

## **Rickets and Osteomalacia**

Failure of mineralization with subsequent bone deformities and fracture

- ↓ Ca /P
- ↓ Vit D
- chronic renal disease
- Chronic flourosis
- Generalized failure of mineralization of growth plate, cartilage and bone
- Growth plates thickened
- Ability of chondrocytes to proliferate and hypertrophy is partially retained.

### **Grossly**

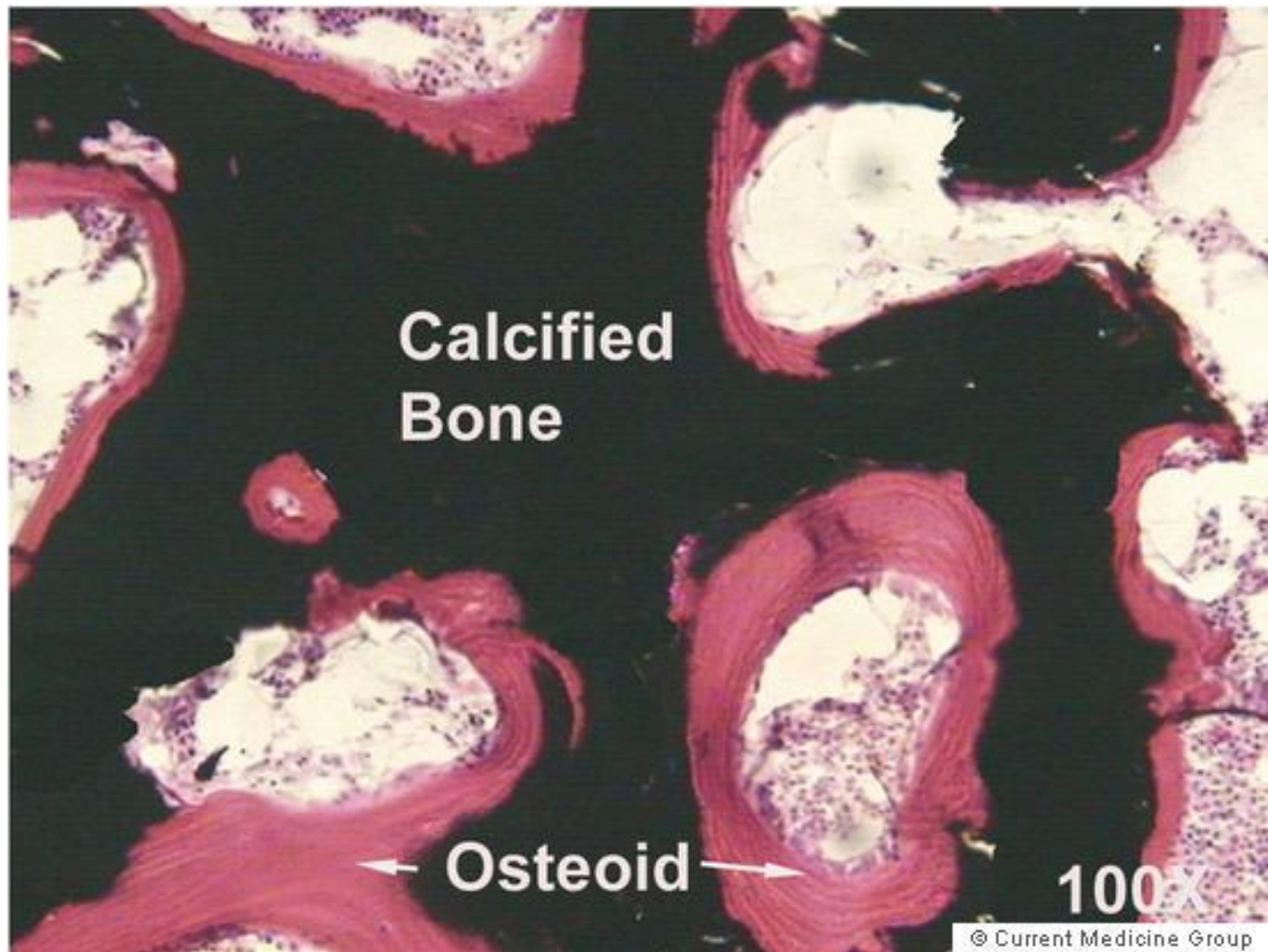
- Bones deformed, break easily
- Enlarged metaphysis reflect the thickening of the physis and
- Failure of normal modeling of metaphysis (cut back zone)
- Poorly mineralized matrix Ca not resorbed.







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## **Osteomalacia**

Because phytes are absents there are no physical lesion in the adult skeleton

Wide scans of un mineralized osteoid are formed

Clinically, bone pain, pathological fracture and deformities as Chyphosis and scoliosis.

**Osteopetrosis** an osteosclerotic ( $\uparrow$ bone mass) disease that occur in dogs/sheep/ Horse and cattle

- Failure of osteoclasts to resorbed and shape (mold) the primary trabaculae. As a result spicules of bone with central cores of calcified cartilage fill the medullary cavity.
- process affects all bones that develop in a cartilaginous model (elongs by endochondral ossification on growth plate)
- Affected bones are dense and have no medullary cavity
- In cattle is inherited as an autosomal recessive trait, affected calves are typically still born a few weeks premature.

- Bradynathia inferior. Impacted molar teeth and deformed cranium.
- Congenital cortical hyperostosis
- Craniomandibular osteopathy (Lion jaw) in Scottish terrier dogs
- Irregular thickening of mandible, occipital temporal tympanic bullae are often severely affected.
- Numerous thin irregular basophilic cement line(Reversal lines) indicating site where resorption had stopped and subsequent bone formation has occurred give affected bone a characteristic mosaic appearance at macroscopic examination



## **Osteogenesis imperfecta**

- Calves, lamb and puppies
  - Multiple fracture
  - Joint deformities
  - Defective dentine
  - Defect in osteoblastic production of Type I collagen
  - And decrease synthesis of osteonectin.
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- **Angular limb deformity** (lateral deviation of distal portion the limb)
  - Common in foal
  - Mal position of fetus in utero, hypothyroidism, trauma poor conformation, over nutrition(consumption of excess protein and calories)
  - defective endochondral ossification of epiphysis of carpal and tarsal and long bones.



- Osteodystrophy (defective bone formation general term)

Classical metabolic osteodystrophies are

- Osteoporosis
- Fibrous osteodystrophy
- Rickets and osteomalacia
  
- **Osteoporosis/osteopenia**
- Refer to clinical decrease of bone pain and fracture due to reduction of bone density/mass
- Cortical bone is reduced in thickness and increase in porosity
- Trabaculae become thinner, fewer in number
- Develop perforation within the plates
- Medullary cavity becomes enlarged due to endosteal resorption of cortical bone.

- Bone that lack strength more easily fractured
- Micro cracks make bone more brittle.

## **Fibrous osteodystrophy**

- Increased widespread osteoclastic resorption of bone and its replacement by fibrous tissue that occur in primary secondary and pseudohyperparathyroidism
- Wreaking of bone leads to lameness, pathological fracture and deformities.
- Primary hyperparathyroidism (functional parathyroid adenoma, parathyroid adenoma, carcinoma is rare)
- Secondary hyperparathyroidism is more common and either nutritional or renal in origin nutritional and renal fibrous osteodystrophy.

## Lesion

- Osteoclastic resorption of cancellas and endocortical bone
  - Proliferation of fibrous tissue within marrow space especially near endosteal and trabecular surface
  - In advance face entire cortices can be replaced by reactive woven bone and fibrous tissue.
  - Increased external dimension of bone
  - Bone fracture, articular surface, collapsed and some time vertebrae and ribs are deformed.
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- Ossifying fibrous-large heavily mineralized nodes of maxillae and mandible of horse/cattle
  - **Fibrosarcoma**- cells arranged in whirling or interlacing pattern

- Malignancies of fibroblast produces collagens but not bone or cartilage.

## **Chondromas**

- multilobulated and have blue white cut surface
- Slowly and progressively enlarge and can cause thinning of underlying bone
- Multiple lobes of well differentiated hyaline cartilage.

## **Chondrosarcoma-**

- large lobulated have gelatinous on section
- Have large areas of hemorrhage and necrosis
- Well differentiated neoplastic cells is wide
- Some neoplasm are well differentiated and are difficult to distinguished from chondroma
- Some compose of highly anaplastic cells.

**Osteomas-** dense mass that projects from the surface of bone