

Biology of the Salivary Glands 513 (KEY)

MID-TERM Examination

May 23, 2001

Multiple Choice

1. Pilocarpine inhibits secretion more than propranolol because:
 - a. It is a cholinergic agonist and therefore inhibits fluid release.
 - b. It stimulates the muscarinic receptor.
 - c. Propranolol is administered only intravenously and therefore does not inhibit the salivary glands efficiently.
 - d. None of the above (**correct**)
 - e. All of the above

2. If you isolate the anterior hard palate and stimulate it with a lemon drop, which of the following will occur?
 - a. Profuse secretion because the mucous salivary glands located here, have numerous parasympathetic connections.
 - b. No secretion because lemon drops inhibit the beta-adrenergic receptor thereby inhibiting secretion.
 - c. No secretion because the serous salivary glands located here, do not secrete saliva.
 - d. No secretion because this is an unusual location for salivary glands. (**correct**)
 - e. None of the above

3. If you administer a drug that stimulates phospholipase C, in a patient taking atropine, theoretically which of the following could happen:
 - a. Fluid secretion is induced. (**correct**)
 - b. No change in fluid secretion.
 - c. Fluid secretion is further inhibited.
 - d. Protein secretion ceases.
 - e. None of the above

4. A patient presents to your office with bilateral tumors in the parotid gland, complaining of a dry mouth. This lack of secretion is:
 - a. Unrelated to the salivary gland mass.
 - b. Related to disruption and loss of acinar structure and therefore disruption of normal signaling mechanisms in the gland. (**correct**)
 - c. Psychological. The patient has minor salivary glands that produce saliva and therefore disruption of parotid function should have no effect.
 - d. Indicative of inaccurate reporting because all salivary gland tumor tissue continues its normal secretion activities.
 - e. none of the above

5. Signaling molecules within a cell allow:
- Amplification of the stimulus since several identical molecules can be stimulated by the same agonist.
 - Rapid communication between the extracellular and intracellular environments.
 - Resistant to irradiation.
 - Both a) and b). **(correct)**
 - None of the above.
6. Which statement is **not** correct?
- Secondary saliva is isotonic in relation to plasma. **(correct)**
 - Primary saliva is isotonic in relation to plasma.
 - Secondary saliva is hypotonic in relation to plasma.
 - Secondary saliva has a lower concentration of ions in relation to plasma.
 - None of the above.
7. Which statement is **not** correct regarding the myoepithelial cells?
- Speeding up the initial flow of saliva.
 - Reducing luminal volume
 - Part of the structural components of the salivary glands
 - Modified epithelial cells with contractile ability
 - Smooth muscle cells with secretory ability. **(correct)**
8. What event does not occur with stimulated saliva?
- Na^+ increases
 - K^+ increases **(correct)**
 - HCO_3^- increases
 - Flow rate increases
 - None of the above
9. Which one is **not** a parasympathetic ganglion?
- Ciliary ganglion
 - Trigeminal ganglion **(correct)**
 - Pterygopalatine ganglion
 - Otic ganglion
 - Submandibular ganglion
10. In order to stimulate the flow of the saliva in a patient, what would be the **best** approach:
- Stimulating the specific nerves by electrodes
 - Give the patient a parasympathetic agonist drug (carbachol) **(correct)**
 - Give patient a sympathetic agonist drug (isoproterenol)
 - All of the above
 - None of the above

11. The concept of “multi-functionality” describes the fact that:
- every salivary protein has the same multiple functions.
 - salivary proteins tend to have more than one biological activity. **(correct)**
 - each salivary protein possesses one unique biological activity which in concert with the other proteins results in multi-functions.
 - all of the above
 - none of the above
12. The significance of salivary proteins complexing with salivary mucins is that:
- complexing with mucins keeps the mucins from complexing with themselves, thus maintaining their lubricating activity.
 - the mucins can be rapidly eliminated from the oral cavity.
 - the biological activities of the salivary proteins are inhibited until needed.
 - complexing with mucins tends to concentrate the proteins resulting in high levels of biological activity associated with the mucins. **(correct)**
 - None of the above
13. The water retention properties of mucins are important in the airways because they:
- help prevent the airways from drying out. **(correct)**
 - foster the growth of commensal organisms.
 - help anchor dental appliances.
 - all of the above
 - none of the above
14. Pellicle-formation is important to the integrity of the teeth because:
- the pellicle concentrates the inhibitors of calcium-phosphate precipitation at the enamel surface.
 - the pellicle reduces the loss of calcium-phosphate from the tooth.
 - the pellicle concentrates anti-microbial substance at the tooth surface.
 - all of the above **(correct)**
 - none of the above
15. The ability of certain salivary proteins to bind to and aggregate bacteria is a two-edged sword because:
- when salivary proteins are in solution, bacteria are aggregated and can be eliminated before they adhere to the tooth.
 - when salivary proteins are part of the pellicle, bacteria adhere to the tooth surface and can cause damage.
 - aggregation of bacteria enhances their pathogenicity and makes it more difficult for the body to eliminate them.
 - a and b **(correct)**
 - none of the above
16. It is important to prevent supersaturated calcium-phosphate in saliva from precipitating because:
- the calcium-phosphate must be kept in solution to maintain an equilibrium with calcium-phosphate in the tooth.
 - if calcium-phosphate precipitates in the tooth pores, the pores will become blocked.
 - calcium-phosphate may contribute to calculus formation.
 - all of the above **(correct)**
 - none of the above

17. Difficulty in rapidly performing more than two swallows in a row is due to:
- salivary reflux phenomenon.
 - pyosalpingitis.
 - the throat muscles becoming fatigued.
 - lack of oral lubrication. **(correct)**
 - none of the above
18. What ion is mainly responsible for the increase in the stimulated saliva?
- Na^+
 - Negatively charged amylase
 - Cl^-
 - HCO_3^- **(correct)**
 - None of the above
19. Select the **incorrect** statement:
- Saliva contains growth factors such as epithelial growth factor (EGF) and nerve growth factor (NGF)
 - Saliva is generally saturated with respect to calcium and phosphate which help in remineralizing enamel
 - Salivary reflexes are under voluntary control**(correct)**
 - Saliva functions as temperature regulator
 - Digestive enzymes are present in the saliva
20. Select the **incorrect** statement:
- Acetylcholine is the neurotransmitter between the second order neuron and the target organ in the parasympathetic nervous system.
 - Parasympathetic ganglia are located close to their targets.
 - sympathetic ganglia are located in the sympathetic trunk.
 - Norepinephrin (noradrenalin) is the neurotransmitter between the second order neurons and the target organ in the parasympathetic nervous system. **(correct)**
 - None of the above

True/False

21. Different concentrations of a taste quality stimulates salivary flow rate at different rates. **(T)**
22. The teeth are at great risk for decay late a night because the salivary flow rates are low at that time. **(T)**
23. In otherwise healthy individuals (between 30 and 60 years old), there is a normal progressive reduction in salivary flow rates with advancing age **(F)**.
24. Stimulation of muscarinic receptors results in rapid saliva flow because of increased fluid release. **(T)**
25. 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)**.
26. 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)**

27. There is a clear distinction between what are considered functional normal and subnormal levels of saliva. **(F)**
28. In a patient taking no drugs, salivary protein secretion may be impaired if the patient has an inactivating mutation in Gs, the GTP-binding protein. **(T)**
29. If a patient had a defect in cAMP production only in the salivary gland, fluid secretion would not occur. **(F)**
30. A patient with badly damaged muscarinic and adrenergic receptors would have no xerostomia problems because of constitutive secretion of proteins. **(F)**

Multiple Choice

31. What neurotrophic factors are important for the development of the autonomic nervous system?
 - a. NGF
 - b. GDNF
 - c. NrTN
 - d. All of the above **(correct)**
 - e. None of the above
32. 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)**
33. What statement is **not** correct:
 - a. The neurotrophic theory explains the basic controlling 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
 - e. None of the above **(correct)**

True/False

34. Saliva secretion ceases during night. **(F)**
35. Saliva secretion follows a circadian rhythm. **(T)**
36. Total protein composition of the saliva decreases as salivary glands are stimulated. **(T)**
37. Hypolemmal innervation hypothesis explains the mode of contact between the parasympathetic nerve fibers and salivary gland cells. **(T)**
38. Activation of different G-protein coupled receptors is coupled to activation of different intracellular events leading to either protein exocytosis and/or fluid secretion. **(T)**
39. Neurotransmitters exert their biological function as they enter the nuclei of the salivary gland cells. **(F)**
40. Cyclic AMP and IP3 are examples of second messengers. **(T)**