

# JOINTS

Prepared By

**Doppalapudi Sandeep**

M. Pharmacy,

Assistant Professor

Department of Physiology & Pharmacology

Chebrolu Hanumaiah Institute of Pharmaceutical Sciences,  
Chandramoulipuram, Chowdavaram, Guntur, Andhra  
Pradesh, India – 522019

# Joints



# Joints

**Articulations:** The site where 2 or more bones meet.

Joints are the weakest part of the skeleton.

## Classification

### Functional Classification

Amount of movement allowed

- 1). Synarthroses: Immovable joints
- 2). Amphiarthrosis: Slightly movable joint
- 3). Diarthroses: Fully movable joints

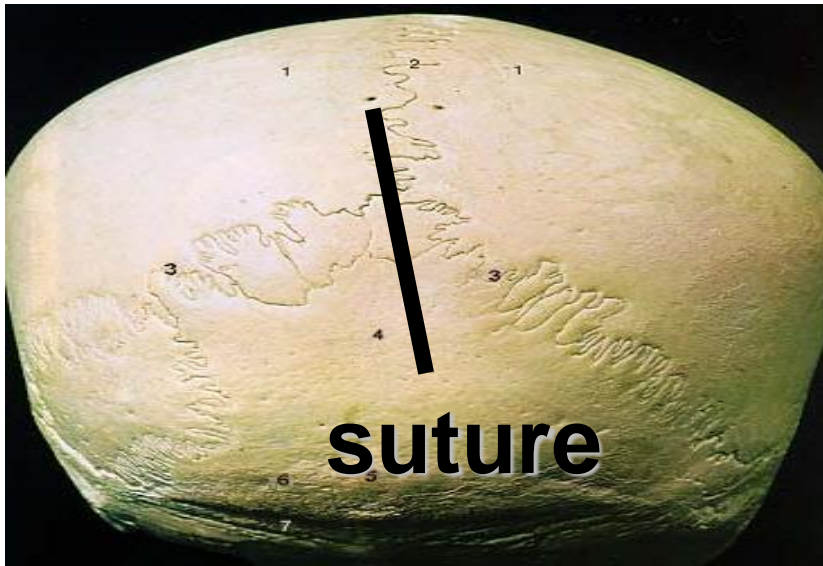
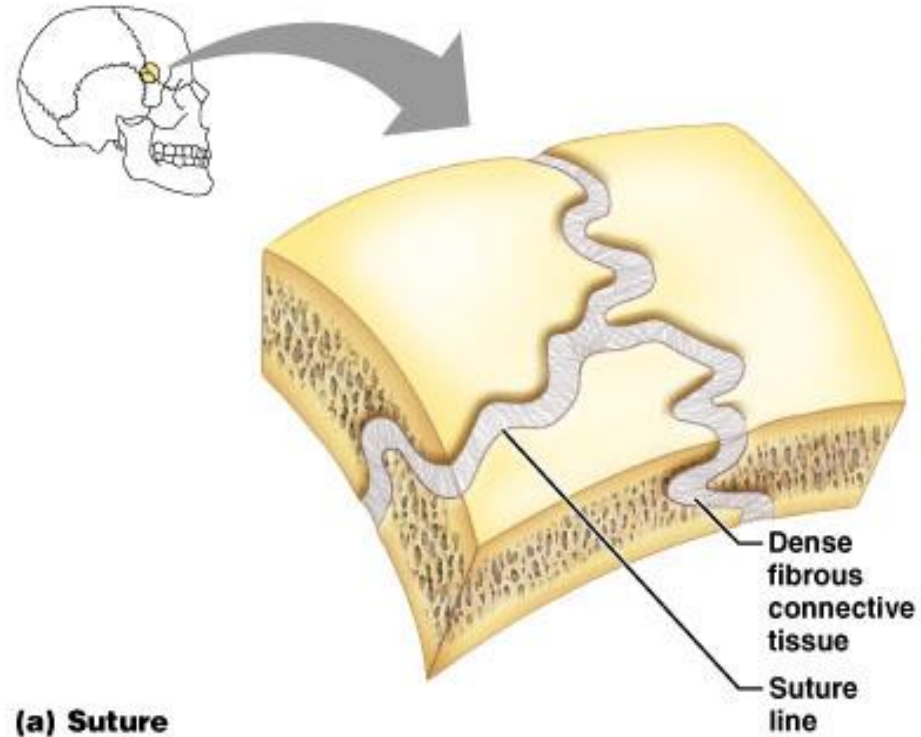
# Structural Classification of Joints

- Fibrous joints
  - Generally immovable
- Cartilaginous joints
  - Immovable or slightly moveable
- Synovial joints
  - Freely moveable

# Fibrous Joints

## Immovable Joints (synarthrosis)

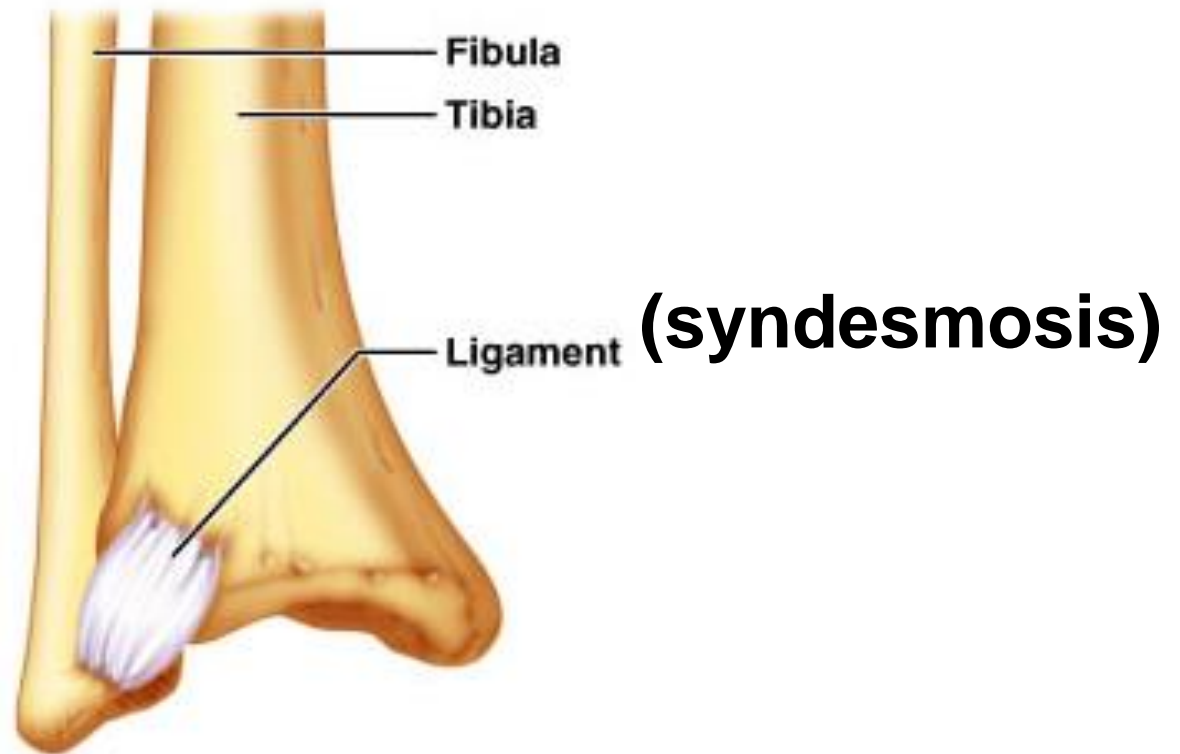
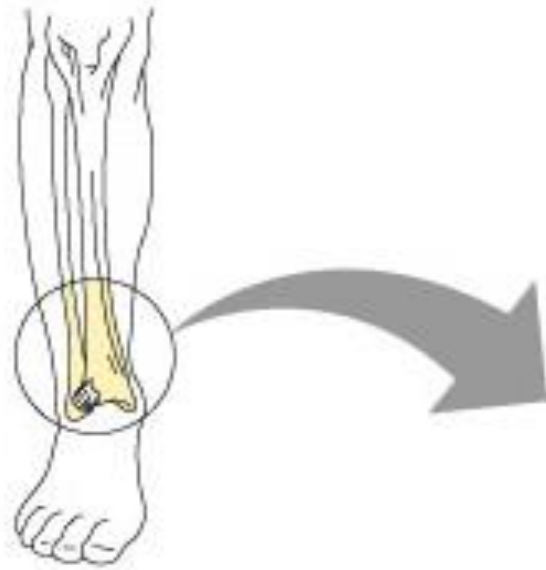
- 1). **Fibrous:** Bone ends united by collagenic fibers
  - a). Sutures
  - b). Syndesmoses
  - c). Gomphoses



Bones united by ligament

# Fibrous Joints

## Immovable Joints (synarthrosis)

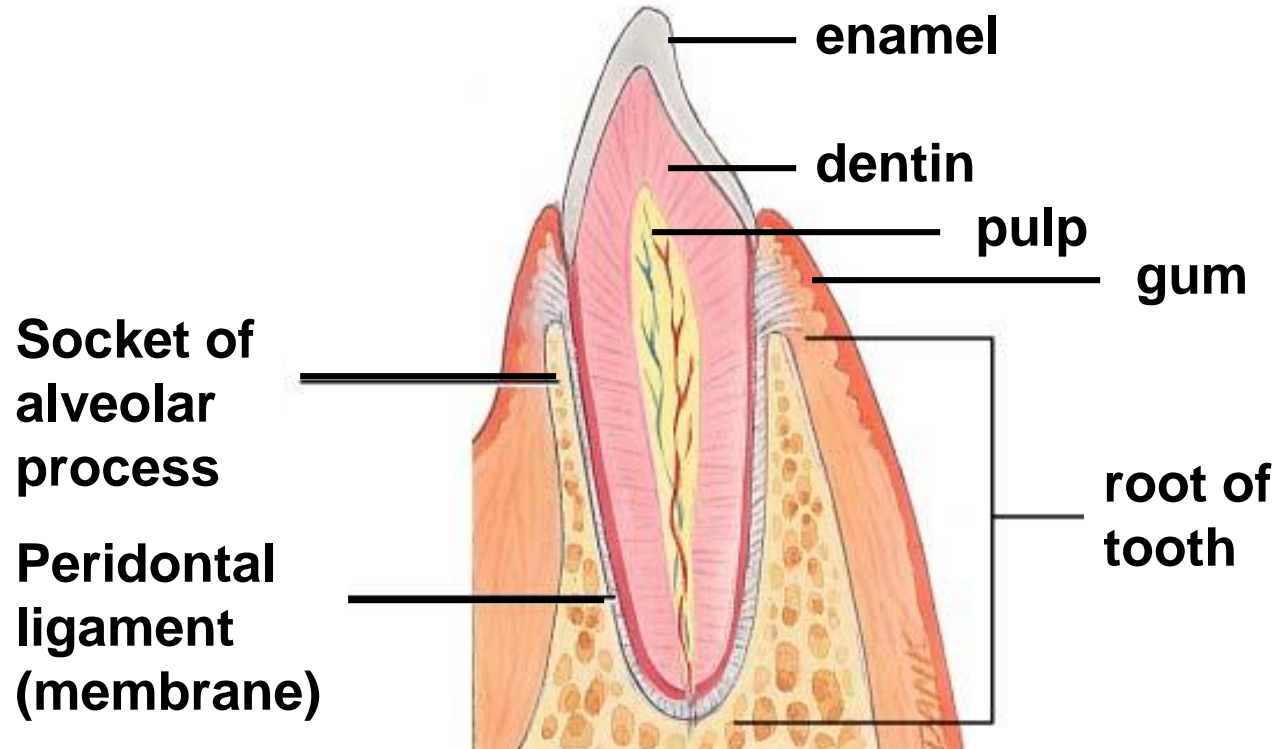


**(b) Syndesmosis**



Bones united by ligament

# Gomphosis



- Ligaments hold tooth in bony socket
- Immovable joint

2). **Cartilaginous Joints:** Bones are united by cartilage

a). Synchondrosis

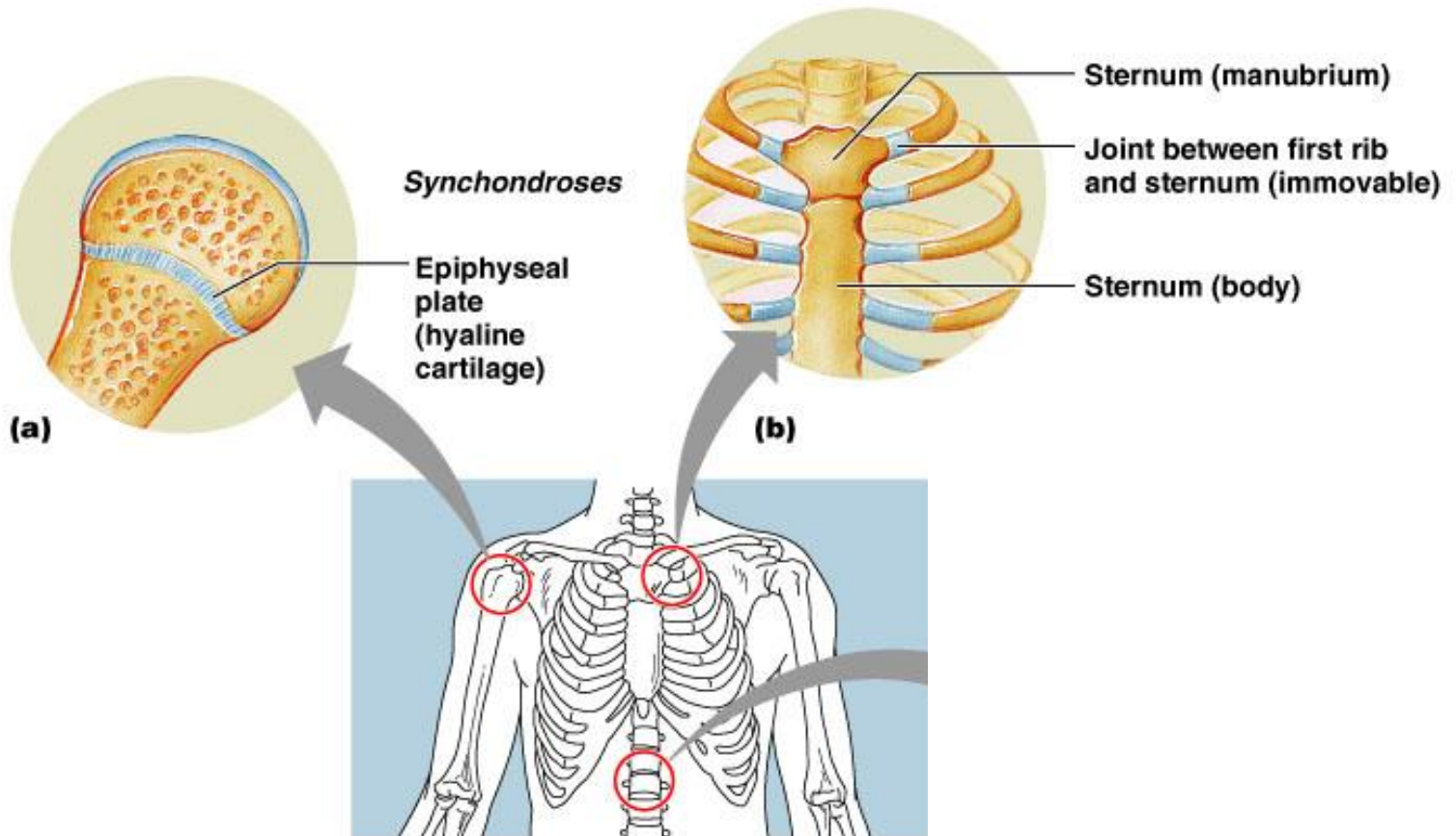
b). Symphyses

- Slightly Movable (ampharthrosis) and Immovable (synarthrosis) Joints
- Lacks a synovial cavity
- Bones connected by fibrocartilage or hyaline cartilage



# Cartilagenous Joints

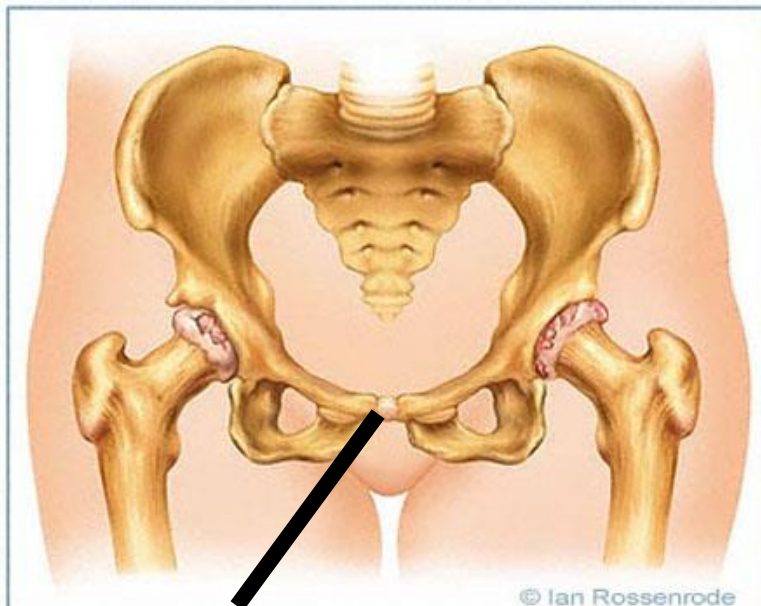
## Immovable Joint (**symphondrosis**)



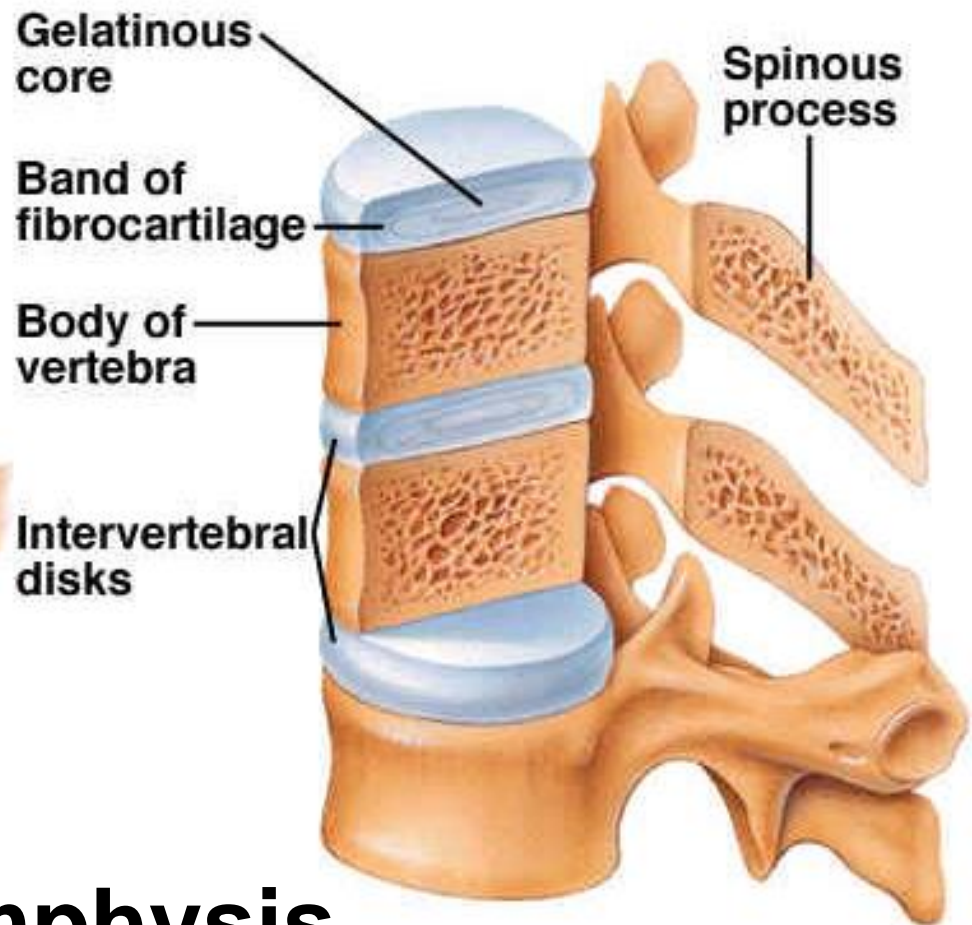
# Cartilagenous Joints

Slightly Movable Joint

(ampharthrosis)



pubic symphysis



symphysis

# Synovial Joints

- Articulating bones are separated by a joint cavity
- Synovial fluid is found in the joint cavity
- Articular cartilage (hyaline cartilage) covers the ends of bones
- Joint surfaces are enclosed by a fibrous articular capsule
- Have a joint cavity filled with synovial fluid
- Ligaments reinforce the joint

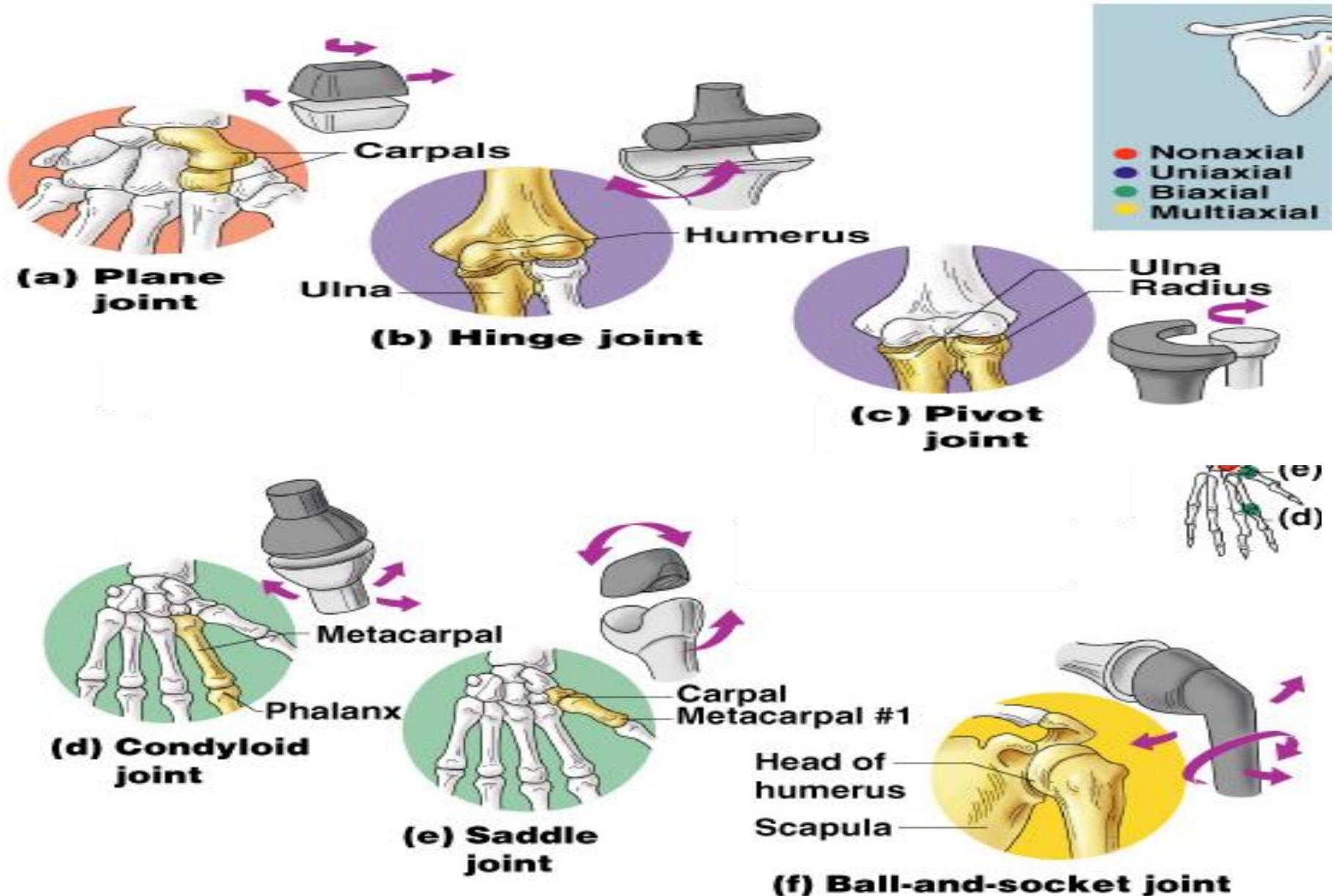
# Structures Associated with the Synovial Joint

- Bursae – flattened fibrous sacs
  - Lined with synovial membranes
  - Filled with synovial fluid
  - Not actually part of the joint
- Tendon sheath
  - Elongated bursa that wraps around a tendon

# Types of Synovial Joints

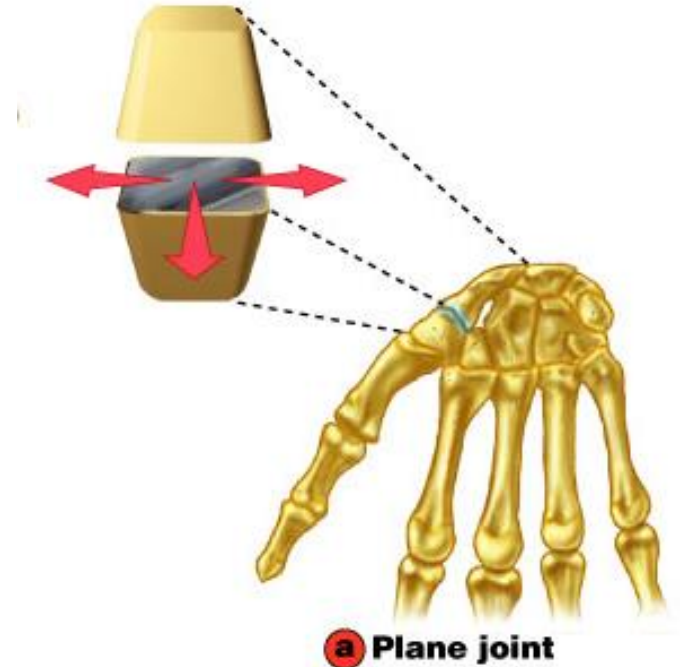
- Planar Joint
- Hinge Joint
- Pivot Joint
- Saddle Joint
- Ball & Socket Joint
- Condylloid or Ellipsoid Joint

# Types of Synovial Joints Based on Shape



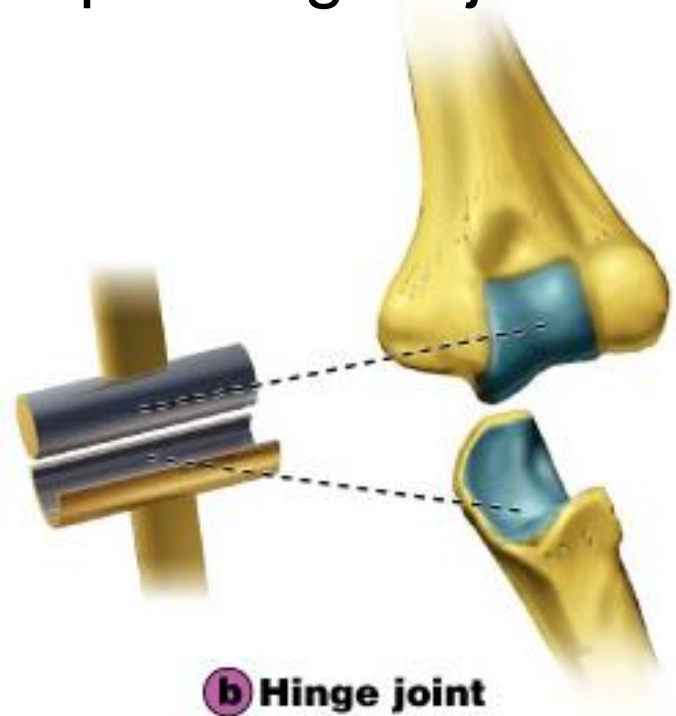
# Planar Joint

- Bone surfaces are slightly curved
- Side to side movement only
- Rotation prevented by ligaments
- Examples:
  - intercarpal to intertarsal joints
  - sternoclavicular joint
  - vertebrocostal joints



# Hinge Joint

- Convex surface of bone fits in concave surface of 2<sup>nd</sup> bone
- Uniaxial like a door hinge
- Examples:
  - Knee, elbow, ankle, interphalangeal joints
- Movements produced:
  - flexion
  - extension
  - hyperextension

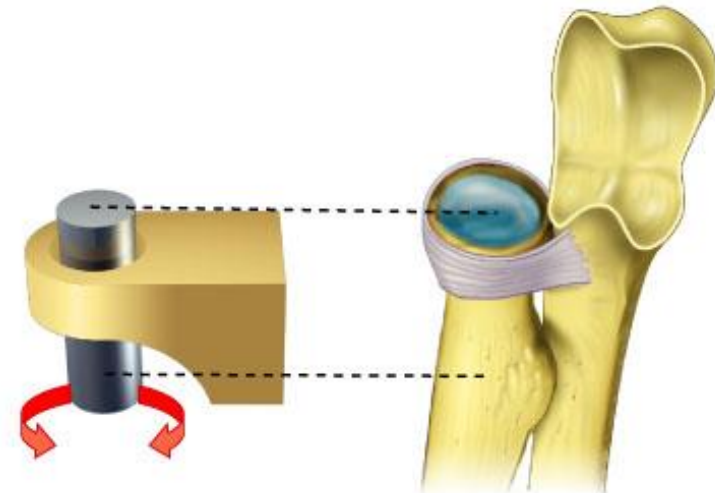


**b** Hinge joint



# Pivot Joint

- Rounded surface of bone articulates with the ring formed by the 2<sup>nd</sup> bone & ligament
- Monoaxial since it only allows rotation around longitudinal axis
- Examples:
  - proximal radioulnar joint
    - supination
    - pronation
  - atlanto-axial joint
    - Turning head side to side “no”



© Pivot joint

# Saddle Joint

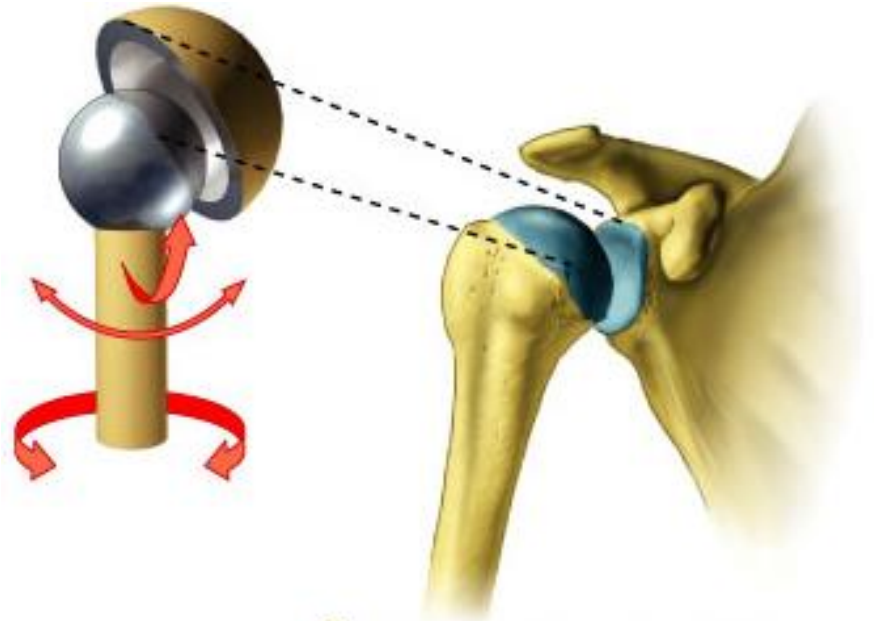
- One bone saddle-shaped, other bone fits like a person riding on the saddle
- Biaxial
  - circumduction allows the tip of the thumb to travel in a circle
  - Opposition allows thumb to touch tip of other fingers
- Examples:
  - Trapezium of carpus and metacarpal of thumb



● Saddle joint

# Ball & Socket Joint

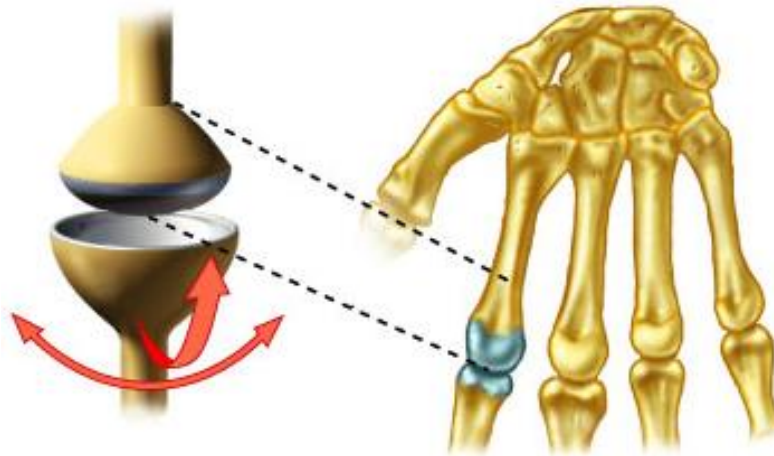
- Ball fitting into a cup-like depression
- Multiaxial
  - flexion/extension
  - abduction/adduction
  - rotation
- Examples:
  - shoulder joint
  - hip joint



**f** Ball-and-socket joint

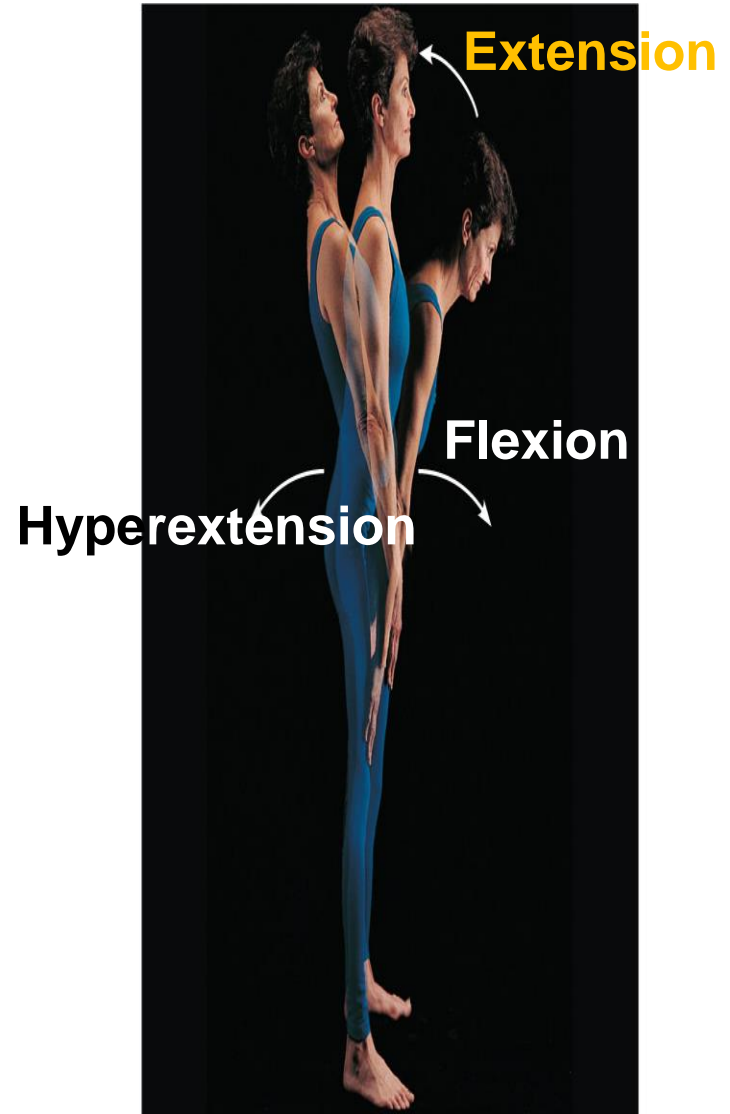
# Condyloid Joint

- Oval-shaped depression fits into oval depression
- Biaxial= flex/extend or adduct/abduct is possible
- Examples:
  - Wrist and metacarpophelangeal joints for 2 to 5 digits

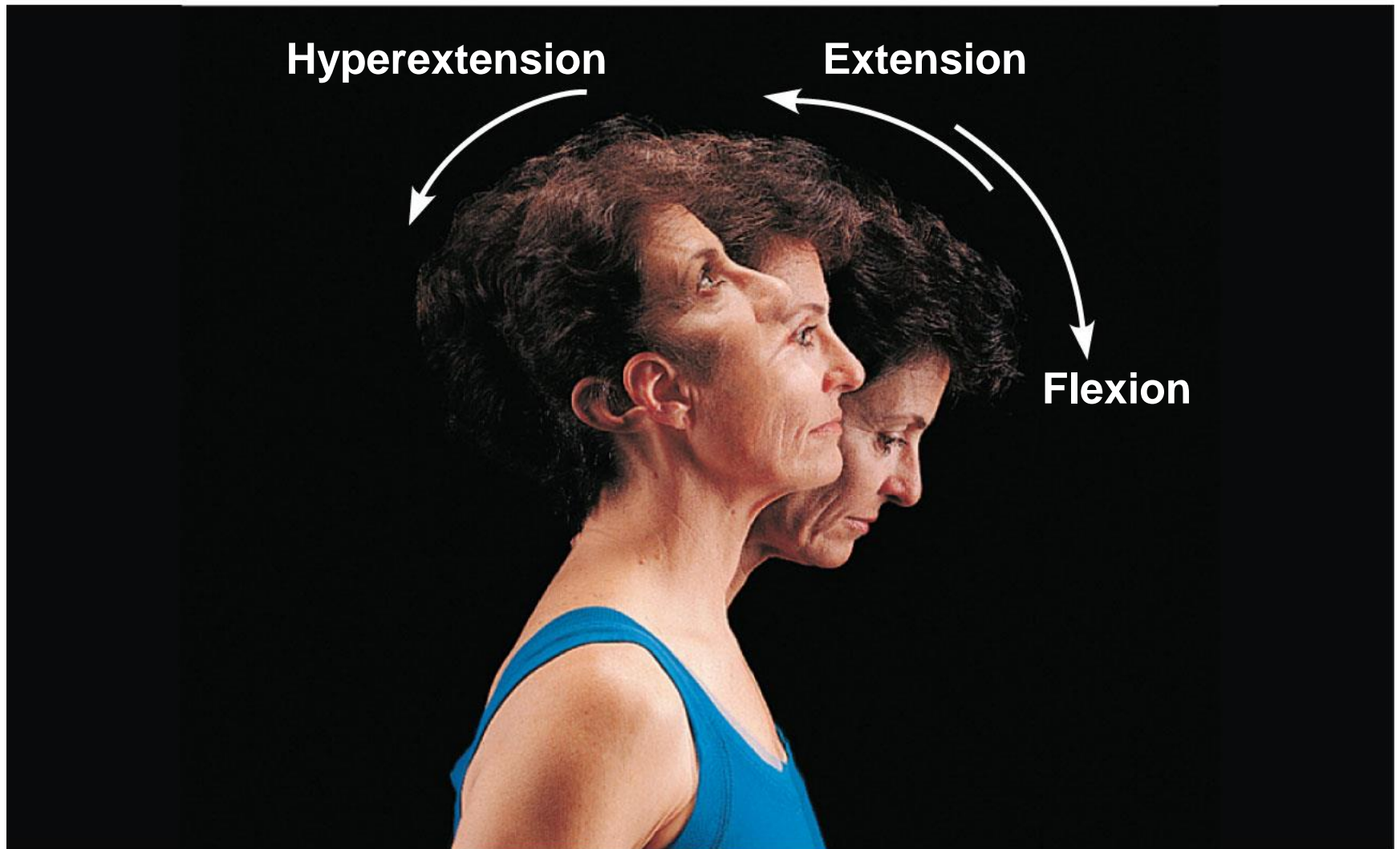




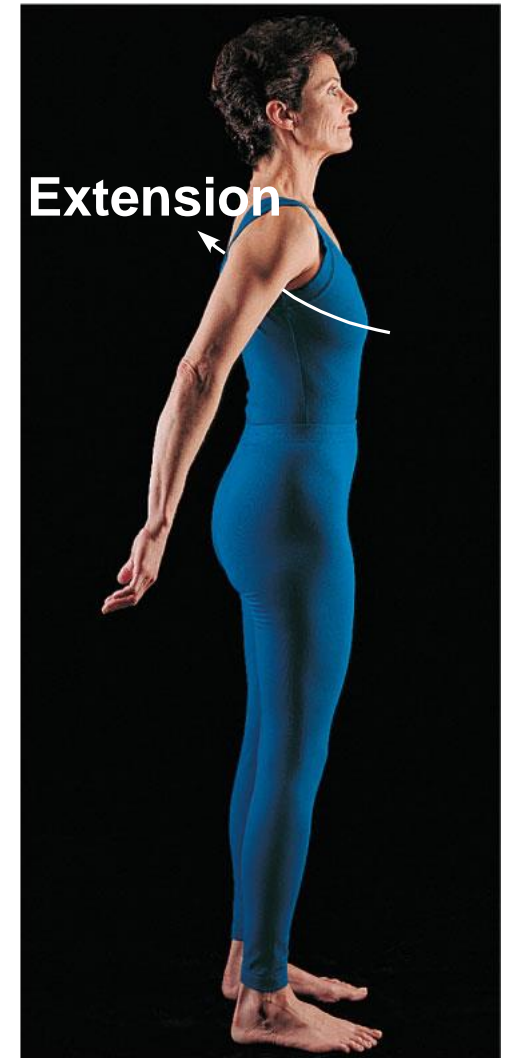
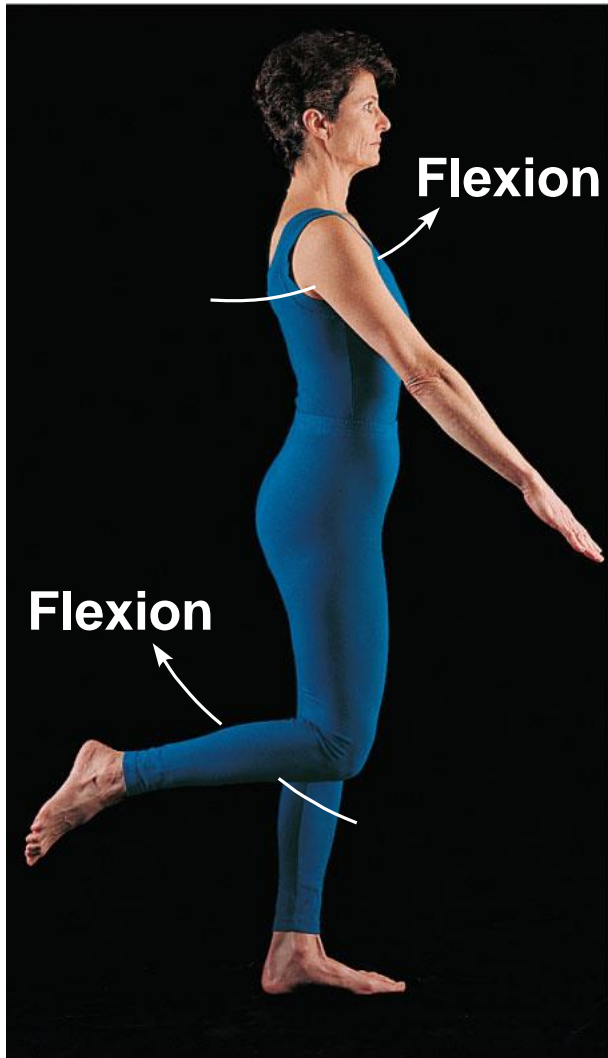
**(a) Gliding movements at the wrist**



**(c) Angular movements vertebral column**



**(b) Angular movements: flexion, extension, and hyperextension of the neck**

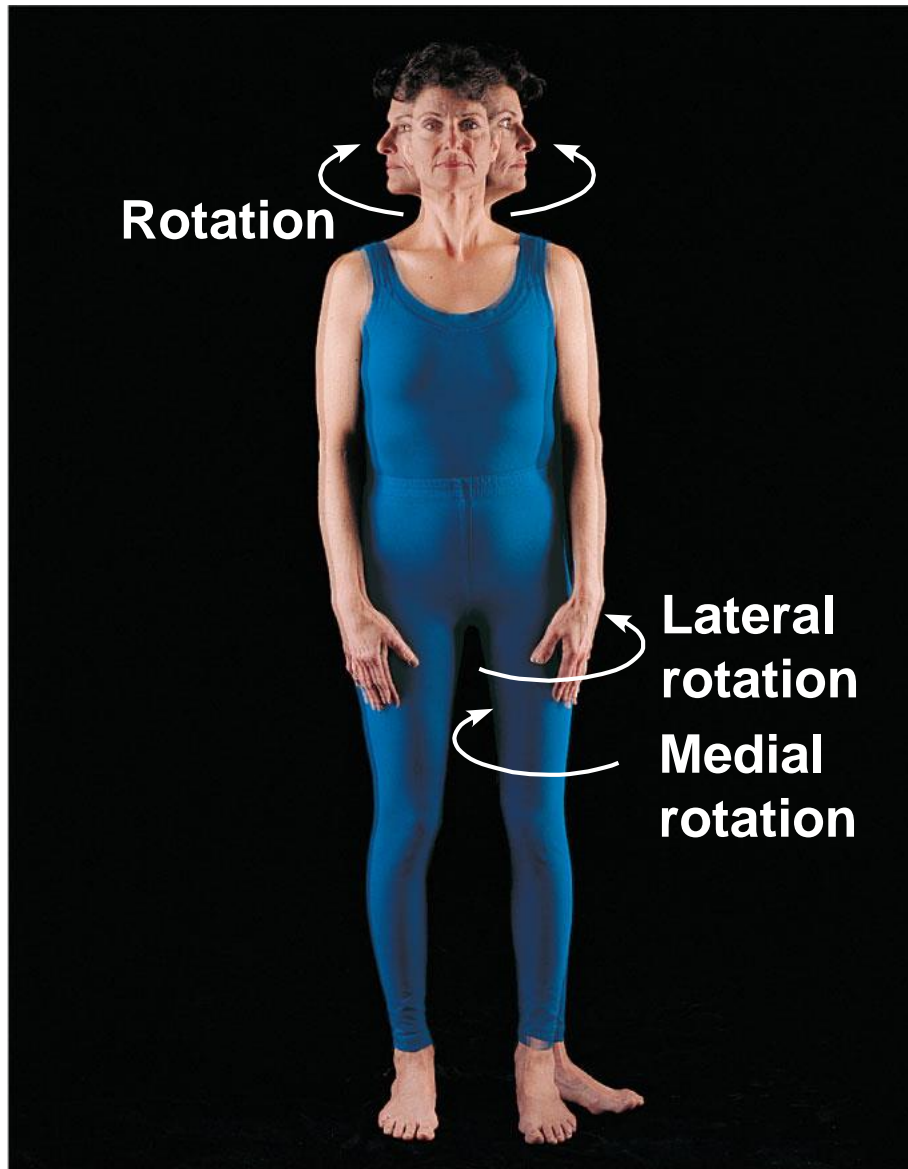


**(d) Angular movements: flexion and extension at the shoulder and knee**

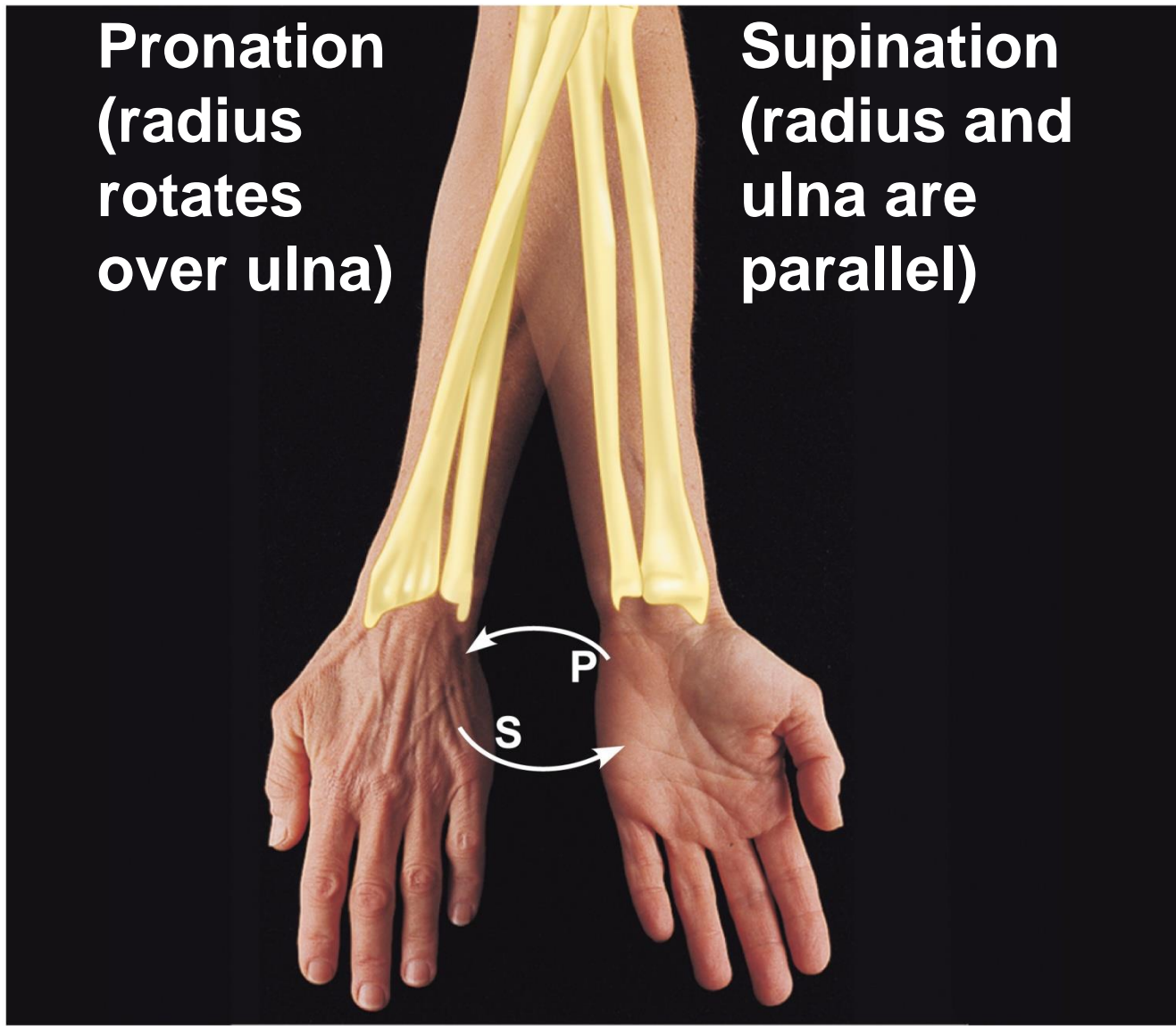


**(e) Angular movements: abduction, adduction, and circumduction of the upper limb at the shoulder**





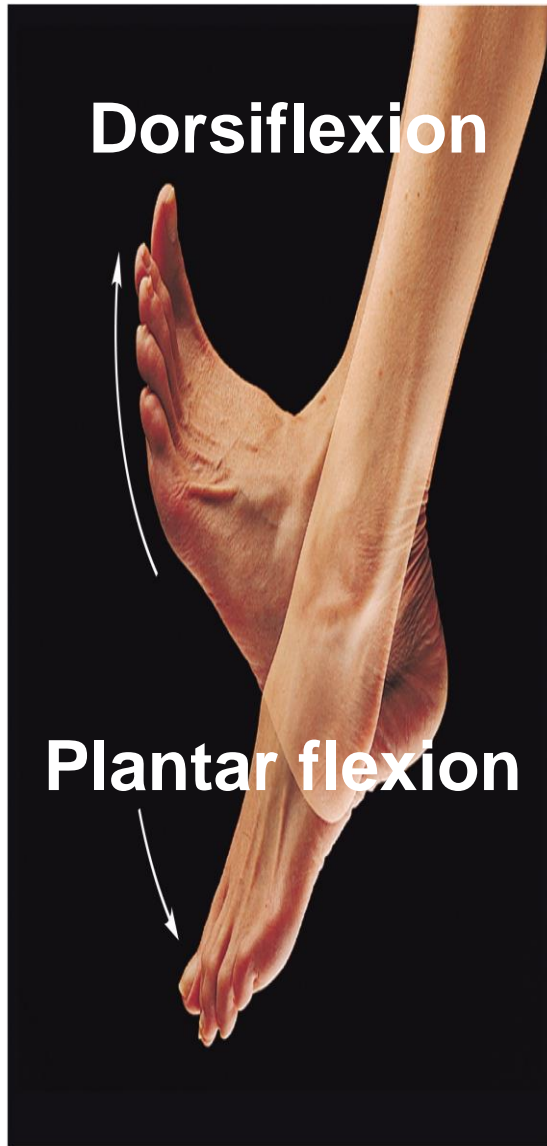
**(f) Rotation of the head, neck, and lower limb**



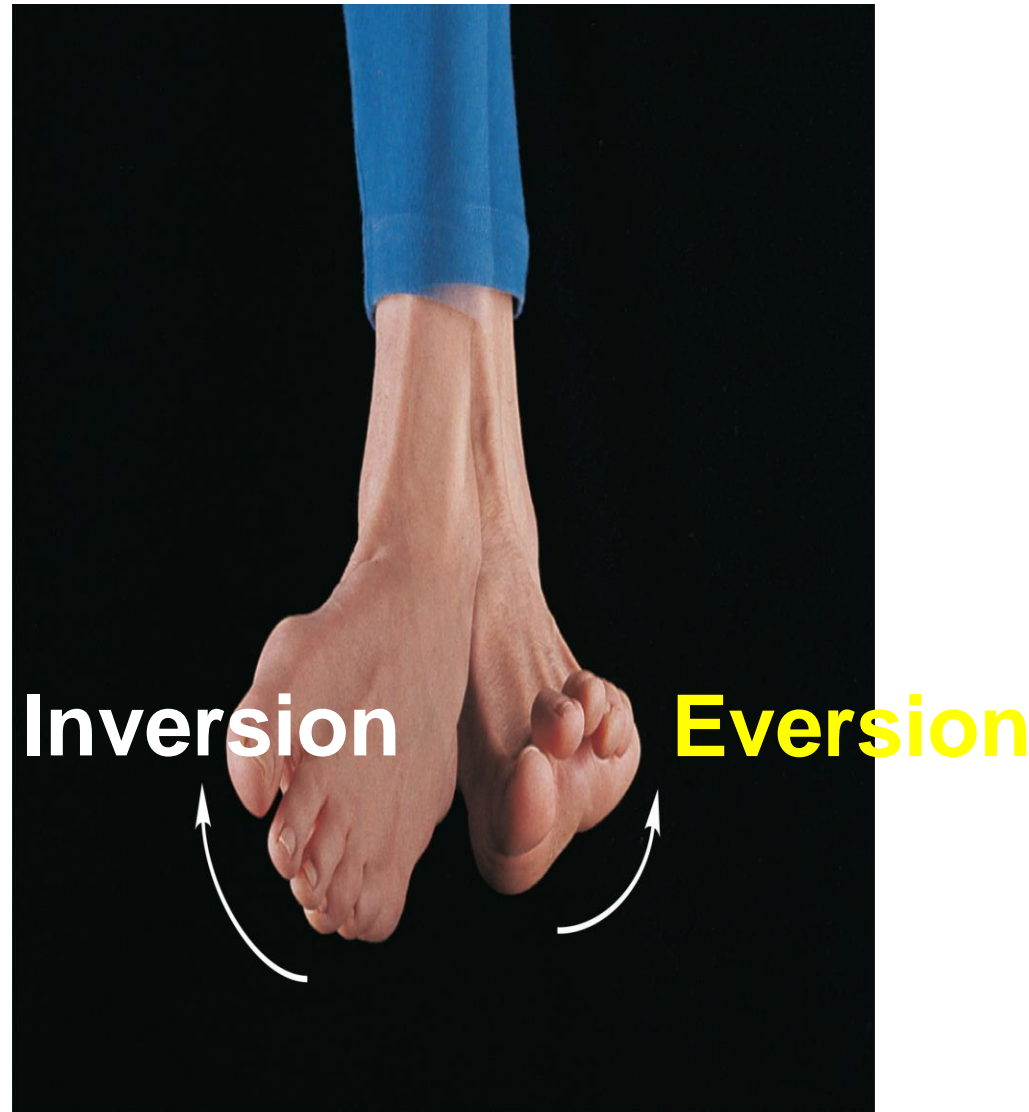
**Pronation**  
(radius  
rotates  
over ulna)

**Supination**  
(radius and  
ulna are  
parallel)

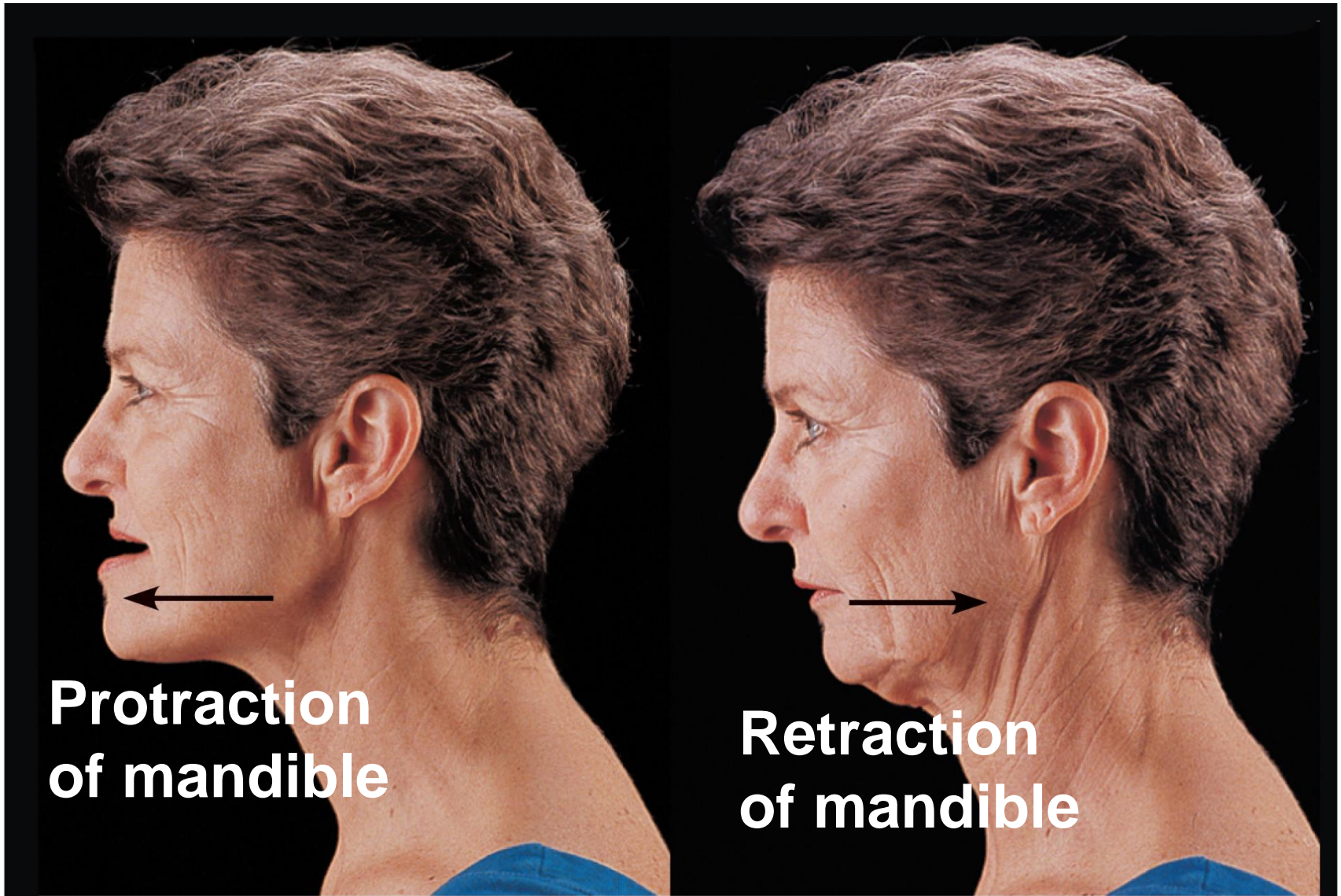
**(a) Pronation (P) and supination (S)**



**(b) Dorsiflexion and plantar flexion**



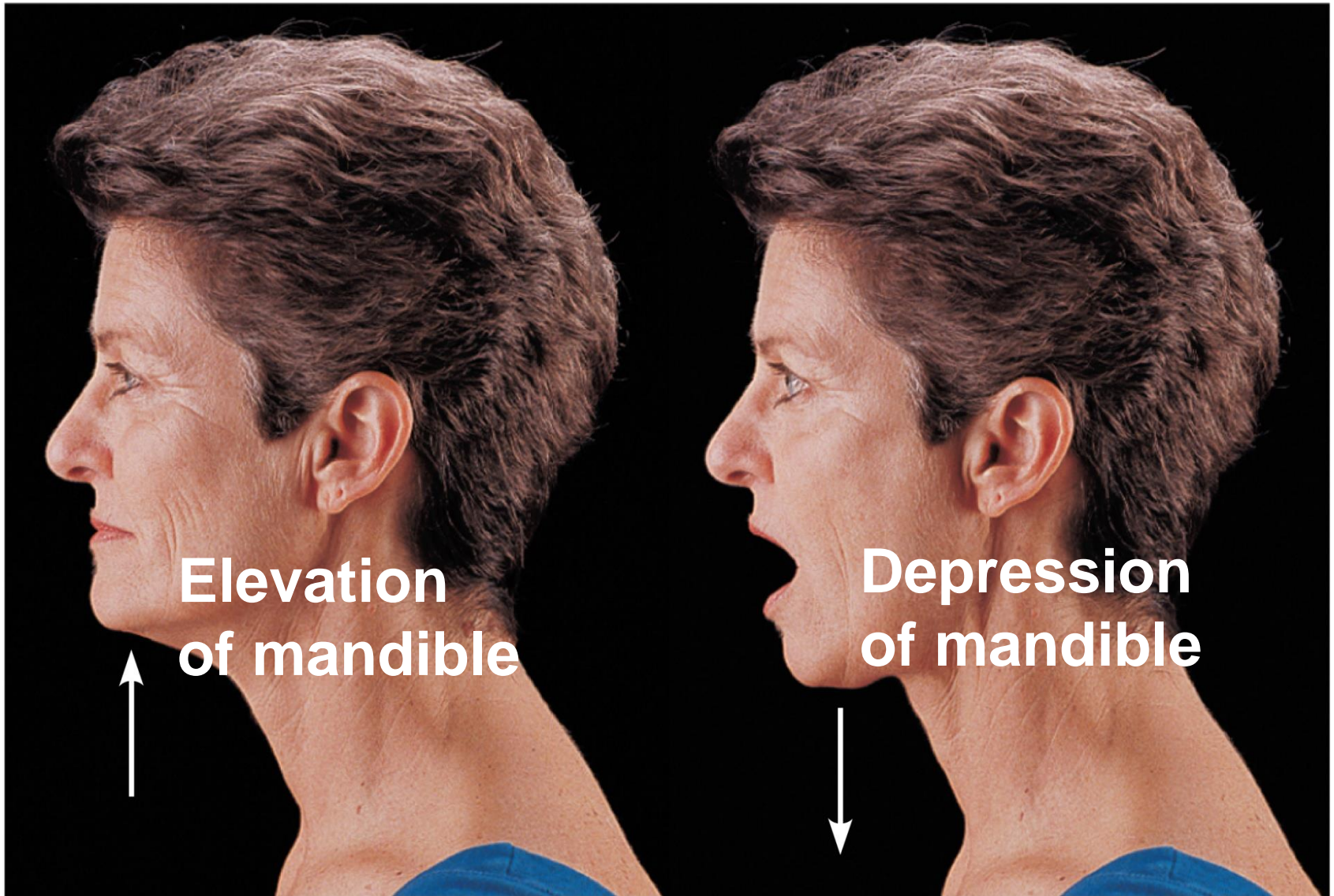
**(c) Inversion & eversion**



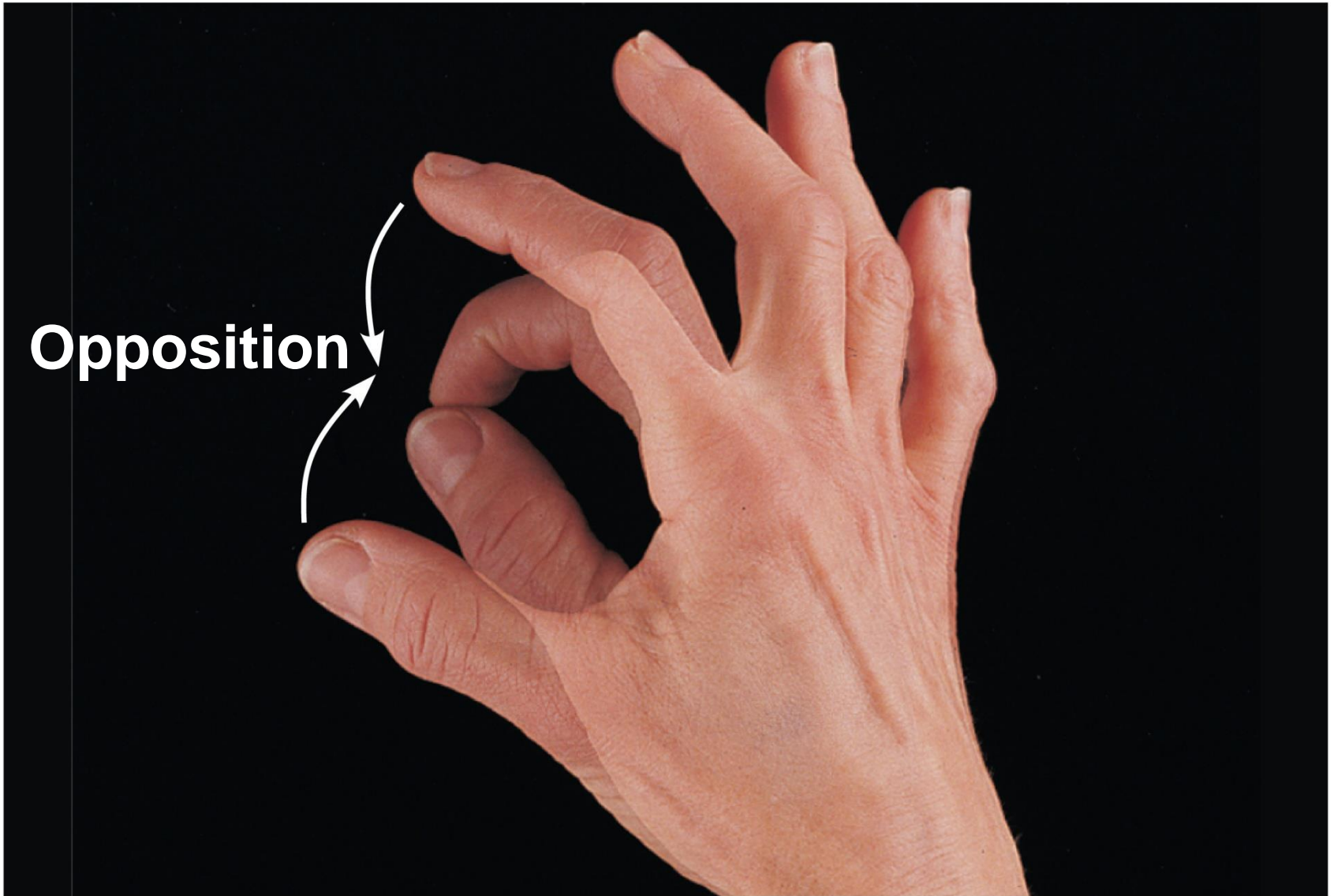
**Protraction  
of mandible**

**Retraction  
of mandible**

**(d) Protraction and retraction**



**(e) Elevation and depression**



**(f) Opposition**

## **Types of joint movement:**

- Flexion- bent knee
- Extension- extend knee
- Hyperextension- bring leg back
- Dorsi flexion- heel
- Plantar flexion- toe
- Abduction- leg out
- Adduction- leg in
- Rotation- twisting
- Circumduction- circular motion
- Supination- palm up
- Pronation- palm down
- Eversion- foot out
- Inversion- foot in
- Protraction- chin forward
- Retraction- chin back
- Elevation- shoulders up
- Depression- shoulders down