

## Anatomy and Physiology - Div. C - 2019-2020

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Total Points: \_\_\_\_ / 169

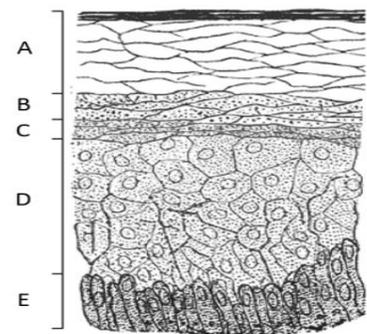
### Integumentary System

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1. What are the most abundant cells in the epidermis? (2 pts)
  - a. Melanocytes
  - b. Keratinocytes
  - c. Langerhans cells
  - d. Dendritic cells
2. Where are keratinocytes found? (2 pts)
  - a. Stratum Spinosum
  - b. Reticular Layer
  - c. Hypodermis
  - d. Stratum Basale
3. What does the secretion of lamellar bodies result in? (2 pts)
  - a. Softens the surfaces of cells in the dermis.
  - b. Activates the immune system
  - c. Slowing of water loss on the epidermis.
  - d. Hastens the process of keratinization
4. Why do cells above the above stratum granulosum begin to die off? (2 pts)
  - a. The cells are too far from the dermal capillaries
  - b. Apoptosis occurs when cells enter the stratum spinosum.
  - c. The cells must die off quickly so they can be replaced with new cells faster
  - d. The harsh external conditions result in mass cell death

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5. **Using the image to the right:** (1 pt each)

- a. Which of the layers are composed of only living cells?
- b. In what type of skin is layer B found?
- c. What are layers C, D, and E named?
- d. In which layer are melanocytes present?



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6. A tonic receptor takes longer to return to its normal action potential firing rate. What would said receptors be most useful in? (2 pts)
- a. Feeling the temperature of a surface
  - b. Feeling textures of a fabric
  - c. Feeling the scratches on a table
  - d. Feeling a cat purring

7. Which layer of skin is only visible in thick skin? (2 pts)
    - a. Stratum lucidum
    - b. Stratum germinativum
    - c. Stratum granulosum
    - d. Stratum basale
  
  8. Which of these is true about the alignment of cleavage lines? (2 pts)
    - a. It contributes to the analysis of fingerprints
    - b. Incisions along said lines heal better and produce less scarring
    - c. They dictate the direction/alignment of myofibril strands
    - d. Muscle growth direction is meant to be parallel to cleavage lines
  
  9. After staining a layer of epidermis, you see many dark granules. What might these granules be? (2 pts)
    - a. Cytokeratin
    - b. Langerhans cells
    - c. Keratohyalin
    - d. Melanin
- 

**Match the following to their functions (not all options will be used):** (1 pt each)

- |                      |   |
|----------------------|---|
| a. Sebaceous glands  | 10. Specialized sweat glands that secrete earwax. |
| b. Ceruminous glands | 11. Exocrine glands that secrete sebum.           |
| c. Ciliary glands    | 12. Glands mostly located in the axial region.    |
| d. Apocrine glands   |   |
| e. Eccrine glands    |   |
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13. Pacinian corpuscles are found on skin and respond to sudden disturbances and vibrations. When pressed, these corpuscles are deformed and sense is perceived. What might explain this phenomenon? (2 pts)
  - a. Increased cellular activity occurs due to deformation, resulting in the excitation of a nerve
  - b. Pressure increases  $\text{Ca}^{2+}$  concentration, prompting a response from the muscles
  - c. Hair follicles around the corpuscles are affected, resulting in the sense of touch
  - d. Deformation causes the opening of sodium ion channels, generating an action potential
  
14. Where are cytokeratins produced in the epidermis? (2 pts)
  - a. Stratum spinosum
  - b. Stratum granulosum
  - c. Stratum corneum
  - d. All of the above

15. What does vitamin D aid in the absorption of? (2 pts)
- Potassium
  - Calcium
  - Magnesium
  - Sodium
16. Someone is going through puberty, what might explain the increase of sweat excretion from their armpits? (2 pts)
- Increased alkalinity of sweat
  - Increased body temperature
  - Activation of eccrine sweat glands
  - Activation of apocrine glands
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17. Give a short description as to what happens in each phase of hair growth: (2 pts each)

- Anagen
- Catagen
- Telogen

18. Which of these phases lasts the longest? (1 pt)

19. Which of these phases lasts the shortest? (1 pt)

20. Does your hair grow faster in the summer or the winter? (1 pt)

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21. How is the acid mantle formed? (2 pts)

- Mixing of free fatty acids from sebaceous gland and sweat
- A natural decrease in pH resulted in distance from blood, which is slightly alkaline
- Secretion of waste in sweat such as uric acid with low pH
- Secretion of low pH proteins that react with external conditions

22. What type of hair is found on males with male pattern baldness? (2 pts)

- Vellus hair
- Club hair
- Terminal hair
- Langulo hair

23. Someone is sweating. Their sweat first forms on their forehead, then spreads to the rest of their body. What can you infer from this? (2 pts)

- They are anxious
- They are distressed
- They are in a humid environment
- They are in a hot location

24. A woman burns both of her arms in the oven, what percent of her body is burned according to the rule of nines? (2 pts)
- a. 4.5%
  - b. 9%
  - c. 18%
  - d. 36%
25. Sebum accumulates and blocks a sebaceous gland. The material is then oxidized and dried. What would this formation be called? (2 pts)
- a. Whitehead
  - b. Blackhead
  - c. Acne
  - d. Pimple
- 

26. A 58 year old woman is presented to the emergency room after collapsing from a seizure. She has been a track runner for years and spends most of her time outdoors. A few weeks ago she began to lose feeling in her left side. She had severe headaches, almost as if something was pushing against her skull. A pigmented lesion is found on her arm. A hard lump appeared under her chin and after going through a PET scan, high metabolic lymph nodes are discovered in that region and metastases were found in her brain. Her condition rapidly worsened.
- a. What is the most likely diagnosis of this patient? (1 pts)
  - b. Besides the lesion identify and describe at least two other details given in the case that could lead to this diagnosis. (4 pts)
  - c. How could the metastases have spread to her brain? (2 pts)
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## Muscular

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27. What does the term 'striated muscle' refer to? (2 pts)
- Cardiac muscle
  - Smooth muscle
  - Skeletal muscle
  - A and C
  - B and C
28. What occurs when satellite cells in skeletal muscles are activated? (2 pts)
- Mitotic proliferation
  - Secretion of lipids to protect surrounding cells
  - Smooth muscle differentiation
  - Decreases hemoglobin count in area
29. Which of these would be an example of an isotonic concentric contraction? (2 pts)
- Pushing an immovable weight
  - Pulling an immovable weight
  - Pulling a weight
  - Pushing a weight away
30. What does ATP bind to in skeletal muscles? (2 pts)
- Actin
  - Myosin
  - Troponin
  - Nebulin
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### True or false: (1 pt each)

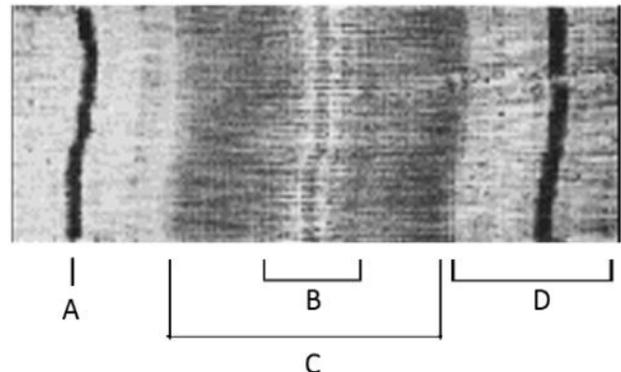
31. The heart is the only location where cardiac muscles are found.
32. The diaphragm is made of smooth muscle.
33. Skeletal muscles cannot be moved involuntarily.
34. Ligaments attach bone to a muscle.
35. Like skeletal muscles, cardiac muscles are also multinucleated.
36. I bands are where actin filaments do not overlap myosin filaments.
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37. What does the binding of  $\text{Ca}^{2+}$  in muscle contraction result in? (2 pts)
- It strengthens troponin's grip, pulling the tropomyosin away from the binding site
  - It moves troponin away from the binding site on the actin fiber
  - It results in the release of ATP
  - It denatures troponin, relaxing its grip

38. A person actively engages in anaerobic strength training, which of the following best describes the effects of this on their muscles? (2 pts)
- The size of the motor units in their muscles will increase
  - The number of muscle cells in their muscles will increase
  - The number of myofibrils in their muscles will increase
  - The thickness of myoglobin in their muscles will increase
39. Motor neurons have myelinated axons with the largest diameter of any axons in the body, which conclusion can be drawn from this? (2 pts)
- The delay between signals from said neurons have long delays, making them unable to perform multiple summations
  - Myelin in the axon 'muffles' the action potential, making it harder for signals to travel
  - Myelin increases action potential propagation, which minimizes delay between signals
  - Motor neurons react slowly to signals due to the size of their axons
40. Hypercalcemia is a condition caused by abnormally elevated calcium levels. How might this condition affect one's muscles? (2 pts)
- Muscles will be abnormally strong
  - Muscles will be unable to contract
  - Muscles will be weakened
  - Muscles will have increased sensitivity to calcium

41. Using the picture of a sarcomere to the right:

- What are the names of A, B, and D? (3 pts)
- What is the function of A? (2 pts)
- What are the filaments in D made of? (2 pt)
- What filaments are not found in B? (2 pt)



42. Which type of connective tissue is found between muscle fibers? (2 pts)
- Epimysium
  - Endomysium
  - Perimysium
  - Myomysium
43. Skeletal muscles stiffen during rigor mortis, which sets in around 2-6 hours after death. What is a reason for this phenomenon? (2 pts)
- ATP breakdown/decomposition
  - Oxidation of myofibrils
  - Decrease in ATP
  - Sarcoplasmic reticulum  $Ca^{2+}$  concentration increases

44. What is a commonality between titin and nebulin? (2 pts)
- Both are signalling proteins
  - Both are enzymes that increase  $\text{Ca}^{2+}$  concentration
  - Both help regulate protein assembly
  - Both are competitive inhibitors of  $\text{Ca}^{2+}$
45. Rodents are able to channel short, quick bursts of energy to escape predators. What type of muscle would you expect to be most prevalent? (2 pts)
- Type I
  - Type IIa
  - Type IIx
  - Type IIb
46. In which type of muscle fiber would you find the highest concentration of myoglobin? (2 pts)
- Type I
  - Type IIa
  - Type IIx
  - Type IIb
47. How does the sarcoplasmic reticulum respond to depolarization? (2 pts)
- It releases sodium ions
  - It releases ATP
  - It releases calcium
  - It releases potassium
48. What is the I-band composed of? (2 pts)
- Myosin
  - Actin
  - Both actin and myosin
  - Neither
49. Which type of troponin binds to tropomyosin? (2 pts)
- Troponin T
  - Troponin I
  - Troponin B
  - Troponin C
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50. A 70 year old man has to be taken to the hospital after choking on his food. The doctor finds he exhibits bilateral ptosis and diplopia, and he stated it was easier to see with just one eye open. His respiratory rate was 27 breaths a minute and his blood-oxygen saturation was 91%. Anti-MuSK (muscle-specific kinase) is found in the patient, and their family history includes multiple cases of immune disorders.
- What is the most likely diagnosis of this patient? (2 pts)
  - What is abnormal about the oxygen levels in his blood and what might have caused this? (3 pts)
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## Skeletal

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51. There are five major cell types found in bone tissue, which of the following does not originate from mesenchymal cells? (2 pts)
- Osteoblasts
  - Osteoclasts
  - Osteocytes
  - Osteogenic cells
52. Which of the following is a valid treatment for scoliosis? (2 pts)
- DMARDs
  - Calcium
  - Bracing
  - NSAIDs
53. Which of the following types of bone appears earliest after fracture of a long bone? (2 pts)
- Lamellar bone
  - Cortical bone
  - Trabecular bone
  - Woven bone
54. What is found between the diaphysis and epiphysis of a long bone in a child? (2 pts)
- Epiphyseal plate
  - Epiphyseal seal
  - Epiphyseal line
  - Epiphyseal cap

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55. List and describe the steps in endochondral ossification. (7 pts)
- How does endochondral ossification differ from intramembranous ossification? (4 pts)
  - What is the cavity in the middle of the primary ossification center called? (2 pt)
  - Are secondary ossification centers present in short bones? (2 pts)
  - Which type of cartilage is most closely associated to endochondral ossification? (2 pts)

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56. As marrow adipocyte count increases: (2 pts)
- Osteoclast count increases
  - Osteoclast count decreases
  - Osteoblast count increases
  - Osteoblast count decreases

57. Which type of cell secretes TRAPase? (2 pts)

- a. Osteoblasts
- b. Osteoclasts
- c. Osteocytes
- d. Osteopontin

58. Which correctly lists the sizes of the types of vertebrae from largest to smallest? (2 pts)

- a. Lumbar, thoracic, cervical
  - b. Thoracic, cervical, lumbar
  - c. Thoracic, lumbar, cervical
  - d. Cervical, thoracic, lumbar
- 

**Fill in the blank with the best-fitting term (not all choices will be used):** (2 pts each)

- |                              |                                 |
|------------------------------|---------------------------------|
| a. Interstitial              | h. Intramembranous ossification |
| b. Magnesium                 | i. Coccyx                       |
| c. Hydroxyapatite            | j. Appositional                 |
| d. Calcium                   | k. Lumbar vertebrae             |
| e. Potassium                 | l. Cervical vertebrae           |
| f. Phosphate                 | m. Sacral vertebrae             |
| g. Endochondral ossification | n. Thoracic vertebrae           |

59. In \_\_\_\_\_ growth, cartilage expands from within as chondrocytes divide and secrete new matrix.

60. Bones act as places of storage for minerals, the two most important of which are \_\_\_\_\_ and \_\_\_\_\_.

61. With the exception of the skull, mandibles, and clavicle, almost all other bones in the body are formed through \_\_\_\_\_.

62. The \_\_\_\_\_, a triangular-shaped bone, is formed by the fusion of vertebrae around the age of 20 and is connected to the \_\_\_\_\_.

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63. What is the most common type of cartilage? (2 pts)

- a. Fibrocartilage
- b. Elastic cartilage
- c. Hyaline cartilage
- d. Yellow cartilage

64. What type of bone is red marrow primarily found in? (2 pts)

- a. Long bones
- b. Short bones
- c. Flat bones
- d. Sesamoid bones

65. Which of these would not happen as a response to low blood calcium concentration? (2 pts)
- PTH levels rise
  - Calcitriol levels rise
  - Osteoclast count rises
  - Calcitonin levels rise
66. The epiphyseal plate is the location on a long bone in which growth takes place, what type of cartilage would this plate mainly be composed of? (2 pts)
- Hyaline cartilage
  - Fibrocartilage
  - Yellow cartilage
  - Elastic cartilage
67. Which of the following would excessively high extracellular calcium be indicative of? (2 pts)
- Scoliosis
  - Osteoporosis
  - Osteoarthritis
  - Bone fractures
68. Small canals connect lacunae to each other and to the central canal, what are these called? (2 pts)
- Howship's lacunae
  - Canaliculi
  - Haversian canal
  - Volkman's canal
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69. A 17 year old girl visits the hospital reporting that she has trouble walking. She was short of breath from walking across the parking lot. Her shoulders do not align correctly, and her spine is shown to form an S-curve that creates a Cobb angle of 47 degrees.
- What is the most likely diagnosis of this patient? (2 pts)
  - Would a 34 year old male patient more likely to receive this diagnosis? (3 pts)
  - What is the best treatment method for this patient and why? (4 pts)
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