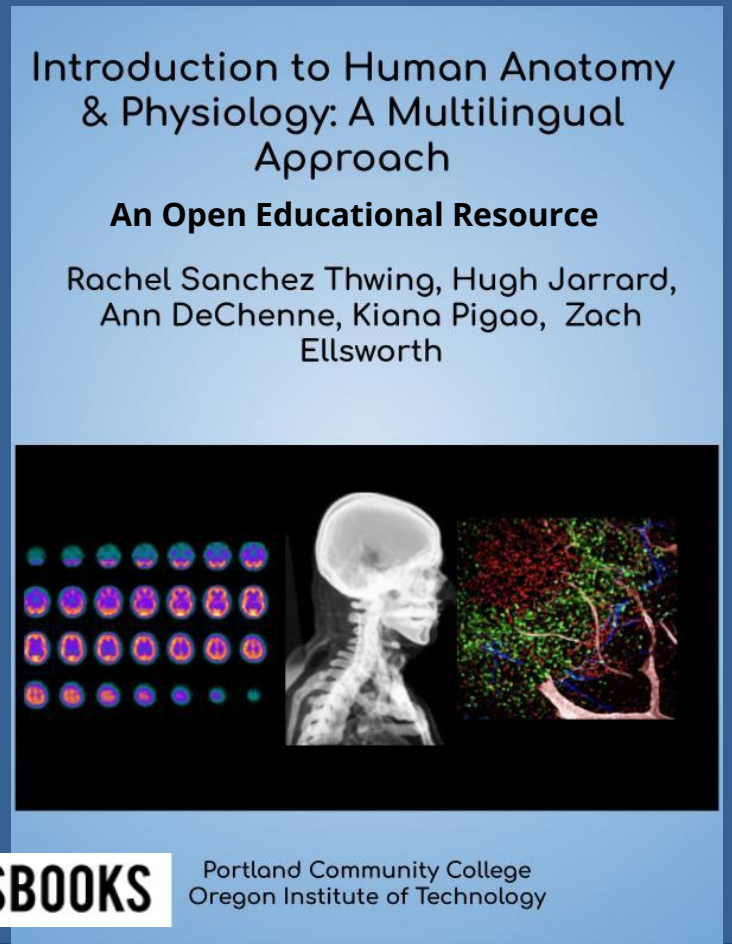
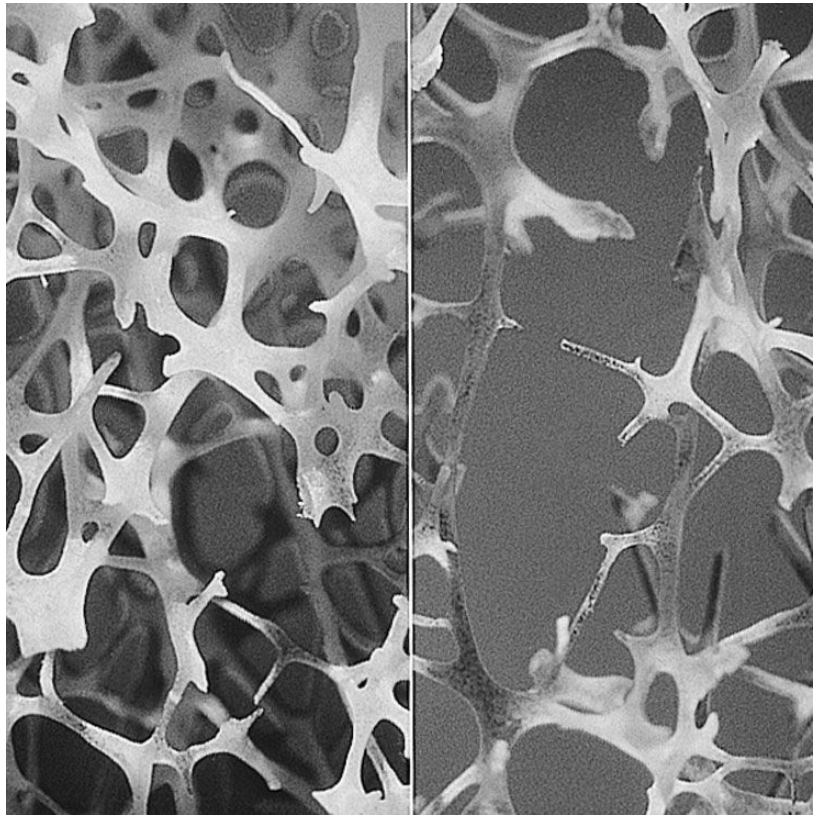
Skeletal System:
Diseases and Disorders





Bone Normal and Degraded by Gtirouflet, CC BY-SA 3.0, via Wikimedia Commons

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Lesson 4: Bone Growth, Repair, and Remodeling

Learning Objective:

- Relate breakdowns in homeostasis to pathological presentations of the skeletal system
    - including bone fracture, arthritis, osteoporosis, and craniosynostosis

See the Skeletal System Wordlist!

- Can be found in accompanying materials to this lecture
- Materials are available in English, Spanish, Russian, Vietnamese, Filipino, East African French, Kiswahili (Swahili) and Chinese.

Module 3 Skeletal System Word List

Microscopic Anatomy
Bone Matrix
Compact Bone
Lacunae (containing Osteocytes)
Lamellae
Osteon
Central canal
Spongy bone

Bone cells:
Osteoblasts
Osteocytes
Osteoclasts

Cranium (Skull):
Occipital Bone
Temporal Bone
Parietal Bone
Frontal Bone
Sphenoid Bone
Nasal Bone
Zygomatic Bone
Maxilla
Mandible
Ethmoid Bone
Vomer Bone
Palatine Bone
Paranasal Sinuses

Axial Skeleton:
Vertebral Column
Intervertebral disc
Atlas (C1)
Axis (C2)
Cervical Vertebrae (C1-C7)
Thoracic Vertebrae (T1-T12)
Lumbar Vertebrae (L1-L5)
Sacrum
Coccyx (3-5 fused vertebrae)

Thoracic Cage:
True Ribs (1-7)
False Ribs (8-12)
Sternum

Appendicular Skeleton:
Upper Appendages
Clavicle
Scapula
Humerus
Ulna
Radius
Carpals
Metacarpal (5)
Phalanges of Hand (Proximal, Middle, Distal)

Lower Appendages
Pelvis
Ilium
Pubic bone
Ischium
Femur
Patella
Tibia
Fibula
Tarsals
Metatarsal (5)
Phalanges of Foot (Proximal, Middle, Distal)

Ossification:
Intramembranous
Endochondral

Homeostatic Imbalances
Osteoarthritis
Osteoporosis

Bone Fractures: General Categories & Treatment

Stress fracture:
from accidental stressor

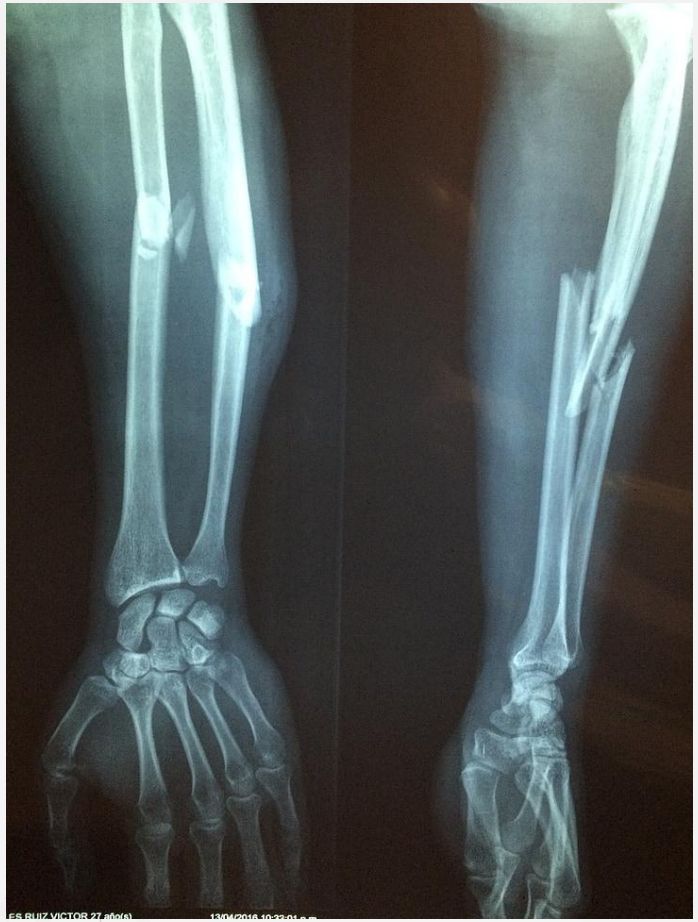
Pathological fracture:
due to weakening
by disease

Open fracture:
breaks the skin

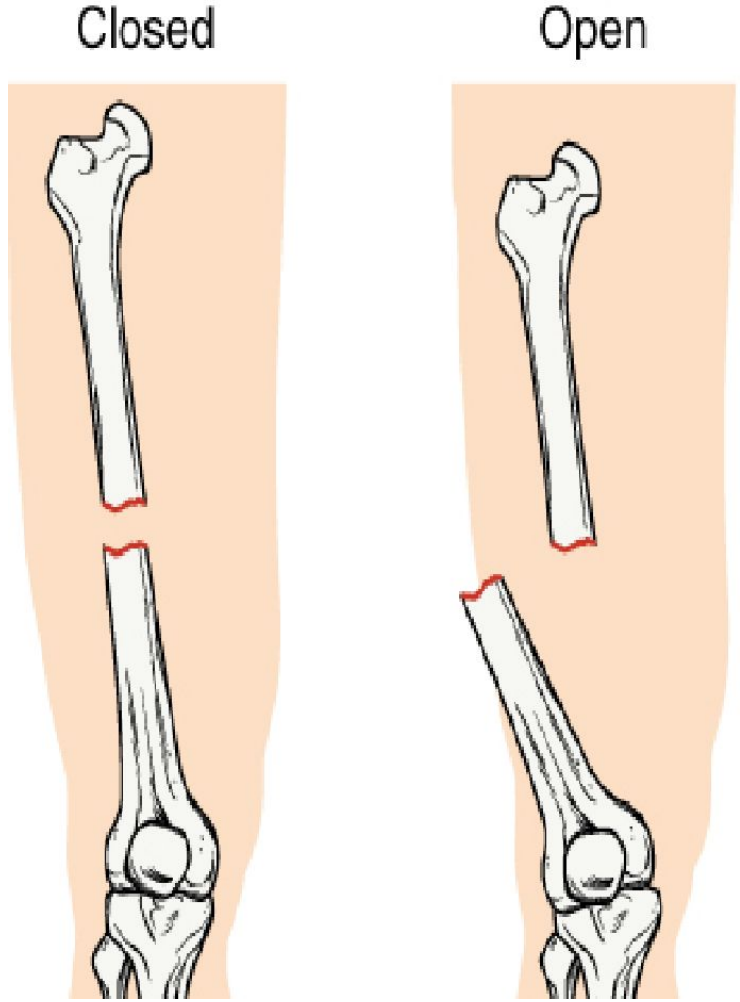
Closed fracture:
doesn't break the skin

Closed reduction:
align broken bones
without surgery

Open reduction:
uses surgery

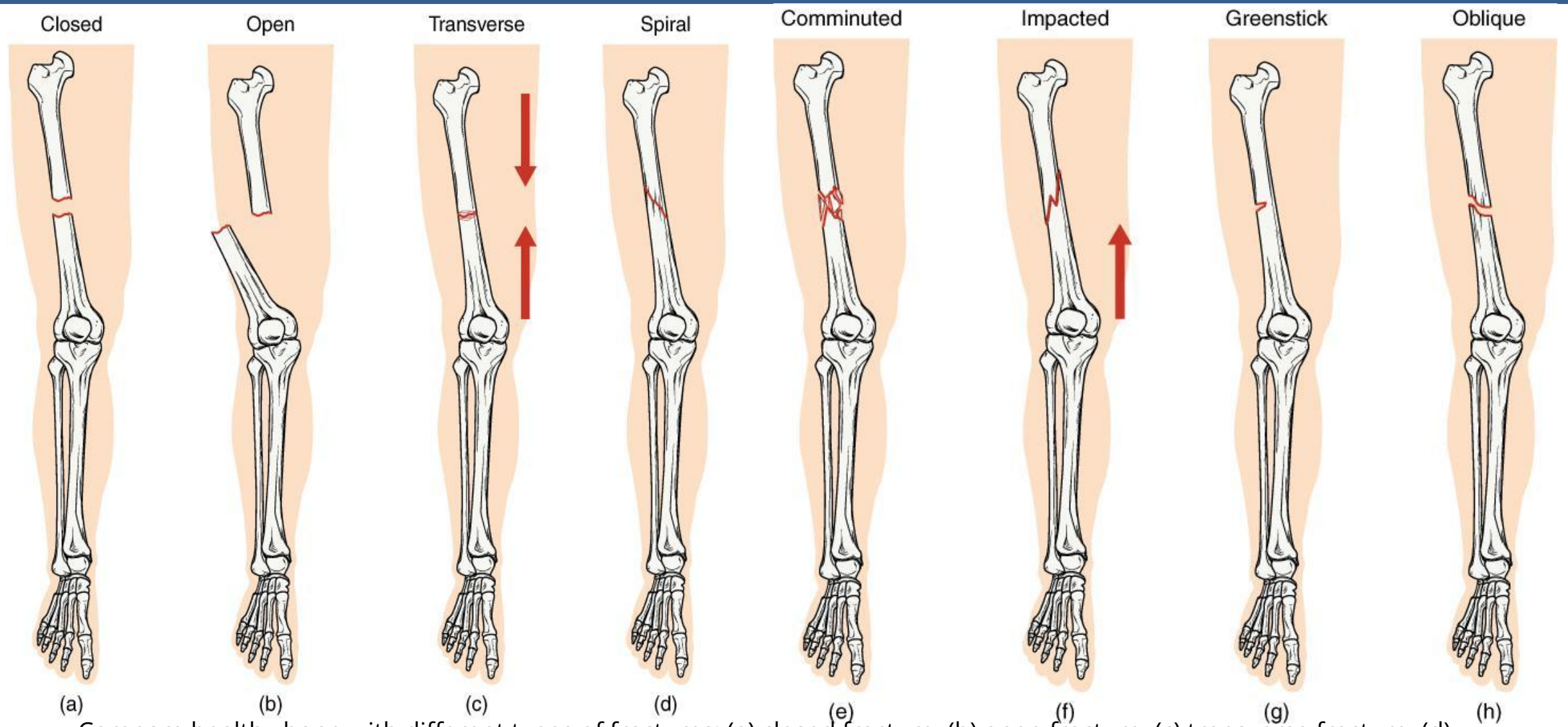


X-ray result by PickPik,CCO.



Type of Fractures by Openstax A&P, 2e

Other Types of Fractures

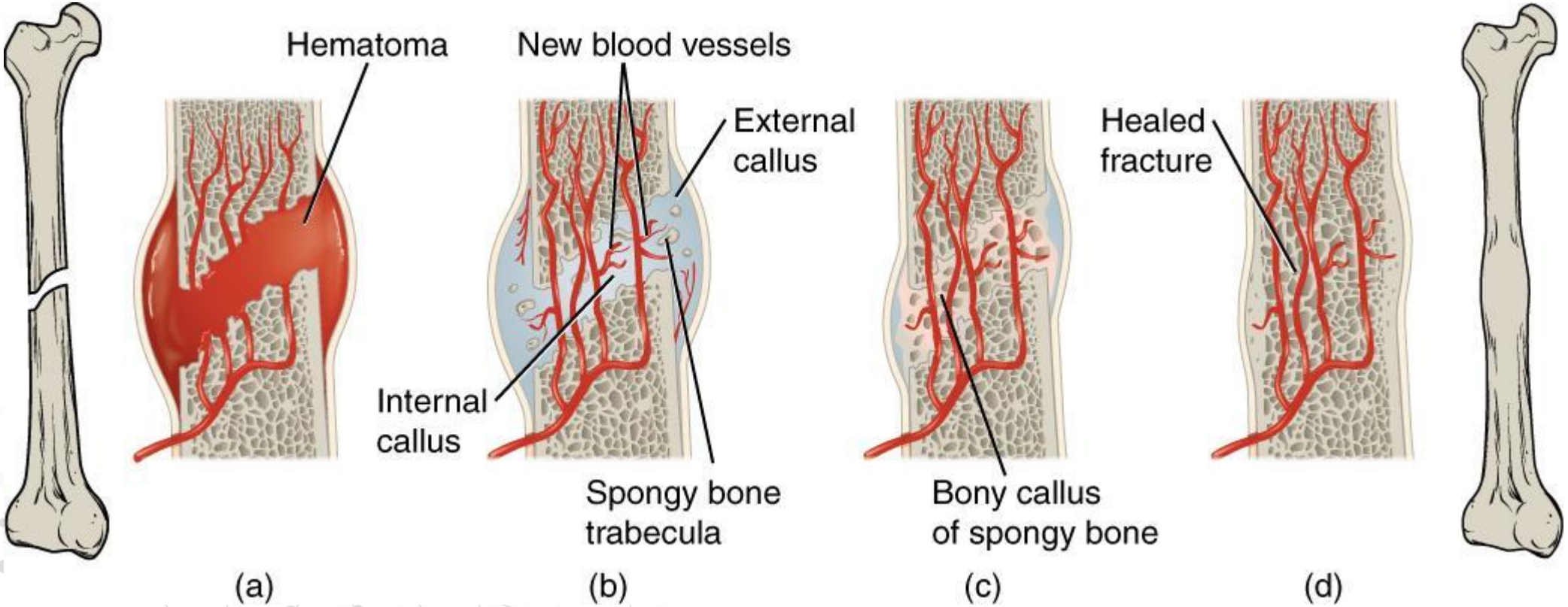


Compare healthy bone with different types of fractures: (a) closed fracture, (b) open fracture, (c) transverse fracture, (d) spiral fracture, (e) comminuted fracture, (f) impacted fracture, (g) greenstick fracture, and (h) oblique fracture.

Type of Fractures by Openstax A&P, 2e

Healing of Bone Fractures

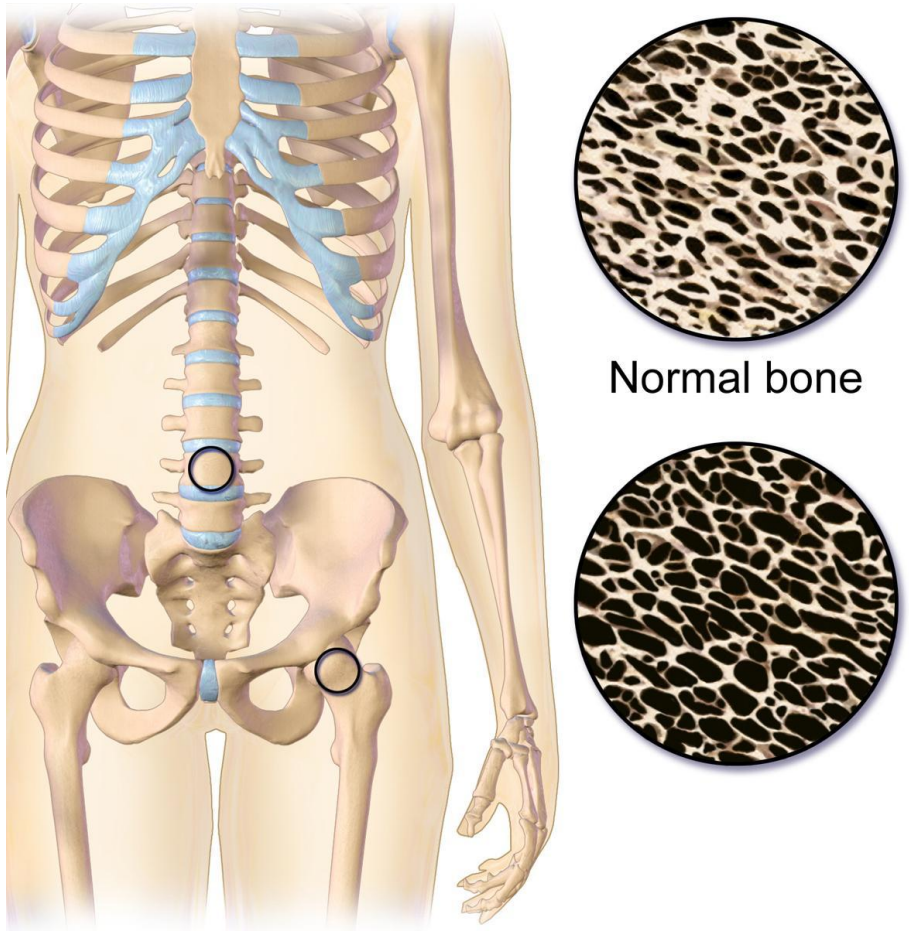
4 major steps, takes 4- 8 weeks:



Stages in Fracture Repair by Openstax A&P, 2e

Osteoporosis

- Most common bone disease
- Loss of bone tissue, especially spongy bone
  - Bones fracture easily
- Most commonly affects post-menopausal white women
  - Estrogen stimulates bone deposition
  - After menopause, estrogen levels decrease



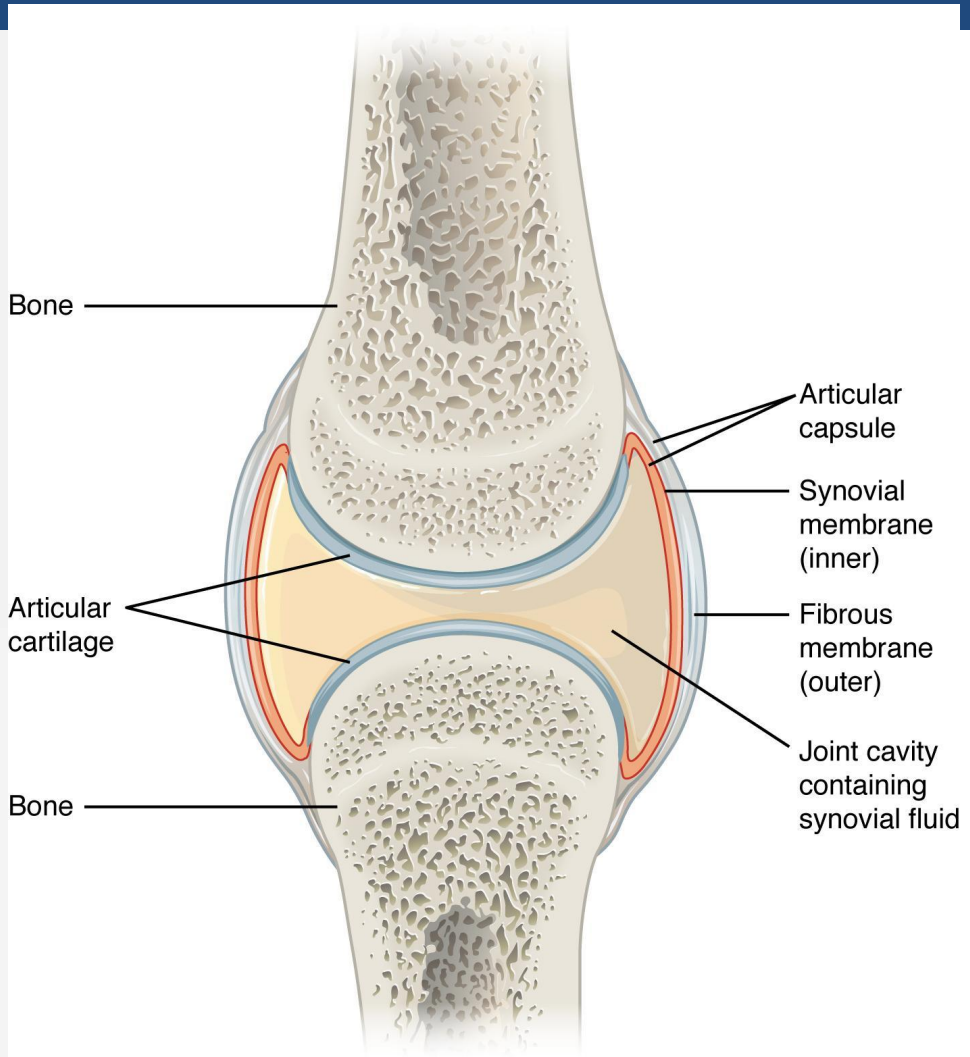
Osteoporosis Effects and Locations by BruceBlaus, CC BY 4.0, via Wikimedia Commons

Arthritis

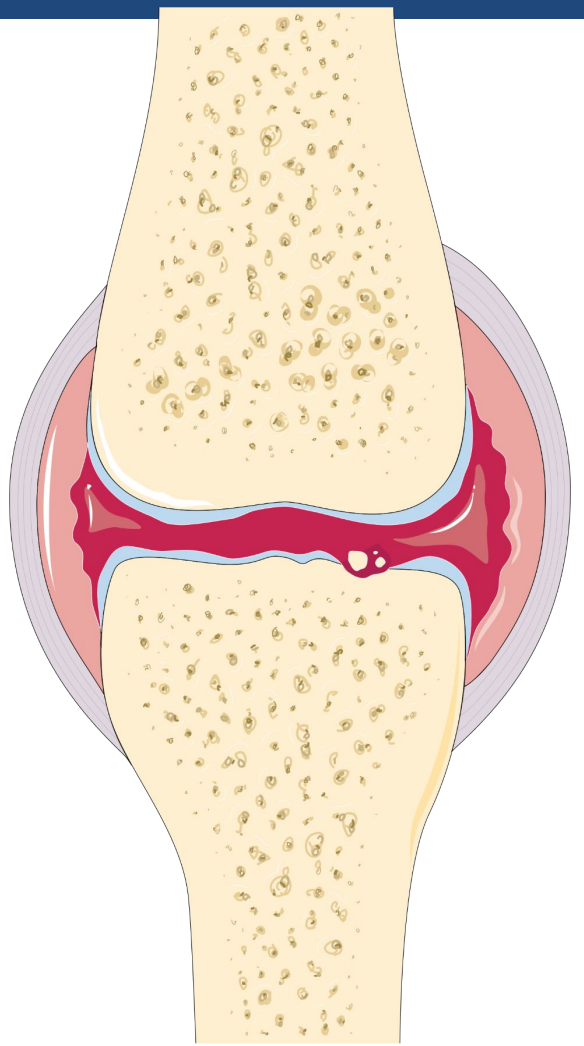
Arthritis:
pain in the joints and surrounding tissues.

Osteoarthritis (OA):
from normal wear & tear on joints

- Articular cartilage wears down
- 85% of people of 70 experience it



Typical joint



Arthritic joint

[Synovial Joint](#) by A&P Openstax, 2e

Arthritic Joint By Laboratoires Servier, CC BY-SA 3.0, via [Wikimedia Commons](#)

Other Causes of Arthritis

Rheumatoid arthritis:
Autoimmune disease against synovial membrane

Causes ankylosis-bony fusion of joints

Affects more women than men

Gouty arthritis:
Accumulation of uric acid crystals in joints, usually big toe

More common in men, hereditary

Craniosynostosis

The **premature fusion of two or more bones** is a condition called craniosynostosis.

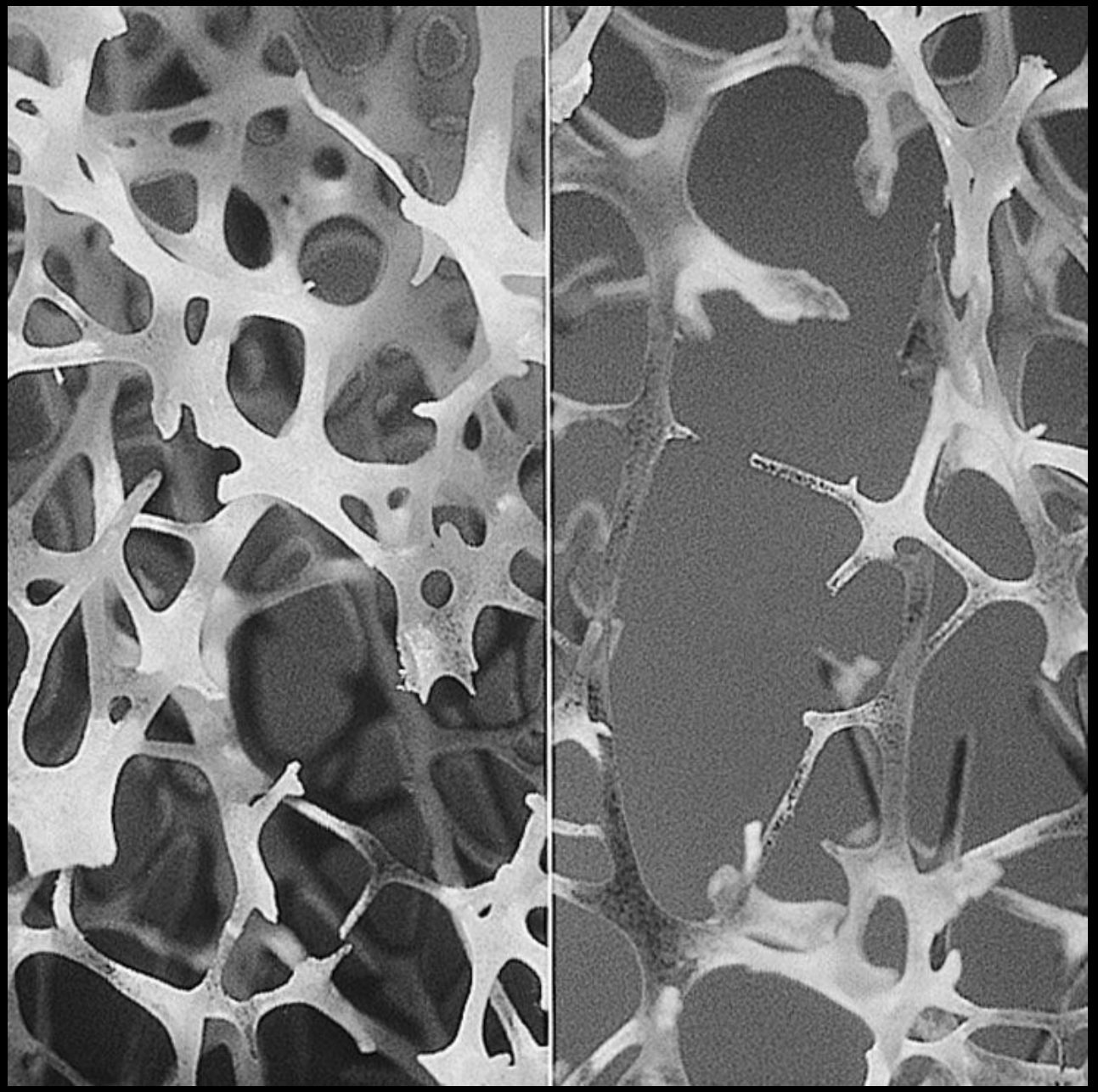
- Error in the normal developmental process
- Results in abnormal growth of the skull and deformity of the head.
- Produced either by defects in the ossification process of the skull bones or failure of the brain to properly enlarge.

Lesson 4: Bone Growth, Repair, and Remodeling Wrap Up

Summary:

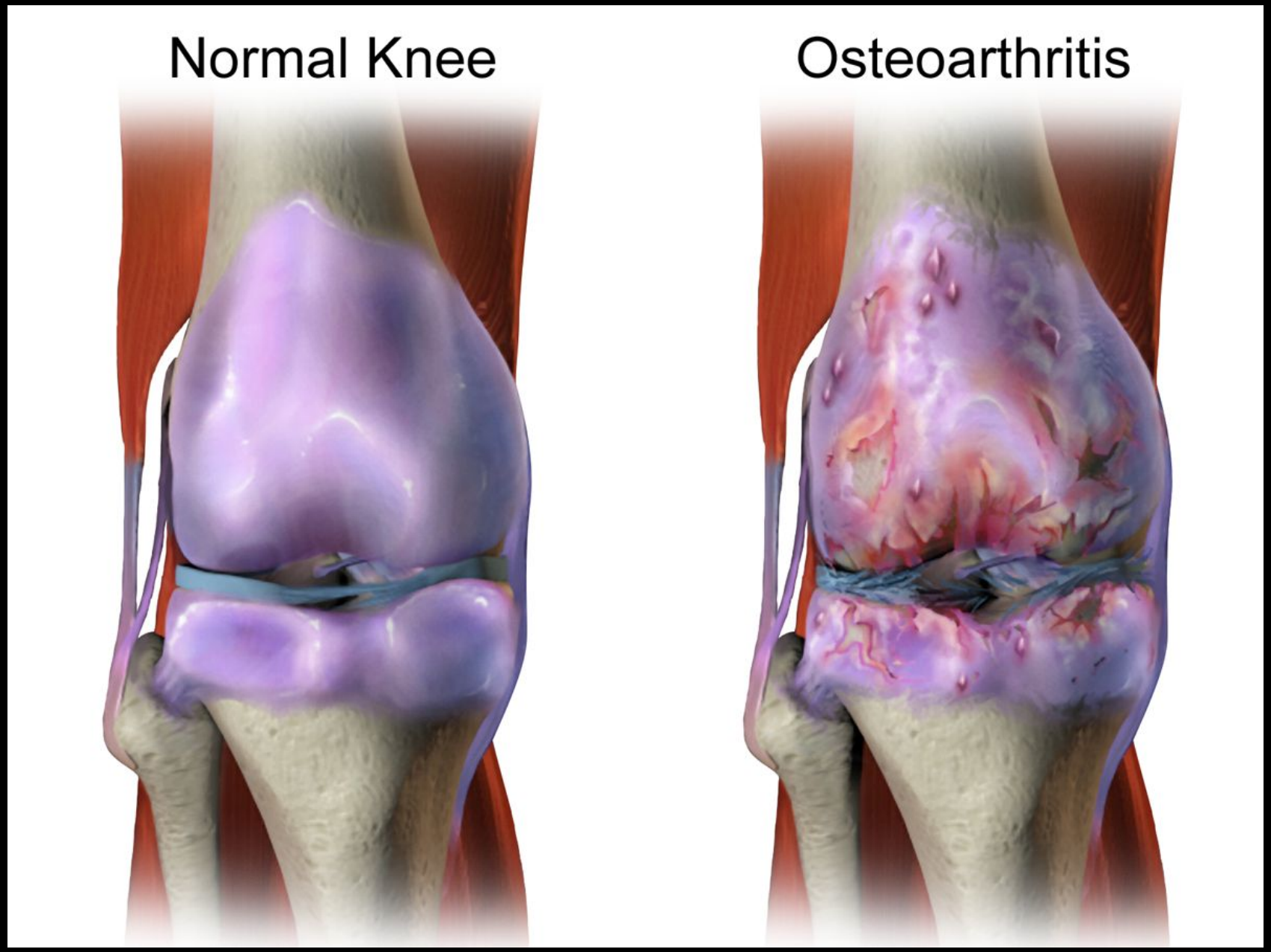
- Related breakdowns in homeostasis to pathological presentations of the skeletal system
    - including bone fracture, arthritis, osteoporosis, and craniosynostosis

Osteoporosis Microarchitecture



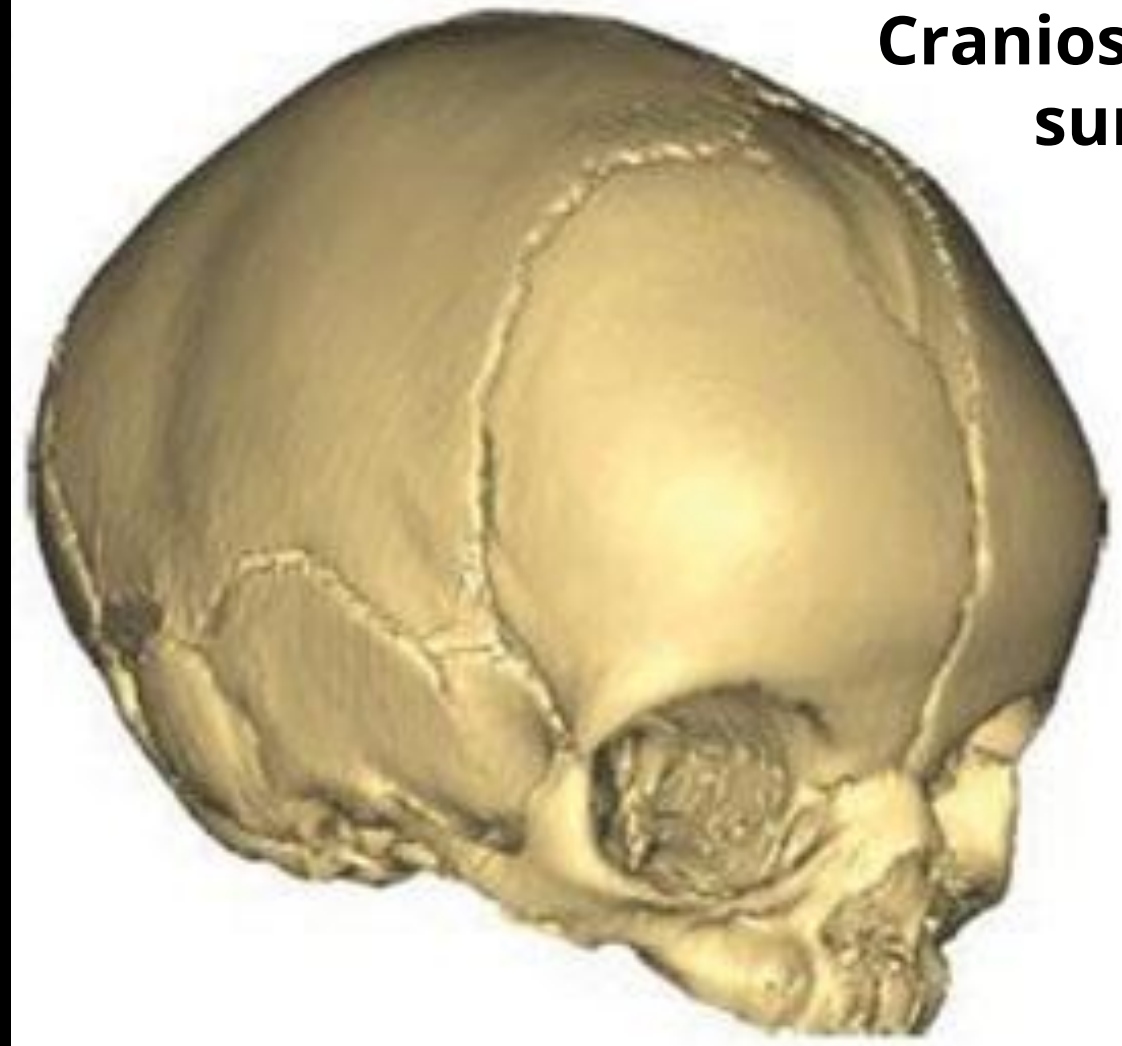
Bone Normal and Degraded Microarchitecture by Gtirouflet, CC BY-SA 3.0, via Wikimedia Commons

Osteoarthritis in the knee



Osteoarthritis By BruceBlaus - Own work, CC BY-SA 4.0, via Wikimedia Commons

Craniosynostosis surgery



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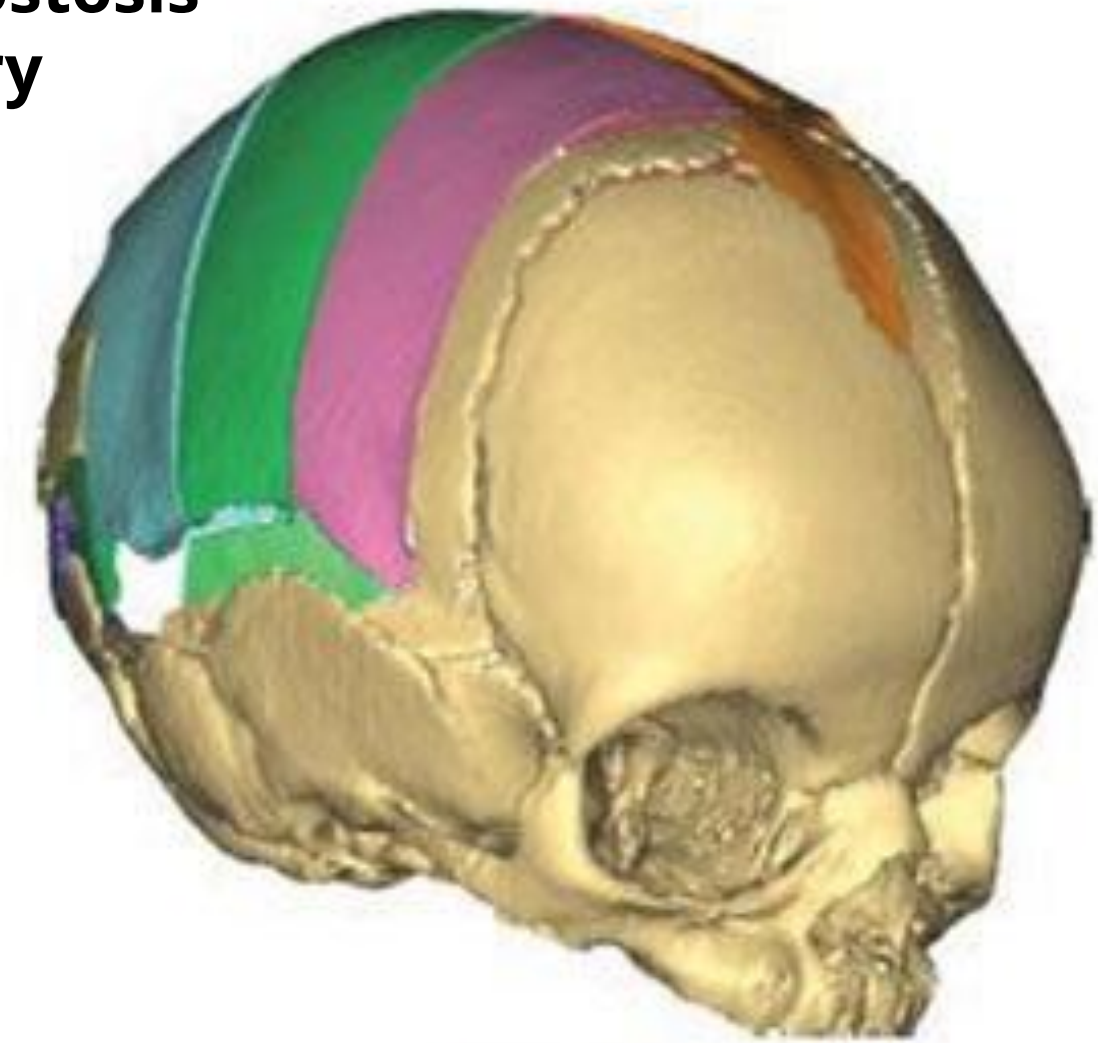

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Craniosynostosis By Andrew Tom W. Baylan, Joseph Mittermiller, Paul A. Cheng, Homan Johns, Dana N. Edwards, Michael S. B. Cheshier, Sam H. Grant, Gerald A. , Lorenz, H. Peter - via Wikimedia Commons

Rheumatoid arthritis ankylosis