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United States Medical Licensing Step 1

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QUESTION 1

A 47-year-old man has undergone a gradual personality change over the past 67 months with increasing moodiness and irritability During your examination you note some choreiform involuntary movements and also recognize some cognitive impairment. Afterward you talk to the man\\'s brother who accompanied the patient to your office and he tells you that their father had similar problems for about a year prior to his death. If you could examine this patient\\'s brain, which of the following would you expect to find?

A. areas of demyelination of the white matter

B. atrophy and loss of neurons of the caudate nucleus

C. loss of pigmented neurons of the substantia nigra

D. neurons ballooned with cytoplasmic vacuoles

E. selective atrophy of anterior frontal and temporal lobes

Correct Answer: B

Section: Pathology and Path physiology In Huntington\\'s disease there is a symmetric atrophy of the caudate nuclei with a great reduction in the number of neurons. The putamen is also affected but usually less so. Areas of demyelination of white matter (choice A) are the classic finding in multiple sclerosis. Loss of pigmented neurons of the substantia nigra (choice C) is a consistent change seen in Parkinson\\'s disease. Neurons ballooned with cytoplasmic vacuoles (choice D) may be seen in a number of lysosomal storage diseases of which Tay- Sachs disease is the classic example. Selective atrophy of anterior, frontal, and temporal lobes (choice E) is seen in Pick disease. There is a severe atrophy of the frontal and temporal lobes which can be sufficient to produce the "knife-edge" appearance characteristic of this disease.

QUESTION 2

While on a wilderness vacation, a banker develops extensive skin lesions noted for their varying degrees of erythema, edema, and vesiculations. His physician tells him that these lesions are due to delayed type hypersensitivity. If this is actually the case, which of the following statements is accurate?

A. Delayed-type hypersensitivity can be transferred passively to volunteers by sensitized lymphocytes.

B. Delayed-type hypersensitivity is suppressed by antihistaminic drugs.

C. This allergy does not cause tissue damage.

D. This allergy is due to IgE absorbed on mast cells.

E. This type of allergy usually occurs after inhalation of grass pollens.

Correct Answer: A

Section: Microbiology/Immunology Delayed-type hypersensitivity is mediated by helper CD4 lymphocytes, not antibody (choice D). Thus it can only be transferred by sensitized CD4 helper lymphocytes. Sensitization occurs via such substances as poison ivy, poison oak, some cosmetics, topically applied sulfonamides, or other drugs and simple chemicals, such as nickel, formaldehyde, and others, but not inhalation of grass pollen (choice E). Part of the tissue destruction seen in tuberculosis is due to delayed-type hypersensitivity, so this type of hypersensitivity reaction may lead to tissue damage (choice C). Administration of antihistaminic drugs, epinephrine, or cromolyn sodium is used for

the treatment of anaphylactic reactions resulting from type I hypersensitivity, but not delayed-type hypersensitivity (choice B).

QUESTION 3

An 18-year-old woman presented with 1 week of history of fever and malaise. She had mild jaundice and elevated temperature. Hemoglobin was 13.8 g/dL, leukocyte count 13 ?109 per liter. Serum bilirubin was elevated (42 mmol/L) and contained 95% unconjugated bilirubin. Liver enzyme tests were normal. Which of the following is the most likely cause of these signs and symptoms?

A. alcohol poisoning

B. decreased glucuronyl transferase

C. increased lactate dehydrogenase (LDH)

D. excessive hemolysis

E. obstruction of bile flow

Correct Answer: B

Section: Physiology Glucuronyl transferase is the enzyme that conjugates bilirubin in the liver, after which it is excreted in bile or urine. Ahereditary defect in glucuronyl transferase concentration, or activity, is called Gilbert syndrome. It may lead to mild jaundice and general discomfort with typical onset in childhood or early adulthood. Alcohol poisoning (choice A) leads to liver damage, and an elevation of conjugated bilirubin. Abnormalities of liver enzyme tests would be expected. Lactate dehydrogenase (choice C) catalyzes the conversion of lactate to pyruvate as part of cellular energy production. Since many cells including red blood cells are rich in LDH, increased serum LDH levels could point toward excessive hemolysis, but would not be a cause for it. Although hemolysis that exceeds the capacity of the liver to clear bilirubin from serum (choice D) would lead to increased unconjugated bilirubin, it is not the best choice due to the woman\\'s normal hemoglobin (1216 g/dL for females). Obstruction of bile flow (choice E) leads to backup of largely conjugated bilirubin in the blood stream.

QUESTION 4

A neurology resident is testing the jaw-jerk reflex in a patient by tapping gently on the right masseter muscle and observing elevation of the mandible. What is the location of the neuronal cell bodies of the proprioceptive fibers mediating the jaw-jerk reflex?

A. mesencephalic trigeminal nucleus

B. motor trigeminal nucleus

C. principal (main) trigeminal nucleus

D. spinal trigeminal nucleus

E. trigeminal (gasserian) ganglion

Correct Answer: A

Section: Anatomy The jaw-jerk reflex is a monosynaptic (stretch) reflex for the masseter muscle. Proprioceptive fibers from the muscle travel by way of the trigeminal nerve back to their cell bodies in he mesencephalic trigeminal nucleus. Projections from this nucleus synapse on motor neurons of the motor trigeminal nucleus (choice B) which elicits contraction of the masseter muscle. The principal (main) trigeminal nucleus (choice C) receives light touch sensory information from the face, whereas the spinal trigeminal nucleus (choice D) receives pain and temperature sensations. The trigeminal (gasserian) ganglion (choice E) contains the cell bodies of all sensory neurons projecting to the principal (main) and spinal trigeminal nuclei.

QUESTION 5

A 41-year-old male suffering from unstable angina is undergoing cardiac testing. At rest, his heart rate is 70 beats per minute. His left ventricular end-diastolic volume is estimated to be 150 mL, while his end systolic volume is 80 mL. What is his estimated cardiac output?

A. 3900 mL/min

B. 4400 mL/min

C. 4900 mL/min

D. 5400 mL/min

E. 5900 mL/min

Correct Answer: C

Section: Physiology

Cardiac output is calculated by multiplying heart rate by stroke volume. Stroke volume is the difference

between end-diastolic ventricular volume and end-systolic volume. Hence 150 - 80 = 70 mL stroke volume.

70 mL × 70 beats/min = 4900 mL/min.