

Advanced Human Physiology and Pathology

Advanced Biology · Answer Key · 15 Questions

1. Which specific renal transport mechanism is responsible for the reabsorption of approximately 65% of filtered sodium and water in the proximal convoluted tubule?

- A) Active transport via Na⁺/K⁺-ATPase pump**
- B) Passive diffusion through aquaporins
- C) Secondary active transport via SGLT1
- D) Solvent drag through paracellular pathways

2. In the context of the cardiac cycle, which phase represents the period of isovolumic ventricular contraction where all four heart valves are closed?

- A) Ventricular systole phase 1**
- B) Ventricular systole phase 2
- C) Ventricular diastole phase 1
- D) Ventricular diastole phase 2

3. Which immunoglobulin isotype is most abundant in human colostrum and provides primary mucosal immunity in neonates?

- A) IgG
- B) IgM
- C) IgA**
- D) IgE

4. The conversion of fibrinogen to fibrin during the coagulation cascade is primarily catalyzed by which activated clotting factor?

- A) Factor Xa
- B) Factor IIa (Thrombin)**
- C) Factor IXa
- D) Factor XIIa

5. Which hypothalamic nucleus is primarily responsible for the regulation of circadian rhythms in humans?

- A) Arcuate nucleus
- B) Ventromedial nucleus
- C) Suprachiasmatic nucleus**
- D) Paraventricular nucleus

6. During cellular respiration, which complex in the electron transport chain is also known as succinate-coenzyme Q reductase?

- A) Complex I
- B) Complex II**
- C) Complex III
- D) Complex IV

7. What is the primary function of the Kupffer cells located within the hepatic sinusoids?

- A) Bile production
- B) Heme synthesis
- C) Phagocytosis of pathogens and debris**
- D) Glycogen storage

8. Which hormone, secreted by the G-cells of the stomach, is the primary stimulator of gastric acid secretion?

- A) Secretin
- B) Cholecystokinin
- C) Gastrin**
- D) Somatostatin

9. In the visual pathway, where do the majority of retinal ganglion cell axons terminate to form the primary visual relay station?

- A) Superior colliculus
- B) Lateral geniculate nucleus**
- C) Pulvinar nucleus
- D) Primary visual cortex

10. Which enzyme is the rate-limiting step in the cholesterol biosynthesis pathway?

- A) HMG-CoA synthase
- B) HMG-CoA reductase**
- C) Mevalonate kinase
- D) Squalene synthase

11. What is the clinical term for the accumulation of excess fluid in the interstitial space due to increased capillary hydrostatic pressure or decreased oncotic pressure?

- A) Ascites
- B) Edema**
- C) Effusion
- D) Lymphadenopathy

12. Which nerve provides the primary parasympathetic innervation to the thoracic and abdominal viscera?

- A) Glossopharyngeal nerve
- B) Accessory nerve
- C) Vagus nerve**
- D) Phrenic nerve

13. During the process of oogenesis, in which phase are primary oocytes arrested until puberty?

- A) Prophase I**
- B) Metaphase I
- C) Anaphase I
- D) Prophase II

14. Which specific protein is responsible for anchoring actin filaments to the sarcolemma in skeletal muscle fibers, preventing contraction-induced damage?

- A) Titin
- B) Dystrophin**
- C) Nebulin
- D) Desmin

15. In the context of blood gas transport, the 'Haldane effect' describes how the oxygenation of hemoglobin promotes the dissociation of which molecule?

- A) Carbon dioxide**
- B) Carbon monoxide
- C) Nitric oxide
- D) Bicarbonate