

Ch. 1 Continued

A. Typical Bony Features

- a. Articular (Hyaline) cartilage
 - i. Covers epiphysis to provide cushioning effect & reduce friction
 - ii. Secreted fluid during movement

B. Bone Growth

- a. Endochondral bones
 - i. Begin as mostly cartilage/ masses of cartilage
 - ii. Epiphyseal plates close
- b. Longitudinal growth continues as long as epiphyseal plates are open
 - i. Most close by 18, but some may be present until 25.
- c. Internal layer of periosteum builds new concentric layers on old layers
- d. Simultaneously, bone around sides of the medullary cavity is resorbed so that diameter is continually increased
- e. Osteoblasts – cells that form new bone
- f. Osteoclasts – cells that resorb old bone

C. Bone Properties

- a. Composed of calcium carbonate, calcium phosphate, collagen, & water
 - i. 60%-70% of bone weight – calcium carbonate & calcium phosphate
 - ii. 25%-30% of bone weight – water
- b. Collagen provides some flexibility in strength in resisting tension
- c. Aging causes progressive loss of collagen & increases brittleness
 - i. Aging fractures are most common in the hip or back
- d. Most outer bone is cortical with cancellous underneath
- e. Cortical bone – low porosity, 5%-30% nonmineralized (porous) tissue
- f. Cancellous bone – spongy, high porosity, 30%-90%
- g. Cortical is stiffer & can withstand greater stress, but less strain than cancellous
- h. Wolff's Law
 - i. Bone's response to the stress that is placed on it
 - ii. Bone size & shape are influenced by the direction & magnitude of forces that are habitually applied to them
 - iii. Bones reshape themselves based upon the stresses placed upon them
 - iv. Bone mass increases over time with increased stress

D. Bone Markings – pg. 14

- a. Processes (including elevations & projections)
 - i. Processes that form joints
 - 1. Condyle – medial & lateral condyle of femur. Large rounded projection that articulates with another bone.
 - 2. Facet – articular facets in the vertebra. Small, flat/nearly flat surface

3. Head - head of femur. Prominent round projection of bone.
- ii. Processes to which ligaments, muscles, or tendons attach
 1. Crest
 2. Epicondyle
 3. Line
 4. Process
 5. Spine (spinous process)
 6. Suture
 7. Trochanter
 8. Tubercle
 9. Tuberosity – projection
- b. Cavities (depressions) – including openings & grooves
 1. Facet
 2. Foramen
 3. Fossa
 4. Fovea – normally for blood vessel entrance
 5. Meatus
 6. Sinus
 7. Sulcus (groove)

E. Classification of Joints

- a. Articulation or arthroses
 - i. Connection of bones at a joint usually to allow movement between surfaces of bones
- b. Type & range of movements are similar in all humans; but the freedom, range, and vigor of movements are limited by configuration of bones where they fit together, ligaments & muscles
- c. 3 major classifications - Functional
 - i. Synarthrodial – immovable
 1. Suture such as skull sutures – close after 1st year
 2. Gomphosis such as teeth fitting into mandible or maxilla
 - ii. Amphiarthrodial – slightly movable
 1. Allow a slight amount of motion to occur
 2. Syndesmosis – held together with ligament. Tibia & fibula. Bones may or may not touch each other at actual joint. Ex: coracoclavicular joint.
 3. Symphysis – least amount of motion. Separated by fibrocartilage pad that allows very light movement. Pubic symphysis & intervertebral discs.
 4. Sychondrosis - separated by hyaline cartilage that allows very slight motion. Costochondral joint; connects ribs to sternum. Most amount of movement.
 - iii. Diarthrodial – freely movable
 1. Known as synovial joints
 2. Composed of sleeve-like joint capsule
 3. Secretes synovial fluid to lubricate joint cavity

4. The more movement a joint has, the less stable it is.
5. Capsule thickenings form tough, nonelastic ligaments that provide additional support against abnormal movement or joint opening
6. Articular or hyaline cartilage covers the articular surface ends of the bones inside the cavity
7. Range of motion are important to sustaining joint health & function
8. Some diarthrodial joints have specialized fibrocartilage disks
 - b> Medial and lateral menisci
 - c> Glenoid labrum
 - d> Acetabular labrum
9. Diarthrodial joints have motion possible in one or more planes
10. Degrees of freedom
 - b> Motion in 1 plane = 1 degree of freedom
 - c> Motion in 2 planes = 2 degrees of freedom
11. Six types
 - b> Arthrodial (gliding) joints
 - i. 2 plane or flat bony surfaces which butt against each other
 - ii. Little motion possible in any 1 joint articulation
 - iii. Usually work together in series of articulations
 - iv. Ex:
 1. Carpal bones of wrist (8)
 2. Innertarsal joints of feet
 - v. Flexion, extension, abduction, adduction
 - c> Ginglymus (Hinge) joint
 - i. An uniaxial articulation
 - ii. Articular surfaces allow motion in only one plan
 - iii. Ex:
 1. Elbow
 2. Knee
 3. Talocrural joint (ankle)
 - d> Trochoid (Pivot, Screw) joint
 - i. Also uniaxial articulation
 - ii. Ex:
 1. Atlantoaxial joint
 2. Radio-ulnar joints
 - e> Condylloid (Knuckle joint)
 - i. Biaxial ball & socket joint