

91530 Pathophysiology and Pharmacology 2

Week One

Lecture – Musculoskeletal Pathophysiology, Bones

Bone turnover

- 5 – 7% recycled weekly
- 0.5g enter/leave the adult skeleton each day

Bone remodelling

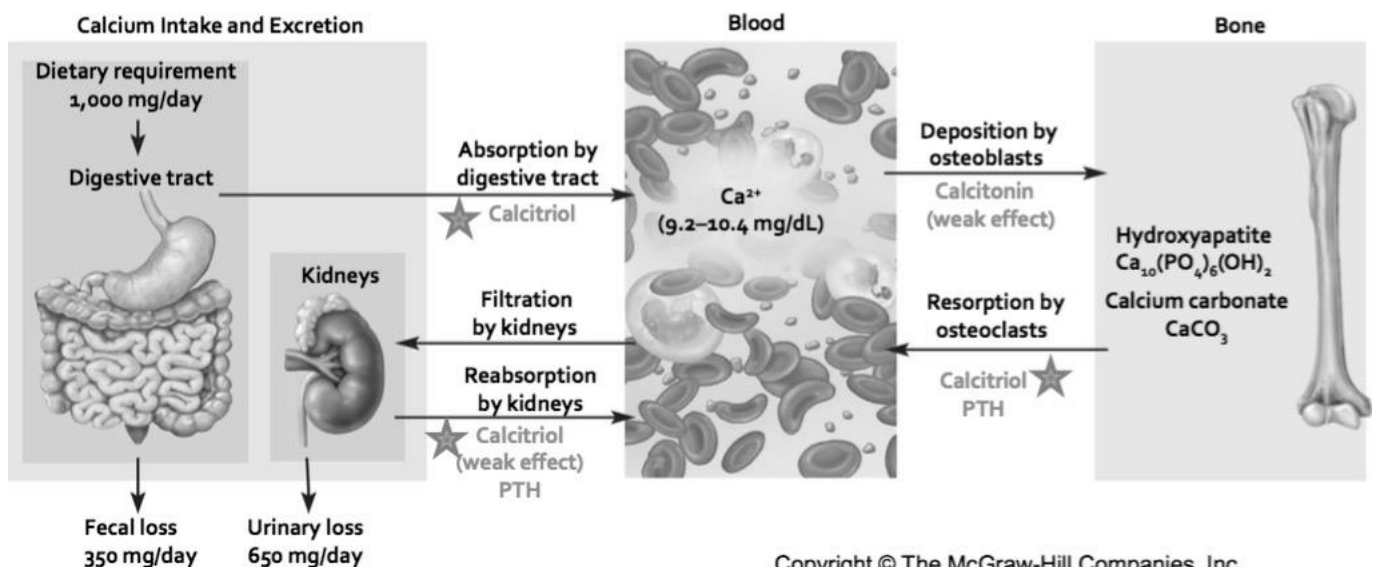
- Osteoblasts – build bone
- Osteoclasts – corrode bone

Calcium balance in bone and blood (9 – 11mg/100ml)

- Falling blood Ca^{2+} levels
 - Parathyroid glands release parathyroid hormone (PTH)
 - Osteoclasts degrade bone matrix and release Ca^{2+} into blood
- Rising blood Ca^{2+} levels
 - Thyroid gland releases calcitonin
 - Calcitonin stimulates calcium salt deposit in bone

Calcium Homeostasis

- Depends on a balance between dietary intake, urinary and faecal losses, and exchanges between osseous bone tissue
- Regulated by 3 hormones; calcitriol, calcitonin, and parathyroid hormone
- Calcitriol – activated vitamin D
 - Produced by the sequential action of the skin, liver and kidneys



Osteomalacia

- 1/3 Australians have vitamin D deficiency
- Metabolic bone disease
- Deficiency of vitamin D lowers the absorption of calcium from the intestines
- Inadequate or delayed mineralisation
- Bone formation progresses to osteoid formation but calcification does not occur
- Soft rather than rigid bone
- Symptom is pain when weight is put on the affected bone, also bone fractures, vertebral collapse, bone malformation

Rickets

- In Australia restricted to immigrants
- Similar pathology to osteomalacia, but usually in children
- Bone-softening disease that causes severe bowing of the legs, deformities to the pelvis, skull and rib cage are common,
- Poor growth, and sometimes muscle pain and weakness
- Surgery often required
- Deformity can improve with normalisation of bone metabolism

Fractures

- Signs and symptoms
 - Impaired function
 - Unnatural alignment (deformity)
 - Swelling
 - Possible muscle spasm
 - Tenderness and pain
 - Bruising or discolouration around the break
 - Impaired sensation
 - X-ray evidence of break
- Types
 - Open – break through intact skin, bone marrow exposed to external environment, risk of infection and osteomyelitis
 - Pathologic – occurs in bone which is weakened by disease
 - Comminuted – more than 2 parts of bone, harder to heal with callus formation
 - Impacted – pressure/weight that causes break, impacts or crushes the rest of that bone
- Classifications
 - Closed – bone is broken, skin is not broken
 - Open – bone is broken and protruding through skin

- Greenstick – bone is bent on one side with incomplete fracture on the other side