

Bi 253
Sample exam 2
Spring 2007

1. A lizard gas exchanger would best be described as...
 - a. ram-jet
 - b. flow-through
 - c. buccal-pumped
 - d. tidal

2. Excluding the energy it takes to move the medium across the gas exchanger, which of the following ventilatory systems is the most efficient at extracting oxygen from the medium it is in?
 - a. frog positive pressure
 - b. human tidal
 - c. fish positive pressure
 - d. reptile negative pressure

3. Which of the following is *not* a factor in how fast oxygen is delivered to tissues?
 - a. amount of water coating the alveoli
 - b. rate of lung capillary blood flow
 - c. PO_2 in the alveoli *vs.* that in the blood
 - d. activity of oxygen transporters
 - e. none of the above; all are factors

4. Why do fish expend so much of their energy budget on ventilation?
 - a. water is dense and viscous compared with air, so it takes more force to pass it over the gas exchanger
 - b. water does not hold as much oxygen as air, so more water must be moved per unit time, compared with air, to extract the same amount of oxygen
 - c. gills are much less efficient than lungs at extracting oxygen
 - d. lacking surfactant, fish gills are often partially collapsed and this reduces the amount of oxygen they can extract. Thus the fish must pump more water to compensate.
 - e. a & b

5. Most of the carbon dioxide transported to the lungs is carried...
 - a. by rhodopsin
 - b. bound to hemocyanin
 - c. as bicarbonate ion
 - d. in otoliths as calcium carbonate
 - e. as carbamyl dihydride

6. Which of the following factors does *not* contribute to vascular resistance?
 - a. stroke volume
 - b. vessel diameter
 - c. overall length of blood vessels
 - d. blood viscosity

7. Consider a situation with a normal cell that has a -60 mV resting potential. This is the standard resting potential due to the potential due to the normal distribution of ions across the membrane, and the normal ion conductance across the membrane. What would happen to the resting potential if the internal potassium concentration of the cell doubled?
 - a. the cell would hyperpolarize
 - b. the cell would depolarize slightly
 - c. the resting potential would be +55 mV
 - d. the resting potential would go to zero
 - e. the cell would stop resting and start exuding vast quantities of battery acid

8. The ability to generate action potentials requires...
 - a. myelin
 - b. voltage-sensitive sodium channels
 - c. voltage-sensitive potassium channels
 - d. b & c
 - e. all of the above

9. Where would you expect to find i.p.s.p.'s?
 - a. in a post-synaptic dendrite region
 - b. in the mid-region of a long motor axon
 - c. associated with voltage-sensitive sodium channel proteins
 - d. in myelinated portions of an axon
 - e. within the synaptic cleft

10. Graded potentials...
 - a. Are found only in certain neurons
 - b. Typically represent a hyperpolarization
 - c. Are found in sensory cells only
 - d. Propagate along the axon but not in dendrites or neuron terminal endings
 - e. None of the above

11. Suppose you have a neuron with normal resting potassium channels but which also has some special sodium channels. The sodium channels are not voltage-gated, rather they are stuck open. They are small channels, and have about the same conductance as the resting K^+ channels. If this neuron does not make action potentials, which of the following is your best estimate of the neuron's resting potential?
 - a. +100 mV
 - b. +50 mV
 - c. +5 mV
 - d. -70 mV
 - e. -100 mV

12. Elephants have very good low frequency hearing (infrasound to humans). How would you expect the basilar membrane and/or cochlea of an elephant to change relative to a human, to account for the improved low-frequency range? (Note: Recall that the basilar end of the membrane is where the stapes pushes on the oval window, and the apical end is at the small peak of the cochlea.)
 - a. Both the basilar part of the membrane and the apical part of the membrane grow longer
 - b. Over its entire length the basilar membrane would become thinner
 - c. The apical end of the basilar membrane would grow longer, wider, and less rigid.
 - d. The apical end of the basilar membrane would become much more rigid, and with less mass.

13. Which of the following animals is most likely to have an all-rod retina?
 - a. A crab living on a shallow ocean bottom at about five meters depth
 - b. Ducks
 - c. Your basic rat
 - d. A lizard
 - e. **Turtles**

14. What is the function of mammalian middle ear ossicles?
 - a. The ossicles compensate for low-frequency barometric changes that would damage the cochlea.
 - b. The ossicles are suspended away from body tissues making them relatively cold. This minimizes the response of hair cells to thermal noise.
 - c. Middle ear ossicles are connected to the eustacian tubes and push them open to compensate for pressure changes.
 - d. Middle ear ossicles act as a lever system to allow more effective force to be delivered to the fluid of the inner ear.

15. The transduction channel in a vertebrate hair cell is opened by...
 - a. a ligand gate
 - b. the release of glutamate at the efferent synapse
 - c. mechanical stress applied through tip links from adjacent stereocilia (stereovilli)
 - d. displacement of the basilar cell membrane
 - e. stretch of the fenestra sensorium

16. The tectorial membrane overlies inner hair cells in the cochlea, but is not in contact with them. What is the function of the tectorial membrane?
- This membrane makes a special fluid compartment that allows a special high calcium solution to be present on the apical surface of hair cells.
 - This membrane moves up and down along with the basilar membrane, but because of its attachment point is sheared laterally compared with the basilar membrane, leading to lateral fluid drag across the hair cells.
 - The tectorial membrane attaches to the basilar membrane so as to apply tension on the latter; this creates a stiffness gradient for the traveling wave.
 - The tectorial membrane acts as a pressure relief device for loud sounds, needed because the endocochlear fluid is not compressible.
17. What is the difference between a pheromone and a hormone?
- Hormones are found only in vertebrates and pheromones are found only in invertebrates.
 - Pheromones are signals transmitted via a portal blood system.
 - Hormones are secreted by ducted glands while pheromones are secreted by ductless glands.
 - Pheromones are broadcast via an external medium while hormones are blood-transported.
18. Endocrine cells produce hormones, but are themselves controlled only by neurons
- True
 - False
19. The hypothalamus is...
- part of the digestive system
 - another name for the adenohypophysis
 - contains endocrine cells but not neurons
 - a structure of the central nervous system
 - the main source for secretion of erythropoietin
20. Which intracellular signaling function should NOT be present in the area 4, 5, 6 in the figure to the right?
- binding to promoter region
 - phosphorylation
 - kinase activation
 - energy (ATP) consumption

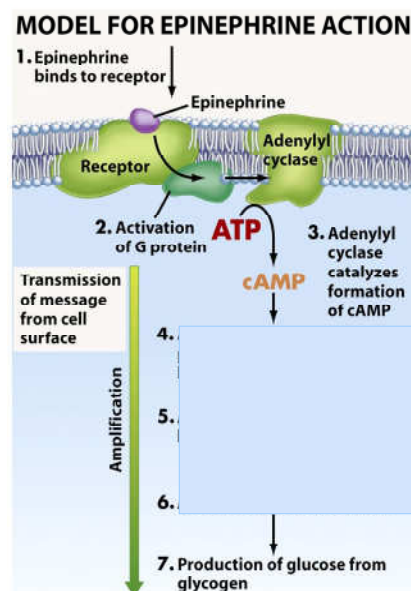


Figure 47-17 Biological Science, 2/e
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