

Joints

Joints

- Occur where two bones meet
- Allow various ranges of motion?
- Are they found in only the appendicular skeleton?

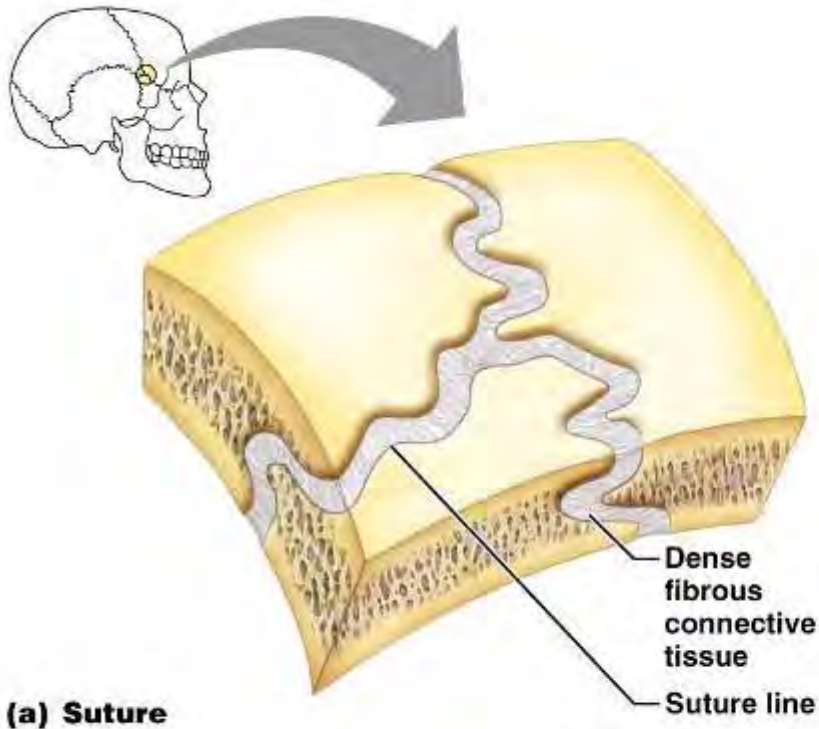
Two ways to classify joints

- **Range of motion**
 - Synarthrosis, amphiarthrosis, diarthrosis
- **Composition of the joint**
 - Boney, fibrous, cartilaginous, synovial

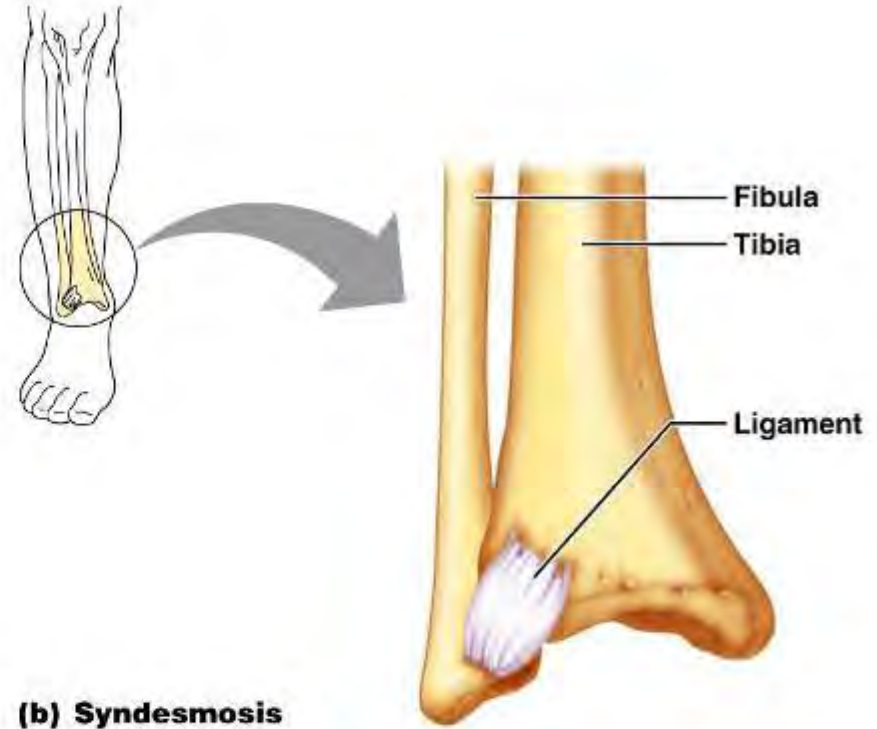
Synarthrosis (immovable)

- Would these be strong joints?
- Examples?
 - **Sutures** (skull bones)
 - **Gomphoses** (teeth)
 - **Synchondroses** (epiphyseal cartilages)
 - **Synostosis** (epiphyseal lines of mature long bones)

Fibrous articulations



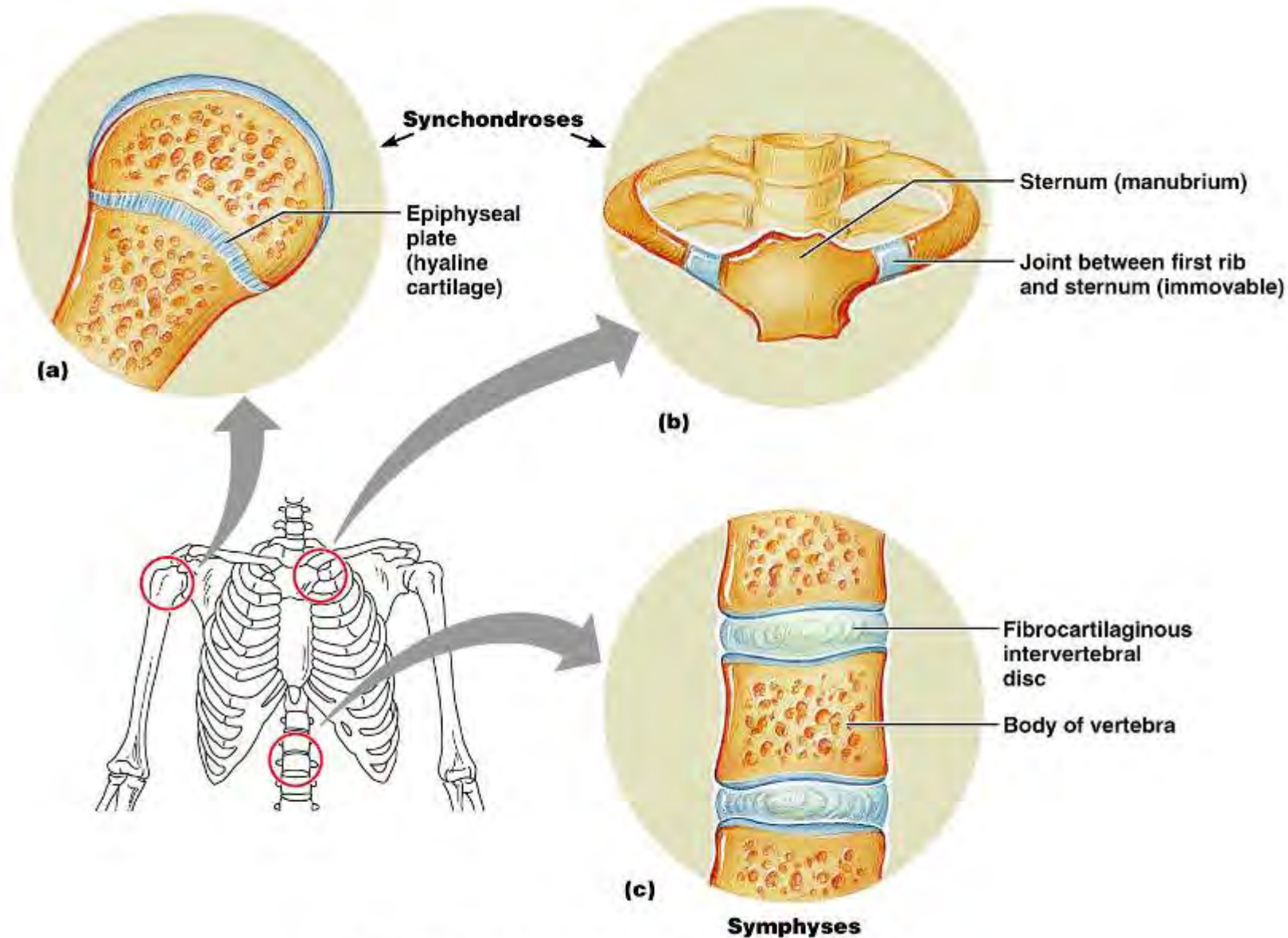
Synarthrotic



Amphiarthrotic

Amphiarthroses (slightly movable)

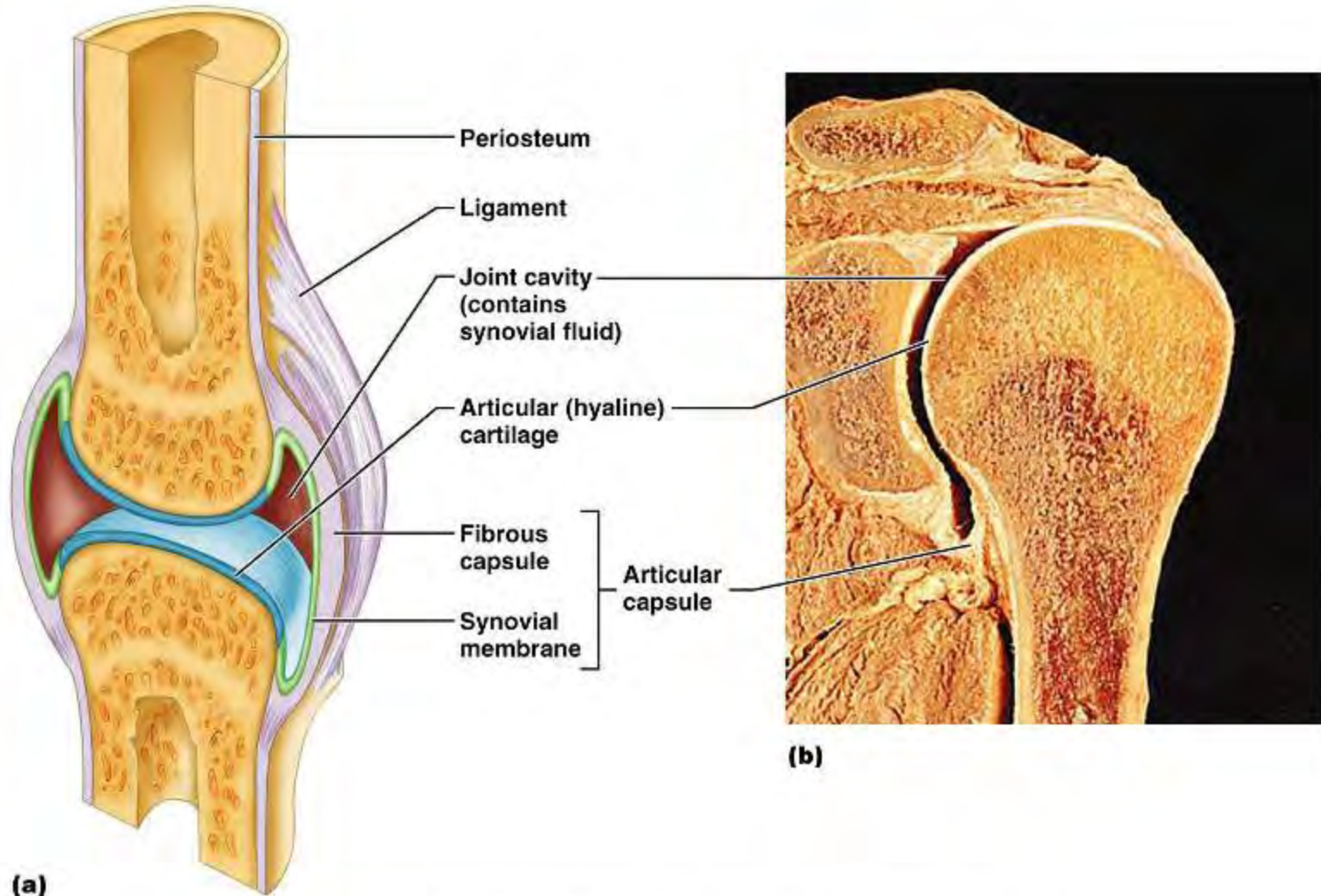
- Would these be strong?
- Joint is formed with collagen fibers or cartilage
- Examples:
 - **Syndesmosis** (ligaments)
 - **Symphyses** (separated by fibrocartilage; pubic symphysis, vertebral discs)



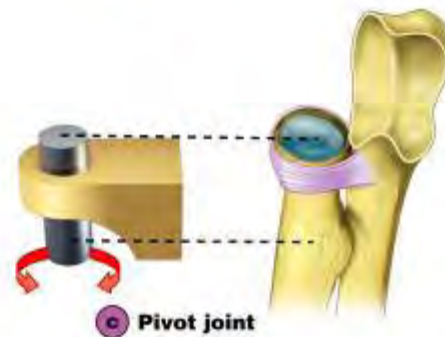
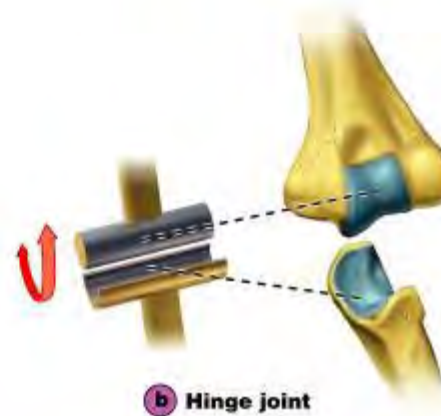
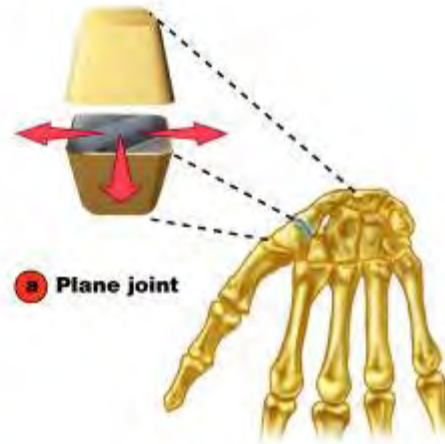
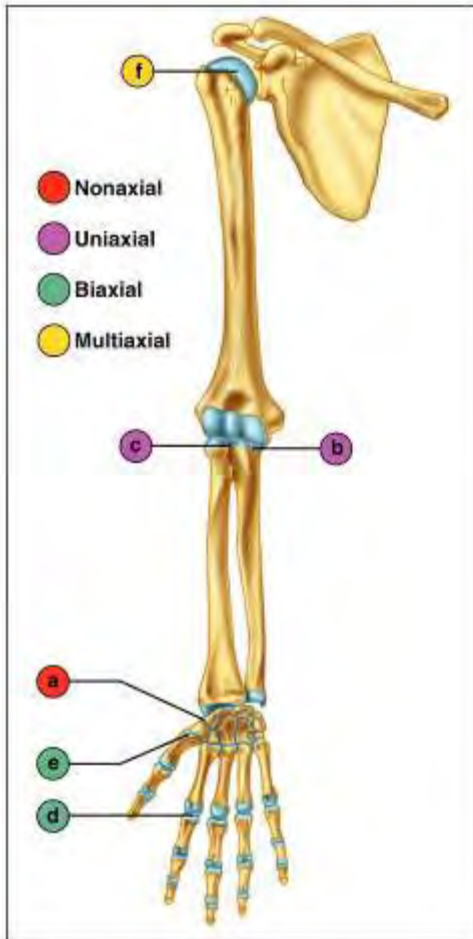
Diarthroses (freely movable)

- Are these joints strong?
- What is the key function?
- **All diarthrotic joints are synovial joints**
- Examples?
 - Knee
 - Shoulder
 - Hip

Parts of articulations



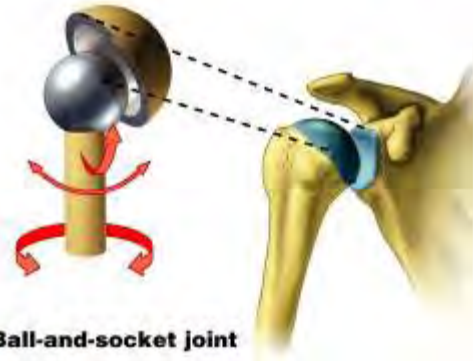
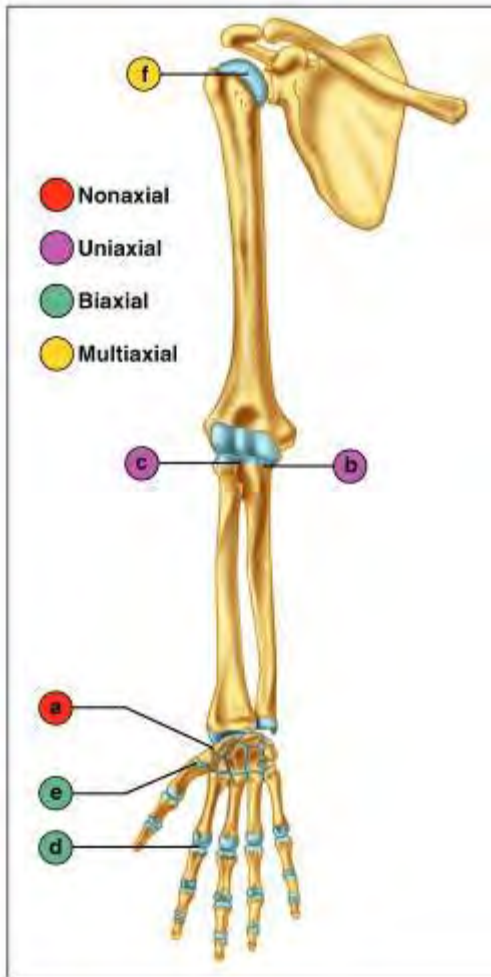
Synovial joints



- **Plane**; slight movement
- **Pivot**; slight rotational movement in 1 direction
- **Hinge**; movement in 1 direction

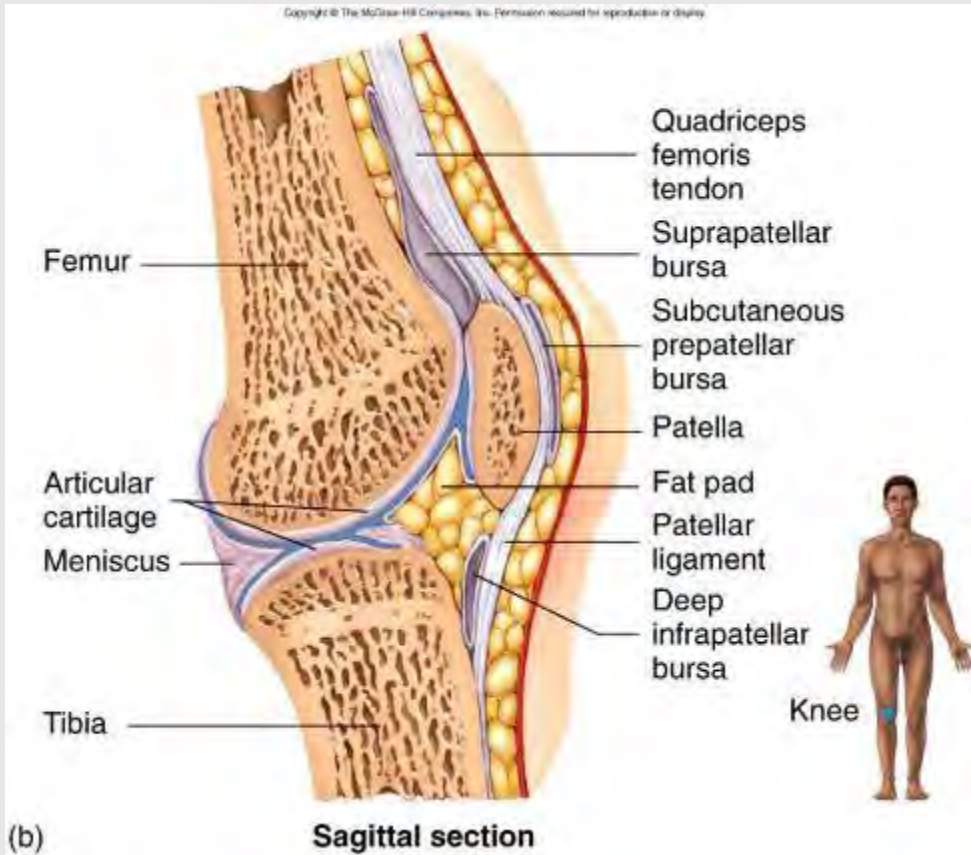
Synovial joints

- **Saddle**; major movement in 1 direction; slight in another
- **Ball & Socket**; movement in *multiple* axes
- **Condyloid**; 2 or more axes



f Ball-and-socket joint

Synovial joints have lots of structures



Bursa: Connective tissue pads

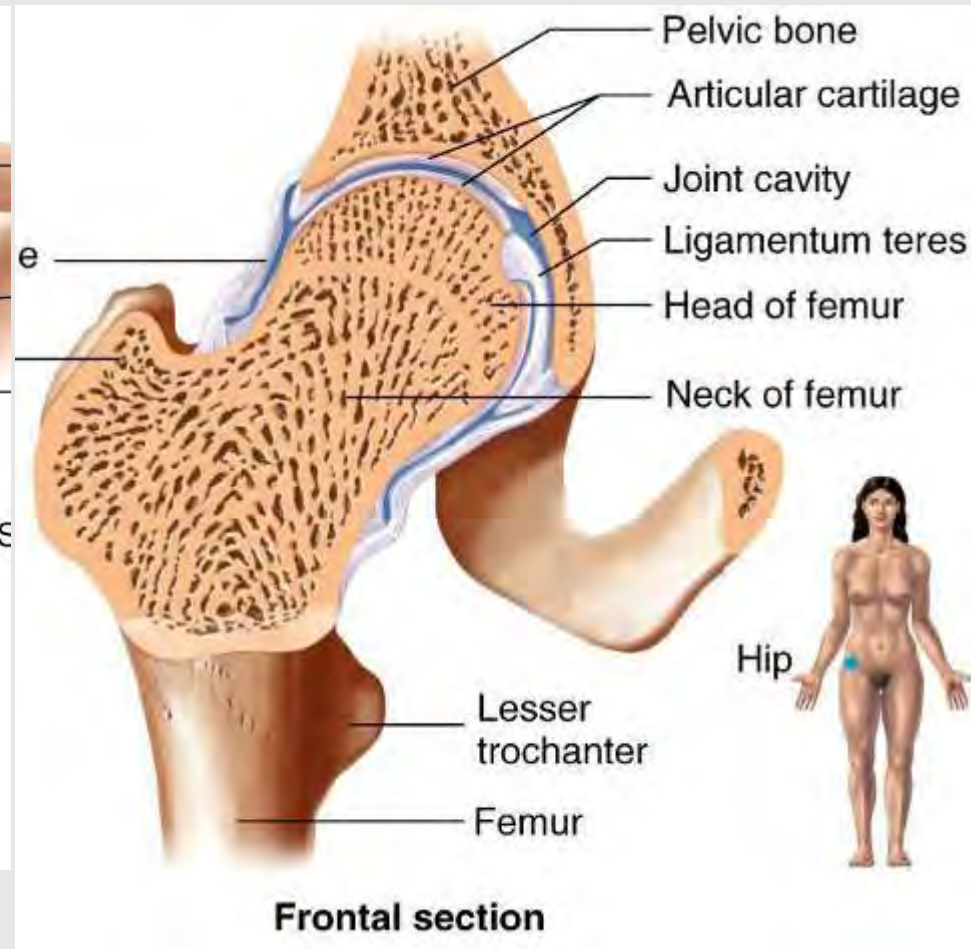
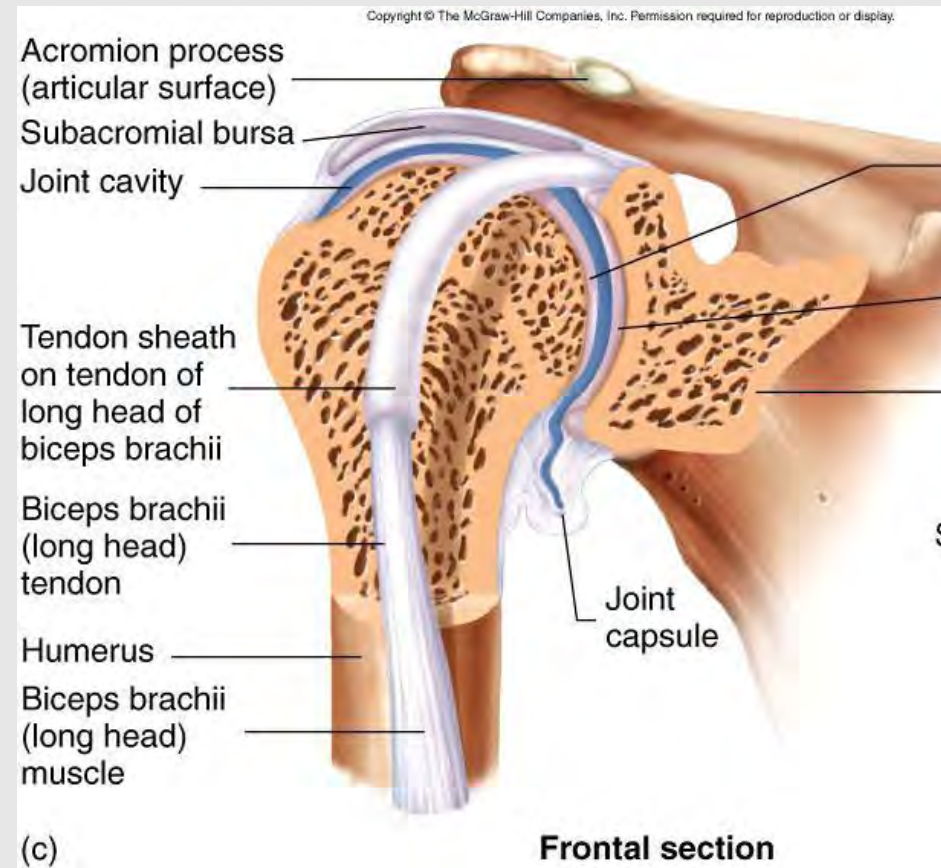
Meniscus: Fibrocartilage pads

Synovial fluid:
proteoglycan-rich fluid for:

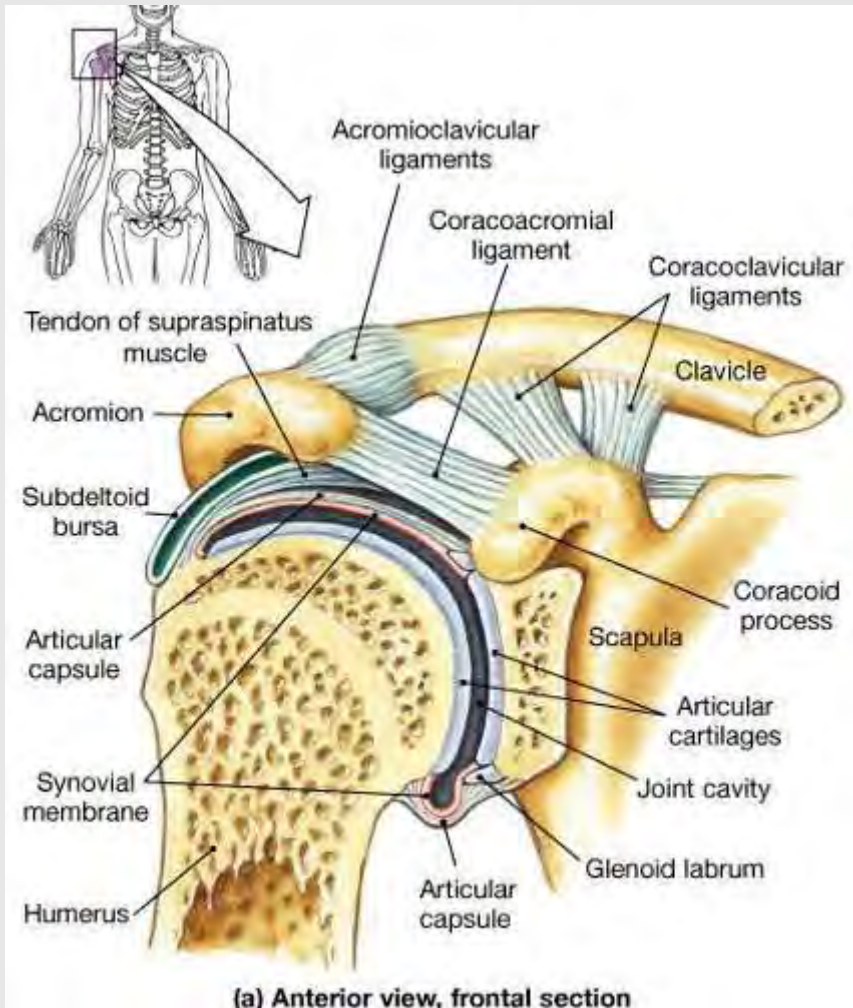
1. Lubrication
2. Shock absorption
3. Nutrient delivery

Compare shoulder & hip

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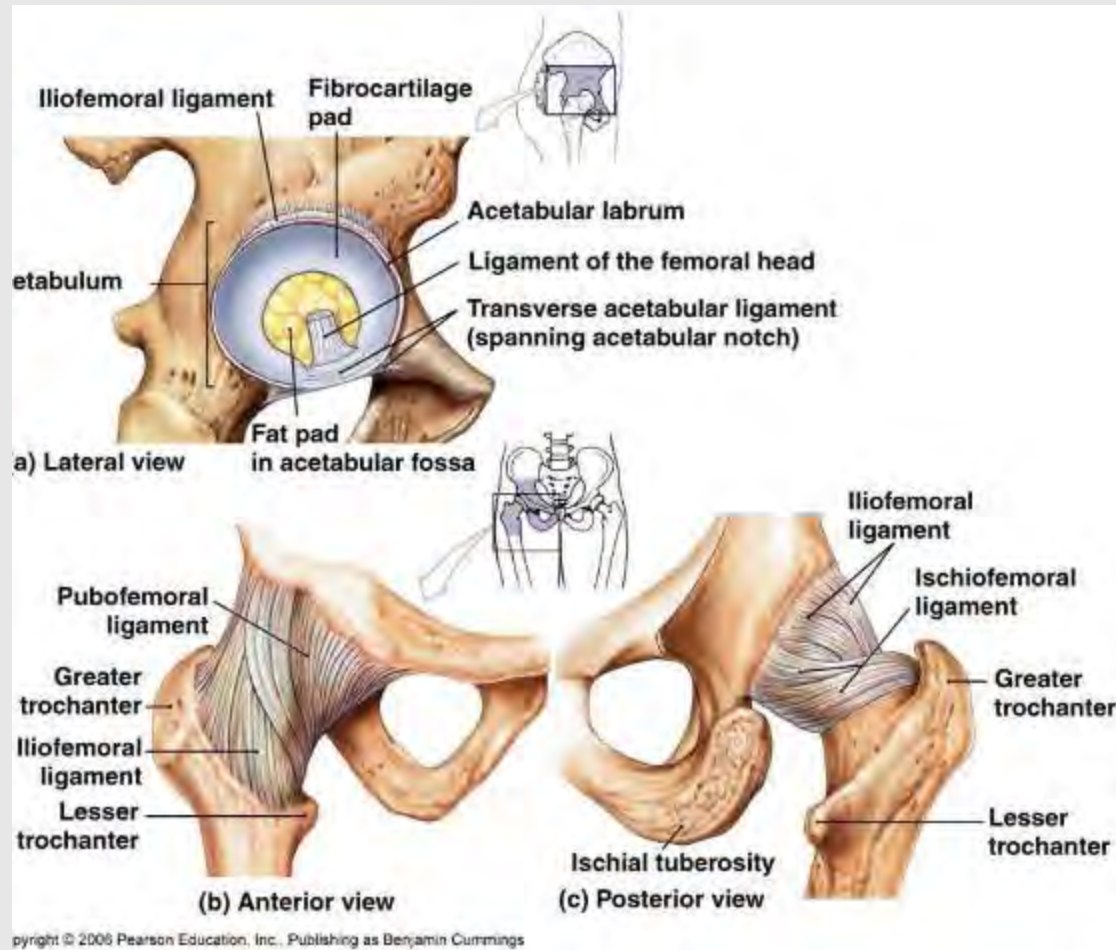


Shoulder joint



- **Most mobile joint**
- **Weakest joint**
- Small ligaments hold shoulder together
- Small, thin muscles stabilize humerus
- Shallow joint capsule

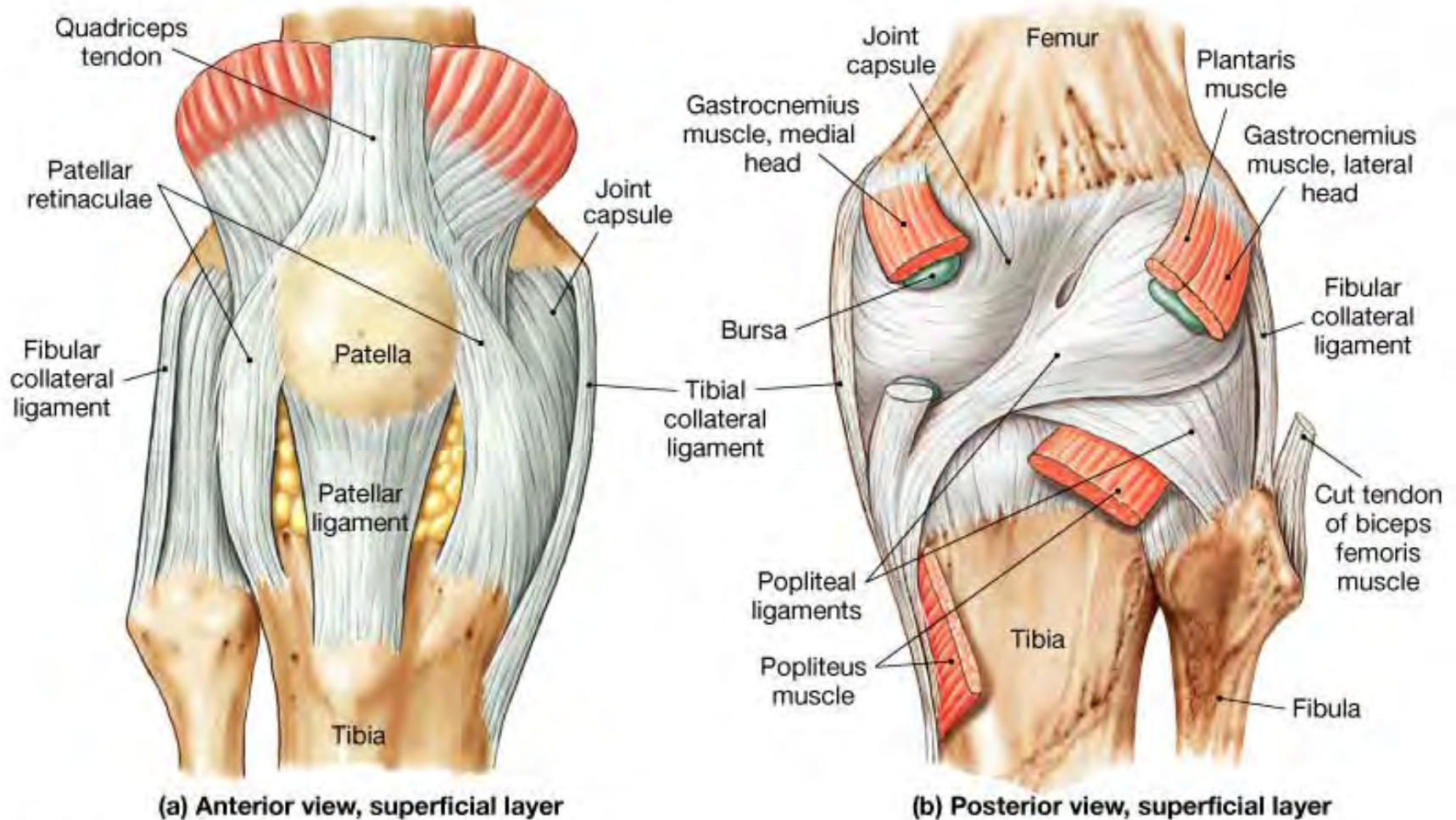
Hip joint



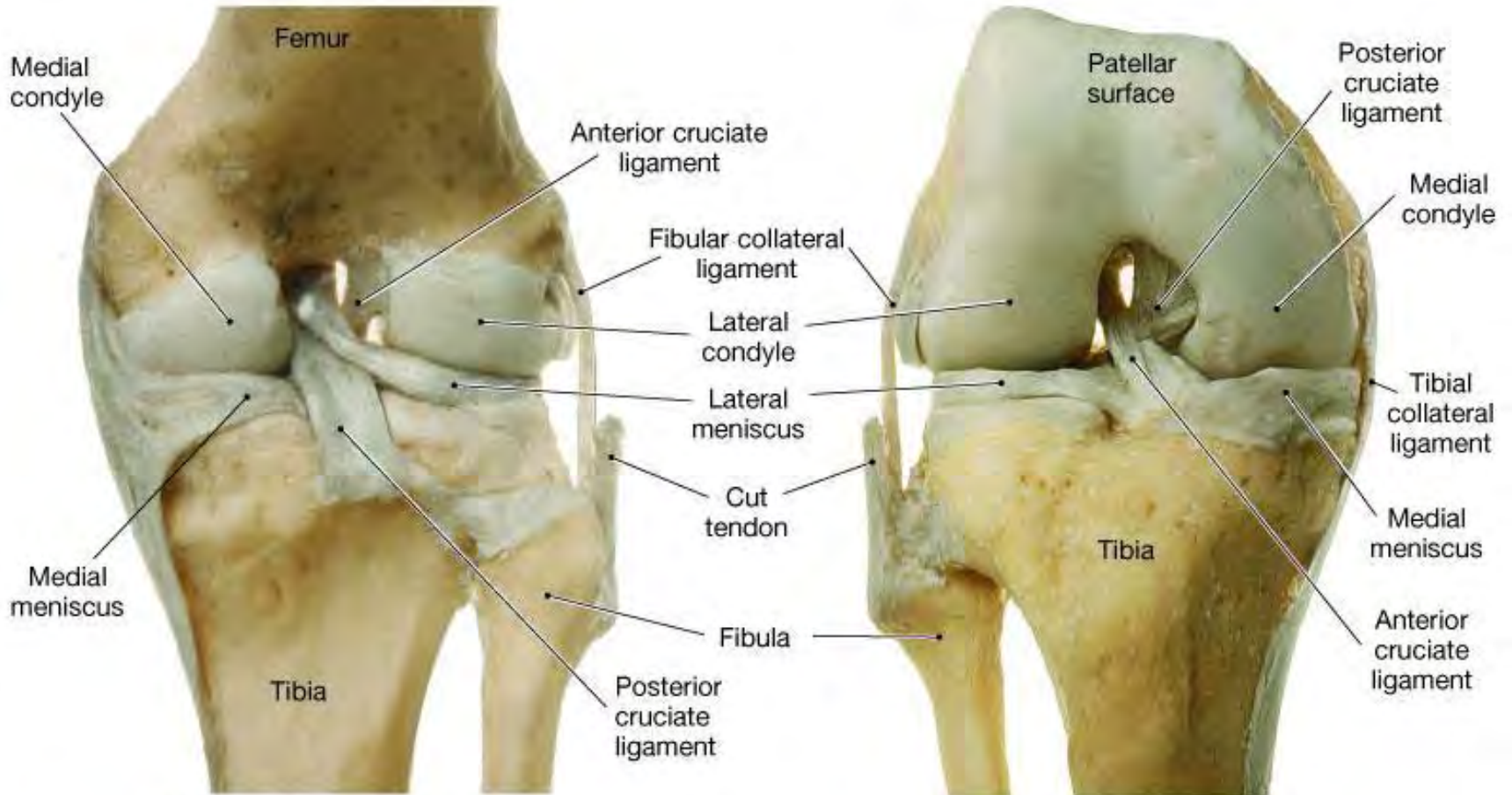
Very Stable

- Acetabulum swallows head of femur
- Multiple ligaments wrap entire joint capsule
- Massive muscles stabilize position

Knee joint: complex



Knee joint

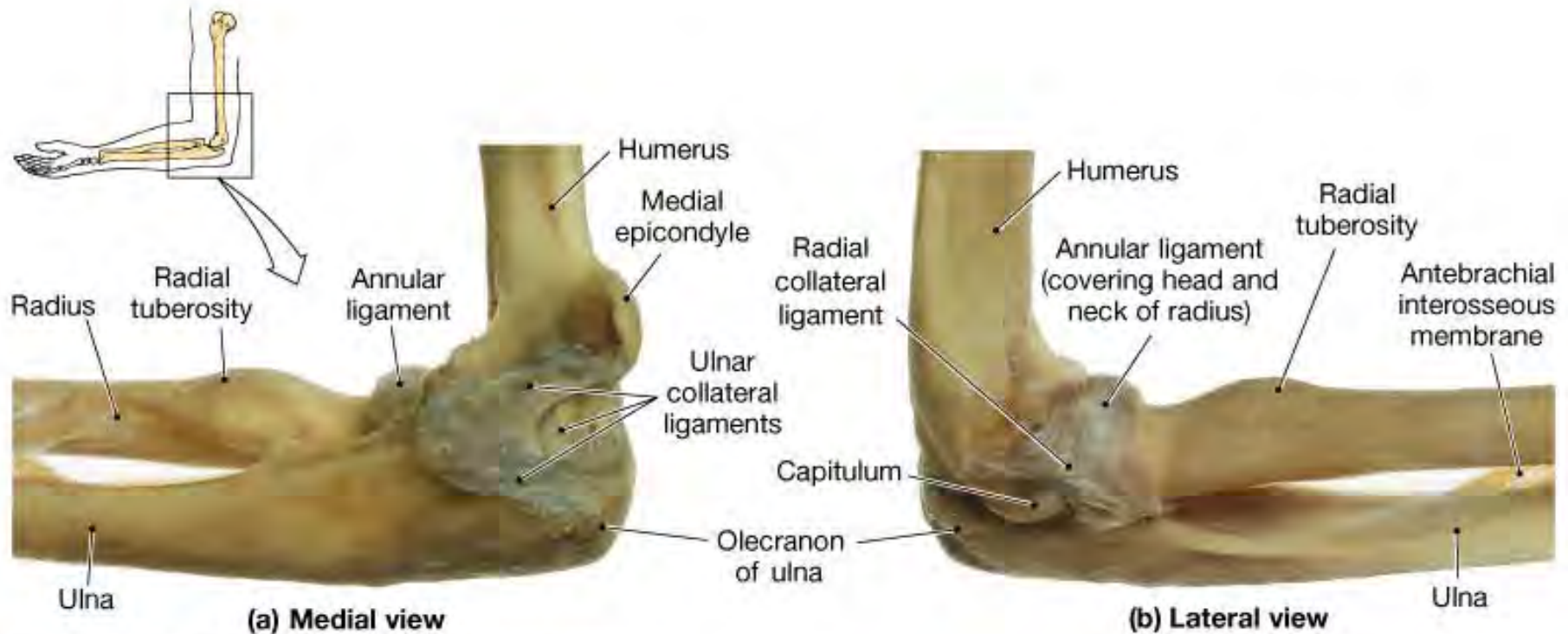


(c) Deep posterior view, extended

(d) Deep anterior view, flexed

Elbow joint

Most stable: interlocking bones; single joint capsule; strong, wrapping ligaments



Joint Disorders

- **Arthritis**

- **Rheumatoid arthritis:** Affects connective tissues; most pronounced & crippling in joints of hands & feet
- Autoimmune disease (body attacks itself)
- CT cells of synovial membrane proliferate, grow into articular cartilage of bones; bones eventually fuse

Joint Disorders

- **Arthritis**
 - **Osteoarthritis:** Natural degeneration with age and lack of exercise
 - **Gout:** Accumulation and storage of crystals of uric acid (waste) in kidney & joints
 - Most often affects base of big toe & other leg & foot joints

Joint Disorders

- **Sprains:** pulled or torn joint stabilizing ligaments
 - Results when bones of joints are pulled forcefully apart
- **Dislocation:** the end of one bone is pulled OUT of socket.
 - Occurs in ball & socket, ellipsoid or pivot joints
- **Cartilage injuries:** "Hammering" on articular cartilage squashes and kills chondrocytes

Joint Disorders

- **Bursitis:** Inflammation of bursa
 - Inflammation of bursae around shoulder and elbow is common
 - Caused by muscle *instability* or *underdevelopment*
 - Bursitis at base of big toe = **Bunion**
 - Often caused by wearing shoes too tight