Calcium is the most abundant mineral in the body, found in some foods, added as a dietary supplement, and present in some medicines (such as antacids). Calcium is required for vascular contraction and vasodilation, muscle function, nerve transmission, intracellular signaling and hormonal secretion, though less than 1% of total body calcium is needed to support these critical metabolic functions. The remaining 99% of the body's calcium supply is stored in the bones and teeth where it supports their structure and function.

A decrease in albumin level causes a decrease in serum calcium. Low levels of calcium are found in hypoparathyroidism, pseudohypoparathyroidism, vitamin D deficiency, malnutrition and intestinal malabsorption. Among causes of hypercalcemia are cancers, large intake of vitamin D, enhanced renal retention, osteoporosis, sarcosidosis, thyrotoxicosis, hyperparathyroidism. Clinical diagnosis should not be based on a single test result; it should integrate clinical and other laboratory data.

**PRINCIPLE**
Calcium with Arsenazo III (1, 8-Dihydroxy-3, 6-disulpho-2, 7-naphthaleneketone-(azo)-dibenzenearsonic acid), at neutral pH, yields a blue colored complex. The intensity of the color formed is proportional to the calcium concentration in the sample.

**INTENDED USE**
For the measurement of calcium concentration in human serum, plasma or urine.

**INTRODUCTION**
For in vitro-diagnostic use only.

**STORAGE AND STABILITY**
- All components of the kit are stable until the expiration date on the label when stored tightly closed at 2-8°C protected from light and contaminants prevented during their use.
- Do not use reagents over the expiration date.
- Signs of reagent deterioration:
  - Presence of particles and turbidity.
  - Blank absorbance (A) at 650 nm ≥ 0.50.

**PRECAUTIONS**
R: May damage fertility or the unborn child.
STD: May be corrosive to metals.

**MATERIAL**
<table>
<thead>
<tr>
<th>MATERIAL PROVIDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>R (Arsenazo III)</td>
</tr>
<tr>
<td>Calcium STD</td>
</tr>
</tbody>
</table>

**MATERIALS REQUIRED BUT NOT PROVIDED**
- Spectrophotometer or colorimeter measuring at 650 nm.
- Matched cuvette 1.0 cm light path.
- General laboratory equipment.

**PROCEDURE**
1. Assay conditions:
   - Wavelength: 650 nm
   - Cuvette: 1 cm. light path

2. Adjust the instrument to zero with distilled water.
3. Pipette into a cuvette:

<table>
<thead>
<tr>
<th>R (ml)</th>
<th>Standard(µl)</th>
<th>Sample(µl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blank</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Standard(µl)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Sample(µl)</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

4. Mix and incubate for 2 min at 37°C /15-25°C
5. Read the absorbance (A) of the samples and Standard, against Blank. The color is stable for at least 1 hour.

**CALCULATIONS**
Serum, plasma
(A)Sample-(A)Blank x 10 (STD conc.) = mg/dl total calcium
(A)Standard-(A)Blank

Urine
(A)Sample-(A)Blank X10Xvol. (dl) urine /24 h = mg/24-hours total calcium
(A)Standard-(A)Blank

Conversion factor: mg/dl X 0.25 = mmol/l

**REFERENCE VALUES**
Serum, plasma

<table>
<thead>
<tr>
<th></th>
<th>Newborns</th>
<th>Children</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8-13 mg/dl (2-3.25 mmol/L)</td>
<td>10-12 mg/dl (2.5-3 mmol/L)</td>
<td>8.5-10.5 mg/dl (2.1-2.6 mmol/L)</td>
</tr>
</tbody>
</table>

Urine

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50-300 mg/24h (1.25-7.5 mmol/24h)</td>
<td>80-160 mg/24h (2.4 mmol/24h)</td>
</tr>
</tbody>
</table>

These values are for orientation purposes, each laboratory should establish its own reference range.

**QUALITY CONTROL**
- If control values are found outside the defined range, check the instrument, reagents and calibration material.
- Each laboratory should establish its own Quality Control scheme and corrective actions if controls do not meet the acceptable tolerances.

**PERFORMANCE CHARACTERISTICS**

1. Measuring range:
From detection limit of 0.026 mg/dl to linearity limit of 32...
mg/dl. If the results obtained were greater than linearity limit, dilute the sample 1/2 with NaCl 9 g/l and multiply the result by 2.

2. Precision

<table>
<thead>
<tr>
<th></th>
<th>INTRA - ASSAY (N=20)</th>
<th>INTER - ASSAY (N=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (mg/dl)</td>
<td>8.35</td>
<td>14.28</td>
</tr>
<tr>
<td>SD</td>
<td>0.08</td>
<td>0.08</td>
</tr>
<tr>
<td>CV (%)</td>
<td>0.96</td>
<td>0.56</td>
</tr>
</tbody>
</table>

3. Sensitivity

1mg/dl=0.0316 A.

4. Accuracy:

Results obtained using ATLAS reagents (y) did not show systematic differences when compared with other commercial reagents(x).

The results obtained using 50 samples as follows:

Correlation coefficient(r): 0.9506.

Regression equation=0.8944x+1.3421.

The results of the performance characteristics depend on the analyzer used.

INTERFERENCES

No interference was observed with triglyceride up to 1.25g/l.

A list of drugs and other interfering substances with calcium determination has been reported by Young.

NOTES

1. Calibration with the aqueous standard may cause a systematic error in automatic procedures. In these cases, it is recommended to use a serum Calibrator.
2. Use clean disposable pipette tips for its dispensation.
3. CALCIUM CAL: proceed carefully with this product as, due its nature, it can get contaminated easily.
4. Most of the detergents and water softening products used in the laboratories contain chelating agents. Defective rinsing will invalidate the procedure.

REFERENCES


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