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United States Medical Licensing Step 1

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**QUESTION 1**

Which of the following personality traits would most likely result from anal-phase fixation?

- A. dependency
- B. fierce competitiveness
- C. parsimony
- D. narcissism

Correct Answer: C

Section: Behavioral Science and Biostatistics The anal phase of development occurs around age 2, around the time of toilet training. Developmental difficulty around this time may result in "anal-phase fixation," in which some characteristics of this phase may unduly influence the adult personality. Such characteristics include struggles over the issue of control.

Excessive cleanliness and orderliness, or the opposite, as well as parsimony and hoarding may occur. Dependency (choice A) is characteristic of oral phase, and fierce competitiveness (choice B) may be characteristic of the Oedipal phase. Narcissism (choice D) is a complex phenomenon that develops from very early life and not confined to any particular stage of development.

QUESTION 2

A grandmother undergoing chemotherapy for cancer in a hospital was exposed to a grandchild with chickenpox. In order to prevent a clinical complication of varicella or disseminated zoster in the grandmother, which of the materials listed below should be used as an appropriate medical intervention?

- A. acyclovir
- B. indinavir
- C. killed varicella-zoster virus (VZV) vaccine
- D. live attenuated VZV vaccine
- E. subunit VZV vaccine

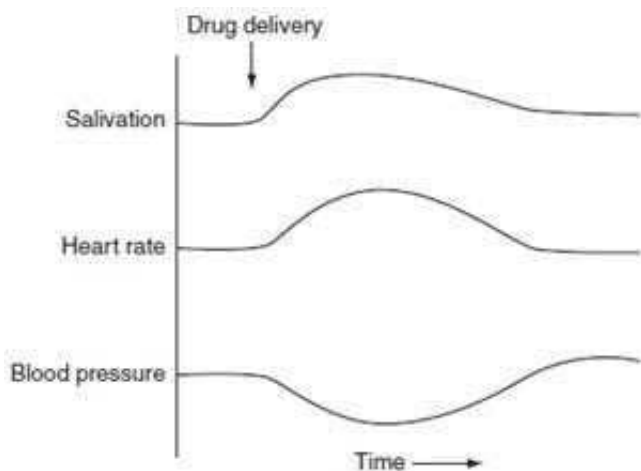
Correct Answer: A

Section: Microbiology/Immunology Prevention of varicella and disseminated zoster rests on the administration of acyclovir. Killed varicellazoster virus (VZV) vaccine has not been shown to be effective. Furthermore, if the immunological system has been compromised the immune responses will be very weak and of questionable value (choice C). Live attenuated VZV vaccines cannot be given to immunocompromised individuals because vaccination can be lethal (choice D). Subunit VZV vaccines are not available, and will be of little value to persons with suppressed immunological responses (choice E). Indinavir is a protease inhibitor used for the treatment of AIDS, not for varicella or zoster (choice B).

QUESTION 3



In a study of a new drug, the agent was administered to anesthetized animals while blood pressure, heart rate, and salivation were recorded. The results of a typical experiment are shown in below figure. What is the best characterization of this new agent?



- A. alpha-adrenoceptor agonist
- B. alpha-adrenoceptor antagonist
- C. cholinesterase inhibitor
- D. direct-acting muscarinic agonist
- E. ganglionic nicotinic agonist

Correct Answer: D

Section: Pharmacology Salivary glands contain muscarinic receptors, primarily of the M3 subtype, that receive parasympathetic innervation. Direct-acting agonists such as bethanechol and indirect agents such as neostigmine mimic parasympathetic nerve stimulation. Blood vessel endothelial cells contain M3 receptors that are not innervated, but respond to circulating directacting muscarinic agonists. When these endothelial receptors are activated, nitric oxide synthesis is stimulated and smooth muscle relaxation occurs promptly with vasodilation and a drop in blood pressure. Because no nerve endings are present, indirect-acting cholinomimetics such as cholinesterase inhibitors do not have this vasodilating effect. In the presence of hypotension induced by a direct-acting muscarinic agonist, a strong compensatory reflex originates in the baroreceptors and results in tachycardia. In the case of cholinesterase inhibitors, the normal heart rate slowing effect of the vagus is amplified and at normal doses, bradycardia results. The effect of the new drug illustrated in figure is most consistent with a direct-acting muscarinic agonist (choice D). Alpha receptor ligands (choices A and B) have little effect on salivation, although indirectly acting agents like ephedrine can cause a sensation of dry mouth. However, ephedrine causes increased blood pressure. Aganglionic stimulant drug (choice E) causes increased salivation but also increases sympathetic discharge to the blood vessels and results in increased, not decreased, blood pressure.

QUESTION 4

Which of the following drugs can be used in rheumatoid arthritis with the lowest probable incidence of GI complications?

- A. aspirin
- B. celecoxib



- C. ibuprofen
- D. misoprostol
- E. naproxen

Correct Answer: B

Section: Pharmacology A through C and E are NSAIDs. NSAIDs have long been drugs of first choice in arthritis treatment. Their primary mechanism of action in arthritis appears to be inhibition of COX, an enzyme required for the synthesis of inflammatory and other prostaglandins. Two forms of COX are present in the body: COX-1, which is required for synthesis of several useful prostaglandins (e.g., PGE₁, a cytoprotective agent in the stomach), and COX-2, the isoform responsible for synthesis of prostacyclin as well as most of the damaging prostaglandins. Celecoxib is more selective for COX-2 and thus has a lower incidence of adverse GI effects. The older NSAIDs (choices A, C, and E) inhibit both COX-1 and COX-2 with less selectivity and thus reduce protective prostaglandins, resulting in a high incidence of GI disorders, especially peptic ulceration. Misoprostol (choice D) is a PGE₁ analog that is used with NSAIDs to reduce peptic ulceration; unfortunately it causes a high incidence of diarrhea.

QUESTION 5

S-pyogenes, Group A, is subdivided into specific antigenic types principally on the immunologic differences in which of the following?

- A. hyaluronic acid capsule
- B. M protein
- C. streptolysin O
- D. streptolysin S
- E. TSST

Correct Answer: B

Section: Microbiology/Immunology M protein (choice B) is a major virulence factor of Group A *S. pyogenes*. M proteins appear as hair-like projections of the cell wall which resist phagocytosis by PMNs. Group A Streptococci are nonvirulent, and antibodies to specific M proteins will protect against reinfection. There are, however, more than 80 types of M protein, with little cross-protection observed. M protein may well have an important role in the pathogenesis of rheumatic fever. Purified streptococcal cell wall membranes induce antibodies that cross-react with human cardiac sarcolemma. A component of the cell wall of selected M types induces antibodies that react with cardiac muscle tissue. The M protein serotypes are used to subdivide Group A streptococci into 80 different serotypes. The other choices (A, C, D, and E) are all virulence factors of Group A streptococci, but do not form the basis of identifying antigenic different subgroups or serotypes.

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