

Magnesium

More than half of the reserves of magnesium is stored in the bone tissue, the rest is mostly intracellularly. This is the second most represented intracellular cation. Less than 2 % of body magnesium is found in the extracellular fluid. It is a cofactor for more than 300 enzymatic reactions. Magnesium occurs in plasma bound to proteins (mainly albumin), in complexes or in the ionized form.

Reference values:

Serum and plasma: 0,7 – 0,9 mmol/l

Clinical significance:

Hypermagnesemia: renal failure

increased supply (*total parenteral nutrition, laxatives*)

dysfunction of the thyroid gland (*hypothyroidism*), dehydration

Hypomagnesemia: inadequate intake (*chronic alcoholism, long-term total parenteral nutrition with insufficient Mg*)

gastrointestinal loss (*inflammatory bowel disease, vomiting, diarrhea, chronic pancreatitis, bowel resection*)

renal loss (diuretics)

extensive burns

pregnancy

DETERMINATION OF MAGNESIUM

PRINCIPLE OF THE METHOD

Magnesium in the sample reacts with calmagite in alkaline medium forming a coloured complex that can be measured by spectrophotometry. EGTA is included in the reagent to remove calcium interference.

MATERIALS AND INSTRUMENTS

Magnesium (BioSystems S.A., Spain), tubes, graduated pipette, automatic pipette, pipette pump, cuvette, spectrophotometer SPEKOL 1300

CHEMICALS

Reagent – Calmagite 80 mmol/l, EGTA 60 mmol/l, diethylamine 0,2 mol/l

Calcium/Magnesium Standard – calcium 10 mg/dl, magnesium 2 mg/dl (0,82 mmol/l)

PROCEDURE

1. Bring the reagent to room temperature.
2. Pipette into labelled test tubes according to the table.

| | BLANK tube 1 | STANDARD tube 2 | SAMPLE tube 3 |
|---------------------------|-----------------|--------------------|------------------|
| Magnesium Standard (S) | — | 20 µl | — |
| Sample | — | — | 20 µl |
| Distilled water | 20 µl | — | — |
| Reagent (A) | 2,0 ml | 2,0 ml | 2,0 ml |

3. Mix thoroughly and let stand the tubes for 2 minutes at room temperature.
4. Read the absorbance (A) of the standard and the sample at 520 nm against the blank.

CALCULATIONS

The magnesium concentration in the sample is calculated using the following general formula:

$$C_{\text{sample}} = (A_{\text{sample}}/A_{\text{standard}}) \times C_{\text{standard}}$$

CONCLUSION