

Chapter 6: Bones & Bone Tissue

Intro to the skeletal system:

- two types:
 1. Bone
 2. Cartilage

Functions of the Skeletal System

- support
- protection
- movement
- storage
- blood cell production

Cartilage

- 3 types:
 1. Hyaline cartilage
 - most of the bones develop from hyaline cartilage
 - growth and length of the bone and its repair involves the production of hyaline cartilage followed by bone replacement
 - most of the cartilage is made up of cartilage
 - e.g. costal cartilage; bronchi (lungs); tip of the nose
 2. Fibrocartilage
 - e.g. pubic symphysis/symphysis pubis; intervertebral disc
 3. Elastic cartilage
 - e.g. external ear; epiglottis
- Chondroblasts produce cartilage matrix
- when this matrix surrounds the chondroblast, it becomes chondrocyte (mature cartilage cell)

- the matrix contains collagen, which produces the strength
- it also contains proteoglycans, which makes the cartilage resilient
- the cartilage is covered by 2 layers called perichondrium
- the cartilage is avascular (no blood vessels)
- articular cartilage covers the ends of long bones and has no perichondrium

Classification of Bones

1. Long bone - bone is longer than it is wide; they are longer than the width
 - e.g. humerus
2. Short bone - cube shaped; bone about as long as it is wide
 - e.g. carpals and tarsals
3. Irregular bone - the bone's shape does not fit into the other classifications of bone
 - e.g. vertebrae; facial bones
4. Flat bone - the bone is broad, flat, and thin

Structure of the Long Bone

1. Diaphysis
 - also called the shaft
 - made up of compact bone
 - has a nutrient foramen through which blood vessels enter the compact bone
2. Epiphysis
 - the end of the bones
 - consists of spongy bone
 - they are wider than diaphysis
3. Epiphyseal Plate
 - also called growth plate
 - it is made up of hyaline cartilage
4. Epiphyseal Line
 - growth occurs at epiphyseal plate
 - when it stops growing, the epiphyseal plate becomes ossified (meaning when bone cells form) and is called the epiphyseal line

5. Medullary Cavity

- the diaphysis of the long bone can have a large internal space called the medullary cavity
- it is filled w/ red bone marrow (rbm) or yellow bone marrow (ybm)
 - red bone marrow produces blood cells that are present in cancellous bone (aka spongy bone)
 - e.g. proximal epiphysis of the long bone
 - e.g. sternum
 - e.g. iliac crest
 - yellow bone marrow is filled w/ adipose tissue and is found in the medullary cavity
 - e.g. limb bones of adults

6. Periosteum

- it is a double layered connective tissue covering the outer surface of the bone except where articular (hyaline) cartilage is present
- the ligaments and tendons attach to the bone through the periosteum
- the periosteum is secured to the underlying bone by perforating fibers

7. Endosteum

- it is a thin connective tissue membrane that lines the inner cavities of the bone

8. Articular cartilage

- it is a thin layer of hyaline cartilage covering the ends of the bone where it forms a joint

9. Cancellous bone (aka Spongy bone)

- a bone that has many small spaces found in the epiphysis

10. Compact bone

- it is a dense bone w/ few internal spaces and are organized into osteons
- they form the diaphysis and covers the cancellous bone of the epiphysis

Bone Histology

- Extracellular bone matrix