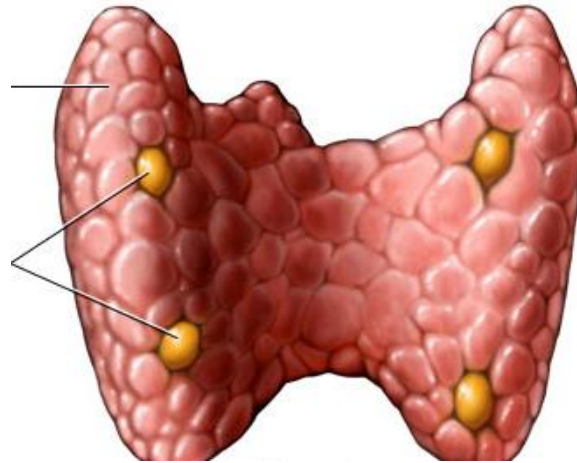




Parathyroid disorders

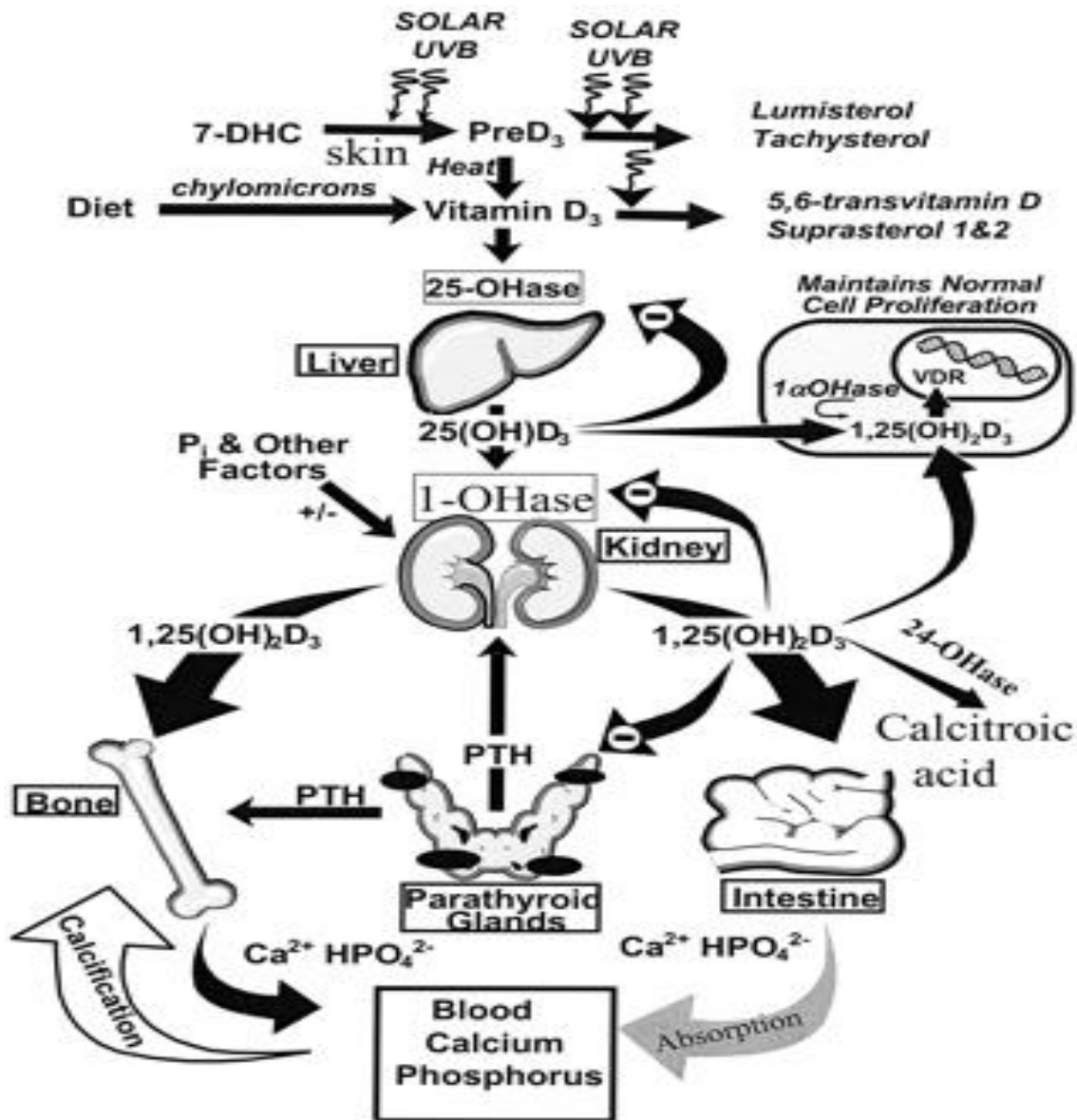
Calcium metabolism



physiology of calcium homeostasis

- PTH (parathyroid hormone)
- Vitamin D
- Calcitonin(parafollicular cells of thyroid gland) : it opposes the effects of PTH by :
inhibiting osteoclasts from breaking down
bone

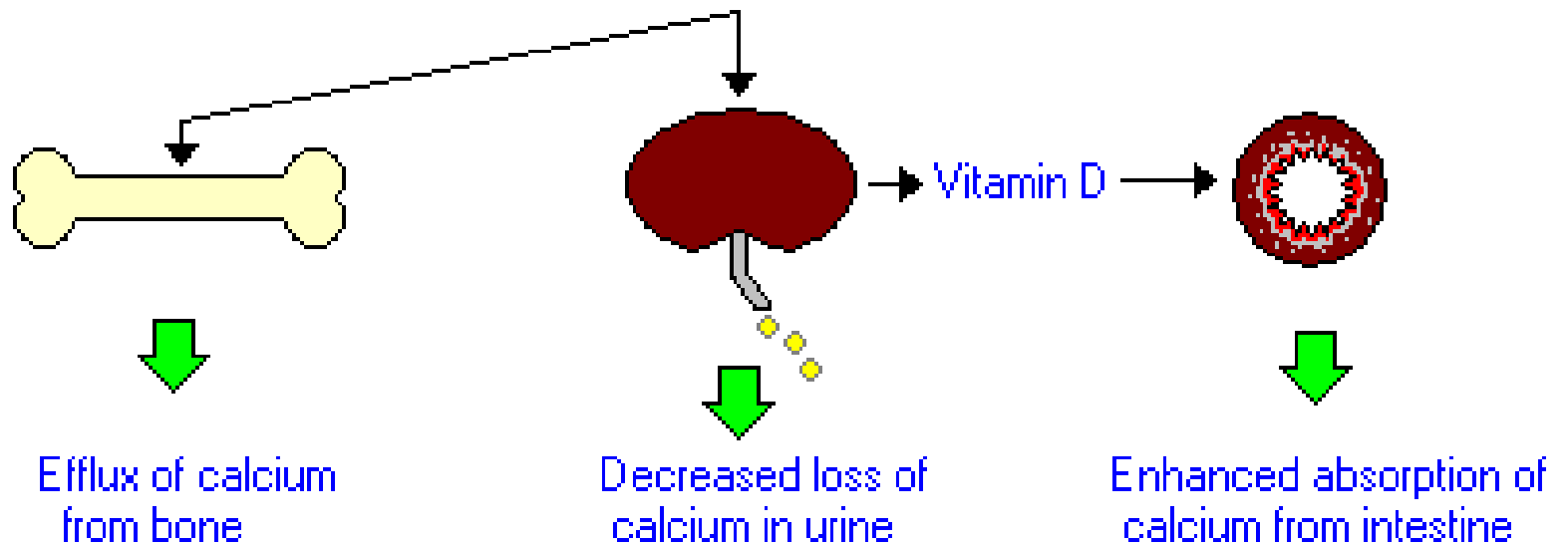
It inhibits CA reabsorption in renal tubular cells



Low concentration of calcium in blood

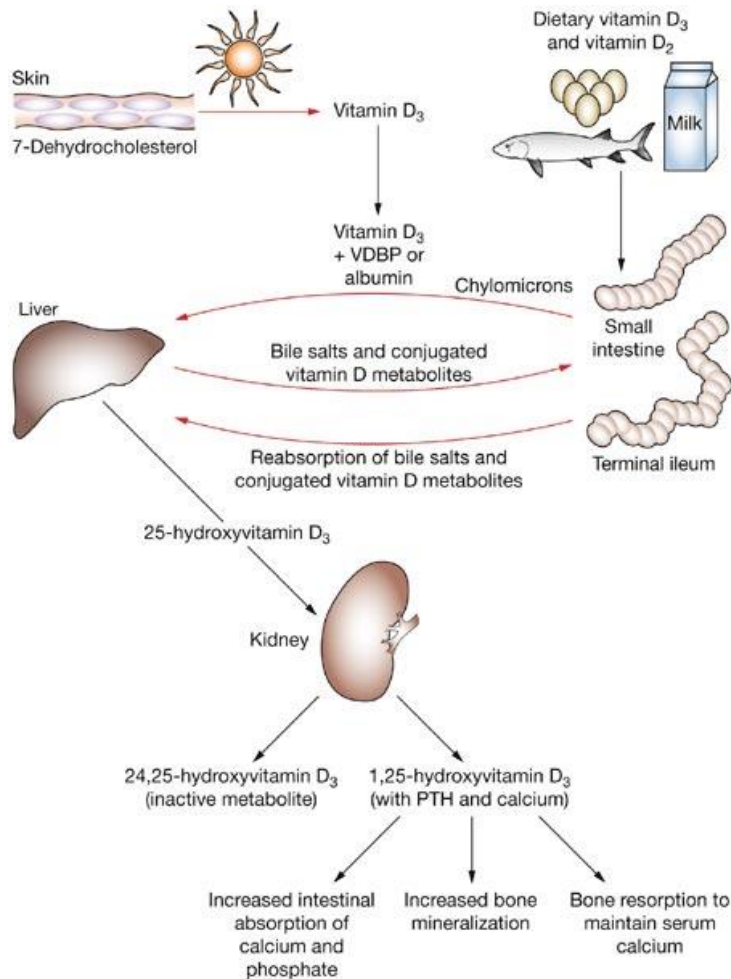


Release of parathyroid hormone



Increased concentration of calcium in blood

Vitamin D metabolism



- **Best time for sun exposure in Riyadh**

Summer : 9 am - 10:30 & 2-3 pm

Winter : 10 am - 2 pm

Hypercalcemic states

- Causes
- Hyperparathyroidism : presentations
symptoms
“stones,bones,abdominal
groans&psychic moans”

Impact on bones : osteoporosis , osteitis fibrosa cystica

Impact on kidney : renal stones

Neuromuscular , psychiatric : fatigue , lethargy,depressed mood

Non-specific features : sometimes asymptomatic

Diagnosis

Treatment

Primary hyperparathyroidism

- Most common presentation is asymptomatic hypercalcemia
- “bones,stones,abdominal moansand psychic groans”
- Bone disease : osteoporosis and fractures. Osteitis fibrosa cystica
- Neuromuscular : fatigue and weakness
- Neuropsychiatric : depressed mood,psychosis
- Kidney : nephrocalcinosis , stones(ca oxalate)
- Cardiovascular : hypertension,ventricular hypertrophy

Primary hyperparathyroidism

- Calcium is high
- Phosphorus is low
- PTH is high

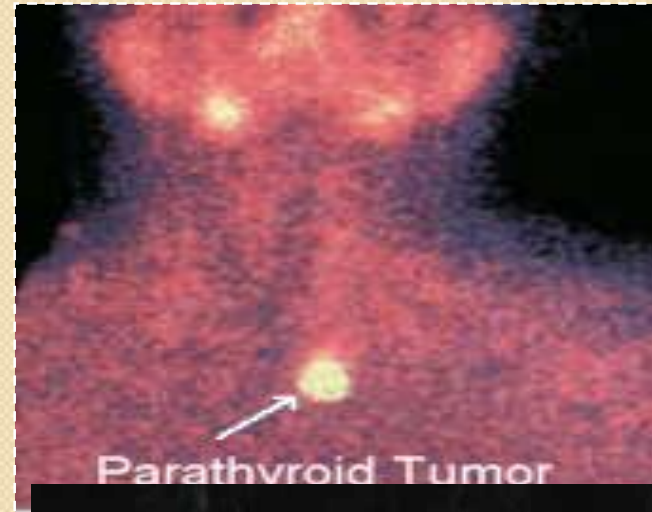
Other hypercalcemic states

- **Sarcoidosis**
- **Thyrotoxicosis**
- **Adrenal insufficiency**
- **Thiazides & lithium**
- **Hypervitaminosis D**
- **Immobilization**
- **Familial hypocalciuric hypercalcemia (PTH IS NORMAL)** , mild hypercalcemia , hypocalciurea , Mg high normal or high ,autosomal dominant
- **MALIGNANCY : Increased PTHrp : commonest cause(BREAST CANCER),**
- **MULTIPLE MYELOMA , : production of osteoclast activating factor**
- **LYMPHOMA and SARCOIDOSIS : & 1,25 dihydroxyvitamin D**
- **PTH IS NORMAL in malignancy induced hypercalcemia**

Treatment of hyperparathyroidism

- In primary hyperparathyroidism : if patient is symptomatic (lithiasis , osteoporosis, pancreatitis) **surgery is indicated**: bilateral neck exploration or focused parathyroid exploration if adenoma is localized preoperatively
- Intraoperative PTH monitoring
- endoscopic parathyroidectomy
- Medical treatment : cinacalcet (calcimimetic agent) : if patient is a high surgical risk.

- Preoperative localization :
U/S , CT ,MRI ,sestamibi scan
- Removal of adenoma
If hyperplasia : subtotal
(removal of 3 ½ of glands)



SURGERY OF PRIMARY HYPERTHYROIDISM

Secondary hyperparathyroidism

- Chronic renal disease causing hypocalcemia
- Severe vitamin D deficiency
- Malabsorption

Tertiary Hyperparathyroidism

After long standing secondary hyperparathyroidism

Hypoparathyroidism

Causes : hypoparathyroidism (autoimmune or post surgery ,

Hypomagnesaemia : Mg is important for the release of PTH and for its effect)

Polyglandular autoimmune syndrome Type I (moniliasis→hypoparathyroidism→hypoadrenalism

- Pseudohypoparathyroidism : type IA autosomal dominant . Resistance to PTH+ somatic features. Type IB : isolated resistance . PTH IS HIGH
- Clinical presentations : acute tetany(post surgical)OR chronic :
- Eye : cataract , CNS (calcification of basal ganglia) causing extrapyramidal disorders
- Cardiac : prolonged QT interval .

Hypocalcemia with high PTH :

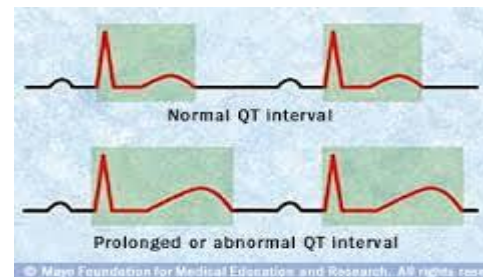
- Vitamin D deficiency
- Renal impairment
- Vitamin D dependent rickets (1-alpha-hydroxylase deficiency) and hereditary resistance to to vitamin D).
- Pseudohypoparathyroidism (resistance to the action of PTH)

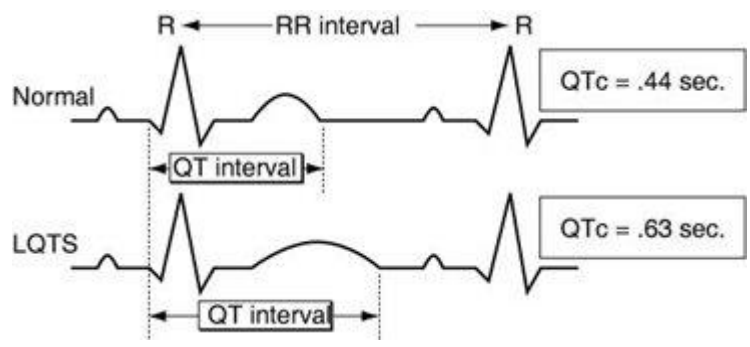
Hypoparathyroidism

- Low calcium
- High phosphorus
- Low PTH

Clinical presentation

- Numbness
- If severe hypocalcemia : tetany
- Trosseau sign
- Chovstek sign
- ECG : prolonged QT interval





Treatment of hypocalcemia

- Calcium :1-2 gm daily
- vitamin D analogs : calcitriol or alfacalcidol
- If severe and acute with tetany : give 10 cc of 10% calcium gluconate slowly (careful in patients on digoxin)



Osteoporosis

DEFINITION

DIFFERENTIATING OSTEOPOROSIS
FROM OSTEOMALACIA

CAUSES

DIAGNOSIS

PREVENTION

TREATMENT

DEFINITION OF OSTEOPOROSIS

- Low bone mass with microstructural disruption resulting in fracture from minimal trauma.



Causes of osteoporosis

- Menopause
- Old age
- Calcium and vitamin D deficiency
- Estrogen deficiency in women and androgen deficiency in men
- Use of steroids

Exclude secondary causes especially in younger individuals and men

Box 2: Common secondary causes of bone loss

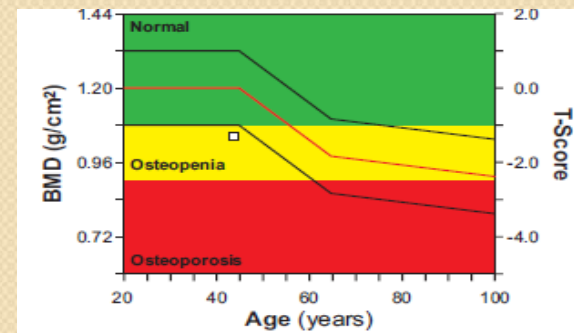
- Hyperparathyroidism (primary or secondary)
- Vitamin D inadequacy
- Malabsorption state (e.g., celiac disease, inflammatory bowel disease, short gut syndrome)
- Hypercalciuria
- Hyperthyroidism
- Chronic lung disease
- Malignancy (e.g., myeloma, bony metastasis)
- Rheumatoid arthritis
- Hepatic insufficiency

Diagnosis of osteoporosis

- Dual-energy x-ray absorptiometry (DXA) measuring bone mineral density (BMD) and comparing it to BMD of a healthy woman
- More than -2.5 SD below average : osteoporosis



Lumbar spine
Femoral neck



Bone density scanner

WHO Osteoporosis criteria 1994

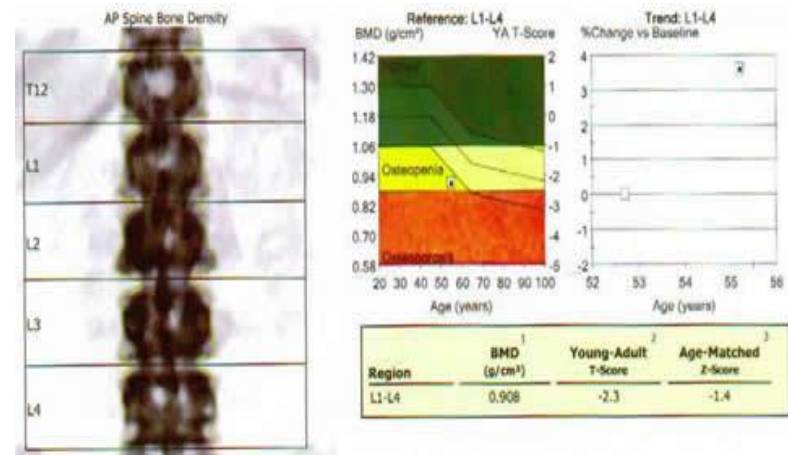
Definition based on BMD :

Normal : greater than or equal to -1 SD

Osteopenia: BMD which lies between - 1 and -2.5 SD

Osteoporosis : less than or equal to - 2.5 SD

Severe osteoporosis : osteoporosis with 1 or more fragility fractures



Treatment of osteoporosis

- Prevention
- Public awareness
- Adequate calcium and vitamin D supplements
- Bisphosphonates : reducing bone breakdown
- Denosumab : reduces bone break down
- Teriparatide : anabolic

Effects

- Steroids for several days causes bone loss more on axial bones (40 %) than on peripheral bones (20%).
- Muscle weakness
- Prednisolone more than 5 mg /day for long time

Management

- Use smallest possible dose
- Shortest possible duration
- Physical activity
- Calcium and vitamin D
- Pharmacologic treatment:
bisphosphonates , ? PTH

الجمعية السعودية لعشاشة العظام



Saudi Osteoporosis Society



Osteomalacia


Definition of osteomalacia

- Reduced mineralization of bone
- Rickets occurs in growing bone







Causes of osteomalacia

- 
- Vitamin D deficiency (commonest cause)
 - Ca deficiency
 - Phosphate deficiency
 - Liver disease
 - Renal disease
 - Malabsorption (Celiac disease)
 - Hereditary forms
 - (intestinal and gastric surgery) : bariatric surgery
 - Drugs : anti epileptic drugs



Clinical presentation

- 
- Two thirds of patients are asymptomatic
 - Incidental radiological finding
 - Unexplained high alk phosph
 - Large skull, frontal bossing, bowing of legs, deafness, erythema, bony tenderness
 - Fracture tendency: vertebral crush fractures , tibia or femur. Healing is rapid.

- 
- **Bony aches and pains**
 - **Muscle weakness**



LAB.



lab


Ca level

Po4 level

Alk phosph

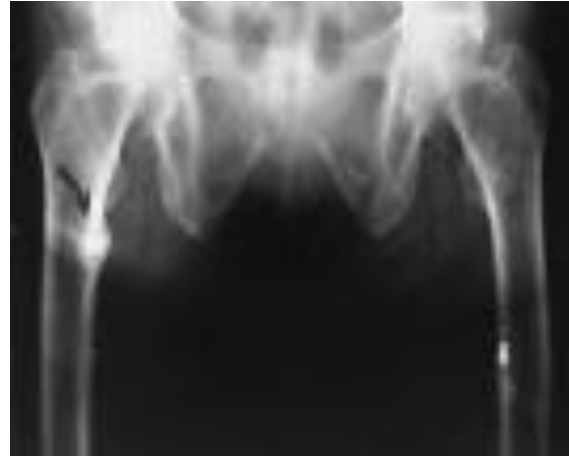
PTH

Vitamin D level

- 
- Low serum vitamin D
 - High PTH
 - High serum alkaline phosphatase


Radiology

- X-ray: growing bones vs mature bones. Subperiosteal resorption, Looser's zones (pathognomonic).
- Bone scan





Treatment of osteomalacia

- 
- Calcium and vitamin D supplements
 - Sun exposure
 - Results of treatment is usually very good.
 - Correcting underlying cause