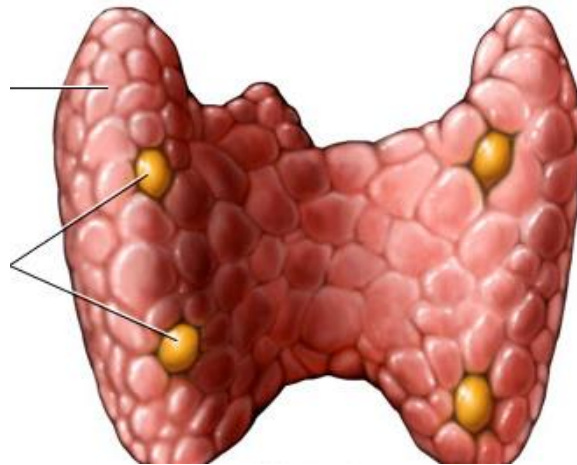




Parathyroid disorders

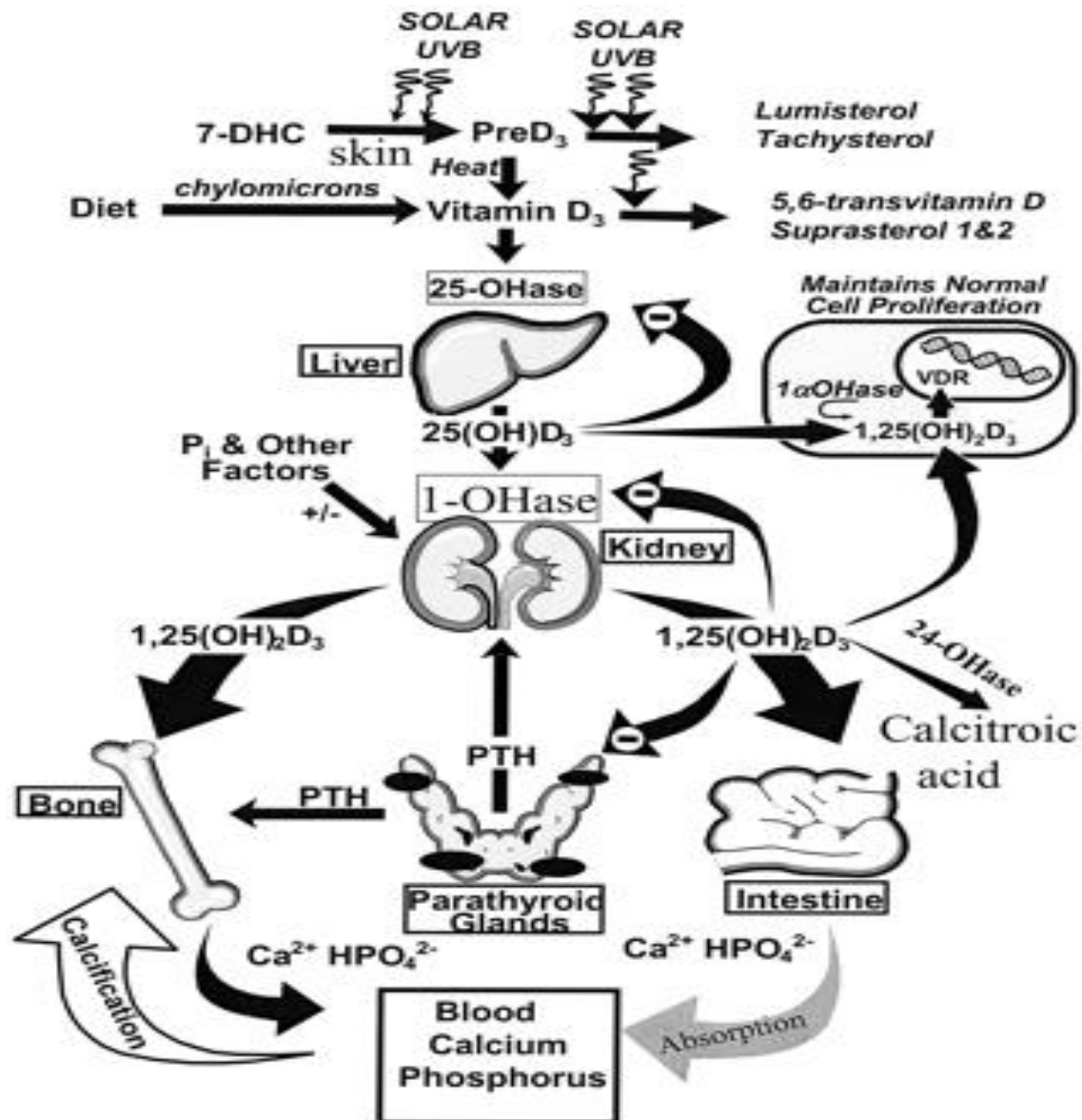
Calcium metabolism



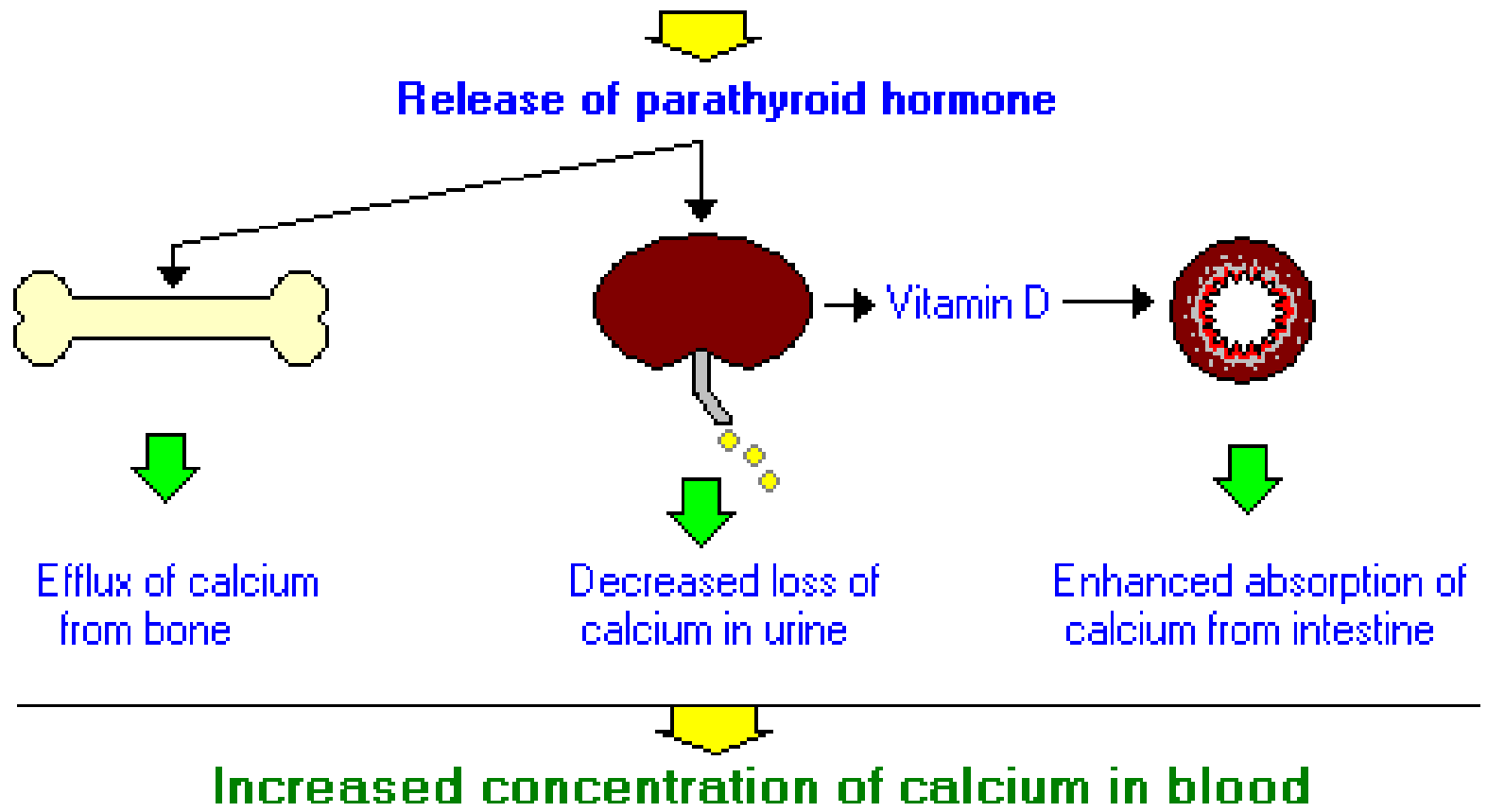
physiology of calcium homeostasis

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

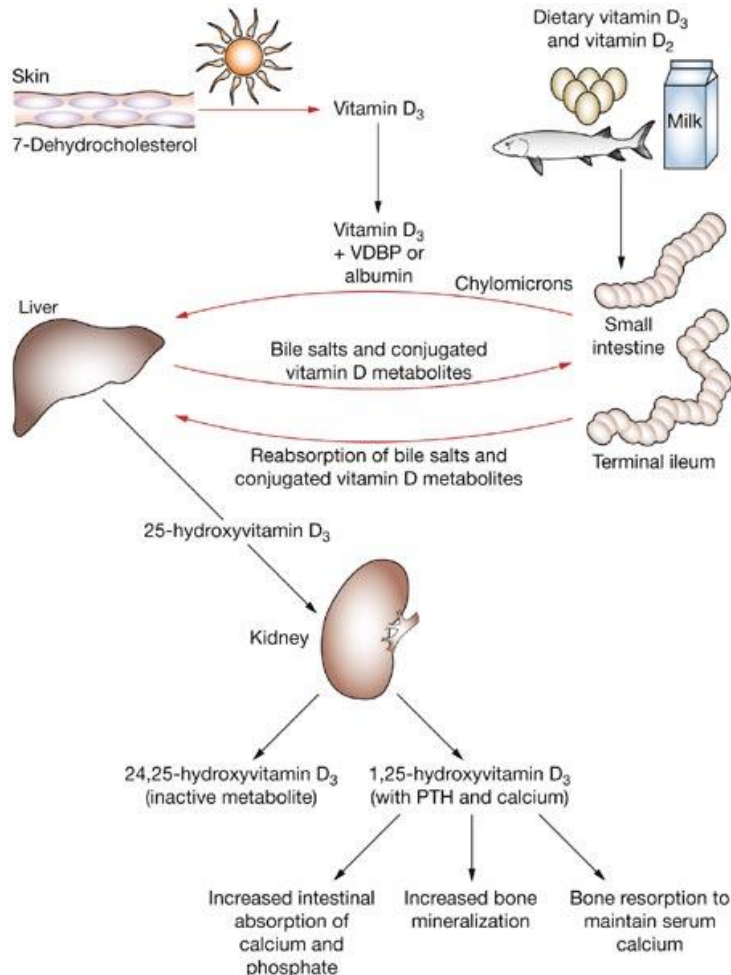
It inhibits CA reabsorption in renal tubular cells



Low concentration of calcium in blood



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

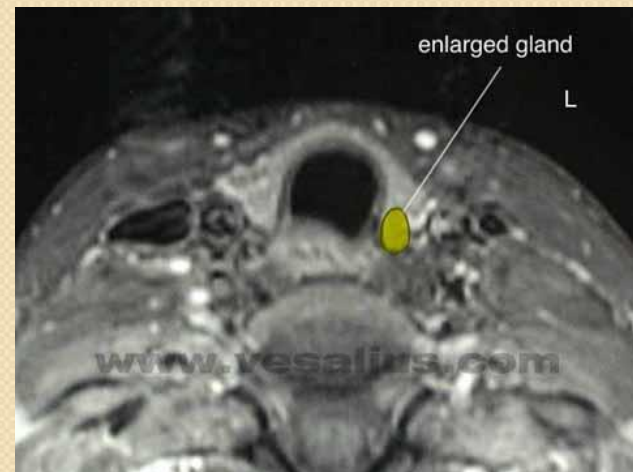
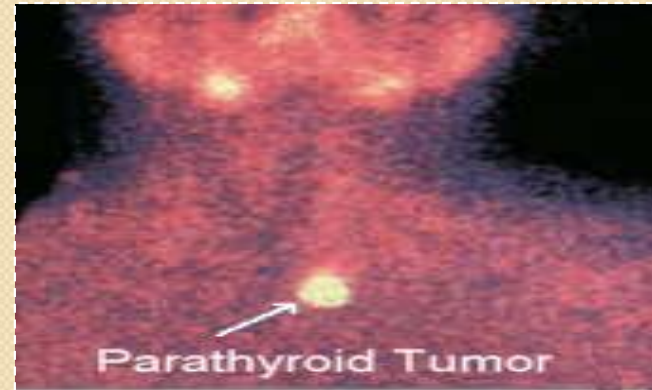
Other hypercalcemic states

- **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 HYPERPARATHYROIDISM

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 .

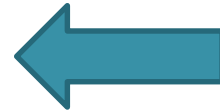
Hypocalcemia with high PTH :

- 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)

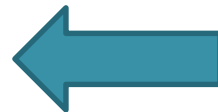
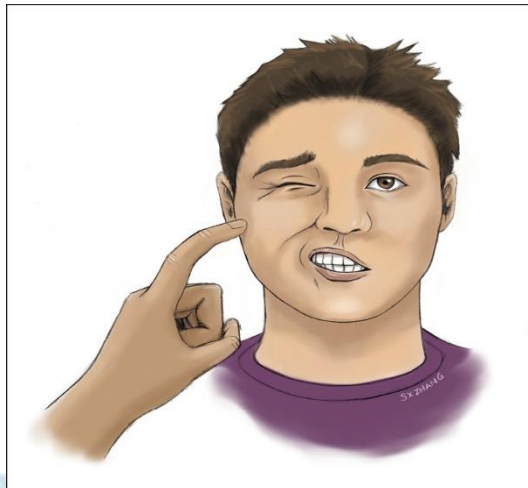
Hypoparathyroidism

- Low calcium
- High phosphorus
- Low PTH

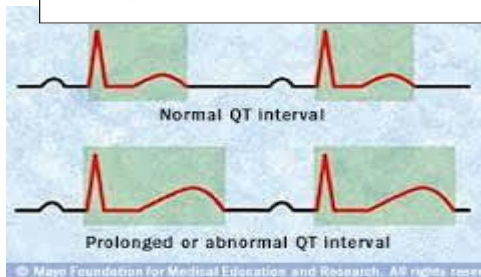
Clinical presentation



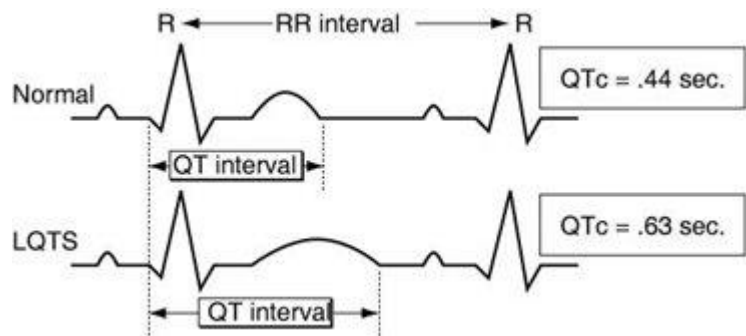
- Numbness
- If severe hypocalcemia : tetany
- Trousseau sign



- Chvostek 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

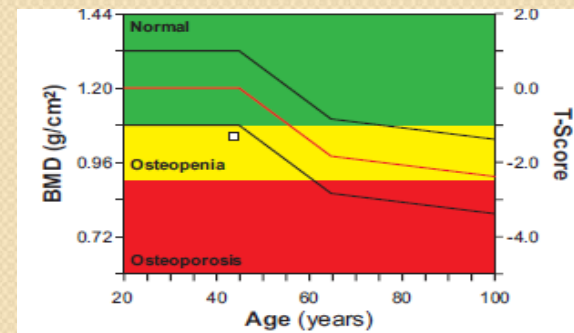
- Hyperparathyroidism (primary or secondary)
- Vitamin D inadequacy
- Malabsorption state (e.g., celiac disease, inflammatory bowel disease, short gut syndrome)
- Hypercalciuria
- Hyperthyroidism
- Chronic lung disease
- Malignancy (e.g., myeloma, bony metastasis)
- Rheumatoid arthritis
- Hepatic insufficiency

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



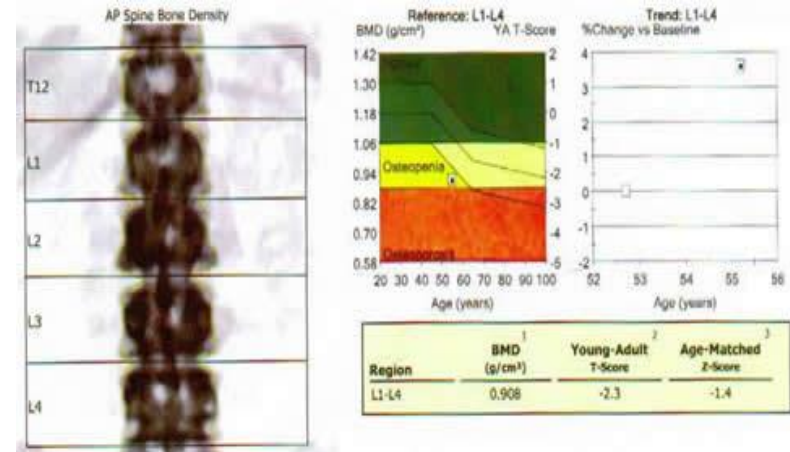
Lumbar spine
Femoral neck



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

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

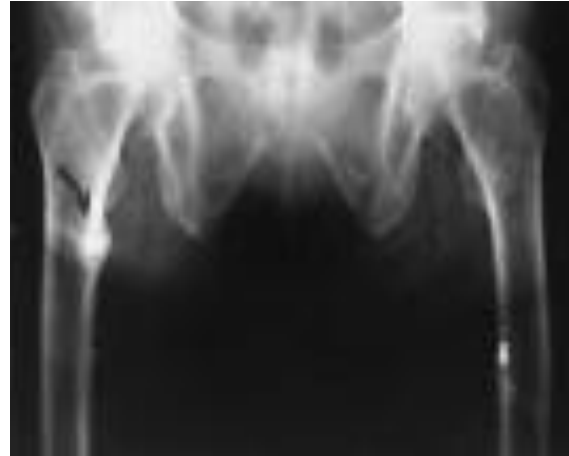
PTH

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