Open Ended Question

(3 pts) Bone is not uniformly dense. For example, long bones are comprised of both cortical and cancellous bone. What is the advantage of having cancellous bone, considering that its weaker and more flexible than cortical bone? List 3 advantages. Hit submit before the timer gets to 0:00 to record your answers.

1. **Cancellous bone gives room in the medullary cavity for bone marrow, allowing for hematopoiesis. Also makes the bone overall lighter and better suited to movement by skeletal muscle. Also has a higher surface-area-to-volume ratio than cortical bone, allowing for better nutrient and Ca2+ exchange. Cancellous bone is more flexible than brittle cortical bone.**

Quiz

Section 1

You are currently competing for the regional competition in the state of North Carolina.

- True
- False

Which body system is NOT being tested on this year?

- Skeletal
- Muscular
- Lymphatic
- Integumentary

Bleeding will occur if you penetrate just the epidermis of the skin.

- True
- False

Which epidermal cell type is a type of macrophage in the skin?

- Keratinocyte
- Merkel cell
- Melanocyte
- Langerhans cell

Which epidermal cell type has spider-like projections?

- Keratinocyte
- Merkel cell
- Melanocyte
- Langerhans cell

Which layer of the epidermis contains melanocyte cell bodies?

- Stratum basale
- Stratum lucidum
- Stratum corneum
- Stratum spinosum

Quiz

Section 2

Melanogenesis is primarily enhanced by exposure to which kind of light?

- Red visible light
- Green visible light
- Ultraviolet light
- All of the above

Lamellated corpuscles are responsible for detection of what?

- Pressure
- Light touch
- Stretch
- None of the above

Variations in skin color are a result of _____.

- differing numbers of melanocytes
- differing colors of melanin produced
- differing amounts of melanin produced
- all of the above
- None of the above

Human skin contains stem cells.

- True
- False

You’re a dermatologist, and a patient comes in to ask you about an odd spot that appeared on his forearm. He’s worried that it might be cancerous. Using the rules of the ABCDE test, which of the following findings would be a cause for concern that his blemish might indeed be skin cancer?

- **The spot has jagged borders.**
- **The spot is uniformly brown throughout its area.**
- The spot is in the shape of an almost-perfect circle.
- **The spot is uniformly red throughout its area.**

Suppose you did find a cause for concern about your patient's skin blemish, and you decide to cut part of the spot out of his skin and biopsy it. To minimize trauma and healing time, how would you want the incision line of the biopsy to be oriented relative to the skin?

- Perpendicular to Langer's lines, as this recruits the most blood cells to quickly clot and heal the incision site.
- Perpendicular to Langer's lines, as this results in the greatest exposed skin surface area for subsequent healing.
- Parallel to Langer's lines, as this pulls cut skin closer to itself, allowing it to heal faster and with less scarring.
- Parallel to Langer's lines, as this recruits the most blood cells to quickly clot and heal the incision site.

Open Ended Question

(3 pts) John is an avid runner. Lately, he's been feeling intense pain, especially during runs, in his tibias. He goes to the radiologist, who conducts an X-ray. There were no obvious fractures found. The radiologist then orders a bone scan. What does she suspect is wrong with John's tibias? Be sure to hit Submit before the timer gets to 0:00 to record your answer!

Stress/hairline fracture

Quiz

Section 3

After safely cutting part of the blemish out of your patient, you biopsy it. The pathology lab gets back to you and says the spot is malignant. What is the best-case diagnosis for this patient, with regard to survival rate and potential for metastasis?

- Basal cell carcinoma
- Squamous cell carcinoma
- Osteosarcoma
- Malignant melanoma

Your next patient of the day comes in with a burn on her hand. She says she spilled boiling water on herself. Her hand has blistered, and she says the burn was extremely painful when she initially received it. What degree of burn does this best describe?

- First-degree burn
- Second-degree burn
- Third-degree burn
- Fourth-degree burn

Squamous cell carcinoma affects which layer of the epidermis?

- Stratum lucidum
- Stratum granulosum
- Stratum basale
- Stratum spinosum

If skin pressure is not surgically released following this kind of burn, the skin may tighten in on itself, restricting blood flow to the wounded area. This phenomenon is called _____.

- Contracture
- vasospasm
- vasoconstriction
- dermatoconstriction

With third-degree burns, what is often the most life-threatening effect of the injury that must be addressed as soon as possible?

- High risk of infection, leading to sepsis
- Extremely intense pain, leading to shock
- Profuse hemorrhage, leading to death by bleeding
- Significant loss of fluid, leading to dehydration

Quiz

Section 4

What is the classification of the patella?

- Long bone
- Flat bone
- Sesamoid bone
- Irregular bone

The linea aspera is located on which type of bone?

- Long bone
- Sesamoid bone
- Sutural bone
- Irregular bone

Which of the following cell types is multinucleated?

- Osteoprogenitor cell
- Osteoblast
- Osteocyte
- Osteoclast

With respect to the shaft of the bone, Haversian and Volkmann canals run in which directions, respectively?

- Parallel; perpendicular
- Parallel; parallel
- Perpendicular; perpendicular
- Perpendicular; parallel

Which is often the most painful type of burn?

- First-degree burn
- Second-degree burn
- Third-degree burn
- Fourth-degree burn

Open Ended Question

(4pts) When you're in a pool, you might notice that your fingers become wrinkly and "prune." Contrary to popular belief, this is actually not due to oils leaving your skin and making it wrinkle; it's actually an autonomic response. Speculate as to what purpose pruning fingers could serve. What other structure in the integumentary system serves this same purpose when your skin is dry? Don't forget to hit Submit before the timer gets to 0:00.

1. **Pruning fingers help increase friction between skin and surfaces when the skin is otherwise slippery and wet. This function is also accomplished by epidermal ridges ("fingerprints") when skin is dry.**

Quiz

Section 5

The C2 vertebra is also called the _____.

- Atlas
- Axis
- Dens
- Odontoid process

Which vertebrae consist of transverse foramina?

- Cervical
- Thoracic
- Lumbar
- None of the above

The xyphoid process is part of which bone?

- Humerus
- Clavicle
- Sternum
- Radius

The radius is medial, and the ulna is lateral.

- True
- False

What is the largest tarsal bone?

- Cuboid
- Navicular
- Talus
- None of the above

Quiz

Section 6

Which of these is the cause of osteoarthritis?

- Immune cells attack the synovial membrane, leading to joint damage and inflammation.
- Immune cells stimulate osteoblasts to secrete more bone matrix into the synovial cavity, restricting joint movement.
- Wear and tear of the articular cartilage causes bony spurs to be deposited, decreasing mobility and damaging joints.
- A microbial infection causes inflammation of the synovial cavity and an overactive immune response.

Which of these is NOT a risk factor for development of osteoporosis?

- Gender
- Sedentary Lifestyle
- Smoking
- Gender & Sedentary Lifestyle
- All of the above

Which of the following lists the stages of bone fracture repair in the correct order?

- Bone remodeling, hematoma formation, callus formation, callus ossification
- Hematoma formation, callus ossification, callus formation, bone remodeling
- Hematoma formation, callus formation, callus ossification, bone remodeling
- Hematoma formation, bone remodeling, callus formation, callus ossification

Which disease is characterized by abnormal anterior curvature of the lumbar spine?

- Kyphosis
- Scoliosis
- Osteoporosis
- Lordosis

If the knee is hyperextended, tearing of which ligament can occur?

- ACL
- BCL
- MCL
- LCL

Which of the following is not a type of bone fracture?

- Stable
- Sliding
- Impacted
- Simple

Which of these choices best describes a greenstick fracture?

- One in which the bone has bent and broken only partially through the diameter of the shaft
- One in which the bone has broken in multiple places
- One in which one end of the break has been forcibly shoved into the other end
- One in which the broken end of the bone sticks through the skin.

Open Ended Question

(3pts) Disease A is caused by Bacterium A, which inhibits inhibition of the presynaptic terminal of the host's neuromuscular junctions, causing acetylcholine to be released at all times. Disease B is caused by Bacterium B, which binds tightly to the presynaptic terminal of the neuromuscular junction, preventing the release of acetylcholine into the synaptic cleft. If a patient is co-infected with Bacterium A and Bacterium B simultaneously, what would you expect to happen? What real-life disease corresponds to the mechanism of Disease A? Be sure to hit Submit before the timer gets to 0:00 to record your answer!

1. **Flaccid paralysis would result (even if the neuron is constitutively firing because of Bacterium A, Bacterium B still prevents ACh from entering the synaptic cleft). Disease A corresponds to tetanus.**

Quiz

Section 7

Osteoarthritis tends to strike smaller joints first, like the fingers and toes, and then progresses onto larger joints, like the hip joints.

- True
- False

What is the name of the joint found between a tooth and its socket?

- Suture
- Syndesmosis
- Synostosis
- Gomphosis

Which type of muscle lacks striations?

- Skeletal
- Cardiac
- Smooth
- Skeletal & Cardiac
- Cardiac & Smooth
- Skeletal & Smooth

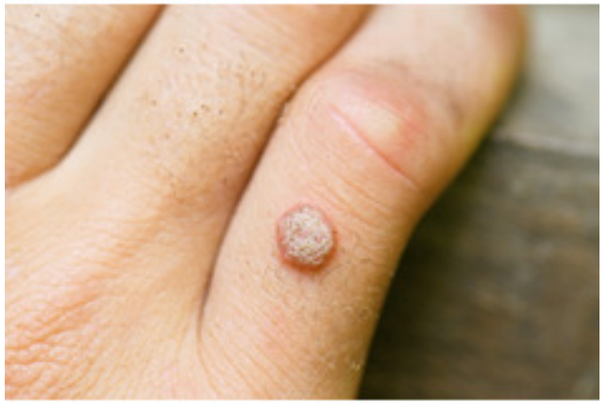
Which type of muscle contains intercalated discs?

- Skeletal
- Cardiac
- Smooth
- Skeletal & Cardiac
- Cardiac & Smooth
- Skeletal & Smooth
- All of the above

Which type of muscle requires Ca^(2+) to contract?

- Skeletal
- Cardiac
- Smooth
- Skeletal & Cardiac
- Cardiac & Smooth
- Skeletal & Smooth
- All of the above

Open Ended Question



(2pts) What is the clinical term for a wart? What is the causative agent of warts? Which three epidermal layers are thickened in the formation of a wart? Hit submit before the timer gets to 0:00 to record your answers.

1. **Clinical term is a papilloma or a verruca (either is acceptable). Causative agent is human papillomavirus (HPV) (don't accept just *virus*). Affected cell layers are stratum corneum, stratum spinosum, and stratum granulosum.**

Quiz

Section 8

What bone does the deltoid insert into?

- Clavicle
- Humerus
- Scapula
- Ulna

How many origins does the triceps brachii have?

- 1
- 2
- 3
- 4

How many insertions does the biceps brachii have?

- 1
- 2
- 3
- 4

Which metacarpal does the extensor carpi ulnaris insert into?

- 1st
- 2nd
- 3rd
- 4th
- 5th

Poliomyelitis is caused by what type of pathogen?

- Bacterium
- Fungus
- Virus
- Protist

Quiz

Section 9

Which event occurs in the disease myasthenia gravis (MG)?

- Antibodies bind to and destroy acetylcholinesterase, leading to weakness and flaccid paralysis.
- Antibodies bind to and destroy acetylcholine receptors, leading to weakness and flaccid paralysis.
- Antibodies bind to and destroy voltage-gated Ca2+ channels, inhibiting muscle contraction.
- Antibodies bind to Ca2+ ions and prevent them from entering the presynaptic terminal.

How does the disease tetanus cause death?

- It can interfere with respiratory muscles and cause death by asphyxiation.
- It can paralyze heart muscles and cause a person to go into cardiac arrest.
- The pain from the disease can be so severe that it causes the person to die.
- The force of contracted skeletal muscles can press upon the blood vessels supplying the extremities, leading to high blood pressure and eventual stroke.

Which of the following musculoskeletal disorders is of genetic cause?

- Duchenne muscular dystrophy
- Myotonic muscular dystrophy
- Myositis
- Duchenne muscular dystrophy & Myotonic muscular dystrophy
- Myotonic muscular dystrophy & Myositis
- Myositis & Duchenne muscular dystrophy
- All of the above

Which of the following is true about Duchenne muscular dystrophy?

- It affects females substantially more than males.
- The average age of onset is about four years.
- The average life expectancy of those affects is approximately mid-40s.
- None of the above.

Which of these conditions is characterized by inflammation of skeletal muscles throughout the body?

- Polymyositis
- Dermatomyositis
- Juvenile myositis
- Myositis ossificans

Open Ended Question

(5pts) Predict what would happen if a person had a mutation producing a nonfunctional calsequestrin protein. Discuss this outcome in terms of the sliding filament model. Hit submit before the timer gets to 0:00 to record your answers.

1. **Spastic paralysis. Without calsequestrin, more Ca2+ ions would remain in the sarcoplasm, bound to troponin. This allows the myosin heads to interact with the actin filaments continually and stimulate muscle contraction.**