Clinical laboratory diagnosis of metabolic bone disorders

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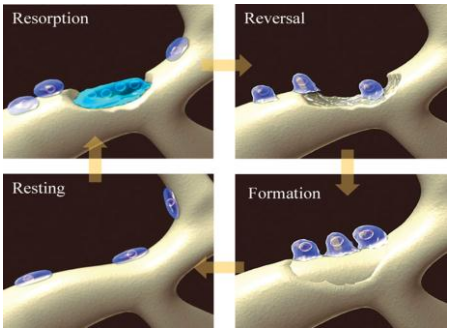


Calcium

Free	Protein bound	Complexed	Total
50%	40%	10%	8.6-10.3 mg/dL 2.15-2.57 mmol/L

Total calcium

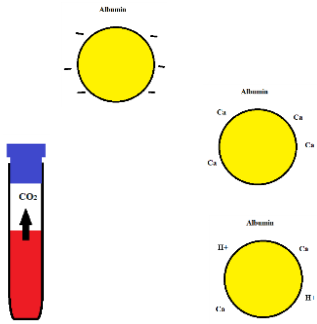
- This is the commonly measured type of calcium
- Levels depend on the serum albumin
- Correction for albumin:
  - Corrected ca = Measured total ca + 0.8 x (4 – Albumin level)

Specimen collection for serum total calcium

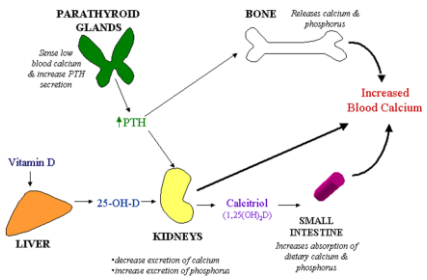
- Serum is used
- Contamination
- Prolonged tourniquet application
- Fasting not needed

Ionised calcium

- Not done routinely
- Needs special handling

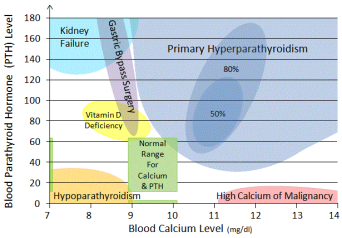


PTH



PTH measurment

- Expensive test
- Done simultaneously with serum calcium



Osteoporosis

- Systemic disorder with decreased bone mass and deterioration of bony microarchitecture.

Biochemical tests in osteoporosis

- Serum calcium
- PTH
- Serum PO4
- Serum ALP

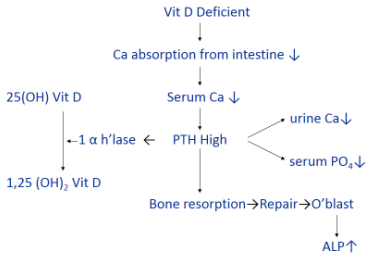
All normal

Bone markers

- Formation markers
  - ALP
  - type 1 procollagen
- Resorption markers
  - piridinium cross-links
  - telopeptides

Osteomalacia/Rickets

- Soft bones
- Osteoids are not mineralized
- Causes?



Biochemical investigations

- Serum calcium
- PTH
- Urinary calcium
- Urinary PO4
- Serum PO4
- Serum ALP
- Vitamin D levels

Hyperparathyroidism

- Primary
- Seconadary
- Tertiary

Primary hyperparathyroidism

- Causes
  - Single adenoma 85%
  - hyperplasia 14%
  - carcinoma <1%

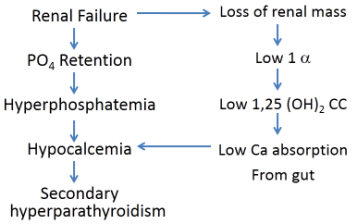
Biochemical investigations

- PTH
- Serum calcium
- Serum PO4

Secondary hyperparathyroidism

- Due to compensatory hyperplasia of parathyroid gland secondary to hypocalaemia
- Causes:
  - Renal failure
  - Vitamin D deficiency

Secondary Hyperparathyroidism



Biochemical investigations

- PTH
- Serum calcium
- Serum PO4
- Vitamin D

Tertiary hyperparathyroidism

- Long standing secondary hyperparathyroidism → autonomous parathyroid hyperplasia
- ESRF

Biochemical investigations

- PTH
- Serum calcium
- Serum PO4
- Vitamin D

Hypoparathyroidism

- Causes
  - Following thyroidectomy
  - Autoimmune disorders
  - Haemochromatosis
  - Magnesium deficiency

Biochemical investigations

- PTH
- Serum calcium
- Serum PO4

Thank You