Anatomy and Physiology Div C

This test will begin at 3:15pm. The first slide will ask you for your school, team, and team members. 1 person should submit answers for the team. Once the section gets to 0:00, the test moves on but DOES record the answers you have clicked.

Open Ended Question

What is your school name?
What is your team (Varsity, JV1, JV2, etc.)?
What is each team member's name?

Please enter your answer here.

Quiz

Quiz 1

Articular cartilage—which is aneural, avascular, and alymphatic—covers the articular ends of diarthrodial joints. Which of the following is a place where articular cartilage would be found?

- At a synovial joint
- Below a perichondrial layer
- At a syndesmosis
- Both A and B
- Both A and C
- All of the above

Suppose you're a researcher conducting experiments on samples of different types of cartilage, trying to analyze their surface properties. For your first experiment, you take two samples of the same type of cartilage and slide them against one another. Which of the following types of cartilage would slide past itself with the least force applied?

- Semilunar cartilage
- The cartilage of a condyloid joint
- The cartilage of a meniscus
- The cartilage of two bones worn down by osteoarthritis

For your next experiment, you apply a compressive force to different samples and measure the deformity of each sample in response to the load. Which sample is the most resistant to the load you apply?

- Articular cartilage
- The cartilage of a condyloid joint
- Elastic cartilage
- Fibrocartilage

A patient has a disease interfering with the production of type I collagen. Which of the following accurately describes the effect of the disease on this person's bones?

- They would become more porous.
- They would be weaker and more prone to breakage with less applied force.
- Both A and B
- Neither A nor B. Collagen is not present in high enough amounts in bone to affect its porosity or strength.

Which of the following is/are true about osteocytes? I. They retain the ability to multiply. II. They retain the ability to secrete bony matrix. III. They die relatively quickly after enclosure in matrix, typically within days to weeks.

- I only
- II only
- I and II only
- II and III only
- None of the above

When a person suffers a traumatic injury, emergency medical specialists will often "stabilize C-spine," which means manually holding the cervical vertebrae in place to prevent spinal cord injury. Suppose a person is in a car accident has broken their odontoid process. Which of the following is true about this injury?

- The point about which the patient's axis pivots has been damaged.
- **The patient will experience drastically impaired neck flexion because of this injury.**
- Stabilizing the patient's cervical spine may prevent this broken piece of the C1 vertebra from lodging itself into the patient's brainstem.
- **None of the above**
- **All of the above**

Quiz

Quiz 2

Which of the following bone markings is not a type of projection?

- Line
- Tubercle
- Crest
- Process
- Head
- Facet
- Notch
- Ramus

Osteoid refers to _____ bone matrix.

- organic
- inorganic

In the growth of long bone, the _____ zone involves active cell division.

- proliferation
- hypertrophic
- calcification
- ossification

Which skeleton forms the long axis of the human body?

- Axial skeleton
- Appendicular skeleton

Which of the following is a bone-lining cell?

- Periosteal cell
- Endosteal cell
- Both A and B
- None of the above

Improper chest compressions during cardopulmonary resuscitation (CPR) causes fractures most often to which bone marking?

- The xiphoid process of the sternum
- The manubrium of the sternum
- The body of the sternum
- The angle of the sternum

Quiz

Quiz 3

Which of the following statements is/are true about the nucleus pulposus?

- It becomes increasingly gelatinous with age.
- It may burst through the annulus fibrosus in a disc herniation, the incidence of which increases with age.
- It functions to ease pressure between vertebral pedicles.
- It plays an important role in nutrient diffusion to adjacent verebrae
- Both A and B
- Both B and C

Imagine that most of the major Volkmann's canals in a long bone were suddenly blocked. What would be a major consequence?

- Nothing would happen. Volkmann's canals are not essential to the health of the bone
- Nutrients wouldn't be able to travel through blood along the lengths of each individual osteon.
- Nutrients wouldn't be able to travel through blood in lacunae from one canaliculus to the next.
- Nutrients wouldn't be able to travel through blood vessels from the outer surface of the bone to the inside.
- Nutrients wouldn't be able to travel through blood in canaliculi from one lacuna to the next.

How do trabecular bone osteoblasts and osteocytes receive nutrients?

- Primarily through their osteons. Blood from Volkmann's canals supply the cells through canalicular diffusion.
- **Primarily through their osteons. Blood from Haversian canals supply the cells through canalicular diffusion.**
- **They primarily rely on canalicular diffusion from Haversian systems in cortical bone.**
- **They primarily rely on direct diffusion from the red bone marrow lining the bones.**

Which bone is fractured in this scan?

- Tibia
- Calcaneus
- Talus
- Cuboid
- Navicular

What type of scan was used in this question?

- X-ray
- MRI
- CT
- PET

The vertebrae are an example of _____ bones.

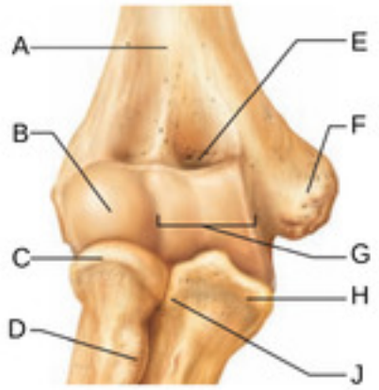
- flat
- irregular
- sesamoid
- short
- spiny

Quiz

Quiz 4

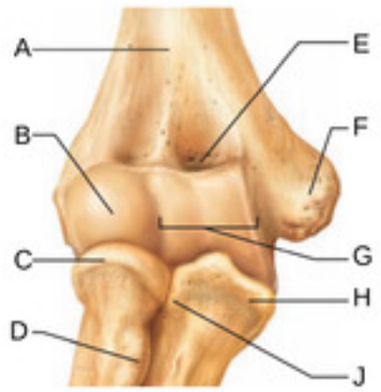
A person who has very little exposure to the sun is at increased risk of which of the following?

- Poorly calcified bones
- Osteoporosis
- Melanoma
- Squamous-cell carcinoma



What joint is pictured here?

- Knee
- Elbow



What is the name of structure B from this question?

- Trochanter
- Trochlea
- Capitulum
- Head of radius
- Neck of femur

Which of the following affect(s) the color of somebody's skin?

- The oxygenation of blood in the dermis
- The number of Pacinian corpuscles in the dermis
- The amount of melanin in the dermis
- Both A and C
- All of the above

Which of the following integumentary pigments is orange in color?

- Eumelanin
- Pheomelanin
- Carotene
- Hemoglobin

Where are sudoriferous glands found?

- Palms
- Back
- Soles of the feet
- All of the above

Quiz

Quiz 5

What is the difference in the integumentary system between a fair skin and darker skin?

- Fair skin has fewer melanocytes than darker skin.
- Fair skin has more melanocytes than darker skin.
- Fair skin has a greater concentration of eumelanin relative to pheomelanin than in darker skin.
- Fair skin has less melanin than darker skin.
- Both A and D.

It’s a very hot day outside, and you’re sweating profusely. Which of the following is/are true about your integumentary system?

- Your sudoriferous glands are especially active.
- Your apocrine glands are especially active.
- Your cutaneous blood vessels are undergoing vasoconstriction to redirect the relatively warm blood from your skin in order to keep you feeling cooler.
- Both A and C
- All of the above

A 50-year-old comes to you with second-degree burns on the front of his chest and abdomen and on his entire right arm. What percentage of his body area is affected?

- 18%
- 27%
- 36%
- 41%
- 45%

During chemotherapy for cancer treatment, mitosis is interrupted in cancerous cells. However, this has the adverse effect of interrupting mitosis is non-cancerous cells as well. Which layer of the hair is adversely affected, causing hair to fall out as a result of chemotherapy?

- Hair matrix
- Internal root sheath
- External root sheath
- Cuticle

Keratin cross-linking is promoted by _____.

- loricrin
- fillagrin
- fibrillin
- keratohyalin
- keratoplakin

Which layer of the dermis accounts for 80% of its thickness?

- Reticular layer
- Papillary layer

Rest Station

Use this opportunity to take a break!

Quiz

Quiz 6

In skin, which of the following is the thinnest?

- The epidermis
- The stratum granulosum
- The stratum spinosum
- The stratum corneum
- The stratum basale

What is the color of melanocytes in the stratum germinativum?

- Black
- Brown
- Red
- Orange
- Clear

Which of the following would be increased in number during chronic dermatitis?

- Langerhans cells
- Dendritic cells
- Keratinocytes
- Both A and B
- Both A and C
- All of the above

Which of the following cells have tendril-like processes that extend out from their cell bodies? I. Melanocytes II. Langerhans cells III. Merkel cells IV. Pacinian corpuscles

- I only
- I and II only
- I, II, and III only
- I, II, and IV only
- I, II, III, and IV

Your feel the vibration of your phone in your pocket. Which of the following is true of the mechanoreceptor primarily responsible for this sensation?

- This mechanoreceptor is slowly adapting.
- This is a tonic mechanoreceptor.
- This mechanoreceptor can be used for detection of smooth vs. rough textures.
- This mechanoreceptor is also the mechanoreceptor primarily responsible for detection of light touch.

You are about to give a presentation to your class about the integumentary system. You're very nervous, and you notice that your armpits are sweating. Which of the following is true about the sweat produced from your armpits?

- Its primary function is thermoregulation, acting to cool you down during this very stressful time.
- The sweat that comes from the armpits initially and intrinsically smells worse than the sweat that would come from your forehead during an intense workout.
- This sweat comes from eccrine glands. Modified eccrine glands include ceruminous glands and mammary glands.
- The gland secreting this sweat is always associated with a hair follicle, whereas the sweat coming from your forehead during an intense workout can secrete directly onto the skin surface.

Quiz

Quiz 7

True/False. The ageing of the skin is completely intrinsic, and there are no environmental factors that can speed up or slow down this process.

- True
- False

Which of the following is/are true of muscular dystrophy?

- **Although men are affected by Duchenne muscular dystrophy more often, women may also experience mild symptoms if they are carriers.**
- **Duchenne muscular dystrophy is a milder form of Becker muscular dystrophy.**
- The dystrophin protein—mutated in muscular dystrophy—is one of the largest ever discovered, which may account for its relatively high mutation rate.
- **Both A and B**
- **Both A and C**
- **All of the above**

True/False. The thin filaments of the sarcomere lengthen slightly during contraction, while the thick filaments remain the same length.

- True
- False

Muscles connect to bones by means of _____ and _____.

- ligaments; cartilage
- tendons; cartilage
- ligaments; tendons
- tendons; aponeuroses
- tendons only

True/False. During rigor, there are no nucleoside triphosphates bound to myosin.

- True
- False

Which of the following anchors thin filaments to the sarcolemma?

- Myomesin
- Titin
- Nebulin
- Dystrophin
- None of the above

Quiz

Quiz 8

True/False. When acetylcholine increases sarcolemma permeability at the neuromuscular junction, the entire length of the muscle fiber instantaneously depolarizes, causing a muscular contraction.

- True
- False

Why doesn’t smooth muscle appear striated?

- It doesn’t have sliding filaments.
- It has sliding filaments, but the sarcoplasm doesn’t contain actin and myosin.
- **It has sliding filaments, but they are not arranged in a linear fashion to give rise to striations.**
- **Each cell is eliptically shaped and thus fits with other cells more like parallel polygons than parallel lines in striated muscles.**

True/False. Muscles are wrapped in perimysium.

- True
- False

You are in the forest, running away from a hungry lion. Suddenly, a tendon ruptures, breaking contact between your gastrocnemius and your calcaneus. What is the major function that you just lost with this injury?

- Knee extension
- Plantar eversion
- Plantar flexion
- Knee rotation

Your tendon has ruptured while you're on the run from this hungry lion, but fear not! There is another muscle that can perform the lost action (although less effectively than both muscles together). What is the name of this muscle?

- Vastus medialis
- Tibialis anterior
- Soleus
- Rectus femoris

Still on the run from this lion, you suddenly trip over. The lion prepares to pounce, but you think fast and kick it in the face before it can hurt you. What best describes the cellular mechanism underlying this forceful kick?

- Acetylcholine binds to receptors lining the sarcoplasmic reticulum, allowing sodium ions to rush in, triggering an action potential.
- Acetylcholinesterase binds to receptors lining the sarcoplasmic reticulum, allowing calcium ions to rush in, triggering an action potential.
- Acetylcholine binds to receptors on the sarcolemma, allowing calcium ions to rush in, triggering an action potential.
- Acetylcholine binds to receptors on the sarcolemma, allowing sodium ions to rush in, triggering an action potential.

If someone has a mutation in their acetylcholinesterase enzyme that causes it to function at increased capacity, what would be a probable result?

- **Muscle weakness resulting from decreased permeability of the sarcomere to action potentials.**
- Muscle weakness resulting from increased sequestration of Ca^{2+} ions away from the synaptic cleft.
- Spastic paralysis resulting from unimpeded ion flow into the sarcomere and consequent liberation of Ca^{2+} and muscle contraction.
- Spastic paralysis resulting from this enzyme opening ligand-gated ion channels at the synaptic cleft, constantly depolarizing the sarcomere.

When you eat a chicken leg, you may notice that the meat has a “grain” to it, meaning that it can be torn apart into stringy pieces of meat. Where do these long strands of meat originate? Would you see this stringiness in a chicken’s intestine?

- The “grain” directly comes from the parallel fasciculi arranged along the fiber of the muscle. You wouldn’t see this stringiness in the intestine because smooth muscles have no sarcomeres.
- The “grain” directly comes from the parallel sarcomeres arranged along the fiber of the muscle. You wouldn’t see this stringiness in the intestine because smooth muscles have no sarcomeres.
- The “grain” comes directly from the strings of striated muscle arranged along the fiber of the leg. You would see this stringiness in the intestine, as the intestine also has striated muscle fibers.
- The “grain” comes directly from the strings of smooth muscle arranged along the fiber of the leg. You would see this stringiness in the intestine, as the intestine also has smooth muscle fibers arranged in a parallel fashion.

Open Ended Question

A parent comes to you concerned that their five-year-old son has chronic fatigue, breathing difficulties, abnormal lateral curvature of the spine, and general muscle weakness. These symptoms started about a year ago and gradually became worse, to the point where it's difficult for him to even stand from a sitting position. You suspect that this condition is muscular in nature. You decide to take a few tests. Blood Test. A blood test shows that the patient has high levels of creatine kinase. DNA Test. A DNA test shows that the DMD gene on the X chromosome is mutated. The protein product of this gene is found to function at a substantially impaired level. Muscle Biopsy. Muscle cells are extracted from the patient, crushed, centrifuged, and tested for the presence of different proteins. The test is positive for the protein caveolin-3. The test is positive for the protein collagen VI. The test is positive for the protein dystrophin. What disease affects this patient?

Please enter your answer here.

Open Ended Question

The disease from the last question is called Becker muscular dystrophy. Pathophysiologically, what is the difference between Duchenne muscular dystrophy and Becker muscular dystrophy? Why are blood creatine kinase levels high in individuals with Becker muscular dystrophy? How does the lack of functional dystrophin lead to this disease?

Please enter your answer here.

CONGRATULATIONS!!

YOU'RE DONE!

Go take a break.