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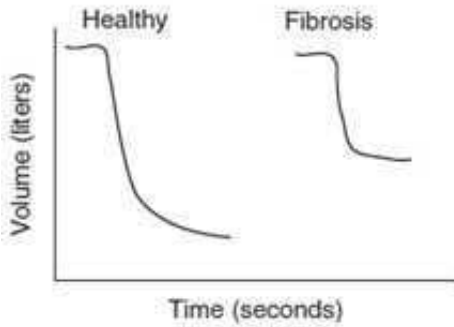
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QUESTION 1

Below figure shows pulmonary function test tracings from a healthy person and a patient with pulmonary fibrosis. Of the following measures which would you expect to be increased in this patient, as compared to the expected norms?



- A. Forced expiratory volume (FEV)/forced vital capacity (FVC)
- B. FRC
- C. FVC
- D. tidal volume
- E. vital capacity

Correct Answer: A

QUESTION 2

Severe septic infections caused by bacteria possessing capsules often occur following splenectomy. Which of the following statements most accurately explains why this medical complication is able to occur?

- A. The spleen is a source of IgM and IgG antibodies needed to opsonize encapsulated bacteria.
- B. The spleen is the main source of stem cells.
- C. The spleen is uniquely equipped to process capsular polysaccharides.
- D. The spleen rapidly inactivates many antimicrobial agents.
- E. The spleen readily metabolizes therapeutic doses of antibiotics.

Correct Answer: A

Section: Microbiology/Immunology The spleen is important for the production of IgM and IgG antibodies needed to opsonize encapsulated bacteria. Involvement of the spleen in metabolizing (choice D), inactivating of antimicrobial

agents (choice E), or processing of capsular polysaccharides (choice C) is not considered important. The main source of stem cells is the bone marrow not the spleen (choice B).

QUESTION 3

The structure indicated by arrow 1 in Fig. 1-2 is which of the following vessels?

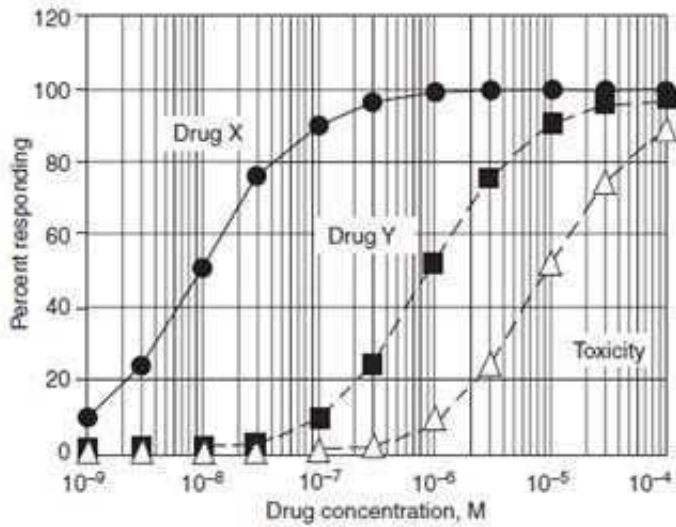
- A. brachiocephalic artery
- B. left brachiocephalic vein
- C. left common carotid artery
- D. right brachiocephalic vein
- E. superior vena cava

Correct Answer: D

Section: Anatomy Remember that in viewing axial or transverse CT scans through the body, the right side of the patient is to your left and the left side to your right. In other words, the feet of the patient are toward you and the head away from you. The back of the patient is at the bottom of the image and the front of the patient toward the top. Directional terms are always in reference to the patient. The insert at the bottom right indicates the level of the section. Arrow 1 indicates the right brachiocephalic vein. The left brachiocephalic vein (choice B) is seen as the elongated structure immediately posterior to the manubrium of the sternum and to the left of the right brachiocephalic vein. Immediately posterior to the left brachiocephalic vein is the brachiocephalic artery (choice A, arrow 2). To the left of the latter are the left common carotid artery (choice C) and the left subclavian artery (arrow 3). The superior vena cava (choice E) is not seen at this level because the right and left brachiocephalic veins are still separate.

QUESTION 4

Figure shows the quantal population doseresponse curves for the therapeutic and toxic effects of drugs X and Y. Both drugs are agonists at the same receptor to produce the therapeutic response, and the maximum responses obtained with each agent are the same. The toxicity curve in the figure shows the superimposed toxic response curves for drugs X and Y; they are identical in terms of the concentration dependence. Which of the following statements is most correct?



- A. At 1×10^{-5} M both drugs cause adverse effects in 90-100% of patients.
- B. Drug X has a larger therapeutic index than drug Y.
- C. Drug X is more efficacious than drug Y.
- D. Drug Y is more potent than drug X.
- E. Drug Y is safer than drug X.

Correct Answer: B

QUESTION 5

Which of the following colonizes the nasopharynx and produces toxins that kill ciliated epithelial cells, causes edema locally, and induces lymphocytosis systemically?

- A. B. pertussis
- B. Hemophilus influenzae type b
- C. L. pneumophila
- D. N. meningitides
- E. P. aeruginosa

Correct Answer: A

Section: Microbiology/Immunology

B. pertussis (choice A) is a highly communicable small gram-negative coccobacillus that causes whooping cough (pertussis). It is isolated on Bordet-Gengou medium. B. pertussis produces a number of factors involved in the pathogenesis of the disease. A hemagglutinin mediates attachment of the bacteria to ciliated epithelial cells. The pertussis toxin promotes lymphocytosis, histamine sensitization, and a mechanism of action similar to cholera toxin.

Atracheal exotoxin inhibits DNA synthesis in ciliated cells. B pertussis survives only briefly outside the human host. During the catarrhal stage, large numbers of infectious bacteria are released in respiratory secretions. It is during the paroxysmal stage that the cough develops its explosive character and the "whoop" upon inhalation. Infants are especially at risk with persistent coughing in older children and even adults. An excellent vaccine is available to control this disease. The other choices (B, C, D, and E) are also upper respiratory pathogens capable of causing serious disease episodes. None of them produce the toxic products that are made by B. pertussis that are directly responsible for the action on cells and symptoms observed in whooping cough.

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