

Module 4 LO3

Bones Histology

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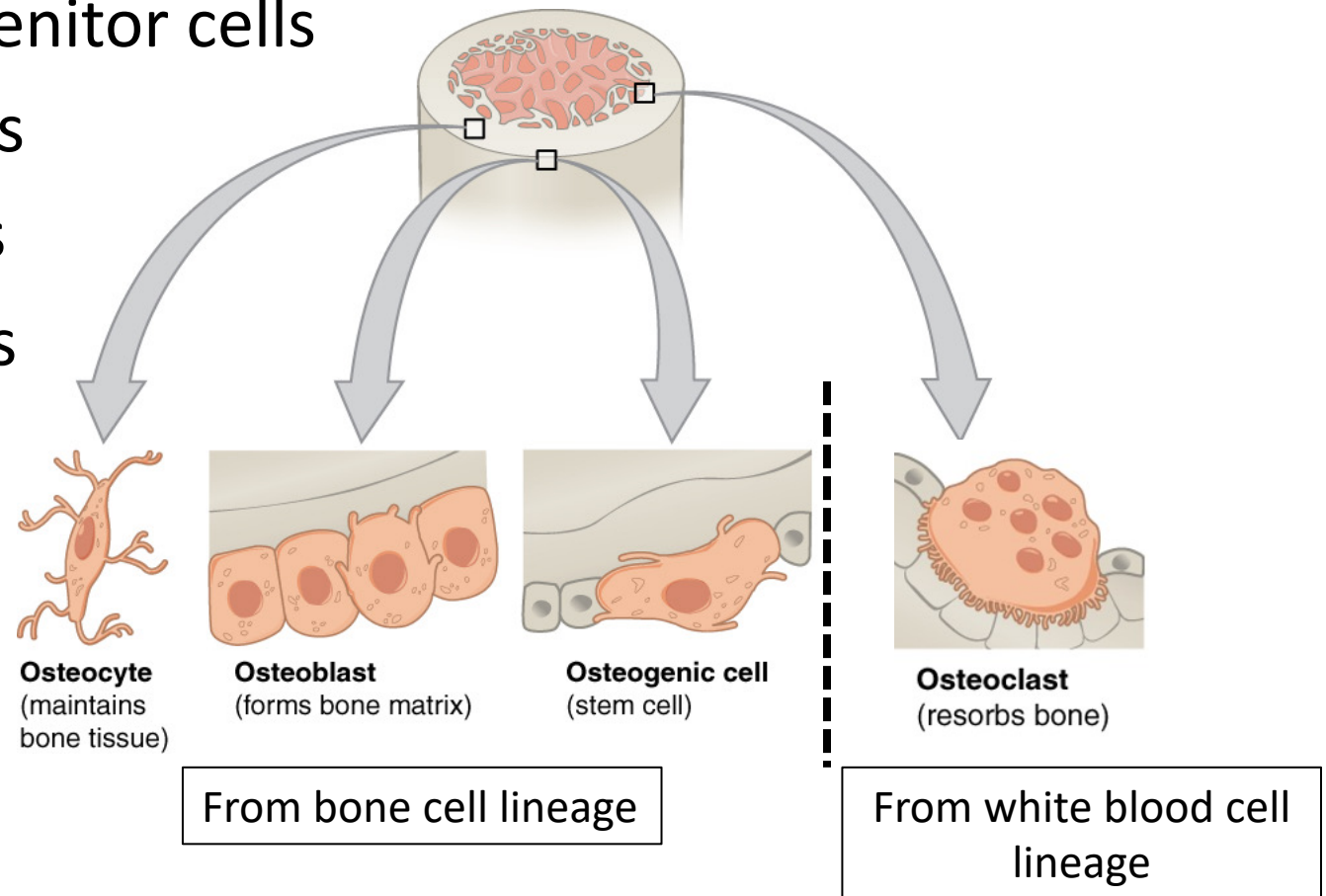
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3. Bone Histology

- Contains:
 - Abundant extracellular matrix that surrounds cells
- Extracellular contains
 - 15 % water
 - 30 % collagen fibers
 - 55 % crystallized mineral salts
 - Calcium phosphate – most abundant
 - Calcium phosphate + calcium hydroxide = hydroxyapatite (crystals)
 - Hydroxyapatite + calcium carbonate + Mg + F + K, SO₄
 - Salts + collagen fibers = crystalize and hardens tissue = calcification

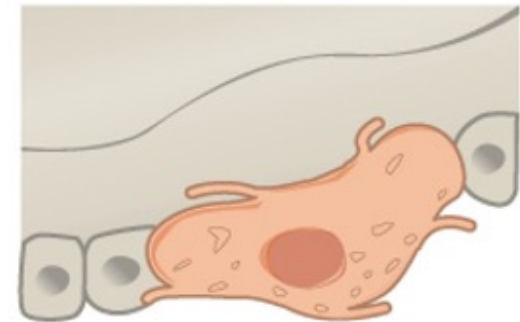
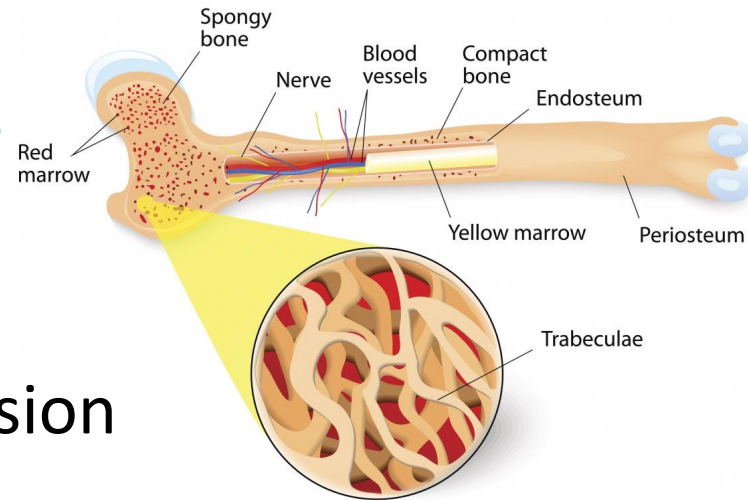
Types of Cells in Bone Tissue

1. Osteoprogenitor cells
2. Osteoblasts
3. Osteocytes
4. Osteoclasts



1. Osteoprogenitor Cells

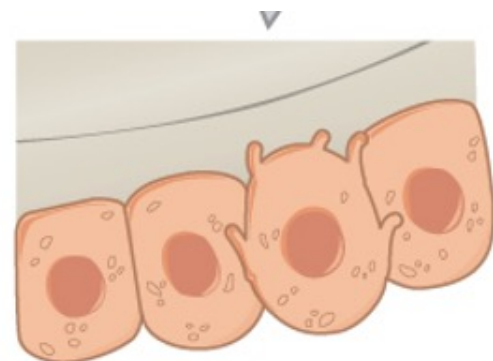
- Bone stem cells
- Only one that undergoes cell division
 - Become osteoblasts
- Location:
 - Inner portion of periosteum
 - Endosteum
 - Canals of bone that contain blood vessels



Osteogenic cell
(stem cells)

2. Osteoblasts

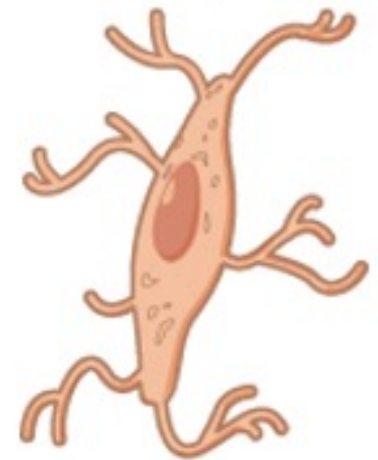
- Bone-building cells
- Synthesize and secrete collagen fibers and other organic components
 - Needed to build extracellular matrix of bone tissue
 - Initiate calcification
- This calcification traps the osteoblasts
 - Transform into osteocytes



Osteoblast
(forms bone matrix)

3. Osteocytes

- Mature bone cells
- Main cells in bone tissue
- Maintain daily metabolism
 - Exchange of nutrients and wastes with the blood
- Do not undergo cell division



Osteocyte
(maintains
bone tissue)

4. Osteoclasts

- Huge cell
 - Derived from fusion of monocytes
- Concentrated in endosteum
- Ruffled border
 - Releases powerful lysosomal enzymes and acids
 - Digest protein and mineral components of extracellular matrix
- Bone resorption
 - Part of normal development, growth, maintenance and repair of bone
- Help regulate blood calcium level
 - In response to certain hormones
- Used as target cells in osteoporosis

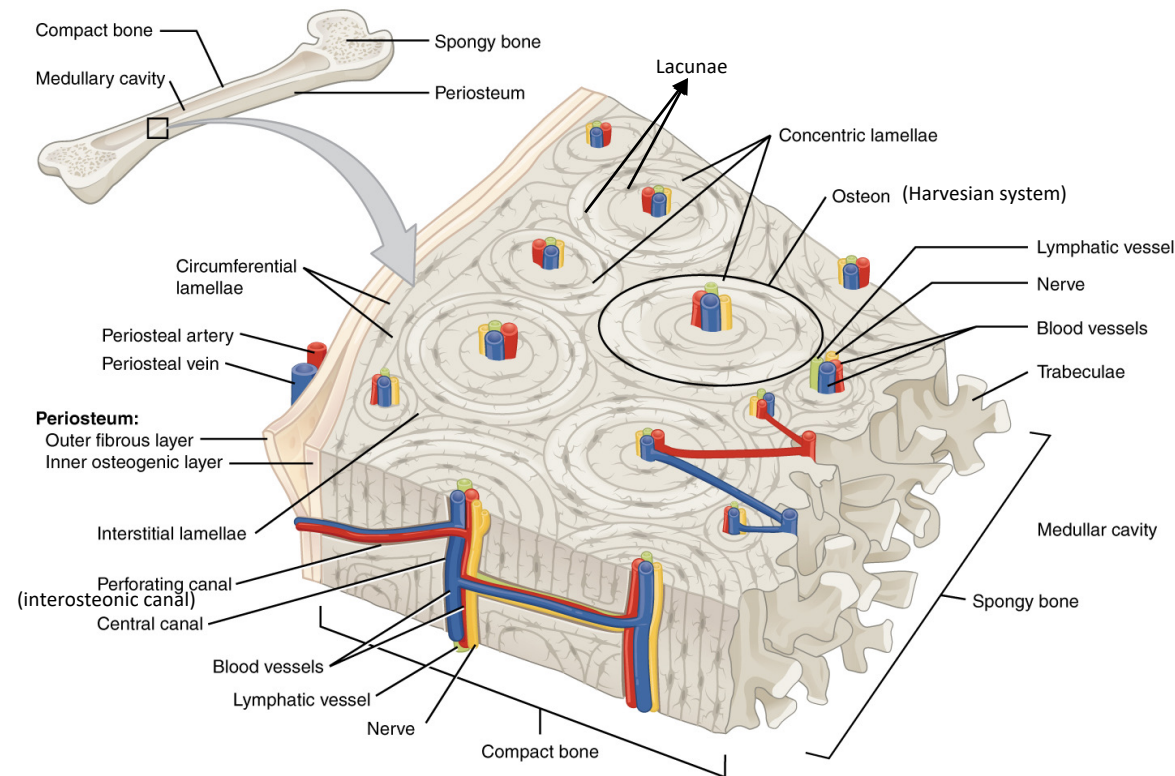


Osteoclast
(resorbs bone)

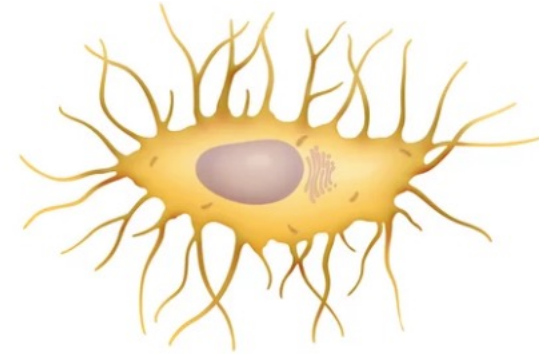
Bone Types

- Formed during ossification
 1. Woven bone
 2. Lamellar bone
- Classified according to amount of bone matrix relative to space
 - A. Spongy bone
 - B. Compact bone

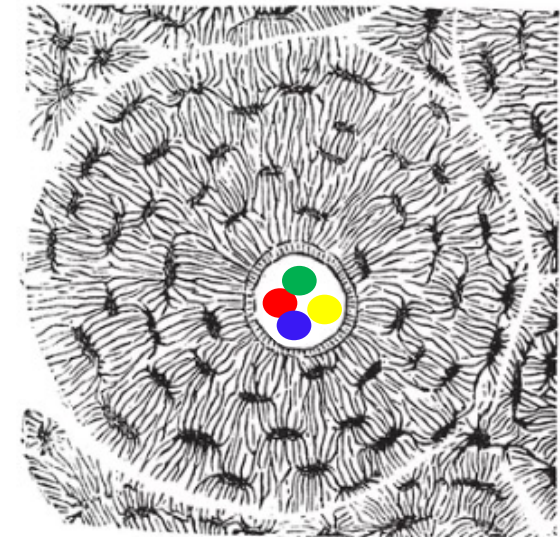
A. Histology of Compact Bone



Also called cortical or dense bone



Osteocyte



Osteon with lamellae and canaliculi

B. Histology of Spongy Bone

