

General Questions

1. What are the Hering–Breuer reflexes?
2. What role does the blood–brain barrier play in the regulation of respiration?
3. What is Ondine’s curse?
4. What is the breaking point? Discuss the factors that affect it.
5. How does hypoxia generate increased numbers of impulses in the afferent nerves from the carotid chemoreceptors? Discuss the cellular and molecular mechanisms involved.

Multiple-Choice Questions

In questions 1–9, select the single best answer.

1. The main respiratory control neurons
 - (A) send out regular bursts of impulses to expiratory muscles during quiet respiration
 - (B) are unaffected by stimulation of pain receptors
 - (C) are located in the pons
 - (D) send out regular bursts of impulses to inspiratory muscles during quiet respiration
 - (E) are unaffected by impulses from the cerebral cortex
2. Intravenous lactic acid increases ventilation. The receptors responsible for this effect are located in the
 - (A) medulla oblongata
 - (B) carotid bodies
 - (C) lung parenchyma
 - (D) aortic baroreceptors
 - (E) trachea and large bronchi
3. Spontaneous respiration ceases after
 - (A) transection of the brainstem above the pons
 - (B) transection of the brainstem at the caudal end of the medulla
 - (C) bilateral vagotomy
 - (D) bilateral vagotomy combined with transection of the brainstem at the superior border of the pons
 - (E) transection of the spinal cord at the level of the first thoracic segment
4. The following physiologic events that occur in vivo are listed in random order:
 - (1) Decreased cerebrospinal fluid pH
 - (2) Increased arterial PCO_2
 - (3) Increased cerebrospinal fluid PCO_2
 - (4) Stimulation of medullary chemoreceptors

- (5) Increased alveolar PCO_2

What is the usual sequence in which they occur when they affect respiration?

- (A) 1, 2, 3, 4, 5
 - (B) 4, 1, 3, 2, 5
 - (C) 3, 4, 5, 1, 2
 - (D) 5, 2, 3, 1, 4
 - (E) 5, 3, 2, 4, 1
5. The following events that occur in the carotid bodies when they are exposed to hypoxia are listed in random order:
 - (1) Depolarization of type I glomus cells
 - (2) Excitation of afferent nerve endings
 - (3) Reduced conductance of hypoxia-sensitive K^+ channels in type I glomus cells
 - (4) Ca^{2+} entry into type I glomus cells
 - (5) Decreased K^+ efflux

What is the usual sequence in which they occur on exposure to hypoxia?

 - (A) 1, 3, 4, 5, 2
 - (B) 1, 4, 2, 5, 3
 - (C) 3, 4, 5, 1, 2
 - (D) 3, 1, 4, 5, 2
 - (E) 3, 5, 1, 4, 2
 6. Stimulation of the central (proximal) end of a cut vagus nerve would be expected to
 - (A) increase heart rate
 - (B) stimulate inspiration
 - (C) inhibit coughing
 - (D) raise blood pressure
 - (E) cause apnea
 7. Injection of a drug that stimulates the carotid bodies would be expected to cause
 - (A) a decrease in the pH of arterial blood
 - (B) a decrease in the PCO_2 of arterial blood
 - (C) an increase in the HCO_3^- concentration of arterial blood
 - (D) an increase in urinary Na^+ excretion
 - (E) an increase in plasma Cl^-
 8. Variations in which of the following components of blood or cerebrospinal fluid do *not* affect respiration?
 - (A) Arterial HCO_3^- concentration
 - (B) Arterial H^+ concentration
 - (C) Arterial Na^+ concentration
 - (D) Cerebrospinal fluid CO_2 concentration
 - (E) Cerebrospinal fluid H^+ concentration

9. Intractable hiccups sometimes respond to
- (A) increasing arterial PO_2
 - (B) injection of acetylcholine
 - (C) injection of dopamine antagonists
 - (D) increasing arterial pH
 - (E) hyperventilation

CHAPTER 36

- | | | | | |
|--------|-------|-------|-------|--------|
| 1 (D) | 2 (B) | 3 (B) | 4 (D) | 5 (E) |
| 6 (E) | 7 (B) | 8 (C) | 9 (C) | 10 (G) |
| 11 (G) | | | | |