Joints

- Sites where bones and cartilage form a connection.
- Known as an **articulation** or **arthrosis**

Classification of joints

Structural - based on the structure connects the articulating surfaces of bones.

Functional - based on the amount of movement between articulating bones

Structural Classification

Fibrous
- joined by fibrous connective tissue.
-Functionally are *synarthroses* or *amphiarthroses*

Cartilaginous
- joined by cartilage (*hyaline cartilage/fibrocartilage*)
-Functionally are *synarthroses or* amphiarthroses*

Synovial
- joined within a fluid-filled cavity. (*most common joint*)
-Functionally are *diarthroses*

• Based on the structure of the articulating surfaces

Functional Classification

Synarthrosis - little to no movement (ex., suture of skull)

Amphiarthrosis - slight movement (ex., pubic symphysis, intervertebral discs)

Functional Classification (cont)

Diarthrosis - significant movement

Three categories based on axes of motion
1. **Uniaxial**— movement in one plane (ex., elbow)
2. **Biaxial**— movement in two planes (ex., metacarpophalangeal joints) 3. **Multiaxial**— movement in three or more planes (ex.,hip)

• Based on the extent of joint

Fibrous Joints

Characterisitics of Fibrous Joints
- NO joint cavity
-Held together by dense (fibrous) connective tissue

Fibrous Joints (cont)

Types
1. **Sutures**
- Joins the bones of the skull
-synarthroses
-convoluted shape prevents movement between bones
-form when skull bones completely ossify during early childhood
2. **Syndesmoses**
-Joins two parallel bones using fibrous connective tissue
-Amphiarthroses
-Found between radius and ulna of forearm between tibia and fibula of leg
3. **Gomphoses**
-Anchors teeth to maxilla
Made of numerous shorts bands of dense connective tissue called *periodental ligaments*
- Synarthroses

Cartilaginous Joints

Characteristics of Cartilaginous Joints
-Bones joined by cartilage or fibrocartilage

Cartilaginous Joints (cont)

Types
• **Synchondroses**
-Joined by hyaline cartilage
-Found in every long bone to allow increase in skeletal size
-Synarthroses
(Ex., epiphyseal plates, costal cartilage)
• **Symphyses**
-Joined by fibrocartilage
-Permits strong attachment while allowing limited movement
-Amphiarthroses
(Ex., pubic symphysis, intervertebral symphysis)

Synovial Joints

Characteristics of Synovial Joints
-Contains a joint cavity (Bones do not directly touch)

• **Articular capsule**
-Forms wall of cavity
-Ligaments to attach bones
-**Synovial Membrane** (secretes synovial fluid to lubricate joints and nourish cartilage)
• **Articular cartilage**
-Hyaline cartilage at ends of bones
-Diarthroses

Synovial Joints (cont)

Supporting Structure

1. Ligaments

-Strong bands of fibrous connective tissue

-Strengthen and support joints by anchoring bone together

2. Tendons

-Connective tissue structure that attaches muscle to bone

Cushioning Structures

• Articular discs and menisci

-Pads of fibrocartilage between bones.

-Provide shock absorption and help smooth movements.

• Bursae and tendon sheaths

-Prevent friction between bone and tendons

• Fat pads

-Provide cushioning

Pivot Joint

-Rounded portion of a bone enclosed in a ring

-Allows rotation around one axis

- Uniaxial joint

-Atlantoaxial Joint

Hinge Joint

-Convex end of one bone articulates with the concave end of another

-Allows bending and stretching along one axis

-Uniaxial

-Elbow, knee, ankle, and interphalangeal joints

Synovial Joints (cont)

Condyloid Joint

-Shallow depression at the end of one bone articulates with rounded structure from nearby bone or bones

-Biaxial Joint

-Allows bending and straighte-ning, anterior-posterior movements

-Metacarpophalangeal joints

Saddle Joint

-Both articulating surfaces have a saddle shape

-Biaxial joint

-Allows Circulating movement

-First carpometacarpal joint, sternoclavicular joint

Plane Joint

-Surfaces of the bones are mostly flat

-Bones slide past each other during motion

-Limited motion, but multiaxial joint

-Intercarpal joints, interatrial joints, acromioclavicular joint

Ball-and-socket Joint

-Rounded head of one bone fits into the bowl-shaped

-Great range of motion

-Multiaxial joint

-Hip joint, shoulder joint

Movement at Synovial Joints

Flexion

- reduces the angle of the joint from

Extension

-returns joint to resting position

Hyperextension

-increases joint angle beyond

Lateral Flexion

-bending of neck or body toward

Movement at Synovial Joints (cont)

Abduction

-moves a limb, finger, toe or thumb away from midline of body

Adduction

-moves a limb, finger, toe, or thumb toward midline

Circumduction

-movement in a circular motion

-Combination of flexion, adduction, extension, and abduction at a joint

Rotation

-Twisting movement

• Medial rotation

-moves anterior of a limb toward midline

• Lateral rotation

-moves anterior of a limb away from midline

Supination & Pronation

-movements of the forearm

• Supination

-moves palm toward facing posteriorly

• Pronation

-Moves palm toward facing anteriorly

Dorsiflexion & Plantar Flexion

-Movements of the ankle joint

• Dorsiflexion

moves top of foot towards anterior leg

• Plantar flexion

-Lifts heel away from ground or points toes toward ground

Joint Damage

Arthrisis

-Inflamation of a joint

-Leads to pain, swelling, stiffness, and reduced mobility of the joint