USMLE-STEP-1 Q&As

United States Medical Licensing Step 1

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QUESTION 1

Desmin is a 53-kDa protein found in skeletal and smooth muscle cells. It plays a role in coordinating muscle cell contraction. Desmin belongs to which type of intermediate filaments?

A. type I

B. type III

C. type IV

D. type V

E. type VI

Correct Answer: B

Section: Anatomy Desmin belongs to the type III intermediate filaments. Intermediate filament proteins have three domains: a head domain (N-terminal), an alpha-helical rod domain, and a tail domain (C-terminal). The six types of intermediate filament proteins are differentiated by the sequence in the rod domain. Type I (choice A) intermediate filaments include the cytokeratins. Type IV (choice C) intermediate filaments are found in the nervous system and include the neurofilaments and alpha-internexin. Type V (choice D) intermediate filaments are the nuclear lamins. Nestin, expressed in stem cells of the central nervous system, is a type VI (choice E) intermediate filament.

QUESTION 2

Recanalization of the bile duct after the 13th week after fertilization allows for bile produced in the liver to reach the duodenum. However, if recanalization fails to occur and this cannot be corrected surgically, the affected infant will need a liver transplant. During development, the liver arises from which of the following?

A. foregut

B. hindgut

C. midgut

D. pleuroperitoneal membrane

E. septum transversum

Correct Answer: A

Section: Anatomy The liver arises as a ventral outgrowth from the caudal portion of the foregut. The midgut (choice C) arises past the junction point between the bile duct and the duodenum, distal to the formative outgrowth of the liver. The midgut gives rise to the small intestine and part of the large intestine. The hindgut (choice B) arises further distally and gives rise to the rest of the large intestine, the superior part of the anal canal, the epithelium of the urinary bladder, and most of the urethra. The pleuroperitoneal membrane (choice D) and the septum transversum (choice E) are developmental components of the diaphragm.

QUESTION 3

A 78-year-old man has ankle edema, tachycardia, and shortness of breath on mild exercise. His blood pressure is 155/98. He has been diagnosed with hypertension and mild heart failure. Which of the following regimens is most appropriate for starting therapy?

A. captopril plus dobutamine

B. captopril plus hydralazine

C. enalapril plus hydrochlorothiazide

D. furosemide plus spironolactone

E. losartan plus hydralazine

Correct Answer: C

Section: Pharmacology The combination of an ACE inhibitor and a diuretic is rational for this patient with hypertension and mild heart failure as both drugs are effective for both conditions. Furthermore, ACE inhibitors have been shown to slow or stop the progression of heart failure and thiazide diuretics have been shown to be among the cheapest and most effective agents for hypertension. If this combination is not sufficiently active to control the heart failure, a loop diuretic mightbe substituted for the thiazide. Dobutamine (choice A) is a parenteral drug for acute failure. Hydralazine (choices B, E) is a vasodilator that causes tachycardia and usually requires concurrent administration of a beta blocker. Use of two diuretics choice D) is probably unnecessary in this early stage of failure and is not the most effective therapy for hypertension.

QUESTION 4

A 54-year-old construction worker collapses at his work site and is brought to the emergencyroom in a comatose state. His skin is dry and hot and his rectal temperature is 105?. Which of the following is the most likely diagnosis?

A. heat cramps

B. heat exhaustion

C. heat stroke

D. malignant hyperthermia

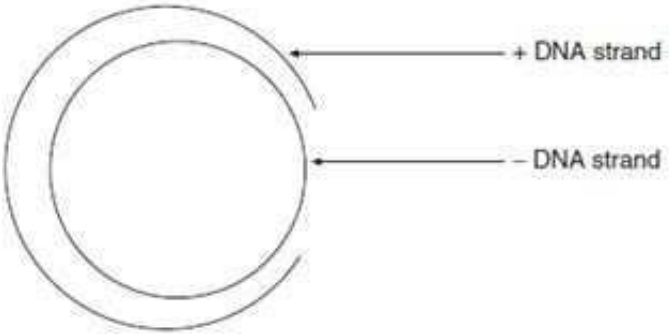
E. pyrexia

Correct Answer: C

Section: Pathology and Path physiology Heat stroke is a life-threatening condition resulting from a failure of heat regulation. It is marked by high body core temperature and the failure of sweating. Heat cramps (choice A) are the result of the loss of fluid and electrolytes through sweating. Painful cramping of muscles can occur, but core temperature remains normal. Heat exhaustion (choice B) results from excessive sweating and failure to replace the lost fluid. This results in hypovolemia, venous pooling, and reduced cardiac output. The skin is wet and the temperature is usually normal. Heat exhaustion is not life threatening, and there is usually spontaneous recovery when the person is moved to a cool place. Malignant hyperthermia (choice D) is an inherited condition in which there is an increased temperature when the person is exposed to certain anesthetics. It has no relationship to environmental temperature. Pyrexia (choice E) is fever and is usually defined as a cytokine-mediated increase in body temperature as part of a response to disease. This results in the hypothalamus having a higher "set point" for the body\\'s temperature.

QUESTION 5

A 53-year-old alcoholic man had been experiencing acute episodes of nausea and eventually jaundice. Avirus was detected from him, which had a circular molecule of DNA having the structure diagrammed in below figure. Which virus listed below has this type of genome?



A. EBV

B. hepatitis A virus

C. hepatitis B virus

D. JC virus

E. papillomavirus

Correct Answer: C

Section: Microbiology/Immunology The genome of hepatitis B virus is composed of a circular, double-stranded DNA. It has a negative strand of 3200 nucleotides and another positive, incomplete strand of 17002600 nucleotides. Papilloma (choice E) and polyomaviruses belong to the family of Papoviridae, which lacks envelopes and have a double-stranded, circular DNA genome. Both strands are complete and thus differ from the genome of hepatitis B virus that has one incomplete positive strand. Hepatitis Avirus (choice B), the cause of infectious hepatitis, has a linear single-stranded RNA genome, and as such it is a member of the enteroviruses. EBV (choice A) is a member of the herpesviruses and as such has a double-stranded, linear DNA genome. EBV has been associated with infectious mononucleosis, Burkitt lymphoma, and nasopharyngeal carcinoma. JC virus (choice D) is a member of the polyomaviruses.