SESSION #12

JOINTS
aka: articulations
where: two or more bones meet
function: hold together & give mobility

Classifications

JOINTS

Structural
classified by: what material binds

- cartilaginous
- fibrous
- synovial

Functional
classified by: movement allowed

- synarthrotic joints
- amphiarthrotic joints
- diarthrotic joints

STRUCTURAL

1. Fibrous
tissue type: dense fibrous CT
joint cavity: no cavity
movable: immovable, protective

2. Cartilaginous
united by: cartilage
joint cavity: no cavity
movable: not highly
3. Synovial Joints

Bones separated by: fluid-filled joint cavity
Moveable: diarthrotic - freely moveable

Which joints: all limbs

Features:

- Synovial Fluid
  - Lubricate
  - Nutrify
- Articular (Joint) Cavity
  - Inner Synovial Membrane
  - Capsular
  - Extracapsular Nerve

- Reinforcing Ligaments
- Nerves & Blood Vessels

Other features:

1. Fatty Pads
2. Articular Discs
3. Bags of Synovial Fluid that act as lubricating "ball bearing"
4. Bursae
5. Tendon Sheaths

Fatty pads:
- Function: cushioning between fibrous capsule layer & synovial membrane or bone
Articular discs
  Aka: menisci
  "fit" bone ends
  Functions: stabilize joint, reduce wear & tear

Bursae
  Function: reduce friction where anything can rub together

Tendon sheaths
  What are they? elongated bursae
  Function: wrap around tendons subjected to friction

Joint stability
  Articular surface
    - Minor role
    - Shallow surfaces, less stable than ball & socket

  Ligament
    - # & location
    - Major role
    - More ligaments = stronger joint
    - Limited role

  Muscle tone
    - Function: keep taut as they cross joints most important
      - Shoulder
      - Knee
      - Arch of foot
INJURIES

1. Cartilage tears
   - Due to compression & shear stress
   - Repaired with: arthroscopic surgery

2. Sprains
   - Reinforcing ligaments are stretched or torn
   - Partial tears repair very slowly because of poor vasculanization

3. Dislocation (luxation)
   - Forced out of alignment

4. Subluxation
   - Partial dislocation of a joint

INJURIES common
1. Cartilage tear
2. Sprain
3. Dislocation
4. Subluxation

INJURIES inflammatory & degenerative
1. Bursitis
2. Tendinitis
3. Arthritis
Bursitis
- inflammation: bursa
- cause: blow or friction

Tendinitis
- inflammation: tendon sheaths
- cause: overuse

Arthritis
- symptoms: pain, stiffness, swelling
- acute forms: bacteria → antibiotics
- chronic forms
  1. osteoarthritis
  2. rheumatoid arthritis
  3. gouty arthritis

Arthritis
- 1. osteoarthritis
- 2. rheumatoid arthritis
- 3. gouty arthritis

Osteoarthritis
- AKA OA
- common? most common
degenerative & irreversible
  “wear & tear” arthritis
- cause: cartilage worn down faster
- women > men by age 85
Rheumatoid Arthritis
- acute or chronic
- cause: autoimmune/unknown
- inflammatory
- arises? 40 → 50
- women > men

Gouty Arthritis
- deposition of: uric acid crystals
- men > women
- what joint? base of big toe

Muscular System

Muscle Tissue
- Skeletal
  - tissue: bones, skin
  - fibers: stripes, longest
  - voluntary
  - contract rapidly, tire easy
- Cardiac
  - only found: striated involuntary contraction
  - involuntary steady state
- Smooth
  - found in hollow organs
  - not striated
  - involuntary
  - w/o NS stimulation
Characteristics:
- Excitable
- Contractile
- Extensible
- Elastic

Functions:
1. Produce movement
2. Maintain posture
3. Stabilize joint
4. Generate heat as they contract

Skeletal Muscle:
- Skeletal muscle is an organ made up of different tissues.

3 Features:
1. Nerve & blood supply
2. Connective tissue sheaths
3. Attachments

Nerve & blood supply:
- Each muscle has:
  - How is the oxygen being used: contractions
  - Waste is removed
Connective tissue sheaths
- Connective tissue covers: skeletal muscle & each fiber
- Support & reinforce whole muscle
- Sheaths external → internal external
  - Epimysium
dense irregular CT
surrounds external muscle
largest
  - Perimysium
fibrous CT surrounding fascicles
  - Endomysium
fine areolar CT
surrounds each fiber

Attachments
- muscles span joints & attach to bones
- attach in 2 places
  - insertion: moveable end
  - origin: immovable end
- attach direct/indirect
  - direct
aka fleshy
epimysium fused to periosteum of bone
or perichondrium of cartilage
indirect connective tissue wrapping extend beyond muscle as ropelike or sheetlike aponeurosis

muscle fiber anatomy
fiber: muscle cell
describe a muscle fiber: long, cylinder, multiple nuclei

organelles
sarcolemma: muscle fiber plasma membrane
sarcomplasm: cytoplasm

glycosomes: glycogen storage
myoglobin: O2 storage

modified organelles
myofibrils: describe rodlike, densely packed 1000s myofibrils 80% cell volume

features
striations
stripes formed from repeating series of dark & light bands along each myofibril
A bands: dark regions
H zone: lighter region in middle A band
M line: line of protein (myomesin)
I bands: lighter region
Z disc (line): can shear sheet in middle I band

Sarcomere
Smallest contractile unit
aka functional unit
Individual sarcomeres line from end to end

Label:

Diagram:
- A band
- H zone
- I band
- Z line
- M line

F band