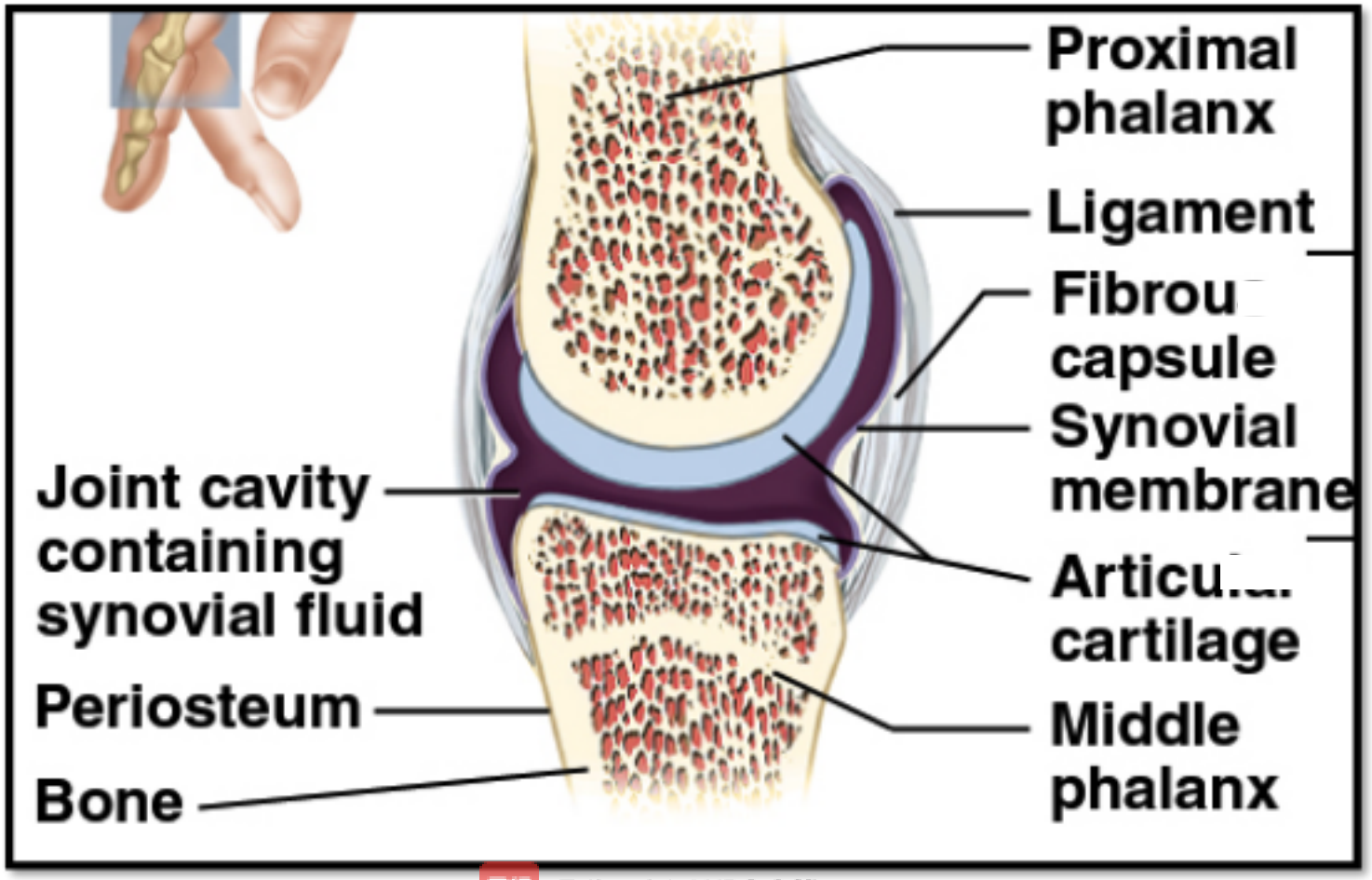
JOINTS

Synovial Joint

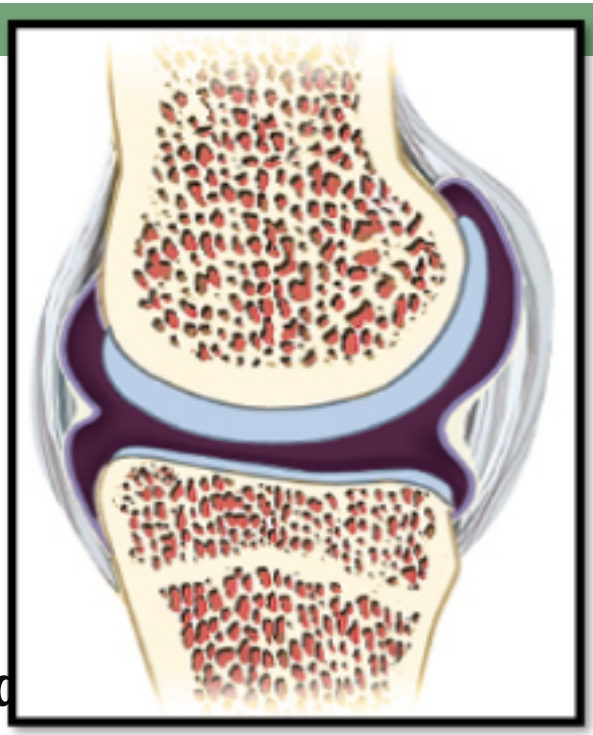
- Joint in which two bones are separated by a space called a joint cavity
- Most are freely movable



General Anatomy of Synovial Joints

Fibrous capsule

- Enclose synovial cavity
- Lined by synovial membrane
- continuous with periosteum
- Stabilize the joint, permit movement but resist dislocation



Synovial membrane

highly vascular membrane inside fibrous capsule c
synovial fluid

- viscous slippery fluid rich in albumin & hyaluronic acid & similar to raw egg white

Cont.

- **Articular cartilage:** Hyaline cartilage covering the joint surfaces
- **Meniscus:** is pad of fibrocartilage in jaw, wrist, knee and sternoclavicular joints
  - absorbs shock, guides bone movements & distributes forces
- **Tendon:** Attaches muscle to bone
- **Ligament:** Attaches bone to bone
- **Bursa:** Pouch like sac of connective tissues filled with synovial fluid
- **Tendon sheaths:** Are elongated cylinders of connective tissue lined with synovial membrane & wrapped around a tendon
  - numerous in hand and foot

Classification of synovial joint

- According to the shape of articular surfaces
- According to plans
- According to number of articulating bones

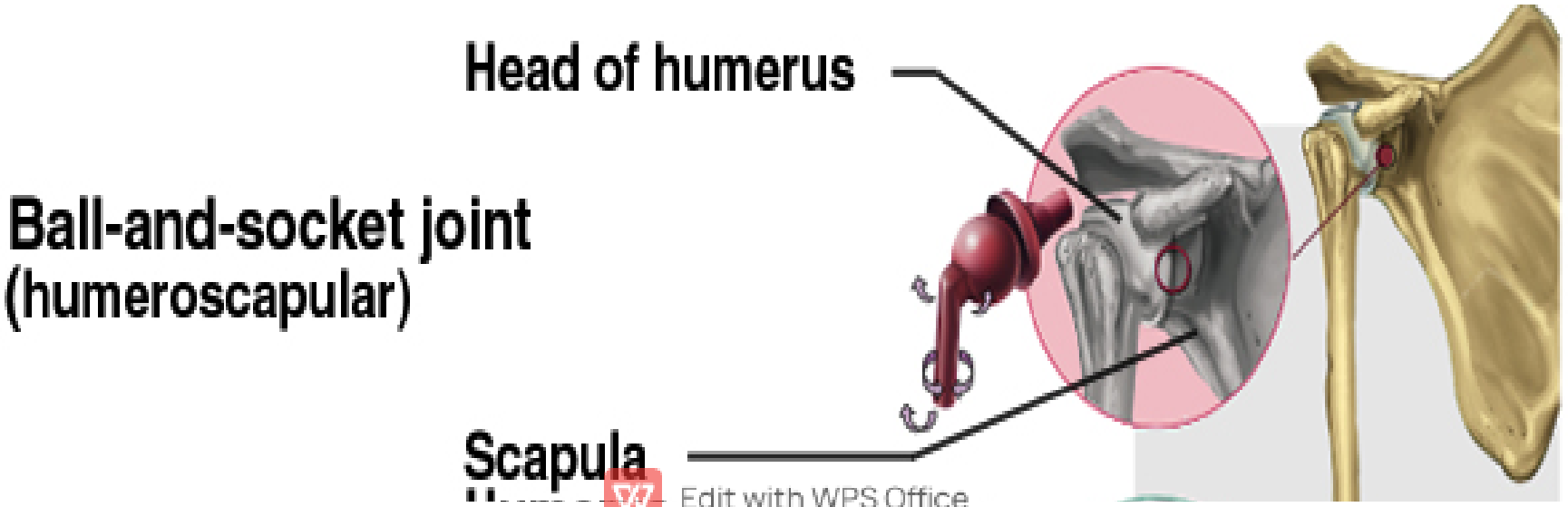
Classification Synovial Joints

- According to the shape of articular surfaces
- Synovial are classified into:

1. Hinge Joint
2. Pivot Joint
3. Condyloid Joint
4. Saddle-shaped joint
5. Ball and Socket Joint
6. Plane Joint

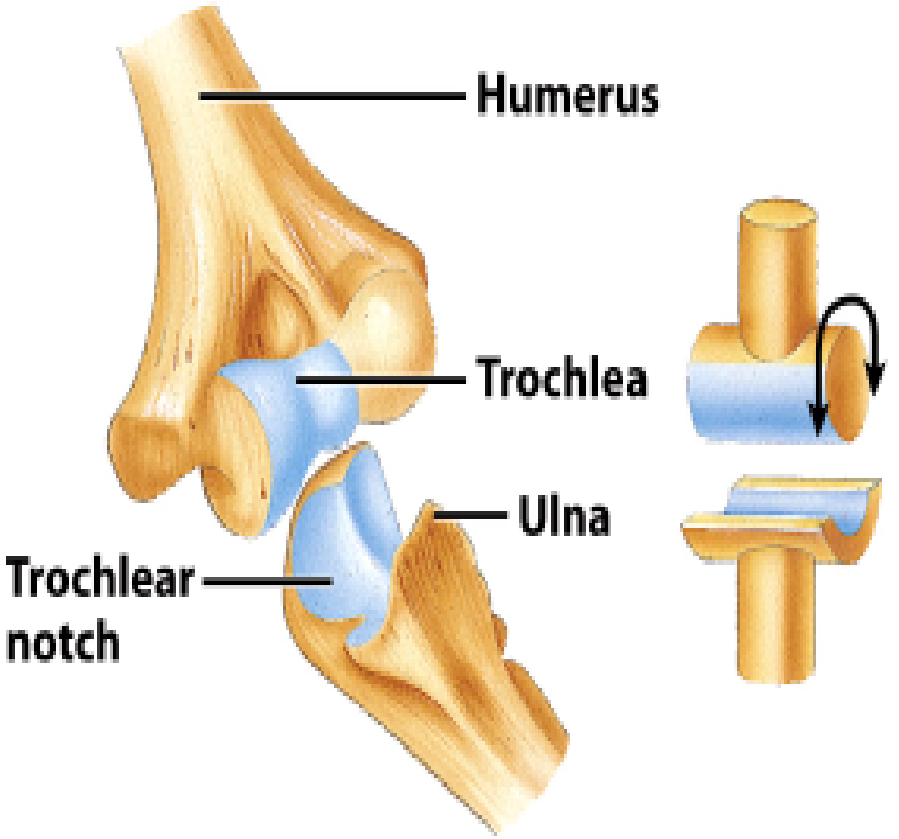
Ball-and-Socket Joints

- Smooth hemispherical head fits within a cuplike depression
  - head of humerus into glenoid cavity of scapula
  - head of femur into acetabulum of hip bone
- Multiaxial joint



Hinge Joint

- Uniaxial
- One bone with convex surface that fits into a concave depression on other bone
- Pully shaped
  - ulna and humerus at elbow joint
  - femur and tibia at knee joint



Hinge joint between trochlea of humerus and trochlear notch of ulna at the elbow

Figure 9-10b Principles of Anatomy and Physiology, 11/e
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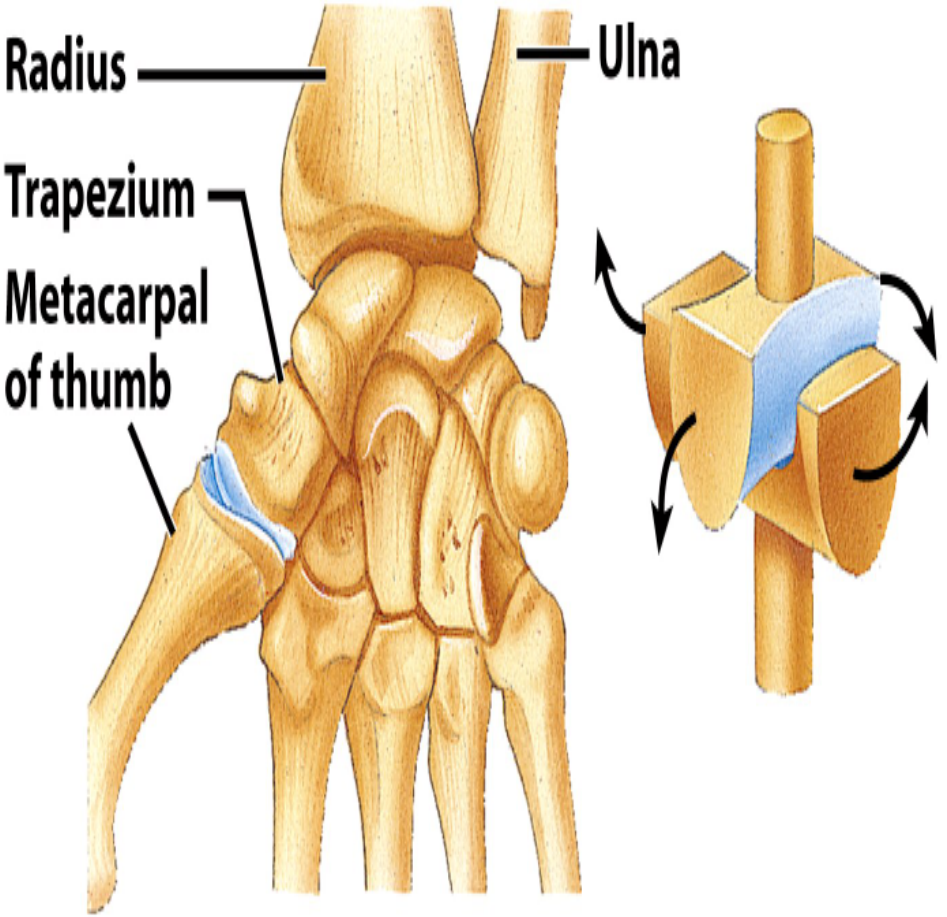
Saddle Joints

- Each articular surface is shaped like a saddle,

concave in one direction and convex in the other

  - trapeziometacarpal joint at the base of the thumb
  - Sternoclavicular joint

- Biaxial joint
  - more movable than a condyloid or hinge joint forming the primate opposable thumb

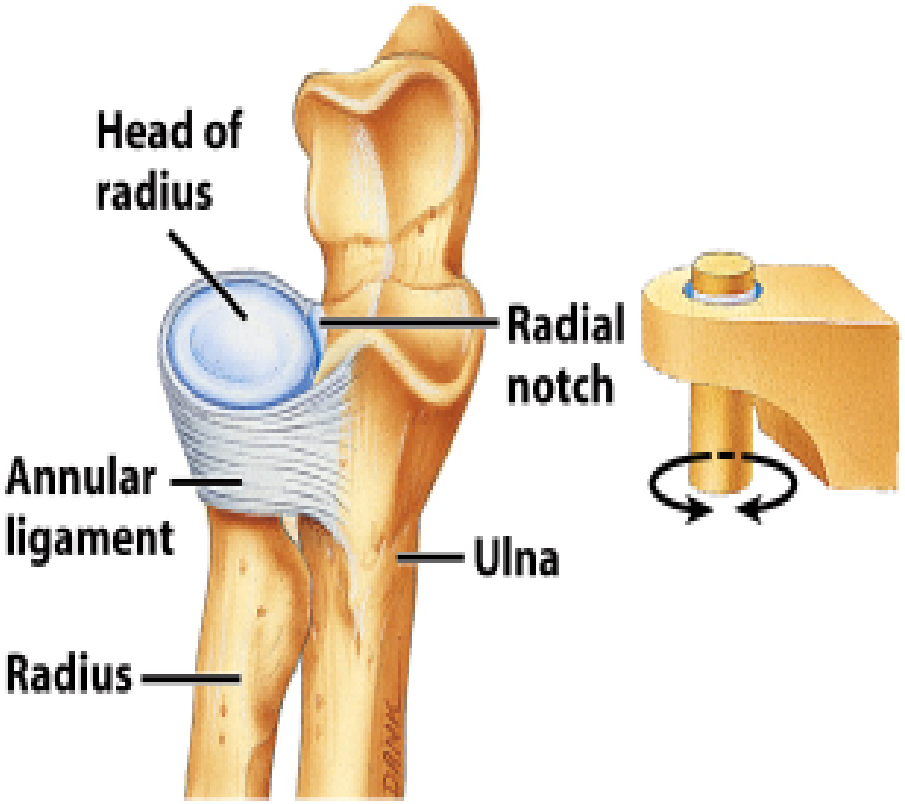


Saddle joint between trapezium of carpus (wrist) and metacarpal of thumb

Figure 9-10e Principles of Anatomy and Physiology, 11/e

Pivot Joints

- One bone has a projection that fits into a ringlike ligament of another
- First bone rotates on its longitudinal axis relative to the other
- Limited rotation
  - atlantoaxial joint (dens and atlas)
  - proximal radioulnar joint allows the
  - radius during pronation and supination



Pivot joint between head of radius and radial notch of ulna

Figure 9-10c Principles of Anatomy and Physiology, 11/e
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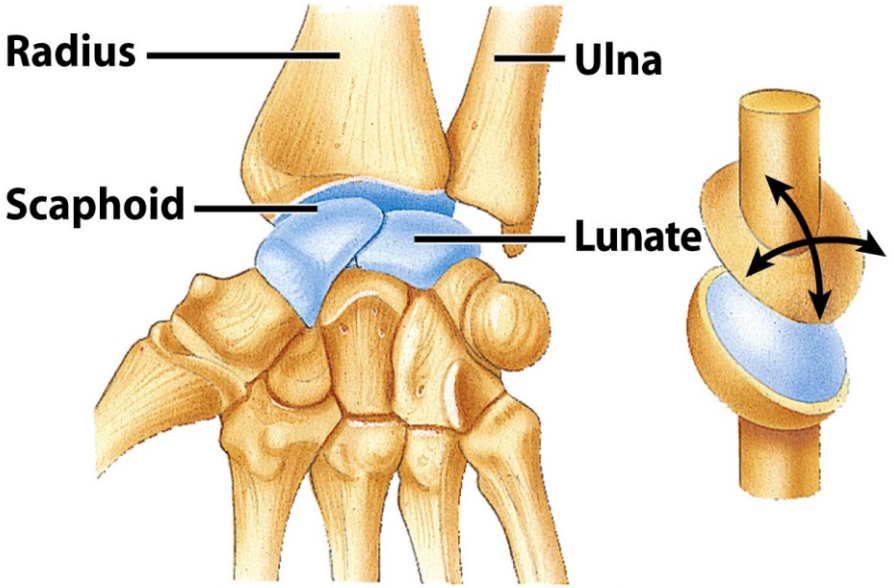
Condyloid (ellipsoid) Joints

- Oval convex surface on one bone fits into a similarly shaped depression on the next
  - radiocarpal joint of the wrist
  - metacarpophalangeal joints at the bases of the fingers
- Biaxial joints

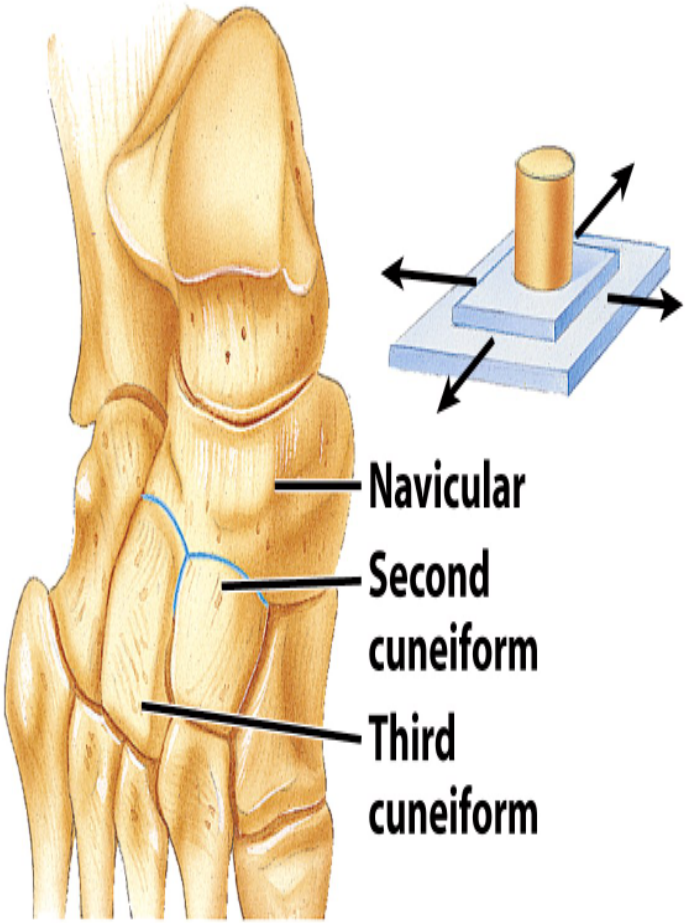


Condyloid joint between radius and scaphoid and lunate bones of the carpus (wrist)

Figure 9-10d Principles of Anatomy and Physiology, 11/e

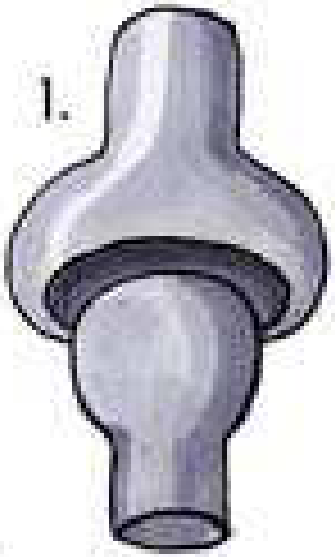
Gliding Joints

- Flat articular surfaces in which bones slide over each other
- Limited monoaxial joint
- Intercarpel joints
- Intermetatarsal joints
- Intermetacarpel joints
- Intertarsal joints



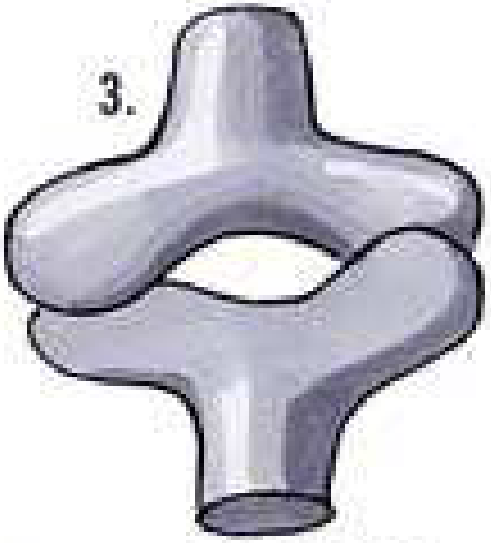
Planar joint between the navicular and second and third cuneiforms of the tarsus in the foot

Figure 9-10a Principles of Anatomy and Physiology, 11/e



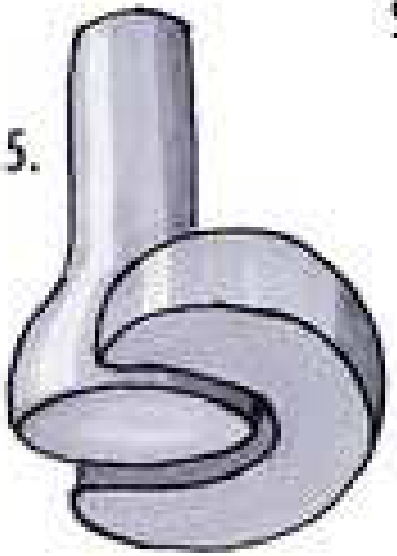
Ball and Socket Joint

Ellipsoid Joint



Saddle Joint

Hinge Joint



Pivot Joint

Classification Synovial Joints

- According to planes
- **Uniaxial** movement occur in one plane e.g. hing joint
- **Biaxial** movement occur in two planes e.g. condylar joint
- **Multiaxial** movement occur in three planes e.g. ball and socket joint

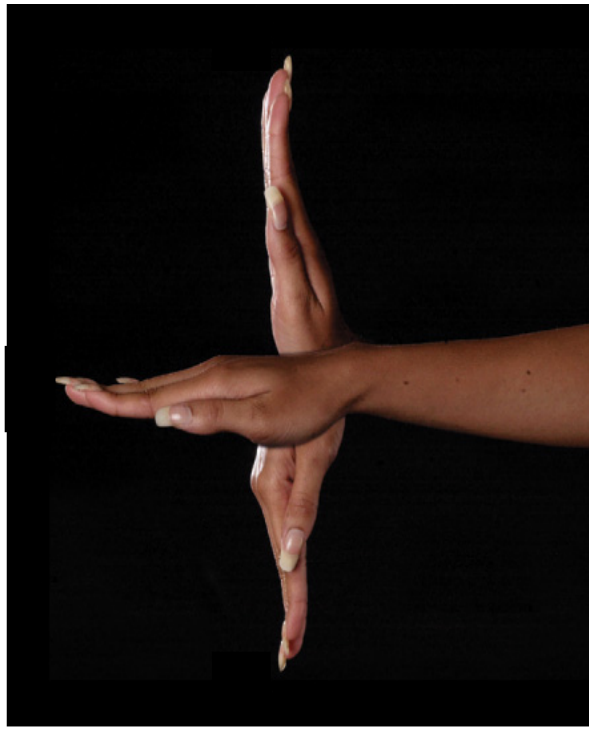
Classification Synovial Joints

- According to number of articulating surfaces
- Simple joints two bones involve e.g. interphalangeal joint
- Compound joints more than two bones involve
- Ankle joint (tibia , fibula ,talus)

Movements of joints

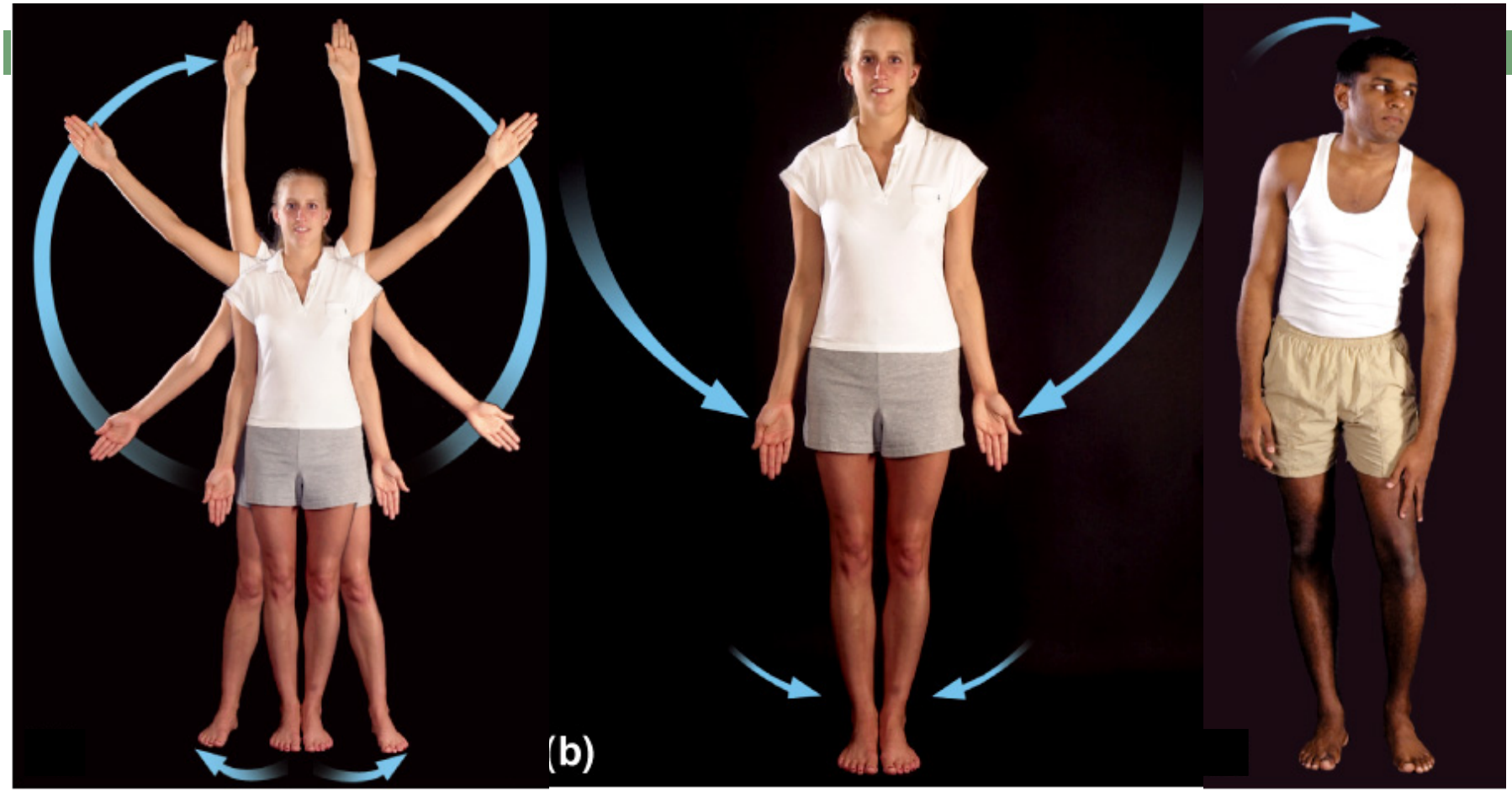
Flexion, Extension & Hyperextension

- **Flexion** decreases the angle of a joint
  - bending elbow or wrist
- **Extension** straightens a joint and returns a body part to the anatomical position
- Hyperextension is extension of a joint beyond 180 degrees



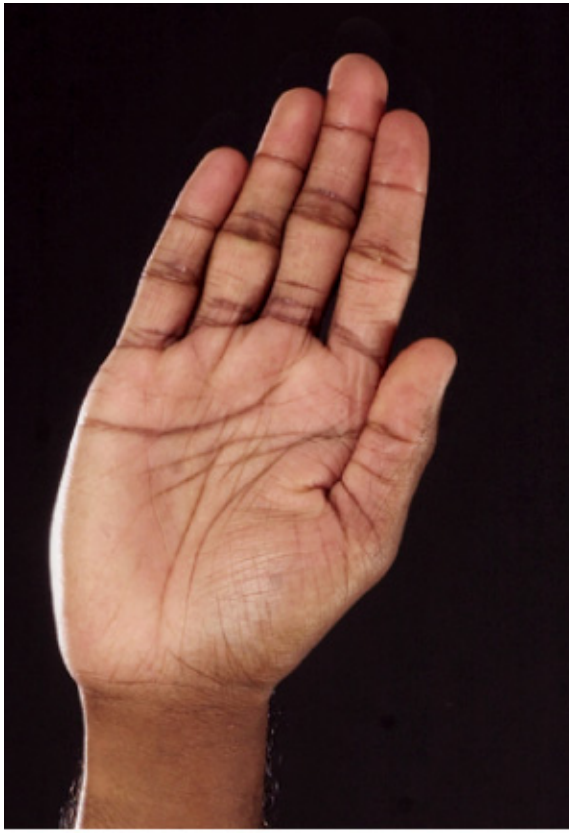
Flexion, Extension

Abduction & Adduction

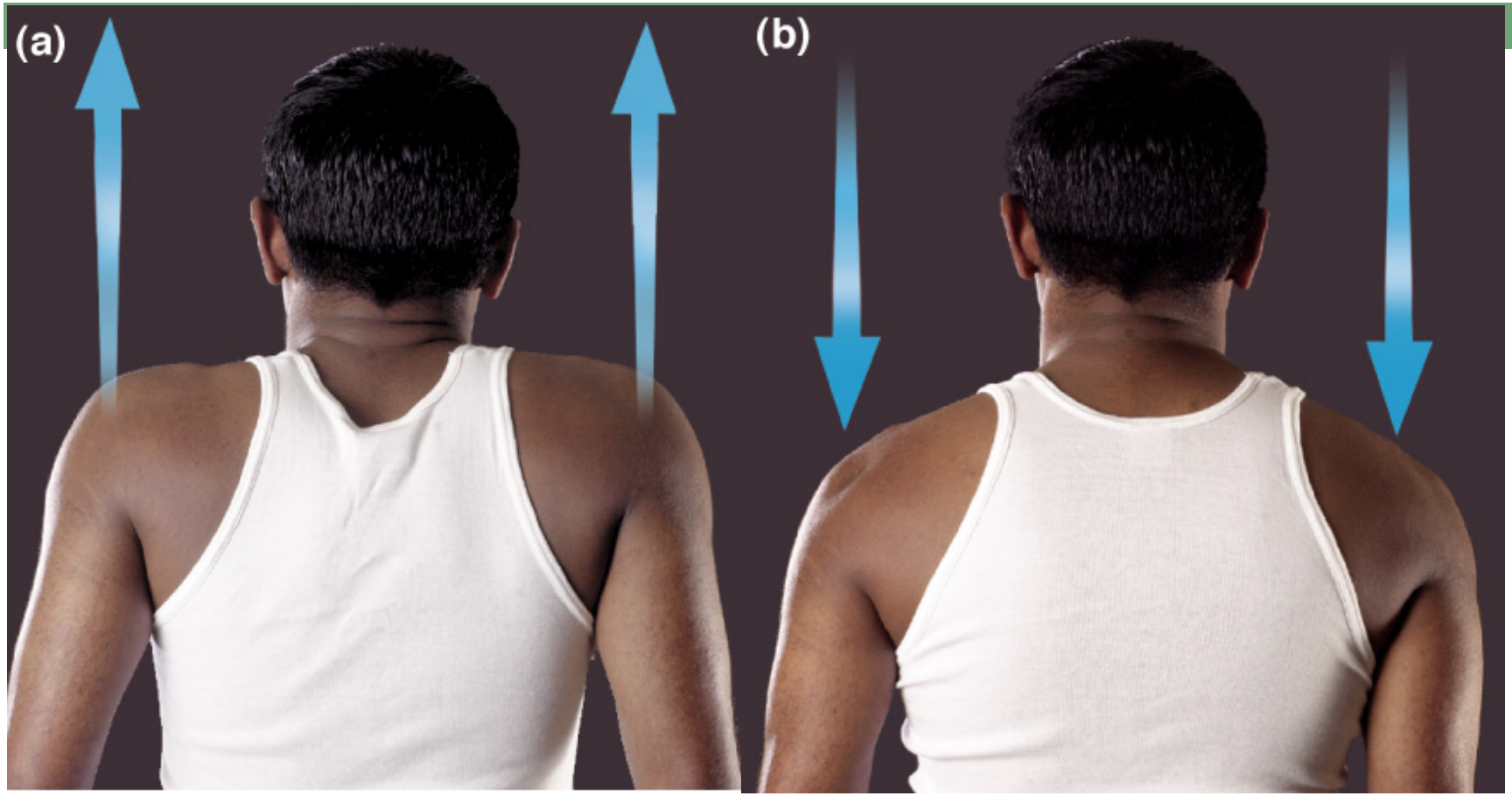


- Abduction is movement of a part away from the midsagittal line -- raising the arm to the side
- Adduction is movement towards the midsagittal line

Abduction & Adduction



Elevation and Depression

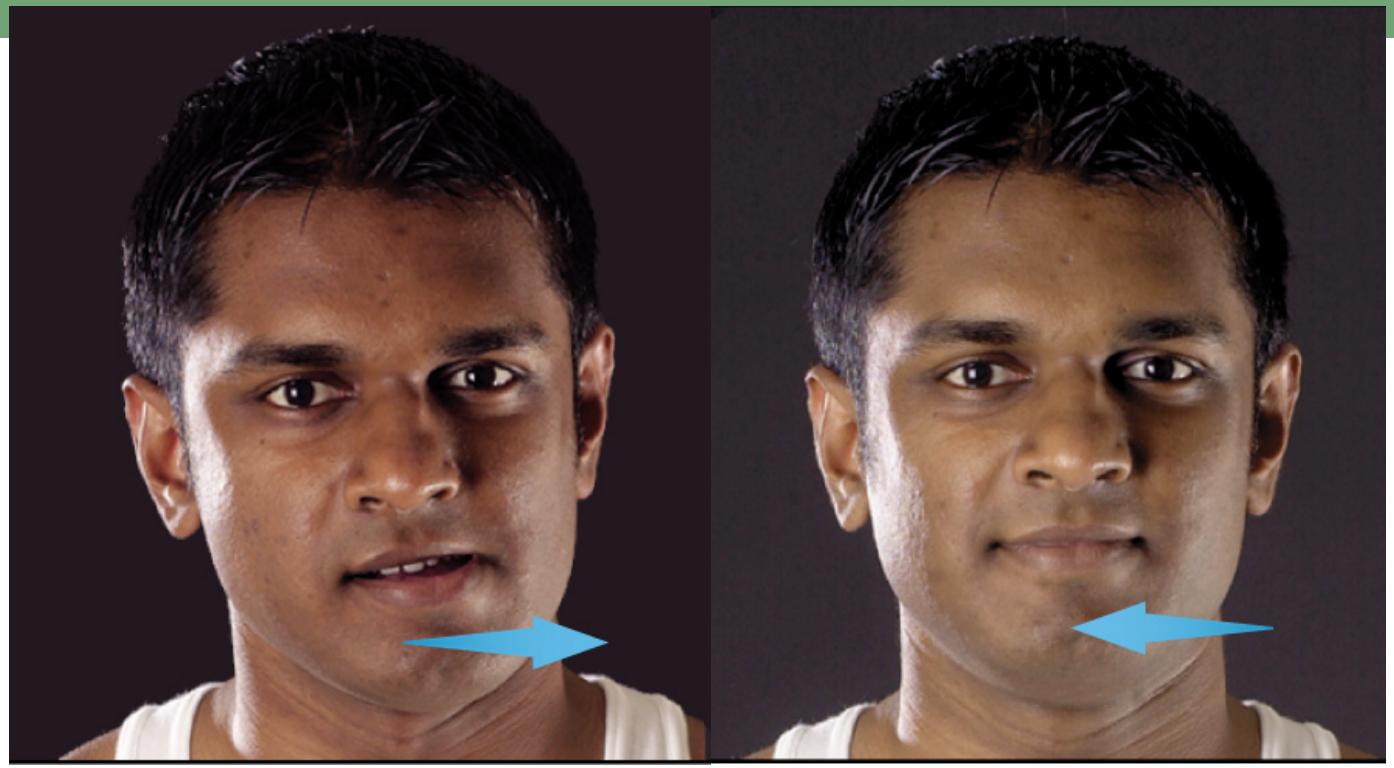


- Elevation is a movement that raises a bone vertically
- Depression is lowering the mandible or the shoulders

Protraction & Retraction

- Protraction is movement of a bone anteriorly (forward) on a horizontal plane
  - thrusting the jaw forward, shoulders or pelvis forward
- Retraction is movement of a bone posteriorly

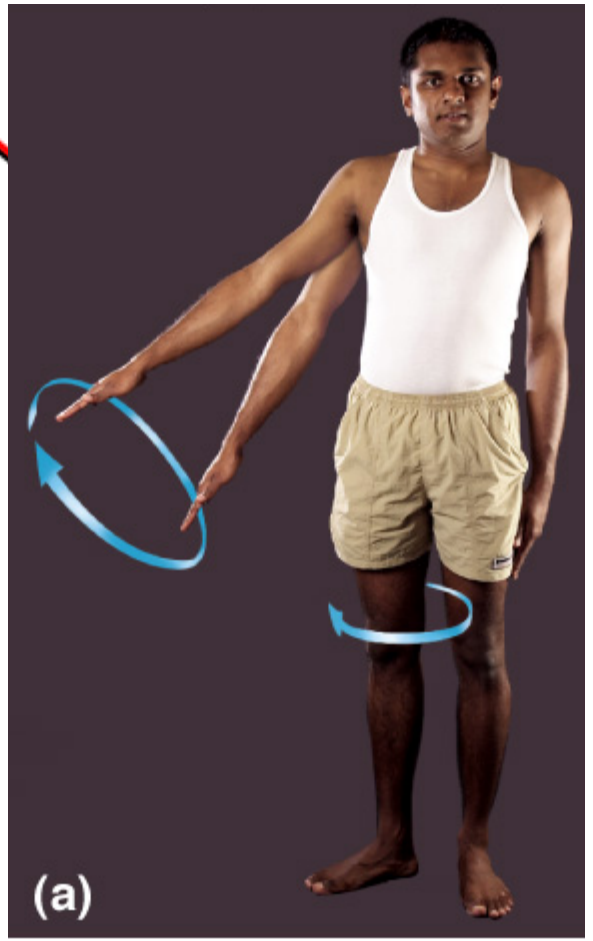
Lateral & Medial Deviation



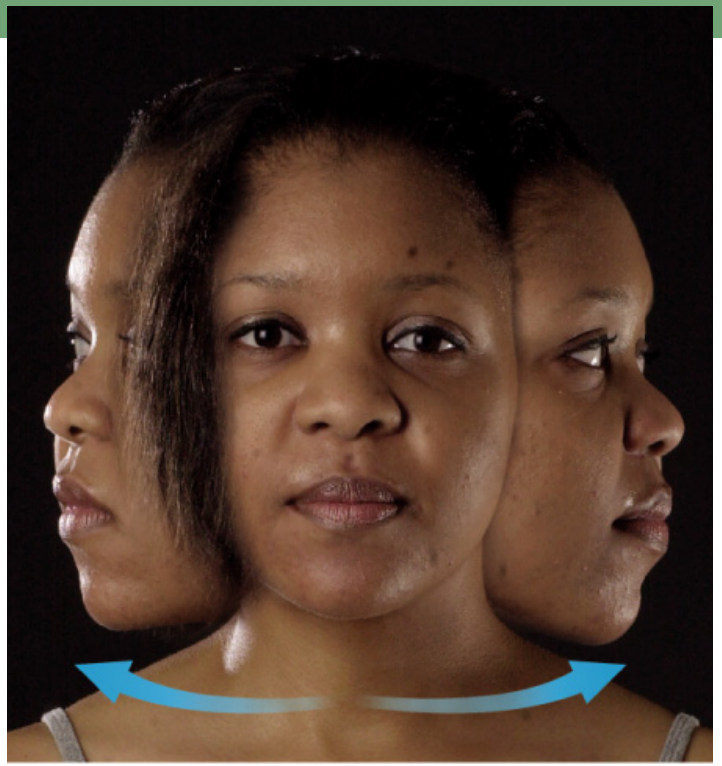
- Lateral deviationis sideways movement to right or left
- Medial deviation is movement back to the midline
- Side-to-side grinding movements occurring during chewing

Circumduction

- Sequence of flexion, abduction, extension & adduction movements
  - baseball player winding up for a pitch



Lateral and Medial Rotation



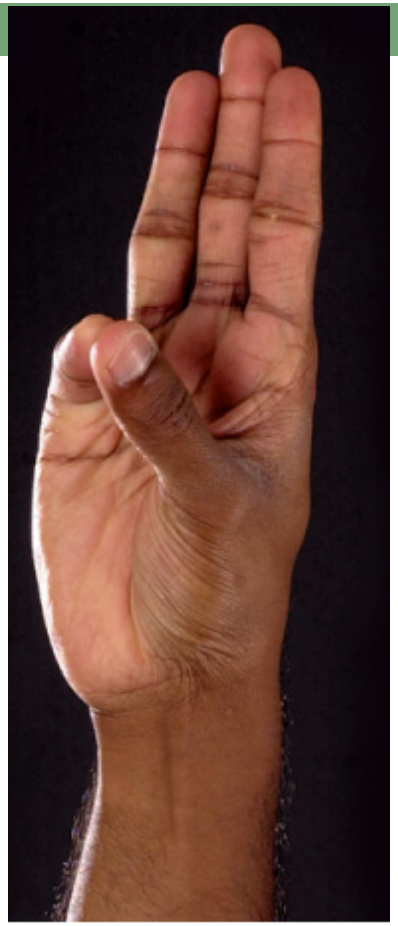
- Movement of a bone turning on its longitudinal axis
  - rotation of trunk, thigh, head or arm
- Medial rotation turns the bone inwards
- Lateral rotation turns the bone outwards

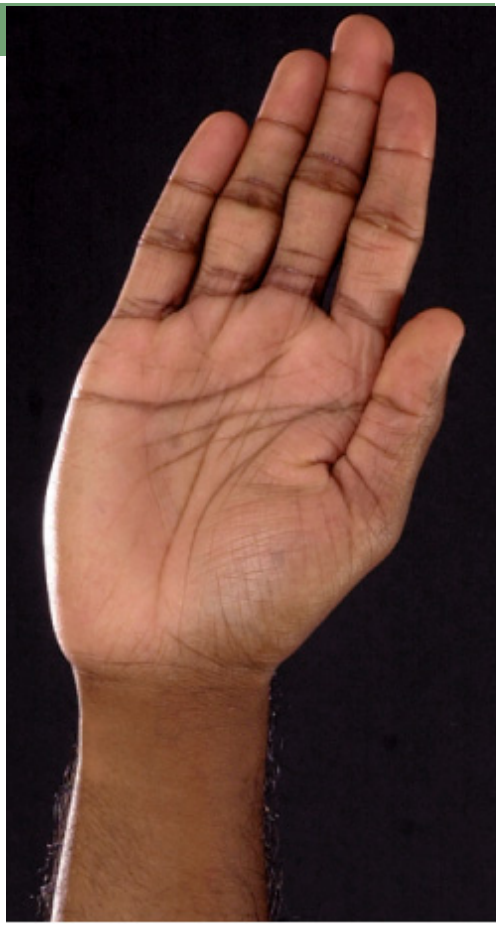
Supination & Pronation

- Occurs in the forearm and foot
- Supination
  - rotation of forearm so that the palm faces forward
  - inversion and abduction of foot (raising the medial edge of the foot)
- Pronation
  - rotation of forearm so the palm faces to the rear
  - eversion and abduction of foot (raising the lateral edge of the foot)

Opposition & Reposition

- Opposition is movement of the thumb to approach or touch the fingertips
- Reposition is movement back to the anatomical position
- Important hand function that enables the hand to grasp objects

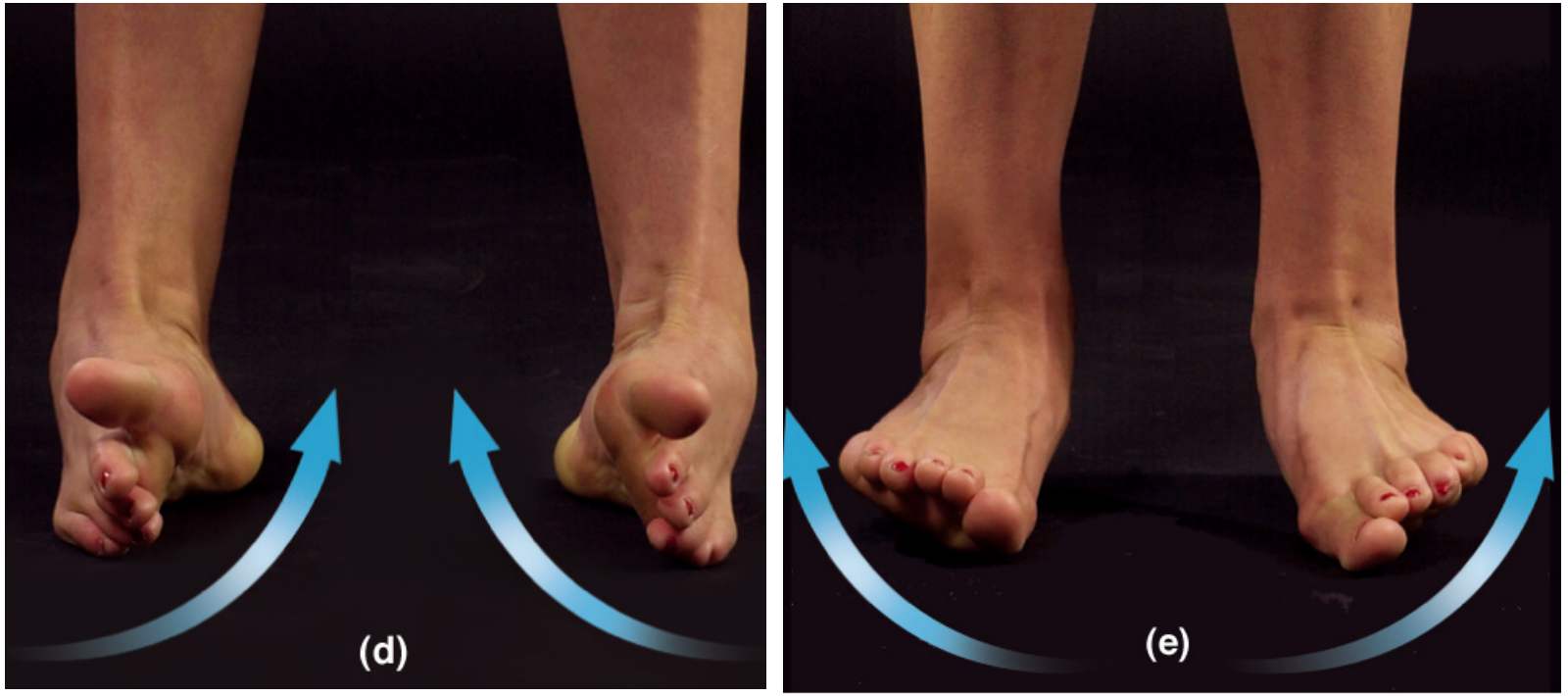




Dorsiflexion & Plantar Flexion

- **Dorsiflexion** is raising of the toes
- **Plantarflexion** is extension of the foot so that the toes point downward as in standing on tiptoe

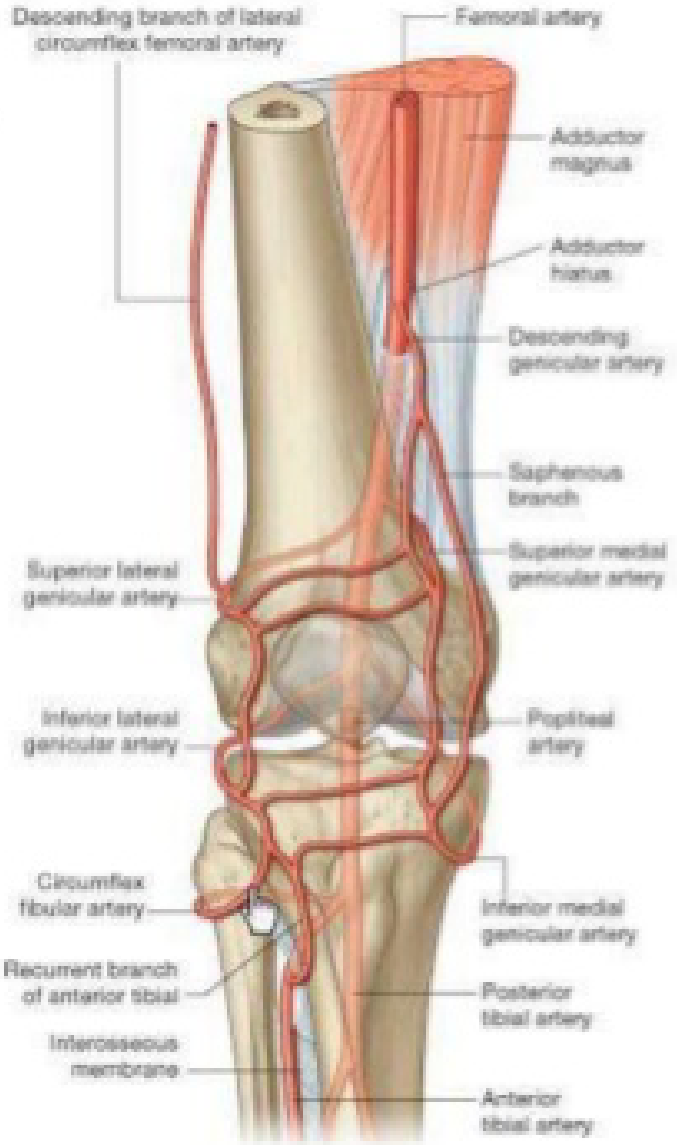
Inversion & Eversion



- Inversion is a movement in which the soles are turned medially
- Eversion is a turning of the soles to face laterally

BLOOD SUPPLY

- Periarticular arterial plexuses– circulus articularis vasculosus
- Articular cartilage: avascular
- Fibrous capsule & ligaments: **poor** blood supply
- Synovial membrane: **rich** blood supply



Lymphatic drainage

- **Lymphatic drainage of synovial joints:**
- Lymphatic form a plexus and the sub intima of the synovial membrane and drain along the blood vessels to the regional deep nodes.

Blood and nerve supply of a Synovial joint

- The nerve supply of a synovial joint best expressed by **Hilton in 1863:**
  "The same trunks of nerves, whose branches supply the groups of muscles moving a joint, furnish also a distribution of nerves to the skin over the insertions of the same muscles: interior of the joint receives its nerves from the same source."

  Proprioceptive: fibers endings in the capsule and ligaments are very sensitive to position and movement.

  The nerve that contains

(1) sensory (mostly pain) fibers from the capsule and synovial membrane

(2) autonomic fibers to blood vessels,

(3) Proprioceptive fibers.

Stability of synovial joints:

- Various factors:

- **Muscles:** The tone of muscles of joint is the most important factor.

Without muscles, the knee and shoulder would have been unstable and the arches of foot would have collapsed.

- **Ligaments:**

Important in preventing Hyper movement and in guarding against sudden stresses. However they do not help against a continuous strain because once stretched, they tend to remain elongated.

- **Bones:**

They help in maintaining the stability only in firm type of joints like the hip and ankle joints. Otherwise in most of the joints there role is negligible.

FACTORS AFFECTING CONTACT AND RANGE OF MOTION AT SYNOVIAL JOINTS

- Structure and shape of the articulating bone
- Strength and tautness of the joint ligaments
- Arrangement and tension of the muscles
- Contact of soft parts
- Hormones
- Disuse
- AGING AND JOINTS
- Various aging effects on joints include decreased production of synovial fluid, a thinning of the articular cartilage, and loss of ligament length and flexibility.
- The effects of aging on joints are due to genetic factors as well as wear and tear on joints.

BE POLITE

say hello

offer help

SMILE

PAY A COMPLIMENT

use please & thank you