

01	☐ A	☐ B	☒ C	☐ D	☐ E
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37	☐ A	☐ B	☐ C	☒ D	☐ E
38	☐ A	☐ B	☐ C	☐ D	☒ E
39	☐ A	☒ B	☐ C	☐ D	☐ E

PRACTICE QUESTIONS

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QUESTION 1

MULTIPLE CHOICE

A patient with chronic hypertension demonstrates left ventricular hypertrophy on echocardiogram. Which cellular adaptations are represented in this finding? (Choose two.)

- ☒ **A** Hypertrophy
- ☒ **B** Hyperplasia
- ☐ **C** Atrophy
- ☐ **D** Dysplasia
- ☐ **E** Metaplasia

ANSWER **A - B**

WHY Sustained pressure overload on the left ventricle causes the cardiomyocytes to increase in size (hypertrophy). Because adult cardiac myocytes are largely terminally differentiated and cannot divide, hyperplasia (an increase in cell number) does not contribute; the increased wall thickness is due to hypertrophy of existing cells. Atrophy, dysplasia, and metaplasia describe different adaptive responses not represented by hypertensive cardiac hypertrophy.

QUESTION 2

MULTIPLE CHOICE

Which of the following are characteristic vascular changes of acute inflammation? (Choose two.)

- ☒ **A** Transient vasoconstriction followed by vasodilation
- ☒ **B** Increased vascular permeability with plasma protein leakage
- ☐ **C** Formation of granulation tissue with neovascularization
- ☐ **D** Stasis of blood flow due to increased viscosity
- ☐ **E** Permanent fibrinoid necrosis of the vessel wall

ANSWER A - B

WHY Acute inflammation is characterized by an initial brief vasoconstriction followed by vasodilation (causing redness and heat) and increased vascular permeability, which allows plasma proteins to leak into the tissues (producing edema). Stasis does occur later in the cascade, but it is a consequence of permeability and fluid loss, not a primary defining vascular change. Granulation tissue is a feature of chronic inflammation and repair, not acute inflammation, and fibrinoid necrosis describes vascular injury seen in immune-mediated vasculitides rather than acute inflammation.

QUESTION 3

SINGLE CHOICE

A patient with severe vomiting and volume depletion develops metabolic alkalosis. Which electrolyte disturbance most directly contributes to sustaining this metabolic alkalosis?

- ☐ **A** Hyperkalemia
- ☒ **B** Hypochloremia
- ☐ **C** Hypernatremia
- ☐ **D** Hypermagnesemia

ANSWER B

WHY Loss of gastric HCl removes hydrogen and chloride from the body. The resulting hypochloremia prevents the kidneys from exchanging chloride for bicarbonate in the distal tubule, so excess bicarbonate generated to buffer the loss of H⁺ cannot be excreted. This is the classic 'chloride-responsive' or saline-responsive metabolic alkalosis seen with vomiting and nasogastric suction.

QUESTION 4

SINGLE CHOICE

A nurse develops a red, indurated area at the site of a Mantoux (tuberculin) skin test 72 hours after placement. This reaction is classified as which type of hypersensitivity?

- ☐ A Type I (IgE-mediated)
- ☐ B Type II (cytotoxic)
- ☐ C Type III (immune complex)
- ☒ D Type IV (delayed-type, cell-mediated)

ANSWER D

WHY The tuberculin skin test is the classic example of a Type IV hypersensitivity reaction. Sensitized T lymphocytes release cytokines that recruit and activate macrophages, producing the characteristic indurated, delayed reaction 48 to 72 hours after antigen exposure. It is mediated by cells rather than by antibodies.

QUESTION 5

SINGLE CHOICE

A patient with heart failure has a reduced cardiac output that activates the renin–angiotensin–aldosterone system (RAAS). Which direct effect of angiotensin II most contributes to worsening heart failure?

- ☐ A Bronchodilation
- ☒ B Systemic vasoconstriction increasing afterload
- ☐ C Decreased myocardial contractility
- ☐ D Increased renal excretion of sodium and water

ANSWER B

WHY Angiotensin II is a potent vasoconstrictor. Systemic vasoconstriction increases peripheral vascular resistance and therefore left ventricular afterload, which in a failing heart further reduces stroke volume and cardiac output. This is why ACE inhibitors and angiotensin receptor blockers are cornerstone therapies in heart failure. Angiotensin II does not cause bronchodilation, decrease contractility, or increase renal sodium excretion—aldosterone promotes sodium and water retention.

QUESTION 6

SINGLE CHOICE

A patient with chronic obstructive pulmonary disease (COPD) demonstrates a forced expiratory volume in one second (FEV1) of 45% of predicted and an FEV1/FVC ratio of 62%. These findings are most consistent with which pattern of pulmonary impairment?

- ☐ A Restrictive pattern with reduced total lung capacity
- ☒ B Obstructive pattern with airflow limitation
- ☐ C Mixed restrictive and obstructive pattern
- ☐ D Normal spirometry with isolated diffusion impairment

ANSWER B

WHY An FEV1/FVC ratio below 0.70 defines airflow obstruction. A reduced FEV1 of 45% indicates moderate-to-severe obstruction. Restrictive disease would typically show a reduced FVC with a normal or increased FEV1/FVC ratio. The findings described are classic for COPD, an obstructive disorder.

QUESTION 7

SINGLE CHOICE

A patient with type 1 diabetes mellitus presents with diabetic ketoacidosis (DKA). Which mechanism most directly accounts for the metabolic (anion gap) acidosis in DKA?

- ☐ A Renal retention of bicarbonate due to hypovolemia
- ☒ B Production of ketoacids (β -hydroxybutyrate and acetoacetate) from lipolysis
- ☐ C Hyperventilation causing a primary respiratory alkalosis
- ☐ D Loss of bicarbonate through osmotic diarrhea

ANSWER B

WHY In type 1 diabetes, insulin deficiency combined with counter-regulatory hormone excess promotes lipolysis and hepatic ketogenesis, producing the strong ketoacids β -hydroxybutyrate and acetoacetate. Accumulation of these unmeasured anions creates the high anion gap metabolic acidosis of DKA. Respiratory compensation (Kussmaul respirations) is a response to, not a cause of, the acidosis.

QUESTION 8

SINGLE CHOICE

In the pathophysiology of acute kidney injury (AKI) due to ischemic injury, which tubular segment is most vulnerable to ischemic damage because of its high metabolic demand?

- ☒ **A Proximal convoluted tubule**
- ☐ B Thin descending limb of the loop of Henle
- ☐ C Distal convoluted tubule
- ☐ D Collecting duct

ANSWER A

WHY The proximal convoluted tubule has very high active reabsorptive activity and therefore a high oxygen and ATP demand, making it especially susceptible to ischemic injury. Necrosis of proximal tubular cells, particularly in the straight portion (pars recta), is a hallmark of ischemic acute tubular necrosis and is a key step leading to oliguria and acute kidney injury.

QUESTION 9

SINGLE CHOICE

A patient experiences a thrombotic stroke in the middle cerebral artery (MCA) territory. Which clinical finding is most consistent with an MCA rather than a posterior cerebral artery (PCA) lesion?

- ☐ A Contralateral homonymous hemianopia with macular sparing
- ☒ **B Contralateral face and arm weakness with aphasia (if dominant hemisphere)**
- ☐ C Bilateral loss of pain and temperature sensation
- ☐ D Vertigo, ataxia, and cranial nerve IX/X deficits

ANSWER B

WHY The middle cerebral artery supplies the lateral frontal, parietal, and temporal cortex. Classic deficits include contralateral face and upper extremity weakness (the leg is relatively spared because it is represented in the ACA territory) and, when the dominant hemisphere is affected, aphasia. Homonymous hemianopia with macular sparing is characteristic of PCA infarction. Vertigo and ataxia suggest cerebellar or brainstem involvement.