

Lab.

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Serum Calcium



Calcium

Calcium fulfils a variety of roles in human physiology as a structural factors in bones , teeth and clotting of blood, calcium is the most common metal in our body , calcium exist in the blood in three forms: ionized (13%), complexed (47%) and bound to protein, mainly albumin (40%). When calcium determinations are performed, the total calcium concentration is determined regardless of the amount of calcium present in each form. The plasma level in calcium is greatly affected by the plasma level of inorganic phosphate. In most cases, there is an inverse relationship between calcium and inorganic phosphate.

Some of functions of calcium:

- 1- Muscles contractions.
- 2- Transmission of nerve impulse.
- 3- Skeletal bone and teeth formation.
- 4- Blood coagulation system.

Hormonal control of Ca balance:

- 1- Parathyroid hormone
- 2- Calcitonin
- 3- 1,25- Dihydroxycholecalciferol
- 4- Glucocorticoids

Clinical significance

Hypocalcemia: Low levels of serum calcium usually accompany:

- 1- Hypoparathyroidism
- 2- Some bone diseases
- 3- Certain kidney diseases
- 4- Low proteins levels

Hypercalcemia: Elevated total calcium levels occur in:

- 1- Hyperparathyroidism
- 2- Vitamin-D poisoning
- 3- Sarcoidosis

Principle:

Total calcium is most widely measured by spectrophotometric determination of the colored complex when various metallochromic indicators or dyes bind calcium. O-CPC reacts with calcium to form a red color in alkaline solution, which is measured at near 580 nm



- 1- Bring reagents and samples to room temperature.
- 2- Pipette into labelled test tubes.

TUBES	BLANK	SAMPLE	CAL. STANDARD
Working reagent	1.0 mL	1.0 mL	1.0 mL
Sample	---	10 µL	---
Cal. Standard	---	---	10 µL

- 3- Mix and let the tubes stand 2 minutes at room temperature.
- 4- Read the absorbance (A) of the samples and the standard at **570 nm** against the reagent blank.

*The color is stable for at least 1 hour.

CALCULATIONS

$$\frac{A \text{ Sample}}{A \text{ Standard}} \times C \text{ Standard} = \text{mg/dL total calcium}$$

A: Absorption
C: concentration

REFERENCE VALUES

Serum, plasma	
Newborns (< 10 days)	7.6-10.4 mg/dL (1.9-2.6 mmol/L)
Children (2-12 years)	8.8-10.4 mg/dL (2.2-2.6 mmol/L)
Adults (12-60 years)	8.4-10.2 mg/dL (2.1-2.5 mmol/L)