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United States Medical Licensing Step 1

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QUESTION 1

A 32-year-old male cyclist is struck at night by a hit-and-run motorist. He is unconscious and severely injured and is not discovered until a pedestrian walks by 2 or 3 hours later. When he arrives at the emergency room, he is in shock and his BP is 80/30 mm Hg. He is transfused and a large wound on his right leg is cleaned and sutured. However, by the next day his urine output has decreased to less than 20 mL/h. Which of the following microscopic descriptions best describes his kidneys at this time?

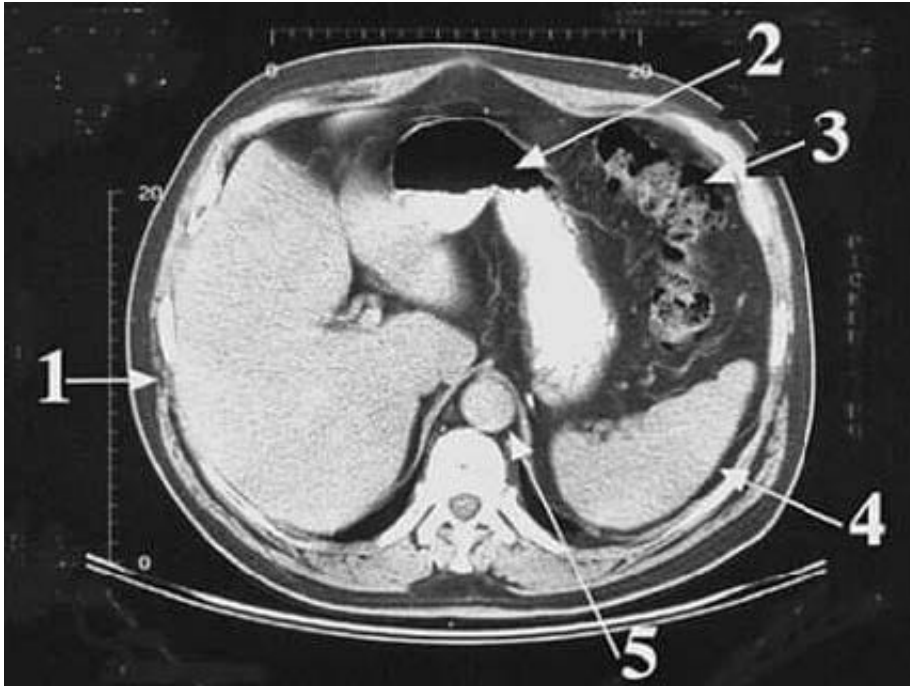
- A. acute PMN infiltration of tubules and interstitium
- B. fibrinoid necrosis of arterioles
- C. focal tubular necrosis with pigmented cellular casts
- D. interstitial mononuclear infiltrate with "thyroidization"
- E. wedge-shaped areas of coagulative necrosis

Correct Answer: C

Section: Pathology and Path physiology One of the consequences of shock is hypoperfusion of the kidneys producing ischemia and acute tubular necrosis, which in turn produces acute renal failure. In this patient this was expressed in the greatly reduced urine production. The pigmented casts are formed from Tamm-Horsfall protein and the sloughed tubule cells. Acute PMN infiltration of tubules and interstitium (choice A) may be observed in acute pyelonephritis. Fibrinoid necrosis of arterioles (choice B) is seen in both malignant hypertension and in some vasculitides such as polyarteritis nodosa. Interstitial mononuclear infiltrate with "thyroidization" (choice D) would be an expected finding for chronic pyelonephritis. Wedge-shaped areas of coagulative necrosis (choice E) describe typical renal infarcts.

QUESTION 2

Arrow 4 in following figure, is pointing to which of the following structures?



- A. abdominal aorta
- B. colon
- C. liver
- D. spleen
- E. stomach

Correct Answer: D

Section: Anatomy The spleen (arrow 4) lies to the left of the abdominal cavity. It is in contact with the left side of the stomach (arrow 2) and lodges against the left paravertebral gutter. The abdominal aorta (choice A, arrow 5) is seen as the circular structure immediately anterior to the vertebra. The colon (choice B, arrow 3) is the convoluted structure to the left anterior aspect of the abdominal cavity. The large liver (choice C, arrow 1) occupies most of the right side of the abdominal cavity. The stomach (choice E, arrow 2) is located between the colon and the liver, and in this case, contains liquid contrast material.

QUESTION 3

A 31-year-old previously healthy woman develops pelvic inflammatory disease and subsequently undergoes a complete hysterectomy; her ovaries are left intact. Incidental findings in the myometrium are three discrete, sharply circumscribed masses that range from 4 to 8 cm in diameter and have a whitish, whorled cut surface. What would have been the most likely outcome over the next 5 years if these masses had not been removed?

- A. complete regression
- B. continued expansile growth
- C. infiltration into surrounding tissues



- D. metastasis via blood vessels
- E. necrosis and hemorrhage

Correct Answer: B

Section: Pathology and Path physiology This description of the myometrial masses is consistent with leiomyomas, benign tumors of smooth muscle origin. Uterine leiomyomas are the most frequent tumor in women and are estimated to occur in up to 75% of women of reproductive age. As benign tumors, the expected outcome for such masses in a premenopausal woman would be continued expansile growth. Growth of leiomyomas is stimulated (but not initiated by) estrogen, therefore, regression (choice A) would be more probable in a woman of postmenopausal age or a younger woman who may have had her ovaries removed but is unlikely to be complete. Infiltration into surrounding tissues (choice C) and metastasis via blood vessels (choice D) are characteristics of malignant tumors only. While necrosis and hemorrhage (choice E) may rarely occur in benign neoplasms, they are quite characteristic of malignant neoplasms, as blood vessels are more numerous and are often poorly formed. Uterine leiomyomas and colonic adenomas are two of the exceptions to the general rule that benign neoplasms develop as single lesions.

QUESTION 4

A known drug abuser is brought to the emergency room by the police. He is in restraints, combative, and hallucinating. His blood pressure, heart rate, and body temperature are elevated. Pupils are dilated and demonstrate both horizontal and vertical nystagmus. Which of the following drugs would cause this presentation?

- A. amphetamine
- B. heroin
- C. LSD
- D. phencyclidine
- E. scopolamine

Correct Answer: D

Section: Pharmacology Phencyclidine, an NMDA receptor antagonist, is a more violent hallucinogen than most other drugs in this class (LSD, mescaline, scopolamine). It causes sympathetic discharge and muscle twitching; nystagmus is very common. Amphetamine (choice A) is a sympathomimetic stimulant that can produce hallucinations or toxic psychosis in overdose, but is not usually associated with nystagmus. Heroin (choice B) is a depressant drug and does not present with combative stimulation. Pupils are constricted by opioids. LSD (choice C) is a classical hallucinogen, but does not commonly cause combativeness or nystagmus. Scopolamine (choice E) similarly does not usually cause combativeness or nystagmus. Both LSD and scopolamine cause mydriasis.

QUESTION 5

A 68-year-old woman presents with sleep disturbances and memory loss. After careful analysis, she is diagnosed with early stages of Alzheimer's disease. Her pharmacological treatment plan includes acetylcholine esterase inhibitors. One week after starting treatment, the woman's daughter calls in, reporting that her mom has developed new symptoms that might be related to her new medicine. Which of the following is a likely side effect of the drug?

- A. dry mouth
- B. forgetting to urinate



- C. muscle weakness
- D. nausea and diarrhea
- E. vertigo

Correct Answer: D

Section: Physiology Increasing the lifetime of acetylcholine by inhibiting its enzymatic breakdown might help existing brain cells to work better. Studies found that Alzheimer patients at early stages might benefit from cholinergic therapy by small improvements in cognitive abilities and a delay in the progression of the disease. However, the side effects of acetylcholine therapy may outweigh the benefits of it. The increased concentration of acetylcholine at postsynaptic nerve endings of the parasympathetic nervous system can result in excessive stimulation of peripheral organ muscarinic and nicotinic receptors. Increased GI motility may occur resulting in nausea and diarrhea. For the same reason, increased salivation, not decreased as in choice A, and increased micturition, and not decreased as in choice B, are expected. Less common side effects include muscle cramps, not muscle weakness as in choice C, due to overstimulation of the cholinergic neuromuscular junction. Acetylcholine overdosing for an extensive time might eventually lead to muscle weakness due to desensitization of postsynaptic acetylcholine receptors, but this is not the best choice in this case. Vertigo (choice E) is the sensation that the room is spinning. Although neurological problems can always lead to kinetoses, there is no direct connection between acetylcholine esterase inhibitors and vertigo.

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