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QUESTION 1

Below figure shows the conversions of cholesterol into the hormones C and D within follicular cells of the ovary (large arrows) and the regulation of these processes (small arrows) by pituitary hormones (A, B, E), when binding to their receptors on the cell surfaces (dark squares). Which of the letters in the figure best represents the hormone the concentration of which in serum changes in the following way?

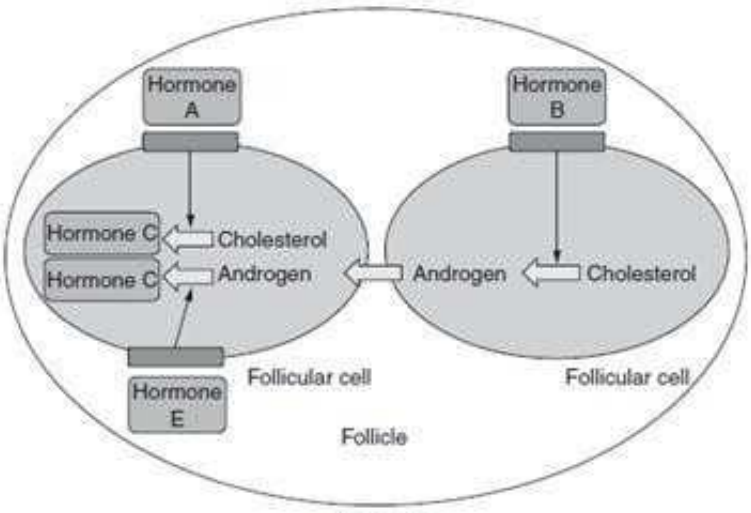


FIG. 2-26

A. A

B. B

C. C

D. D

E. E

Correct Answer: D

Section: Physiology It represents the estrogen estradiol, which is produced from androgen by granulosa cells of the ovaries and released into the capillaries. A woman\\'s estradiol serum concentration roughly reflects the activities of her ovaries. Estradiol levels rise during the follicular phase of the menstrual cycle (days 0 13). They reach peak levels shortly before ovulation on day 1314, and drop back during the luteal phase (days 1428). They reach menstrual/follicular levels at the end of the luteal phase unless there is a pregnancy. After menopause, the ovaries atrophy and estradiol levels become very low. During reproductive cycles, androgens are the main substrate for estrogen synthesis in the granulosa cells. The androgen-estrogen conversion is under the influence of FSH (choice E). FSH concentrations are high after menopause compared to their premenopausal concentrations. The source of androgens is theca cells. They produce it from cholesterol under the influence of LH (choice B). LH concentrations, like FSH, are high postmenopausal. Both, FSH and LH levels are used as a diagnostic tool to determine menopause. Granulosa cells also produce progesterone (choice C) from cholesterol. Progesterone serum levels are low during follicular phase of the menstrual cycle and high during the luteal phase of the menstrual cycle. The transition of cholesterol to progesterone is under the influence of LH (choice A).

QUESTION 2

Sara is a 15-year-old healthy female. With which of the following would one expect a girl of her age to spend a lot of time?

A. a mixed group of peers

B. adults

C. animals

D. furry toys

E. older females

Correct Answer: A

Section: Behavioral Science and Biostatics An adolescent veers away from childish toys and develops an interest in the opposite sex. Peer relationships include members of the opposite as well as the same sex.

QUESTION 3

A 15-month-old baby girl is brought to the emergency room by her parents for a 1-week history of malaise, poor feeding, mild fever, and diarrhea. Physical examination is unremarkable. This is the sixth such occasion for which the parents have brought their daughter to a physician. Past visits have revealed repeated infections, including Candida, cytomegalovirus, and M. avium-intracellulare. A complete blood count (CBC) is remarkable only for a low total lymphocyte count. Immunoglobulin levels are normal. Alymph node biopsy is remarkable for paracortical cell depletion, but is otherwise normal. Which of the following is the most likely diagnosis?

A. Bruton congenital agammaglobulinemia

B. chronic granulomatous disease of childhood

C. severe combined immunodeficiency disease

D. thymic hypoplasia

E. Wiskott-Aldrich syndrome

Correct Answer: D

Section: Pathology and Path physiology In thymic hypoplasia, the congenital developmental failure of the thymus leads to a lack of T- lymphocytes in the blood as well as in appropriate areas of lymph nodes (paracortical area). Deficient T-cell immunity will thus lead to severe, recurrent viral, mycobacterial, fungal, or protozoal infections during infancy. Thymic hypoplasia is best described in association with DiGeorge syndrome, in which defective embryological development of the third and fourth pharyngeal pouches results in developmental failure of thymus and parathyroid formation, congenital heart defects, and severe hypocalcemia, secondary to hyperparathyroidism. An associated, but less well-defined, entity is Nezelof syndrome, in which there is hypoplasia of the thymus, retention of normal parathyroid function, and possible varying degrees of humoral immunodeficiency. Bruton congenital agammaglobulinemia (choice A) is an Xlinked recessive disorder characterized by the failure of B-cell precursors to differentiate into mature B-lymphocytes, which are absent in the peripheral blood, lymph nodes, tonsils, and spleen. Serum immunoglobulin levels are decreased; however, the thymus and Tlymphocyte development are normal and cell-mediated immunity is intact. Chronic granulomatous disease of childhood (choice B) refers to a group of X-linked or autosomal recessive disorders characterized by different enzyme deficiencies of neutrophils and macrophages that lead to inhibition of hydrogen peroxide formation. Although still capable of bacterial phagocytosis, neutrophils and macrophages cannot kill bacteria, particularly the catalase-positive species such as Staphylococcus, Serratia, and Salmonella, which destroy their own endogenous hydrogen peroxide by virtue of catalase production. The disease occurs chiefly in males who present with

recurrent bacterial infections of the skin, lymph nodes, lungs, and bones; widespread abscesses and granulomas are present. Severe combined immunodeficiency disease (choice C) is one of the most dramatic forms of congenital immunodeficiency in which a defect of lymphoid stem cells leads to failure of development of both Band T-lymphocytes. Although probably an embodiment of several different inherited diseases, most patients with severe combined immunodeficiency have the autosomal recessive form, and greater than half of these lack the enzyme adenosine deaminase, resulting in the accumulation of lymphotoxic metabolites. Failure of both cellular and humoral immunity causes a variety of severe viral, bacterial, fungal, and protozoal infections early in life, with death usually occurring within the first year. Wiskott-Aldrich syndrome (choice E) is an X-linked recessive disease characterized by thrombocytopenia, eczema, and immunodeficiency; both cellular and humoral immunity is impaired. Progressive T-cell deficiency occurs despite a morphologically normal thymus, and serum IgM levels are low, although IgG levels are usually normal. Recurrent bacterial, viral, and fungal infections occur, particularly with S. pneumonia and Haemophilus influenzae as these organisms have polysaccharide antigens that mainly elicit IgM antibody response. Thrombocytopenia may be severe and approximately one-third of patients die from hemorrhage. Patients are prone to developing lymphoma.

QUESTION 4

Your patient reports that she is suffering from dizziness and persistent feelings that she is going to die. You inquire as to whether she has been using any illicit substances lately to which she indicates that she has not. She indicates that she has been curtailing going outside, especially in open spaces, because she is afraid that she might have one of those attacks and become immobilized, which of the following is the most likely diagnosis?

A. acute anxiety attack

B. agoraphobia with panic attack

C. agoraphobia without panic attack

D. anxiety secondary to a medical condition

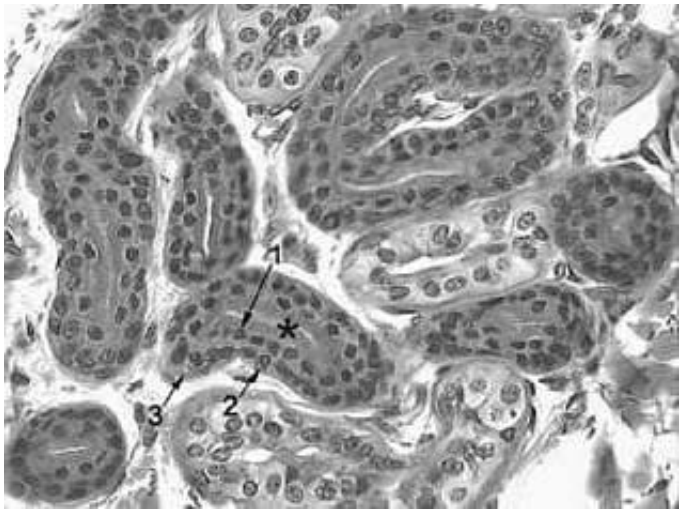
E. cocaine withdrawal

Correct Answer: B

Section: Behavioral Science and Biostatics The symptoms of panic associated with fear and avoidance of being in places where escape may be difficult or embarrassing call for the consideration of agoraphobia with panic attack. Choices A, C, D, and E are not associated with the phenomenon described here.

QUESTION 5

The histological structure marked by the asterisk in Fig. 1-4 is which of the following structures from the integumentary system?



A. aprocrine sweat gland

B. dermal papilla

C. eccrine sweat gland

D. hair follicle

E. sebaceous gland

Correct Answer: C

Section: Anatomy This is the secretory portion of the eccrine sweat gland, recognizable by its three cell types. The apical dark cells (arrow 1) are closest to the lumen. The clear or basal cells (arrow 2) and the myoepithelial cells (arrow 3) are located against the basal lamina. Characteristically, these cells are large and the lumen is small. The apocrine sweat gland (choice A) is lined with simple cuboidal epithelium and thus has a large lumen. The dermal papilla (choice B) is formed by fibroblasts, not epithelia. The hair follicle (choice D) is formed by three concentric zones of keratinized cells and does not have a lumen. The sebaceous glands (choice E) are appendages of the hair follicle and their lumen is lined by stratified squamous epithelium.