

# Biology of the Salivary Glands 513 (KEY)

## MID-TERM Examination

May 28, 2003

### Case A:

A 58 year-old man presents to your office complaining of multiple toothaches for the past month. After a medical history review you learn that he had a cancerous lesion removed from the posterior tongue with subsequent radiation therapy several years ago. He is otherwise currently healthy and takes no medications aside from daily nutritional supplements. The dental history and exam reveals multiple carious cervical surfaces, a lower natural dentition, and a partially edentulous upper ridge with a metal base partial denture. The mucosa adjacent to the partial denture appears red and inflamed. Additionally, his saliva appears rather ropey and is sticky and diminished in amount.

### Questions for Case A:

1. You should be concerned about his history of head and neck radiation with respect to your dental diagnosis and treatment planning.
  - a. T **(correct)**
  - b. F
  
2. What is the most likely cause of his saliva being ropey and sticky and diminished in supply?
  - a. Nothing, that is normal for a man his age.
  - b. His partial denture. People who wear dentures always have sticky, ropey saliva.
  - c. His radiation therapy. It damaged his salivary glands and his saliva quality and quantity have been affected. **(correct)**
  - d. Fear. He is scared to visit the dentist.
  - e. Thirst. These are natural signs of common thirst.
  
3. How is the appearance of multiple carious cervical lesions related to the status of his saliva?
  - a. As the flow of saliva decreases, there is less mechanical cleansing of the tissues.
  - b. As the availability of saliva decreases, there is less buffering capacity which leads to a more acidic environment.
  - c. Nothing, they are not related.
  - d. a, b **(correct)**
  - e. b only

4. Given that this patient has acceptable oral hygiene, what is the most likely cause for the prosthesis-induced erythema (redness, inflammation) on his palate?
  - a. Food. He probably burned his palate on some hot pizza.
  - b. Diminished quantity of saliva. There is less lubrication between the mucosa and the prosthesis. **(correct)**
  - c. Allergy. He is allergic to the metal in the partial denture.
  - d. Nothing. It is normal for the mucosa next to a prosthesis to get red.
  - e. None of the above. You have to biopsy the tissue to look for pathology.
  
5. What will you include in your dental treatment plan for this patient?
  - a. Fillings and other restorative procedures.
  - b. Patient education and symptomatic treatment for the palatal erythema.
  - c. Nothing. You refer him to a hospital dental clinic for care given his history of head and neck radiation.
  - d. Patient education about salivary substitutes, wetting agents, and other means to make the most of his saliva.
  - e. a, b, d **(correct)**

### Case B:

A patient of record presents to your office for her recall six-month prophylaxis and exam. She is 45 years old and in good general health. She has no significant medical history and has denied use of medications. Her chief complaint at this particular visit is the occurrence of a “dry mouth,” particularly in the morning upon awakening. Upon further questioning, you discover that she has been taking an over the counter anti-histamine for allergies for the past three months.

### Questions for Case B:

6. Why is it significant that she did not initially report the anti-histamine use?
  - a. Many patients don't believe that over the counter drugs are important, therefore a careful history is imperative.
  - b. It isn't significant. Dentists don't have to worry about over the counter medication use.
  - c. She has been a patient of record of yours and has now deceived you, you no longer trust her and refer her to someone else.
  - d. Many over the counter drugs may have subsequent oral as well as systemic consequences important to the dental professional.
  - e. a, d **(correct)**

7. What is the most likely contributing factor to this patient's chief complaint of dry mouth?
- You are not sure given the limited information so you ask her to keep a diet history and return for a salivary flow test.
  - Given the sudden onset of symptoms you suspect a salivary gland tumor. You refer her to your former oral pathology instructors at the University of Michigan School of Dentistry.
  - Nothing. You tell her not to worry about it.
  - The antihistamine she is taking for allergies. Many over the counter drugs have "dry mouth" listed as a common complaint of use. **(correct)**
  - None of the above.
8. Will her use of an antihistamine change your dental treatment plan for her?
- No, there is no need to for over the counter medication use.
  - Yes, you will make her appointments during the afternoon as her antihistamine wears off.
  - Yes, you will educate her about antihistamine use and the dry mouth side effect and encourage meticulous oral hygiene and frequent wetting of oral tissues with water. **(correct)**
  - Yes, you will make her appointments during the morning right after her initial dose of antihistamine.
  - No, you don't believe her complaints of dry mouth.

### Case C:

An 80-year-old woman presents to your office for her yearly denture exam with a chief complaint "I have trouble speaking and eating with my dentures." She is a recent widow and is new to the area. Her medical history is significant for surgery (hysterectomy and gall bladder) and use of multiple medications; antihistamines, antihypertensives, and antidepressants are all used on a chronic basis, all three are prescribed by her physician. Her dental history is significant for the following: (1) a well-fitting, but moderately worn, set of complete dentures, (2) red, inflamed tissues under her upper denture, and (3) a cracked lobulated surface on her tongue.

### Questions for Case C:

9. What is the most likely diagnosis given the patient presentation?
- Rough denture surfaces irritating the mouth.
  - Dry mouth (xerostomia) causing the redness and discomfort. **(correct)**
  - Normal effects of aging.
  - Normal effects of wearing complete dentures.
  - None of the above.

10. What is the most likely cause of her diagnosis?
- Age. Age often leads to decreased salivary flow.
  - Dentures. Wearing dentures always causes redness and dryness in the mouth
  - Polypharmacy. Dry mouth signs and symptoms increase with the number of drugs used. **(correct)**
  - Gender. Women naturally have more difficulty wearing dentures successfully.
  - Depression. Being a recent widow she is probably depressed and is not taking care of her mouth properly.

**Multiple Choice (not related to the above cases)**

11. 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 form the initial salivary pellicle which binds and concentrates these proteins on the tooth surface. **(correct)**
  - the biological activities of the salivary proteins are inhibited until needed.
  - complexing with mucins tends to prevent concentration of the proteins on tooth surfaces.
  - None of the above
12. The mucins are important in the maintenance of the airways because they:
- help keep the airways dry.
  - retain moisture and keep the airways from drying out. **(correct)**
  - help anchor dental appliances.
  - all of the above
  - none of the above
13. 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
14. The sialoperoxidase system is not chronically activated because:
- sialoperoxidase is only produced during meal-time.
  - the system requires hydrogen peroxide produce by actively metabolizing bacteria.
  - the system requires thiocyanate ions present in food products.
  - b and c. **(correct)**

- e. none of the above
15. 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

### True/False

16. Unstimulated saliva secretion rate is relatively consistent over a 24 hour period. **(F)**
17. Erosion of the tooth surfaces in head and neck radiation patients is primarily due to the loss of salivary gland function. **(T)**
18. Saliva secretion during mastication is primarily a product of the parotid gland. **(T)**
19. Since amylase is in numerous bodily secretions, one might conclude that its role is not solely as a participant in the nutrition process. **(T)**
20. Xerostomia is a commonly-associated side-effect of prescription drugs. **(T)**
21. Mucosal immunity is important in the protection against pathogens because many pathogens infect the body via the mucosal route. **(T)**
22. Multi-functionality refers to the fact that many salivary components have multiple biological activities. **(T)**
23. Formation of strands of saliva when a patient spits is rarely due to the mucins. **(F)**
24. The sialoperoxidase system is similar to the oxygen-dependent killing systems of neutrophils in that its ultimate products are toxic substances. **(T)**
25. The teeth are at great risk for decay late at night because the secretory IgA levels are lowest at that time. **(F)**
26. In otherwise healthy individuals (between 40 and 80 years old), there is a significant reduction in salivary flow rates associated with advancing age **(F)**.
27. A patient's perception of the amount of saliva s/he makes is a poor indicator of the amount of saliva s/he actually makes. **(T)**
28. 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)**.
29. Caries on root surfaces in patients who have had head and neck irradiation is attributable to decreased mucin levels. **(F)**

30. The ranges of what are considered functional normal and subnormal levels of saliva overlap. (T)
31. M-cells often enable pathogens to penetrate the epithelial cell layer of the mucosa. (T)
32. One would not expect to find secretory component associated with serum IgA. (T)
33. Homing is a process by which cells leaving organized MALT follicles migrate to other mucosal tissues in the body. (T)
34. The ability to induce inflammation is an important role of secretory IgA. (F)
35. Immunization via the mucosal route will often enhance the systemic response to an antigen. (F).
36. 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 (all are correct)
37. In regard to stimulated saliva, what event does **not** occur?
- [Na<sup>+</sup>] increases
  - [K<sup>+</sup>] increases (Correct)
  - [HCO<sub>3</sub><sup>-</sup>] increases
  - Flow rate increases
  - all of the above occur
38. In order to stimulate the flow of the saliva in a patient, what would be the **best** approach
- stimulate specific nerves by electrodes
  - give the patient a parasympathetic agonist drug (carbachol)
  - give patient a sympathetic agonist drug (isoproterenol)
  - all of the above (Correct)
  - none of the above
39. What ion is mainly responsible for the PH increase in the stimulated saliva?
- Na<sup>+</sup>
  - Negatively charged amylase
  - Cl<sup>-</sup>
  - HCO<sub>3</sub><sup>-</sup> (Correct)
  - None of the above

40. 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 are correct