

Advanced Human Biology and Environmental Interactions

Human Biology · Answer Key · 15 Questions

1. Which specific human anatomical structure is vestigial and serves as an example of an evolutionary trait inherited from common mammalian ancestors with larger cecums?

- A) The vermiform appendix**
- B) The thyroid cartilage
- C) The vomeronasal organ
- D) The hyoid bone

2. Which environmental toxin, often found in contaminated groundwater and geological deposits, causes hyperkeratosis and skin lesions in humans through the disruption of mitochondrial ATP production?

- A) Lead
- B) Arsenic**
- C) Mercury
- D) Cadmium

3. During human cold-water immersion, the physiological 'diving reflex' causes bradycardia and peripheral vasoconstriction; which cranial nerve is primarily responsible for the parasympathetic output slowing the heart rate?

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

4. In human evolutionary history, the shift to a diet including cooked tubers and meat facilitated the reduction of the jaw and the gut, a phenomenon described by which specific hypothesis?

- A) The Expensive-Tissue Hypothesis**
- B) The Savannah Hypothesis
- C) The Aquatic Ape Hypothesis
- D) The Arboreal Adaptation Theory

5. Which human protein, essential for iron metabolism and storage, is also upregulated in the liver as an acute-phase response to chronic inflammation or environmental pathogen exposure?

- A) Transferrin
- B) Haptoglobin
- C) Ferritin**
- D) Ceruloplasmin

6. Which atmospheric gas, when present in elevated concentrations in confined environments, triggers hypercapnia, leading to a decrease in blood pH through the formation of carbonic acid?

- A) Nitrogen dioxide
- B) Carbon dioxide**
- C) Carbon monoxide
- D) Sulfur dioxide

7. Human skin pigmentation is an evolutionary adaptation; which specific amino acid is the primary precursor for the synthesis of eumelanin in the melanocytes?

- A) Tyrosine**
- B) Tryptophan
- C) Methionine
- D) Glutamine

8. What is the primary function of the human 'brown adipose tissue' (BAT), which is notably more active in humans exposed to cold environments compared to those in thermoneutral zones?

- A) Insulation of peripheral blood vessels
- B) Non-shivering thermogenesis**
- C) Synthesis of vitamin D3
- D) Secretion of leptin for satiety

9. The human microbiome is heavily influenced by the environment; which phylum typically dominates the gut flora of humans consuming a traditional, high-fiber wild-foraging diet?

- A) Proteobacteria
- B) Firmicutes
- C) Bacteroidetes**
- D) Actinobacteria

10. Which sensory receptor in human skin is uniquely tuned to detect high-frequency vibrations, allowing humans to perceive texture in natural environments?

- A) Pacinian corpuscles**
- B) Meissner corpuscles
- C) Merkel cells
- D) Ruffini endings

11. In high-altitude environments, the human body adapts through erythropoiesis; which hormone produced by the kidneys is primarily responsible for this increased red blood cell production?

- A) Angiotensin II
- B) Erythropoietin**
- C) Aldosterone
- D) Thrombopoietin

12. Which human organ is the primary site for the detoxification of environmental fat-soluble toxins through the cytochrome P450 enzyme system?

- A) Kidneys
- B) Spleen
- C) Liver**
- D) Pancreas

13. Human circadian rhythms are entrained by light exposure; which specific cells in the retina contain melanopsin and transmit photic information directly to the suprachiasmatic nucleus?

- A) Intrinsically photosensitive retinal ganglion cells**
- B) Rods
- C) Cones
- D) Horizontal cells

14. What is the biological mechanism by which humans acquire passive immunity from the environment immediately after birth through maternal breast milk?

- A) Transfer of IgM antibodies
- B) Transfer of IgA antibodies**
- C) Production of IgE antibodies
- D) Active synthesis of IgG

15. Which biological process explains the bioaccumulation of heavy metals like methylmercury in human populations that consume high levels of top-predator marine fish?

- A) Biomagnification**
- B) Homeostasis
- C) Osmoregulation
- D) Chemotaxis