antioxidant, Na K tartrate $\rightarrow$ inhibit pptn of Cu$^{+2}$ as Cu(OH)$_2$
## Procedure

<table>
<thead>
<tr>
<th></th>
<th>[T]</th>
<th>[St]</th>
<th>[B]</th>
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</thead>
<tbody>
<tr>
<td>Serum</td>
<td>0.1 ml</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Standard</td>
<td>--</td>
<td>0.1ml</td>
<td>--</td>
</tr>
<tr>
<td>Biuret reagent</td>
<td>2ml</td>
<td>2 ml</td>
<td>2ml</td>
</tr>
</tbody>
</table>

- Mix, incubate for 20 minutes at R.T.
- Measure absorbances of test and standard at 540 nm
Calculation

Conc. of total proteins (g/dl) = \[
\frac{\text{Abs.of T}}{\text{Abs.of St.}} \times \text{Conc. of st.}
\]
\[
(6 \text{ g/dl})
\]

- Normal range of total proteins = 6-8 g/dl.
**Principle**

- Albumin at a pH lower than its isoelectric point (IEP), it becomes positively charged and has an affinity for anions.
- On combination with anionic dyes e.g. bromocresol green (BCG) → green color.
**Procedure**

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<td>0.1 ml</td>
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</tr>
<tr>
<td>BCG</td>
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<td>1 ml</td>
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</tbody>
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- Mix, incubate for 5 minutes at R.T.
- Measure absorbances of test and standard at 578 nm
Calculation

Conc. of albumin (g/dl) = \frac{\text{Abs.of T}}{\text{Abs.of St.}} \times \text{Conc. of st.}

(4 \text{ g/dl})

Normal range: 3.5-5.5 \text{ g/dl}
Interpretation

Hypovolemia
(Dehydration, Acute vomiting or diarrhea)

- Malnutrition
- Malabsorption
- Liver disease
- Kidney disease
- Chronic vomiting or diarrhea
- Increased protein catabolism