Biology of the Salivary Glands 513 (KEY)

MID-TERM Examination

May 29, 2002

Multiple Choice

1. Which statement is **not** correct?
   a. Secondary saliva is isotonic in relation to plasma. **(correct)**
   b. Primary saliva is isotonic in relation to plasma.
   c. Secondary saliva is hypotonic in relation to plasma.
   d. Secondary saliva has a lower concentration of ions in relation to plasma.
   e. none of the above.

2. Which statement is **not** correct regarding the myoepithelial cells?
   a. Speeding up the initial flow of saliva.
   b. Reducing luminal volume.
   c. Part of the structural components of the salivary glands.
   d. Modified epithelial cells with contractile ability.
   e. Smooth muscle cells with secretory ability. **(correct)**

3. Saliva secretion ceases during …? (I accepted either answer)
   a. Heavy exercise
   b. Heavy sleep **(correct)**
   c. Lunch
   d. Dinner
   e. None of the above **(correct)**

4. A circadian rhythm is observed for?
   a. Sleep
   b. Saliva secretion
   c. Normal body functions
   d. All of the above **(correct)**
   e. None of the above

5. Which statement is correct? (I accepted either answer)
   a. Bicarbonate concentration decreases in stimulated saliva.
   b. Total protein composition of the saliva decreases as salivary glands are stimulated. **(correct)**
   c. Potassium concentration increases in stimulated saliva.
   d. Sodium concentration increases in stimulated saliva. **(correct)**
   e. None of the above.

6. When saliva flow is stimulated, what event does not occur?
   a. Na^+ increases
   b. K^+ increases **(correct)**
   c. HCO_3^- increases
   d. Flow rate increases

7. Which one is **not** a parasympathetic ganglion
   a. Ciliary ganglion
   b. Trigeminal ganglion **(correct)**
   c. Pterygopalatine ganglion
   d. Otic ganglion
   e. Submandibular ganglion

8. In order to stimulate the flow of the saliva in a patient, what would be the **best** approach
   a. Stimulate the specific nerves by electrodes.
   b. Give the patient a parasympathetic agonist drug (carbachol). **(correct)**
   c. Give the patient a sympathetic agonist drug (isoproterenol).
   d. all of the above
   e. none of the above

9. What ion is mainly responsible for the increase in the stimulated saliva?
   a. Sodium
   b. Negatively charged amylase
   c. Chloride
   d. Bicarbonate **(correct)**
   e. None of the above

10. Select the **incorrect** statement
   a. Saliva contains growth factors such as epithelial growth factor (EGF) and nerve growth factor (NGF).
   b. Saliva is generally saturated with respect to calcium and phosphate which help in remineralizing enamel.
   c. Salivary reflexes are under voluntary control. **(correct)**
   d. Saliva functions as a temperature regulator in some animals.
   e. Digestive enzymes are present in the saliva.

11. Select the **incorrect** statement
   a. Acetylcholine is the neurotransmitter between the second order neuron and the target organ in the parasympathetic nervous system
   b. Parasympathetic ganglia are located close to their targets
   c. sympathetic ganglia are located in the sympathetic trunk
   d. Norepinephrin (noradrenalin) is the neurotransmitter between the second order neurons and the target organ in the parasympathetic nervous system. **(correct)**
   e. All of the above

12. Which statement is **correct**
   a. Hypolemmal innervation hypothesis explains the mode of contact between the somatomotor nerve fibers and salivary gland cells.
   b. Hypolemmal innervation hypothesis explains the mode of contact between the sympathetic nerve fibers and salivary gland cells.
   c. Hypolemmal innervation hypothesis explains the mode of contact between the parasympathetic nerve fibers and salivary gland cells. **(correct)**
   d. All of the above
   e. None of the above

13. Select the **correct** statement
   a. Activation of different G-protein coupled receptors is coupled to activation of different intracellular events leading to either protein exocytosis and/or fluid secretion. **(correct)**
   b. Activation of different adenylate cyclase-protein coupled receptors is coupled to activation of different intracellular events leading to either protein exocytosis and/or fluid secretion.
   c. Exocytosis activates different G-protein coupled receptors .
   d. Fluid secretion activates different G-protein coupled receptors.
   e. None of the above

14. Neurotransmitters exert their biological function
    a. as they enter the nuclei of the salivary gland cells.
    b. as they bind to intranuclear receptors.
    c. as they bind to cytoplasmic receptors.
    d. as they bind to mitochondrial receptors.
    e. as they bind to cell surface receptors. **(correct)**

15. Which statement is correct
    a. Acetylcholine activates cAMP and leads to fluid secretion.
    b. Acetylcholine activates IP3 and leads to fluid secretion. **(correct)**
    c. Acetylcholine activates cAMP and leads to protein secretion.
    d. Acetylcholine activates IP3 and leads to protein secretion.
    e. None of the above

16. Which statement is correct
    a. Norepinephrine activates cAMP and leads to fluid secretion
    b. Norepinephrine activates IP3 and leads to fluid secretion
    c. Norepinephrine activates cAMP and leads to protein secretion **(correct)**
    d. Norepinephrine activates IP3 and leads to protein secretion
    e. None of the above

17. Which statement is correct
    a. cAMP production is the major intracellular event after parasympathetic stimulation.
    b. IP3 production is the major intracellular event after parasympathetic stimulation. **(correct)**
    c. IP3 production is the major intracellular event after sympathetic stimulation.
    d. All of the above
    e. None of the above

18. Why should we eat food containing sucrose in conjunction with regular meals
    a. Amino acids neutralize sucrose.
    b. Amino acids neutralize acids produced by plaque bacteria.
    c. Amylase digests sucrose.
    d. Salivary bicarbonate concentration is high. **(correct)**
    e. None of the above

19. What are the major problems in a patient with Sjögren's syndrome
    a. decreased oral clearance
    b. rampant caries
    c. impaired speech
    d. all of the above **(correct)**
    e. none of the above

20. Which statement is correct
    a. Hypolemmal innervation is mainly responsible for protein secretion
    b. Epilemmal innervation is mainly responsible for fluid section
    c. Hypolemmal innervation leads to calcium mobilization in acinar cells **(correct)**
    d. All of the above
    e. None of the above

21. What statement is **not** correct
    a. The neurotrophic theory explains the basic mechanisms for controlling the number of nerve cells in the developing nervous system.
    b. Neurotrophic factors are endogenous proteins and neurons require them for survival.
    c. Neurotrophic factors are produced by the target tissue.
    d. All of the above **(correct)**
    e. None of the above

22. What are neurotrophic factors built from
    a. Triglycerides
    b. Amino acids **(correct)**
    c. Disaccharides
    d. All of the above
    e. None of the above

23. In addition to survival effect, neurotrophic factors are important for many other aspects of the nervous system such as:
    a. Growth
    b. Differentiation
    c. Extension of cellular processes
    d. Synthesis of proteins
    e. All of the above **(correct)**

24. How is neuronal survival controlled by neurotrophic factors
    a. They are produced in limited amounts by the target **(correct)**
    b. Neurons do not require them for survival
    c. Overproduction of neurotrophic factors make sure all neurons survive
    d. All of the above
    e. None of the above

25. Who received the Nobel price in physiology and medicine for their discoveries of growth factors?
    a. Dennis Lopatin
    b. Christopher Nosrat
    c. Rita Levi-Montalcini and Stanley Cohen **(correct)**
    d. All of the above
    e. None of the above

26. The concept of "multi-functionality" describes the fact that:
    a. every salivary protein has a unique structure.
    b. salivary proteins tend to have a single biological activity.
    c. each salivary protein possesses one unique biological activity which in concert with the other proteins results in multi-functions.
    d. all of the above
    e. none of the above**(correct)**

27. The significance of salivary proteins complexing with salivary mucins is that:
    a. complexing with mucins keeps the mucins from complexing with themselves, thus maintaining their lubricating activity.
    b. the mucins form the initial salivary pellicle which binds and concentrates these proteins on the tooth surface. **(correct)**
    c. the biological activities of the salivary proteins are inhibited until needed.
    d. complexing with mucins tends to prevent concentration of the proteins on tooth surfaces.
    e. None of the above

28. The mucins are important in the maintenance of the airways because they:

a. help keep the airways dry.
b. retain moisture and keep the airways from drying out. **(correct)**
c. help anchor dental appliances.
d. all of the above
e. none of the above

29. Pellicle-formation is important to the integrity of the teeth because:

a. the pellicle concentrates the inhibitors of calcium-phosphate precipitation at the enamel surface.
b. the pellicle reduces the loss of calcium-phosphate from the tooth.
c. the pellicle concentrates anti-microbial substance at the tooth surface.
d. all of the above **(correct)**
e. none of the above

30. The ability of certain salivary proteins to bind to and aggregate bacteria is a two-edged sword because:

a. when salivary proteins are in solution, bacterial virulence is enhanced.
b. when salivary proteins are part of the pellicle, bacteria adhere to the tooth surface and can cause damage. **(correct)**
c. aggregation of bacteria enhances their pathogenicity and makes it more difficult for the body to eliminate them.
d. a and b
e. none of the above

31. It is important to prevent supersaturated calcium-phosphate in saliva from precipitating because:

a. salivary calcium is also vital for bone calcification.
b. if calcium-phosphate precipitates in the tooth pores, the pores will become blocked.
c. calcium-phosphate may contribute to calculus formation.
d. b and c **(correct)**
e. none of the above

32. Difficulty in rapidly performing more than two swallows in a row is due to:

a. salivary reflux phenomenon.
b. pyosalpingitis.
c. the throat muscles becoming fatigued.
d. lack of oral lubrication. **(correct)**
e. none of the above

True/False

33. Saliva secretion ceases during the night. **(F)**

34. Erosion of the tooth surfaces in head and neck radiation patients is due to the lack of saliva which provides lubrication, antimicrobial activity and remineralization properties. **(T)**

35. Saliva secretion follows a circadian rhythm. **(T)**

36. Amylase is only found in saliva because its role is solely one of nutrition. **(F)**

37. Xerostomia is an infrequent side-effect of prescription drugs. **(F)**

38. The parotid gland contributes primarily to maintaining basal levels of saliva between periods of eating. **(F)**

39. Lysozyme has other antimicrobial activities in addition to its muramidase activity. **(T)**

40. Formation of strands of saliva when a patient spits is due principally to the mucins. **(T)**

41. The sialoperoxidase system differs from the oxygen-dependent killing systems of neutrophils in that it does not require hydrogen peroxide for killing. **(F)**

42. The teeth are at great risk for decay late a night because the salivary flow rates are low at that time. **(T)**

43. In otherwise healthy individuals (between 30 and 60 years old), there is a normal progressive reduction in salivary flow rates with advancing age **(F)**.

44. A patient's subjective assessment of the amount of saliva s/he makes is the best indicator of the amount of saliva s/he actually makes. **(F)**

45. The primary cause of salivary gland output reduction in the elderly can usually be traced to the medications that they are taking for other medical problems. **(T)**.

46. Erosion of tooth surfaces in patients who have had head and neck irradiation is attributable to increased mucin levels and concentrations of supersaturated calcium phosphate. **(F)**

47. There is a clear distinction between what are considered functional normal and subnormal levels of saliva. **(F)**

48. The thiocyanate required by the sialoperoxidase system is contributed by foods. **(T)**

49. The acidic pH caused by bacteria in the oral cavity is important in the sialoperoxidase system because it protonates the acid formed by the peroxidase system and allows it to penetrate the bacterial cell membranes. **(T)**

50. The innate host defense contributed by the non-IgA salivary proteins is not important in young children because they make high levels of protective sIgA at birth. **(F)**