

Anatomy C - Anatomy and Physiology C - Camas C-Invite - 12-12-2020

GLHF, don't cheat, do good.

1. (4.00 pts) Identify and describe the four primary characteristics of muscle tissue.

Expected Answer: • Excitability: Plasma membranes can change electrical states and send action potential along the length of the membrane. • Contractility: allows muscle tissue to pull on its attachment points and shorten w/ force • Extensibility: can stretch or extend • Elasticity: ability to return to its original shape after contraction or extension

2. (4.00 pts) Identify and describe the structure and function of the three layers of skeletal muscle tissue.

What is this three-layer system known as?

Expected Answer: Epimysium (sheath of dense, irregular connective tissue) allows muscle to contract and move powerfully while maintaining structural integrity, separates muscle from tissues. Perimysium allows nervous system to trigger specific muscle by activating fascicle. Inside each fascicle, each muscle fiber is encased in endomysium (thin connective tissue layer of collagen/reticular fibers), contains ECF and nutrients supplied via blood. Mysia

3. (6.00 pts) Identify and describe the three types of muscle contractions.

Expected Answer: Concentric contraction – muscle shortening to move load, force generated by muscle exceeds load opposing contraction. Eccentric contraction - muscle tension diminishes. Tension generated is not enough to overcome the external load on muscle, muscle fibers lengthen as they contract. Can lead to more muscle damage than concentric loading. Muscle decelerates the joint at the end of a movement. Called negatives in weight training. Isometric contractions - muscle produces tension without changing angle of joint.

4. (6.00 pts) Identify and describe the three main types of skeletal muscle fibers.

Expected Answer: • 3 main types of skeletal muscle fibers. Slow oxidative fibers are red, contract slowly, and use aerobic respiration to produce ATP. Fast oxidative fibers are lighter in color, contract quickly, and use aerobic respiration, but may switch to anaerobic respiration, so they can fatigue quicker. Fast glycolytic fibers are white, have fast contractions, primarily use anaerobic glycolysis, and fatigues the fastest. FG have large diameters and have lots of glycogen.

5. (6.00 pts) Identify and describe the major types of type 2 fast-twitch muscles.

Expected Answer: • 3 major subtypes of type 2 fast twitch muscles. Type 2x produce most force, incredibly inefficient based on high myosin ATPase activity, low oxidative capacity, and heavy reliance on anaerobic metabolism. Type 2a (AKA intermediate fibers) are able to use both aerobic and anaerobic energy systems, have higher oxidative capacity, and fatigue slower.

6. (1.00 pts)

The speed of muscle contraction is relatively static in a single muscle type because the rate of ATP hydrolyzation via myosin ATPase to produce cross-bridge action is also relatively static.

☐ True ☒ False

7. (1.00 pts)

Muscle contraction activity generates the majority of body heat.

☒ True ☐ False

8. (1.00 pts)

When skeletal muscle has been dormant and then activated, initial contractions generate about half the force of later contractions

☒ True ☐ False

9. (1.00 pts)

Muscle tension increases in a graded manner called wave summation, and later muscle contractions become more efficient.

☐ True ☒ False

10. (1.00 pts)

Both Type 1b sensory nerve fibers and A α fibers are innervated by the Golgi Tendon Organ.

☒ True ☐ False

11. (1.00 pts)

The Golgi Tendon Organ (GTO) is responsible for detecting changes in muscle length.

☐ True ☒ False

12. (3.00 pts)

What cardiac muscle cells are responsible for maintaining the rhythm of heartbeats? What property of these cells allows them to control this? Describe this mechanism briefly.

Expected Answer: Heartbeats are controlled by pacemaker cells that directly control heartrate that respond to the autonomic NS and hormones. Pacemaker cells have autorhythmicity (self-excitabile, able to depolarize to threshold and fire action potentials independently).

13. (1.00 pts)

What protein do calcium ions interact with to innervate muscle contractions? (Hint: messenger protein)

Expected Answer: Calmodulin

14. (25.00 pts) For the following muscles, identify its primary biomechanical/kinesiological function, target, target motion direction, origin, and insertion.

Orbicularis Oris
Orbicularis Oculi
Zygomaticus Major
Transversus Abdominis
Internal Intercostals

Expected Answer: Orbicularis Oris: circular muscle. Moves lips. Shaping of lips (lips, multiple directions, tissue surrounding lips, underneath skin at corners of mouth) Orbicularis Oculi: Circular muscle. Closes eye (eyelid skin, compression along superior/inferior axis, medial bones composing orbit, circumference of orbit) Zygomaticus Major: Smiling (mouth corners, lateral elevation, zygomatic bone, under skin at dimples + O.oris) Transversus Abdominis: Squeezing abdomen during forceful exhalations, defecation, urination, and childbirth (abdominal cavity, compression, ilium/ribs 5-10, sternum/linea alba/pubis) Internal Intercostals (11 pairs): Forced exhalation (Ribs, movement along superior/inferior axis to bring ribs closer together, rib inferior to each intercostal, rib superior to each intercostal muscle)

15. (30.00 pts) For the following muscles, identify its primary biomechanical/kinesiological function, target, target motion direction, origin, and insertion.

Brachialis
Palmaris Longus
Extensor carpi ulnaris
Gluteus medius
Gracilis
Vastus intermedius

Expected Answer: Brachialis: Provides additional power in flexing, deep to biceps brachii. (forearm, flexion, front of distal humerus, coronoid process of ulna. Forearm flexor. Anterior compartment of arm. Palmaris Longus: Assists in bending hand up toward shoulder (wrist, flexion, medial epicondyle of humerus, palmar aponeurosis/skin and fascia of palm) Extensor carpi ulnaris: Straightens wrist away from body/tilts hand to side toward body (wrist, extension/adduction, lateral epicondyle of humerus/posterior border of ulna, base of 5th metacarpal) Gluteus medius: Opens thighs (femur, abduction, lateral surface of ilium, greater trochanter of femur) Gracilis: Moves back of legs up toward buttocks/assists in opening thighs (femur/tibia/fibula, flexion/adduction, inferior ramus/body of pubis/ischial ramus, medial surface of tibia) Vastus intermedius: Moves lower leg in front of body (tibia/fibula, extension, proximal femur shaft, patella/tibial tuberosity). Quadriceps femoris group.

16. (2.00 pts) Which of the following substances can freely pass through the integument?

(Mark **ALL** correct answers)

- ☒ A) Small molecules
- ☒ B) Fat-soluble vitamins
- ☐ C) Small inorganic solvents
- ☒ D) Oleoresins
- ☒ E) Heavy metal salts

☐ F) Water

17. (1.00 pts) Rosacea is a common, contagious, inflammatory disease relating to cathelicidins.

☒ True ☐ False

18. (6.00 pts) Identify and describe the three layers of the integumentary vascular supply. Describe what each region of the integument each layer supports/supplies.

Expected Answer: Subcutaneous/deep dermal supply(composed of arteries and veins that branch superficially into middermis to form cutaneous plexus), cutaneous plexus (supplies adnexal structures of dermis like glands and follicles), and papillary plexus (branches superficially to form fine network of capillaries, lies directly subjacent to epidermis, supplies blood to epidermis).

19. (8.00 pts) Identify the primary physical appearance characterized by the following skin conditions and identify/describe one possible cause for each.

Jaundice

Pallor

Bronzing

Vitiligo

Expected Answer: Jaundice: Yellowing. Buildup of bilirubin in blood indicating liver disease. Bilirubin produced when RBCs decompose. Normally processed in liver and deposited in stool. Pallor: paleness, emotional state, anemia, low blood pressure Bronzing: Noticable darkening at extremities. Addison's disease, adrenal cortex. Excess of adrenocorticotrophic hormone. Vitiligo: Melanocytes in certain areas lose ability to produce melanin, possibly due to an autoimmune reaction. Loss of color in patches.

20. (1.00 pts) Nociceptors are the least numerous type of integumentary receptor.

☐ True ☒ False

21. (1.00 pts) TRPV1 receptors are involved in the detection of cold.

☐ True ☒ False

22. (1.00 pts) TRPA receptors require only brief stimuli to be innervated, while chemical receptors require long-lasting stimuli.

☒ True ☐ False

23. (1.00 pts) The ratio of hot:cold (hot:cold) receptors in a single square inch of skin is approximately 6:1.

☐ True ☒ False

24. (7.00 pts)

Describe the critical points in temperature (points at which they are stimulated and when they stop stimulating) for hot receptors and cold receptors. At what temperature do pain receptors take over? At what temperatures do hot and cold receptors become stimulated the most?

Expected Answer: Cold receptors perceive cold when surface drops below 95° F, most stimulated when surface is at 77° F, no longer stimulated below 41° F. Hot receptors perceive hot when surface above 86° F and most stimulated at 113° F. Beyond 113° F, pain receptors take over to avoid damage.

25. (16.00 pts)

Identify and describe the anatomy and physiology of the four main types of cutaneous mechanoreceptors (what do they each sense?). For each, describe the receptive field.

Expected Answer: Slowly Adapting Type 1 (SA1): With multiple Merkel corpuscle end-organ, underlies perception of form/roughness of skin. Small receptive fields, sustained responses to static stimulation. Slowly Adapting Type 2 (SA2): With a single Ruffini corpuscle end-organ, respond to skin stretch, not closely linked to either proprioceptive/mechanoreceptive roles in perception. Produce sustained responses to static stimulation, large receptive fields. Rapidly Adapting Type 1 (RA1): multiple Meissner corpuscle end-organs, perceives flutter/slip on skin. Small receptive fields, produce transient responses to the onset/offset of stimulation. Rapidly Adapting Type 2 (RA2): single Pacinian corpuscle/Vater-Pacinian corpuscles/Lamellar Corpuscles, Perceives high-frequency vibration. Transient responses, large receptive fields.

26. (30.00 pts)

Identify and describe the five main sensory fibers located in the integumentary system. Discuss their relative sizes, myelination patterns, conduction velocities, locations, and types.

Expected Answer: Type 1A (A α): 13-20 μ m diameter. Myelinated. Conduction velocity is 80-120 m/s. Primary receptors of muscle spindle (annulospiral ending). Proprioceptors. Type 1B (A α): 13-20 μ m diameter. Myelinated. Conduction velocity is 80-120 m/s. Golgi tendon organ. Proprioceptors. Type 2 (A β): 6-12 μ m diameter. Myelinated. Conduction velocity is 33-75 m/s. Secondary receptors of muscle spindle (flower-spray ending). All cutaneous mechanoreceptors. Proprioceptors. Mechanoreceptors. Type 3 (A δ): 1-5 μ m diameter. Thin myelination. Conduction velocity is 3-30 m/s. Free nerve endings of touch and pressure. Nociceptors of lateral spinothalamic tract. Cold thermoreceptors. Mechanoreceptors, nociceptors, and thermoreceptors. Type 4 (C): 0.2-1.5 μ m diameter. No myelination. Conduction velocity is 0.5-2 m/s. Nociceptors of anterior spinothalamic tract. Warmth receptors. Nociceptors and thermoreceptors.

27. (2.00 pts) Which of the following are major elements of sebum?

(Mark **ALL** correct answers)

- ☒ A) Cholesterol
- ☐ B) Organic salts
- ☒ C) Pheromones
- ☐ D) Nitrogenous wastes
- ☐ E) Dermicidin
- ☐ F) Cerumen

28. (1.00 pts) Lanugo describes hair that is short, fine, pale, and barely visible to the eye.

☐ True ☒ False

29. (1.00 pts) The bulb of the hair follicle contains blood vessels that nourishes the follicle.

☒ True ☐ False

30. (1.00 pts) Piloerector muscles are small, skeletal muscles involved in the contraction of hair follicles, pulling hair straight up.

☐ True ☒ False

31. (15.00 pts)

Describe the stages of the hair growth cycle, in detail. In each stage, discuss the length of time hairs remain in that particular stage, growth rate, and other key events that characterize that stage.

Expected Answer: Anagen - Growth Phase. 85% are in A phase. 2 to 7 years. Cells divide rapidly at root, approximately 10cm/year. 50 hairs lost and replaced every day. Catagen - Transitional Phase. 2-3 weeks, during which follicle shrinks to 1/6 of normal length. Epithelial root sheath cells below bulge undergo apoptosis; dermal papilla breaks away. Telogen - Rest Phase. 5-6 weeks. No growth. 10-15 % of all hairs. Shaft breaks, existing hair falls out and new hair takes its place. Cells that make arm hair are programmed to stop growing every 2-3 months, stays short. Follicles on head are programmed to let hair grow for years at a time, so hair can grow very long. Animals that shed synchronize their rest phase, so a follicles enter rest phase at once. At end of rest phase, follicle re-enters Anagen Phase. Dermal papilla and base of follicle rejoin and new hair forms. If old hair has not already been shed, new hair pushes old one out, growth cycle starts over

32. (12.00 pts) Identify the two types of contact dermatitis. For each, identify at least 5 substances that can contribute to the formation of dermatitis.

Expected Answer: Irritant dermatitis: most common. Contact w/ acids, bases (soaps/detergents), fabric softeners, solvents, chemicals. Resembles burn. Cement, hair dye, long-term exposure to wet diapers, pesticides/weed killers, rubber gloves, shampoos Allergic contact dermatitis: Adhesives (eyelashes, toupees), antibiotics (neomycin), balsam of Peru (cosmetics, foods, drinks), fabrics, fragrances, soaps, moisturizers, permanent wave solutions, nickel, poison ivy/oak/sumac, rubber/latex.

33. (16.00 pts) Identify and describe the four degrees of burn injuries. For each degree, identify the portions of integument affected, symptoms, and healing/treatment procedures.

Expected Answer: 1st: Only affects epidermis. Pain, swollen. Heal on their own. Mild sunburns. 2nd: Affects both epidermis and dermis. Swelling, blistering, must be kept clean to prevent infection. Heals in several weeks. 3rd: Fully extends to dermis, destroying tissue and nerve endings. Can be white, red, or black. Require medical attention, heal slowly. 4th: Affects underlying muscle and bone. Not as painful, nerve endings are damaged. Cannot be healed by body alone, requires excision, amputation, and grafting.

34. (2.00 pts) For the following image, identify the presented condition.



Expected Answer: Pressure ulcer (bedsore is acceptable)

35. (2.00 pts) For the following image, identify the presented condition



Expected Answer: Keloid or hypertrophic scar

36. (2.00 pts) For the following image, identify the presented condition



Expected Answer: Impetigo

37. (2.00 pts) For the following image, identify the presented condition



Expected Answer: Eczema

38. (2.00 pts) For the following image, identify the presented condition



Expected Answer: Ingrown nail

39. (2.00 pts) For the following image, identify the presented condition.



Expected Answer: Carbuncle

40. (2.00 pts) For the following image, identify the presented condition.



Expected Answer: Scabies

41. (7.00 pts) Identify and describe the types of fibrous joints. In what subtype does a synostosis identify as?

Expected Answer: Suture is fibrous connective tissue made up of a thin layer of dense irregular connective tissue. A suture that persists beyond 6 years old is a frontal/metopic suture. (Synostosis is suture present during skull growth, but replaced by bone in adults). Syndesmosis (parallel bones united) may be filled with sheet of interosseous membrane. Gomphosis (specialized fibrous joint) anchor root of tooth, AKA peg-and-socket joint. Spanning b/w bony walls of socket and root of tooth are numerous short bands of dense connective tissue called periodontal ligaments.

42. (4.00 pts) Identify and describe the types of cartilaginous joints.

Expected Answer: Synchondrosis (bones joined by hyaline cartilage or bone is united to hyaline cartilage), may be temporary (epiphyseal plate) or permanent (costal cartilage). Visible in X-rays of young people as thin dark areas between bone tissue. Symphysis is when ends of articulating bones are covered with hyaline cartilage and fibrocartilage discs connect the bones (pubic symphysis)

43. (8.00 pts) Identify and describe the functional classifications of joints. For each type, indicate mobility and at least two examples.

Expected Answer: Synarthrosis (immobile/nearly immobile, sutures, manubriosternal joint), amphiarthrosis (limited mobility, vertebrae, pubic symphysis), Diarthrosis (freely mobile, uniaxial - elbow, biaxial - metacarpophalangeal, multiaxial – hip or shoulder)

44. (30.00 pts)

Identify and describe the six types of synovial joints. For each type, discuss the anatomical joint structure, a type of motion associated with the joint, an example of the type of joint, and the number of axes that the joint can move in.

Expected Answer: Pivot (U): rounded portion enclosed within ring formed by articulation wall with another bone/ligament. (Atlantoaxial, proximal radioulnar). Rotational Hinge (U): Convex end of one articulates with concave end of adjoining (elbow, knee, ankle, interphalangeal). Flexion/extension Saddle (B): Both articulating surfaces have saddle, concave in one direction and convex in another. (carpometacarpal, sternoclavicular). Flexion/extension, circumduction Ellipsoid/Condylloid (B): shallow depression at end of one =articulates with rounded structure from adjacent. (metacarpophalangeal, radiocarpal). Abduction/adduction, circumduction Plane/Gliding (M): articulating surfaces of bones are flat/slightly curved and same size, allows bones to slide against each other. (intercarpal, intertarsal). Inversion/eversion, flexion/extension Ball & Socket (M): Rounded head of one bone fits into concave articulation of another (Glenohumeral, hip). Abduction/adduction, circumduction, medial/lateral rotation

45. (2.00 pts) Match the following type of motion.

Touching thumb to fingertip

- ☐ A) Flexion
- ☐ B) Circumduction
- ☐ C) Supination
- ☐ D) Pronation
- ☒ E) Opposition
- ☐ F) Reposition

46. (2.00 pts) Match the following type of motion

Jutting the mandible outwards

- ☐ A) Extension
- ☐ B) Supination
- ☒ C) Protraction
- ☐ D) Excursion
- ☐ E) Opposition
- ☐ F) Reposition

47. (2.00 pts) Match the following type of motion.

A ballerina points her toes down during a jump.

- ☐ A) Extension
- ☐ B) Flexion

- ☐ C) Rotation
- ☒ D) Plantar flexion
- ☐ E) Dorsiflexion
- ☐ F) Superior rotation

48. (2.00 pts) Match the following type of motion.

Shrugging your shoulders.

- ☐ A) Circumduction
- ☐ B) Supination
- ☐ C) Pronation
- ☐ D) Extension
- ☒ E) Elevation
- ☐ F) Depression

49. (4.00 pts) Identify and briefly describe the two methods of cartilage growth.

Expected Answer: Appositional – cells in perichondrium secrete matrix against the external face of existing cartilage Interstitial – lacunae-bound chondrocytes inside cartilage divide and secrete new matrix, expanding cartilage from within

50. (12.00 pts) Identify and describe the three types of cartilage. For each type, discuss the structural makeup and most common locations (at least two).

Expected Answer: • Hyaline: fine collagen fiber matrix- most abundant type- found in articular (movable joint) cartilages, costal cartilages (connect ribs to sternum), respiratory cartilages (in larynx & upper respiratory passageways) & nasal cartilages • Elastic Cartilages: similar to hyaline cartilage, more elastic fibers (very flexible) – found in external ear & epiglottis (larynx covering) • Fibrocartilage: rows of chondrocytes, thick collagen fibers; highly compressible with great tensile strength- found in menisci of knee, intervertebral discs & pubic symphysis

51. (2.00 pts) Calcified cartilage is never classified as bone tissue.

- ☒ True
- ☐ False

52. (2.00 pts) The anterior nasal septum is formed by septal cartilage.

- ☒ True
- ☐ False

53. (2.00 pts) The maxillary sinus is the smallest, located within both maxillary bones, below the orbits.

- ☐ True
- ☒ False

54. (2.00 pts) The hyoid bone does not articulate with any other bone in the human body.

☒ True ☐ False

55. (2.00 pts) The base of the skull is separated into four cranial fossae: anterior, middle, posterior, and deep.

☐ True ☒ False

56. (2.00 pts) The internal acoustic meatus is the opening located inside the cranial cavity, on the medial side of the petrous ridge.

☒ True ☐ False

57. (2.00 pts) The ethmoid bone, also known as the "keystone" bone, joins with almost every other bone in the skull.

☐ True ☒ False

58. (2.00 pts) The squamous suture is a small, H-shaped suture at the intersection of the frontal, parietal, and squamous portion of the temporal bones.

☐ True ☒ False

59. (2.00 pts) Initial development of the vertebral column starts with 33 vertebrae, but these later fuses to 24.

☒ True ☐ False

60. (2.00 pts) The artery that supplies the brain travels through the transverse foramen in the cervical vertebrae.

☒ True ☐ False

61. (10.00 pts) Identify the five major ligaments of the vertebral column.

Expected Answer: Anterior longitudinal ligament, supraspinous ligament, nuchal ligament, posterior longitudinal ligament, ligamentum flavum.

62. (2.00 pts) The sternum is mainly cartilaginous in early life.

☒ True ☐ False

63. (2.00 pts) The shallow costal groove exists for the passage of blood vessels in ribs.

☒ True ☐ False

64. (2.00 pts) The clavicle is the only horizontal long bone that exists in the human body.

☒ True ☐ False

65. (2.00 pts) The sternoclavicular joint is indirectly supported by the sternoclavicular ligament.

☐ True ☒ False

66. (2.00 pts)

The primary support for the acromioclavicular joint comes from the very weak coracoclavicular ligament, a common reason for the relatively easy dislocation of the joint.

☐ True ☒ False

67. (2.00 pts) The interosseous membrane of the forearm is a sheet of dense connective tissue that unites the radius and the ulna.

☒ True ☐ False

68. (2.00 pts) The extended forearm deviates from the arm by about 5-15 degrees, allowing the forearm and the hand to swing without hitting the hip, particularly in females.

☒ True ☐ False

69. (2.00 pts) Metacarpals 2-4 are relatively immobile, while 1 and 5 are free.

☐ True ☒ False

70. (2.00 pts)

The acetabulum is the convergence of the three areas of the hipbone that form the deep, cup-shaped cavity, located on the medial side of the hip bone as part of the hip joint.

☐ True ☒ False

71. (2.00 pts) The greater trochanter of the femur is a large, upward facing, bony projection above the base of the neck, where multiple muscles attach.

☒ True ☐ False

72. (2.00 pts) On the lateral side of the distal tibia is where the fibular notch exists, a wide groove that forms the distal tibiofibular joint.

☒ True ☐ False

73. (7.00 pts) So you like ankles? Name every tarsal bone.

Expected Answer: Talus, cuboid, calcaneus, navicular bone, medial cuneiform, lateral cuneiform, intermediate cuneiform.

74. (8.00 pts) Compare and contrast the anatomical composition of the two bone membranes.

Expected Answer: • Endosteum: Layer of osteoprogenitor cells, osteoblast, and small amount of connective tissue that lines all internal surfaces of cavities within bone including osteonic canals and marrow spaces. • Periosteum – Contains blood vessels, nerves, lymphatic vessels that nourish compact bones. 2-layered membrane. Outer fibrous layer is collagenous connective tissue, vascular, penetrate inner layer to enter Volkmann's canals and communicate with vessels in osteonic canals. Inner cellular layer contains osteoprogenitor cells. Covers outer surface except where epiphyses form joints, which are covered with articular cartilage (reduces friction, absorbs shock). Inner osteogenic layer is composed of osteoblasts/osteoclasts. Secured to underlying bone by Sharpey's fibers

75. (15.00 pts) Identify and describe the types of bones and provide an example for each.

Expected Answer: Long: Cylindrical in shape, longer than wide; femur, clavicle, humerus, etc. Leverage. Short: Cube-shaped. Carpals, tarsals. Provide stability and limited motion. Sesamoid: Short bones, shaped like sesame seed. Protect tendons by helping them overcome compressive forces. Can vary in number/placement, patella is only common sesamoid bone. Flat: thin, flat & often curved cranial bones, scapulae, sternum, ribs. Serve as points of attachment for muscles and protect internal organs. Irregular: odd shapes; don't fit into any other classes. Vertebrae, facial bones, sinuses. Protect internal organs.

76. (8.00 pts) In high detail, compare and contrast the anatomical composition of compact bone and spongy bone.

Expected Answer: Compact bone. Microscopic structural unit is called osteon (AKA Haversian system). Composed of concentric rings of calcified matrix called lamellae (inner circumferential, interstitial, outer circumferential). Running down each center of osteons is the central canal (AKA Haversian canal), which contains blood vessels, lymphatic vessels, and nerves (these branch off perpendicularly through perforating canal AKA Volkmann's canals that extend to periosteum and endosteum. Bones that resist tension have helices that are more stretched out along the longitudinal axis. Arteries enter through nutrient foramen (small openings in diaphysis). Nerves are present in metabolically active areas. Spongy bone. Also contains osteocytes housed in lacunae. Trabeculae form along stress lines. Spaces of network makes bones lighter. Spongy bone accounts for remaining 20% of total bone mass but has nearly 10x times the surface area of compact bone. Some spongy bones contain RBM protected by trabeculae

77. (20.00 pts) Compare and contrast the two development pathways of bone formation.

Expected Answer: <https://docs.google.com/document/d/1-2M5M6JUoTiVwaxFR-dgfNqw9IGUVO368JubfV2SbSo/edit?usp=sharing>

78. (6.00 pts) Describe the process of bone repair.

Expected Answer: (1) Injury: broken blood vessels, clotting blood (fracture hematoma 6-8 hours after) (2) Invasion of blood vessels & generalized cells (2-3 days), blood clot/damaged matrix/dead cells are removed by macrophages (3) Fibroblasts develop (1 week) (4) Chondroblasts develop from endosteum and periosteum. (5) Granulation tissue forms. Endosteal chondrocytes create internal callus by secreting fibrocartilaginous matrix b/w ends of broken bone. Periosteal chondrocytes and osteoblasts create external callus of hyaline cartilage and bone (respectively) around break. At the same time, osteoprogenitor cells of periosteum are activated, becoming osteoblasts that deposit trabeculae. (6)

Remodeling with osteoclasts (8 weeks). Cartilage in calli is replaced by trabecular bone via endochondral ossification. Eventually, internal and external calli unite, compact bone replaces spongy bone at outer margins of fracture, healing is complete. Slight swelling may remain on outer surface of bone.

79. (8.00 pts) Identify and describe the three levels of sprain injury. How does the acronym PRICE relate to this?

Expected Answer: Sprain: Ligaments reinforcing a joint are stretched or torn. Partially torn ligaments slowly repair themselves. Completely torn ligaments require prompt surgical repair. Grade 1 is ligament is stretched but still intact, minimal bleeding, mild pain, swelling, no instability, feeling of "popping". Grade 2 is partial rupture of ligament, moderate bleeding, severe pain, swelling, inability to walk on limb. Grade 3 is complete tear, severe pain, extensive bleeding, swelling, unable to bear weight on limb, feeling of complete dislocation. Treatment is PRICE (Protect, Rest, Ice, Compression, Elevate)
