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QUESTION 1

A 21-year-old previously healthy man had a headache, malaise, and low-grade fever for the past 4 days. He was brought to the emergency room this morning after he started behaving in an unusual manner and experienced difficulty in speaking. While he was being transported, he suffered a generalized seizure. Physical examination showed a fever of 103°F and to tal disorientation. Deep tendon reflexes were exaggerated and the plantar response was bilaterally extensor. He had mild neck stiffness and the optic fundi showed early papilledema. Alumbar puncture produced clear CSF under an opening pressure of 300 mm O. Protein was 160 mg/dL, glucose 66 mg/dL (blood glucose 90

H₂

mg/dL), and there were 32 mononuclear cells/L. No PMNs were present. Which of the following is the most likely cause of this man's condition?

- A. glioblastoma multiforme
- B. herpetic meningoencephalitis
- C. meningioma
- D. meningococcal meningitis
- E. spontaneous cerebral hemorrhage
- F. subarachnoid hemorrhage

Correct Answer: B

Section: Pathology and Path physiology The presence of neck stiffness, the increase in the amount of protein, and the number of cells in the CSF confirm the presence of meningitis. However, the unusual behavior, disorientation, seizure, speech disorder, and abnormal reflexes represent involvement of various parts of the cerebral cortex. Thus this is an acute inflammation of the meninges and brain or a meningoencephalitis. This also accounts for the very high CSF pressure since there is brain edema in addition to the meningitis. The somewhat more prolonged course and the presence of mononuclear cells in the CSF are evidence for viral etiology making herpes the best choice of those listed and eliminating meningococcal meningitis (choice D) which elicits PMNs in the CSF and does not produce encephalitis. Tumors (choices A and C) and hemorrhage (choices E and F) would not give this clinical presentation or CSF results.

QUESTION 2

A 20-year-old female tennis player has just won a tennis match on a warm summer day. Her blood pressure at this time is 135/70 with a heart rate of 140 beats per minute and a respiratory rate of 25 per minute. She is flushed and sweating profusely. Compared to the resting state, what can be said about the level of activity of sympathetic nerves to her heart and to her cutaneous vasculature?

- A. both are increased
- B. both are decreased
- C. neither is different from at rest
- D. sympathetic activity to the heart is decreased while that to the cutaneous vasculature is increased



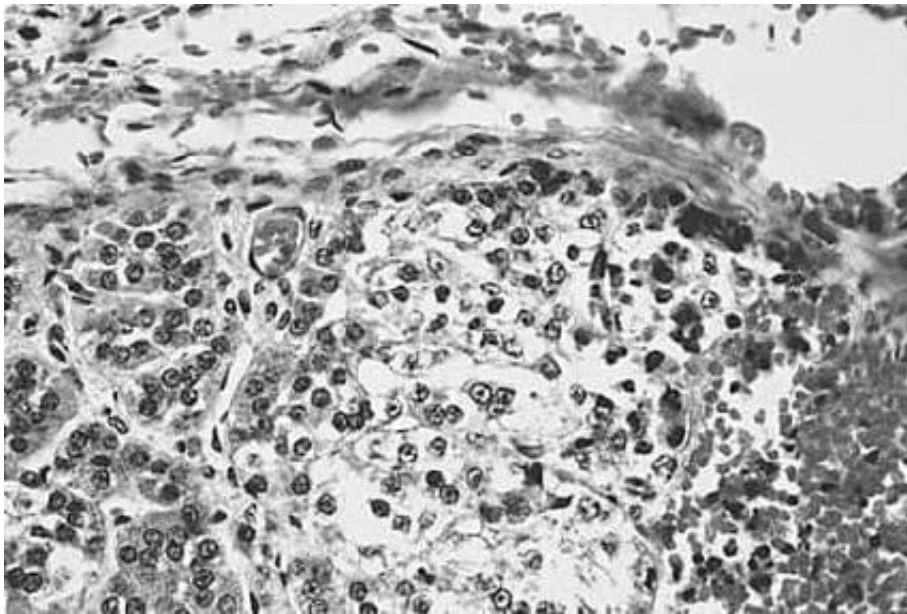
E. sympathetic activity to the heart is increased while that to the cutaneous vasculature is decreased

Correct Answer: E

Section: Physiology During exercise in the heat, blood flow must increase to the actively contracting muscles, as well as the cutaneous vessels to shunt heat from the interior of the body to the skin at the surface of the body. Activation of sweat glands allows cooling via evaporation from the surface of the skin. To increase blood flow to the muscles and the skin, it is necessary to increase sympathetic tone to the heart to increase cardiac output. Most sweat glands are activated by sympathetic cholinergic nerves that are activated during sweating. However, the cutaneous vasculature involved in bringing warm blood to the surface of the skin for cooling is constricted by a strong sympathetic tone at rest. During exercise, when body cooling is necessary, sympathetic tone to these cutaneous capillary loops is reduced, causing vasodilation and increased cutaneous blood flow, thus choice E is appropriate.

QUESTION 3

A 3-day-old girl develops numerous skin lesions followed soon thereafter by severe encephalitis. Despite extensive treatment, she dies a few days later. An autopsy examination reveals that the infant has a systemic infection involving all major organs. The photomicrograph in below figure is taken from a section of adrenal gland. Which of the following is the most likely infectious agent?



- A. cytomegalovirus
- B. herpes
- C. rubella
- D. syphilis
- E. Toxoplasma

Correct Answer: B

Section: Pathology and Path physiology Figure shows areas of necrosis and cell nuclei containing Cowdry A inclusions, indicating that this is a disseminated herpes infection acquired during passage through the birth canal. Cytomegalovirus (choice A), rubella (choice C), syphilis (choice D), and Toxoplasma (choice E) are the other members of the TORCHS



complex, but are typically acquired transplacentally. Cytomegalovirus (choice A) has Cowdry A nuclear inclusions but, in addition, has multiple cytoplasmic inclusions and greatly increased cell size. The other agents do not generate Cowdry A inclusions.

QUESTION 4

An 8-month old boy presents to the emergency room in respiratory distress from a recurrent upper respiratory tract bacterial infection. Labs reveal low levels of IgA, IgD, IgE, IgG, and IgM. Suspecting an immune deficiency disorder, genetic testing reveals a defect in a tyrosine kinase gene. Which of the following would be seen in patients with this immune deficiency disorder?

- A. particular susceptibility to viral and fungal infections
- B. profound deficiencies of cell-mediated immunity
- C. depletion of lymphocytes in the paracortical areas of lymph nodes
- D. normal numbers of B lymphocytes
- E. very low quantities of immunoglobulin in their serum

Correct Answer: E

Section: Microbiology/Immunology Bruton hypogammaglobulinemia is a B-cell immunodeficiency disorder that is X-linked recessive and thus only affects males (boys). Affected patients are deficient in B cells in the peripheral blood and in B-dependent areas of lymph nodes and spleen. Most of the serum immunoglobulins are absent, and the IgG level is