

- angular:
 - flexion (movement of body part anterior to coronal plane; decrease in joint angle b/t anterior to surfaces Exception is the knee and toes) and extension (movement of body part posterior to coronal plane; increase in joint angle b/t posterior surfaces exception is the knee and toes)
 - hyperextension (movement of structure beyond normal anatomical position; can be normal or abnormal causing joint stress or injury), ex. Head looking up at sky
 - plantar (come up on toes) and dorsiflexion (top of foot flexed up/back on heels)
 - abduction (take away from midline) and adduction (bring back to midline)
- circular:
 - rotation
 - pronation and supination
 - circumduction

Lecture 6 - circular and special movements

- Rotation: turning of a structure on its long axis
 - ex. Rotation of head, humerus, entire body
 - medial and lateral rotation: ex. Rotation of the arm
 - aka internal and external
- pronation/supination: refer to unique rotation of the forearm
 - pronation: palm faces posteriorly
 - supination : palm faces anteriorly
- circular movement
 - circumduction: combo of flexion, extension, abduction, adduction
 - appendage describes/makes a cone
- special movements
 - limited to only 1 or two joints
 - types:
 - elevation and depression
 - elevation: moves structure superior
 - depression: moves structure inferior
 - ex. Shrugging shoulders, opening and closing the mouth
 - protraction and retraction
 - protraction: gliding motion anteriorly
 - retraction: moves structure back to anatomist position or even further posteriorly
 - ex. Scapula
 - excursion
 - lateral: moving mandible to right or left of midline
 - medial: return the mandible to the midline
 - ex. Chewing food
 - opposition and reposition
 - opposition: movement of thumb and little finger toward each other
 - reposition: return to anatomical position
 - inversion and eversion
 - inversion [supinate]: turning the ankle so the plantar surface of the foot faces medially (standing on outside of feet so sole points inward)
 - eversion [pronation]: turning the ankle so the plantar surface of foot faces laterally

Preview from Notesale.co.uk
Page 3 of 31

- condyloid: allowing flexion/extension , small amt of rotation
- Menisci: fibrocartilage articular disks that build up margins of the tibia and deepen articular surface
- cruciate ligaments: extend between intercondylar eminence of tibia and fossa of the femur
 - anterior cruciate ligament (ACL): prevents anterior displacement of tibia
 - posterior cruciate ligament (PCL): prevents posterior displacement of tibia
- collateral and popliteal ligaments: along w/tendons of thigh muscles strengthen the joint
- Bursae: may result in slow accumulation of fluid in the joint (water on the knee)
- *knee injuries and disorder:
 - football injuries - often tear the tibial collateral ligament , the anterior cruciate ligament , and damage the medial meniscus
 - bursitis
 - chondromalacia - softening of cartilage due to abnormal movement of patella or to accumulation of fluid in fat pad posterior to patella
 - hemarthrosis -accumulation of blood in joint

Lecture 9 - effects of aging, joint disorders

Effects of aging on joints:

- tissue repair slows, rate of new blood vessel development decreases
- articular cartilage wears down and matrix becomes more rigid
- production of synovial fluid declines
- ligaments and tendons become shorter and less flexible; decrease in ROM
- muscles around joints weaken
- decrease in activity causes less flexibility and decreased ROM

Joint disorders:

- arthritis : inflammation of joint
- osteoarthritis: wear and tear stress related
- rheumatoid: caused by transient infection or autoimmune disease. Systemic.
- joint infections: lyme disease (w/tick as vector), suppurative arthritis. Tuberculous arthritis
- gout: metabolic disorders of unknown causes (idiopathic) . Increase in uric acid in blood results in deposition of monosodium urate crystals in joints and kidneys
- hallux valgus and bunion: Caused by ill-fitting shoes

- joint replacement: prosthetic joint used to eliminate excruciating pain, usually due to arthritis

Module 9

Lecture 1 - Muscular System, functions and properties

Functions of muscular system:

- movement of body
- maintenance of posture
- Respiration
- production of body heat [during muscle contraction, help maintain body temp]
- communication [mandible muscles, tongue movement]
- constriction of organs and vessels [esophagus contracts and relaxes to propel food down to stomach]
- contraction of the heart

General properties of muscle:

- contractility: ability of muscle to shorten w/force [epithelial, nervous, connective can't do]
- excitability: capacity of muscle to respond to a stimulus (from our nerves)
- extensibility: muscle can be stretched to its normal resting length and beyond to a limited degree
- elasticity: ability of muscle to recoil to original resting length after stretched

Lecture 2 - muscle types, connective tissue coverings

Types of muscle tissue: **see table 9.1**

- skeletal:
 - responsible for locomotion, facial expressions, posture, respiratory movements, other types of body movement
 - voluntary
 - multiple nuclei peripherally located
 - structure:
 - composed of muscle cells (fibers), CT, blood vessels, nerves
 - fibers are long, cylindrical, multinucleated
 - tend to be smaller diameter in small muscles and larger in large muscles. 1mm - 4cm in length
 - develop from myoblasts; numbers remain constant
 - striated appearance due to light and dark banding
 - smooth:
 - walls of hollow organs, blood vessels, eyes, glands, skin
 - functions: propel urine, mix food in digestive tract, dilating/constricting pupils, regulating blood flow
 - in some locations, autorhythmic
 - controlled involuntarily by endocrine and autonomic nervous systems
 - single central nucleus
 - cardiac:
 - heart: major source of movement of blood
 - autorhythmic
 - controlled involuntarily by endocrine and autonomic nervous systems
 - single central nucleus
 - connective tissue
 - covering of muscle:
 - layers:
 - epimysium: CT that surrounds a whole muscle (many fascicles)
 - perimysium: Denser CT surrounding a group of muscle fibers.
- Each group called a fasciculus
- Endomysium: Loose CT w/reticular fibers
 - muscular fascia: CT sheet
 - external to epimysium
 - holds muscles together and separates them into functional groups

Nerves and Blood Vessel Supply

- Motor Neurons : stimulate muscle fibers to contract
 - nerve cells w/cell bodies in brain or spinal cord; axons extend to skeletal muscle fibers thru nerves
 - axons branch so that each muscle fiber is innervated
 - contact is made at the Neuromuscular Junction
 - capillary beds surround muscle fibers [blood bring oxygen and nutrients]

Lecture 3 - muscle fibers, filaments, and sarcomeres

*Muscles are primarily protein

-Skeletal muscle fibers

- several nuclei just inside sarcolemma
- cell packed w/myofibrils w/in cytoplasm (sarcoplasm)
- threadlike
- composed of protein threads called myofilaments: thin (actin) and thick (myosin)
- sarcomeres: highly ordered repeating units of myofilaments ; structural and functional unit of the muscle!

2 actins to 1 myosin; actins sliding over myosin for contraction *Actin has linear (F actin) and globular proteins (troponin); active sites on G actin molecules — troponin will bind to G actin, calcium, and

-Actin (thin) myofilaments

- 2 strands of fibrous (F) actin form a double helix extending the length of the myofilament; attached at either end at sarcomere.
- composed of G actin monomers each of which has an active site
- actin site can bind myosin during muscle contraction
- tropomyosin: an elongated protein winds along groove of F actin double helix
- troponin is composed of 3 subunits:
 - one that binds to actin
 - one that binds to tropomyosin
 - one that binds to Calcium ions

Myosin (thick) myofilament

- many elongated myosin molecules shaped like golf clubs
- molecule consists of myosin heavy chains wound together to form a rod portion lying parallel to the myosin myofilament and 2 heads that extend laterally
- myosin heads
 1. can bind to active sites on actin molecules to form cross bridges
 2. Attached to rod portion by hinge region that can bend and straighten during contraction

3. ATPase enzymes a: activity that breaks down ATP, releasing energy. Part of the energy is used to bend the hinge regions of the myosin molecule during contraction

Sarcomeres: Z disk to Z disk

- sarcomere : basic functional unit of muscle fiber
- Z disk: filamentous network of protein. Serves as attachment for actin myofilaments
- striated appearance
 - I bands: from Z disks to ends of thick filaments (myosin)
 - A bands: length of thick filaments
 - H zone: region in A band where actin and myosin DON'T overlap. [bc this is area where have potential to have them come together - how much of a contraction will have] {means it can contract}
 - M line: middle of H zone; delicate filaments holding myosin in place

*In muscle fibers, A and I bands of parallel myofibrils are aligned *

*Titin filaments: elastic chains of amino acids; make muscles extensible and elastic

Lecture 4 - Sliding Filament Theory, Physiology

Sliding filament model

- actin myofilaments sliding over myosin to shorten sarcomeres
 - actin and myosin do NOT change length
 - Shortening SARCOMERES responsible for skeletal muscle contraction

-coccygeus - support pelvic viscera and provides sphincter like action in anal canal and vagina

Lecture 6 - Muscles that move pectoral girdle and arm

-Muscles for pectoral girdle:[all insertion on scapula]

- trapezius - pulls scapula medially
- rhomboid major. - raise and pull scapula medially
- Levator scapula - elevate scapula
- serratus anterior -pulls scapular anteriorly and downward
- pectoralis minor -pull scapula fwd and downward

-Muscles that move the arm (brachial region; insertion on humerus):

- coracobrachialis - flex and adduct the arm
- pectoralis major [on top of pectoralis minor] — Large Origin (greater area of anchoring=more power can generate) - flex, adduct, rotate arm medially
- teres major -extends, adducts, rotates arm medially
- Latissimus dorsi - extends, adducts, and rotates arm medially , pull shoulder downward and back- Large Origin - insertion : intertubercular groove . Swimmers muscle.
- deltoid - abducts, extends, flexes arm {fibers that posterior (extend), lateral (abduct), and anterior fibers (flex); insertion: deltoid tuberosity}
- rotator cuff muscles:
 - supraspinatus - abducts the arm; NO rotation (synergistic/assistant muscle to deltoid)
 - infraspinatus - rotate arm laterally , go to greater tubercle
 - subscapularis - huge muscle that sits against inner surface of scapula, Large Origin, insert on lesser tubercle - rotates arm medially
 - teres minor {rotator cuff muscle}[goes to greater tubercle of humerus (outside/lateral)] - rotates arm laterally

Lecture 7 - muscles that move forearm and hand

-Muscles that move forearm

Anteriorly:

- Biceps brachii - flexes forearm at elbow and rotates hand laterally (origin: scapula, insertion: radius) [supinated]
- brachialis - flexes forearm at elbow [pronated]
- Brachioradialis - Flexes arm at elbow [neutral position]

Posteriorly:

- Triceps brachii - 3 headed muscle that extends forearm at elbow
- Supinator - rotates forearm laterally
- Pronator Teres - rotates forearm medially
- Pronator Quadratus - rotates forearm medially {stronger than pronator teres}

-Muscles that move the hand (origin in forearm and insertion in hand) *radius=abduction, ulnar=adduction*

Anterior:

- Flexor carpi radialis - flex wrist, abduct hand
- flexor carpi ulnaris - flex wrist and adduct hand
- palmaris longus - flex wrist
- flexor digitorum profundus - flex distal joints of fingers
- flexor digitorum superficialis - flex fingers and wrist

Posterior:

- extensor carpi radialis longus [longer head]- extend wrist and abduct hand