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United States Medical Licensing Step 1

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QUESTION 1

A 7-year-old girl presents with a neck mass located at the anterolateral aspect of the neck, anterior to the sternocleidomastoid muscle. A biopsy of the lesion revealed a largely cystic mass lined by stratified squamous epithelium surrounded by an underlying dense layer of lymphoid tissue with germinal centers. Based on these findings, what is the most likely diagnosis?

A. branchial cleft cyst

B. granulomatous lymphadenitis

C. Hodgkin lymphoma

D. metastatic laryngeal carcinoma

E. thyroglossal duct cyst

Correct Answer: A

Section: Pathology and Path physiology A cystic structure in the lateral neck lined by squamous or, less usually, columnar epithelium and surrounded by lymphoid issue with germinal centers is invariably a branchial cleft cyst. Granulomatous lymphadenitis (choice B) should demonstrate granulomatous inflammation in a lymph node which is not described here. Hodgkin lymphoma (choice C) occurs in five subtypes, none of which is associated with epithelial tissue. Metastatic laryngeal carcinoma (choice D) is usually squamous cell in origin and would demonstrate pleomorphic polygonal cells with "prickles" and "pearls." A thyroglossal duct cyst (choice E) can have a histological appearance very similar to that of a branchial cleft cyst but the most important difference is the midline location of the thyroglossal duct cyst.

QUESTION 2

A 4-year-old patient is presented in the pediatric clinic with microcytic anemia. An analysis of his blood by

nondenaturing electrophoresis reveals the following composition of hemoglobin isoforms:

HbF = 75%, HbA = 23%, HbA2 = 2%, and HbS = 0%. Using these data, is it possible to determine that the

infant is most likely homozygous for which of the following?

A. complete deletion of the alpha-globin locus

B. complete deletion of the beta-globin locus

C. mutation in the promoter of the betaglobin genes

D. nonsense mutation in the alpha-globin genes

E. nonsense mutation in the beta-globin genes

Correct Answer: C

QUESTION 3

The sinoatrial (SA) node initiates the heartbeat by giving off an impulse about 80 times per minute. It is located at the junction of the superior vena cava and right atrium. In about 60% of the cases, the SA node derives its vascular supply from which of the following?

A. anterior interventricular artery

B. left circumflex artery

C. posterior interventricular artery

D. right coronary artery E. right marginal branch

Correct Answer: D

Section: Anatomy In 60% of patients, the right coronary artery supplies the SA node. In a third of the population, the SA node is supplied by the left coronary artery and in some patients it receives branches from both the right and the left. The anterior interventricular (choice A) and left circumflex (choice B) arteries are distal branches of the left coronary artery, too distant to supply the SA node. The right coronary artery normally gives out its SA nodal branch in its proximal portion and then distally gives rise to the right marginal (choice E) and posterior interventricular (choice C) arteries. These are also too distant to supply the SA node.

QUESTION 4

A 20-year-old prostitute presents at a local clinic with fever and abdominal tenderness at day 2 of her menstrual cycle. Gram-negative diplococci are seen in a Gram stain of vaginal secretions with many of the bacteria inside PMNs. Which of the following is likely the most important virulence factor necessary for this organism to initiate infection?

A. capsule

B. endotoxin

C. hyaluronidase

D. pili

E. protease

Correct Answer: D

Section: Microbiology/Immunology The most important presumptive diagnostic test for gonorrhea is the demonstration of gram-negative, kidney-shaped diplococcic inside PMNs obtained from thick, creamy urethral exudates. Outside the human host, N. gonorrhoeae is fragile and usually do not survive well and are rapidly killed by drying, heat, and many disinfectants. Inside the host, however, the cocci possess virulence factors that enhance the organism\\'s ability to establish mucus membrane infections. Pili (choice D) are hair-like appendages that extend out several micrometers. They enhance attachment to host cells and resistance to phagocytosis and are the most significant virulence factor. Polysaccharide capsules (choice A) do not appear to be as significant for gonococci infection as they do for N. meningitides infections. N. gonorrhoeae endotoxin (choice B) or LPS is a significant factor for toxicity once infection is established. A protease (choice E) can split IgA molecules, inactivating those antibodies, as do the meningococci. Hyaluronidase (choice D) can be an important virulence factor for grampositive cocci.

QUESTION 5

Which of the following antidiabetic agents acts on the peroxisome proliferator-activated receptor- gamma (PPAR-gamma) nuclear receptor?

A. acarbose

B. glyburide

C. insulin lispro

D. metformin

E. pioglitazone

Correct Answer: E

Section: Pharmacology The glitazone drugs (pioglitazone, rosiglitazone) reduce insulin resistance in peripheral tissues by activating the PPAR-gamma receptor, which promotes glucose uptake and utilization. Acarbose (choice A) interferes with the action of intestinal alpha-glucosidases and reduces absorption of glucose. Glyburide (choice B) and other sulfonylurea hypoglycemic drugs block the ATP-activated potassium channel in pancreatic cells and cause increased insulin release. Insulin lispro (choice C) is a modified insulin with rapid onset and offset of action. All insulins act by causing insertion of glucose transporters into cell membranes and several other mechanisms. The mechanism of action of metformin (choice D) and similar biguanide antidiabetic drugs is still unclear but may involve reduction of glucagon release, stimulation of glycolysis in peripheral tissues, or decreased hepatic and renal gluconeogenesis.