

## **PUT YOUR HONOR CODE NUMBER ON YOUR EXAM!!!**

**This is an “open book, open note, open computer examination.” However, you may not consult with your classmates. You may keep the examination booklet.**

**For the following cases, select the BEST answer.**

### **Case A:**

A 40 year-old male presents to your office with complaints of a painful swelling under his chin that increases at mealtime. He also complains of a dry mouth and a bad taste, all lasting about 3-4 days. He is currently not taking any medications and his medical history is not significant.

1. What do you suspect is the most likely diagnosis?
  - (a) Medication induced xerostomia
  - (b) A tumor in the submandibular gland
  - (c) A stone in the submandibular duct **correct**
  - (d) An aphthous ulcer
  - (e) None of the above
  
2. How will you confirm your suspicion?
  - (a) Visual inspection of Wharton’s Duct
  - (b) Bi-manual palpation of the gland
  - (c) By taking a saliva sample
  - (d) x-ray
  - (e) a, b, d **correct**

### **Case B:**

An 80 year-old woman presents to your office with a chief complaint of an ill-fitting denture. Her denture is 5 years old. Reportedly, it fit fine until just about a month or two ago. Upon further questioning she also has complaints of cheek biting and frequent thirst. She is taking an anti-depressant and an anti-hypertensive. She also takes OTC (over the counter) pain medication PRN (as needed) for osteoarthritis. Her medical history is otherwise not significant.

3. What do you suspect is the most likely cause of her cheek biting and thirst?
  - (a) Medication induced xerostomia **correct**
  - (b) A tumor in the Parotid gland
  - (c) A stone in the Parotid gland
  - (d) Aging xerostomia
  - (e) Her ill-fitting denture

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4. Upon a clinical exam you discover a 1cm “bump” on the anterior hard palate. What will you do?
  - (a) Refer her to an oral surgeon; it is probably a salivary gland tumor.
  - (b) Adjust her denture; it is probably denture-induced stomatitis.
  - (c) Consult her physician; it is probably an oral reaction to her medications.
  - (d) Refer her to an oral surgeon; it is probably a tumor, but not of salivary gland tissue. **correct**
  - (e) Make her a new denture; she is elderly and probably doesn't remember how her denture fit at delivery.
  
5. Upon further questioning, you discover that she has been on the anti-hypertensive and anti-depressant medications for the last 12 years. What about this history most affects the extent to which known xerostomic drugs contribute to xerostomia?
  - (a) Polypharmacy
  - (b) Form; whether it is a pill or liquid
  - (c) Prolonged use
  - (d) All of the above
  - (e) a, c **correct**

**Case C:**

A 45 year-old woman presents to your office with a chief complaint of constant pain in her left cheek and a dry mouth. This started about 4-6 weeks ago and has progressively gotten worse. Her medical history is unremarkable except for occasional use of OTC anti-histamines. Upon clinical exam, you palpate a fibrous, fixed lump in her left cheek of about 1cm, and you are unable to express much saliva from Stenson's duct.

6. What do you suspect is the most likely diagnosis?
  - (a) Stone in the Parotid duct
  - (b) Stone in the Submandibular duct
  - (c) Salivary duct stenosis
  - (d) Parotid gland tumor **correct**
  - (e) Submandibular gland tumor

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7. Why is she complaining of a dry mouth?
- (a) The serous parotid secretions are diminished and the remaining saliva is mostly mucus. **correct**
  - (b) The mucus parotid secretions are diminished and the remaining saliva is mostly serous.
  - (c) The serous submandibular secretions are diminished and the remaining saliva is mostly mucus.
  - (d) The mucus submandibular secretions are diminished and the remaining saliva is mostly serous.
  - (e) None of the above
8. What will you do for her?
- (a) Give her antibiotics and tell her to come back in 10 days.
  - (b) Refer her to an oral surgeon. **correct**
  - (c) Make her a bite splint; it is probably just muscle trismus from grinding.
  - (d) Nothing; it is probably just a bad cheek bite.
  - (e) None of the above

**Case D:**

A 68 year-old male presents to your office on referral from his physician. He has recently been diagnosed with a head and neck cancer and is scheduled to undergo radiation therapy. He will get 6000 cGy in divided doses to the left side of his face after surgery.

9. What will you do first?
- (a) Refer him to a hospital dental clinic; a general dentist shouldn't be treating him.
  - (b) Perform a complete and thorough history, exam and develop a treatment plan. **correct**
  - (c) Nothing. Tell him to return after his radiation treatment.
  - (d) Extract all the teeth on the left side of his face.
  - (e) None of the above.
10. Given the dose and field of radiation, what are you most concerned about?
- (a) xerostomia and radiation caries
  - (b) the nadir
  - (c) permanent damage to the left parotid gland
  - (d) all of the above
  - (e) a, c **correct**

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**Case E:**

A 54 year-old woman presents to your office with complaints of a toothache. Her history is remarkable for radiation therapy to her right side due to a head and neck tumor. She had 6500 cGy in divided doses approximately 5 years ago and she has had no detectable cancer recurrence. She has been followed carefully by her private dentist since that time. However, she is new to the area and has come to see you due to your excellent reputation. She takes an occasional OTC TUMS for indigestion, and she is on a maintenance dose of Salagen (pilocarpine HCl) 5mg three times a day. Upon clinical exam you discover excellent oral hygiene, slightly dry mucosa, and a small carious lesion on a maxillary molar.

11. What is the most likely diagnosis and what will you do?
  - (a) Caries; restore the lesion **correct**
  - (b) Medication induced xerostomia; stop the pilocarpine prescription
  - (c) Recurrent cancer; refer her back to her oncologist
  - (d) Nothing; tell her to come back in 6 months
  - (e) None of the above
  
12. What is the maximum interval for her recall prophylaxis and exam?
  - (a) Every 6 months
  - (b) Whenever she has a problem
  - (c) Every 9 months
  - (d) Whenever she can come in
  - (e) Every 3 months **correct**
  
13. Upon further questioning you discover that she doesn't like the artificial saliva substitute that was recommended for her because it "feels too much like someone else's spit." What will you tell her?
  - (a) You have never heard of saliva substitute.
  - (b) Sip on water periodically and particularly with meals. **correct**
  - (c) Suck on lemon drops.
  - (d) She has no other options to keep her mouth moist.
  - (e) Stop the pilocarpine if she wants her saliva to return.

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**Case F:**

A 46 year-old man presents on referral from his physician. He has been diagnosed with cancer and will need several rounds of chemotherapy. He has not seen a dentist in five years but currently has no chief complaint. He uses OTC anti-histamines, pain medications PRN, and takes several nutritional supplements. Upon clinical exam you note several missing teeth replaced by partial dentures in the maxilla and mandible, fair oral hygiene, several restorable carious lesions, moderate gingivitis.

14. What will you do first?
  - (a) A complete and thorough history, exam, and treatment plan. **correct**
  - (b) Extract his remaining teeth.
  - (c) Nothing; tell him to return after his chemotherapy.
  - (d) Refer him to a hospital dental clinic since his case is too complicated.
  - (e) None of the above
  
15. What consequence(s) of chemotherapy are you most concerned about?
  - (a) Permanent salivary gland destruction
  - (b) Myelosuppression (drug nadir) **correct**
  - (c) None, there are no significant consequences
  - (d) Osteoradionecrosis
  - (e) Staining of teeth
  
16. During the course of his chemotherapy you recommend that he...
  - (a) Come in for weekly checks and updates.
  - (b) Use fluoride, in trays, nightly.
  - (c) Maintain meticulous oral hygiene.
  - (d) Stay well hydrated and nourished.
  - (e) All of the above **correct**

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**Case G:**

A 42 year-old female recently diagnosed with Primary Sjögren's Syndrome presents to your office. She is having a lot of problems with a "dry mouth" and is very discouraged. She was referred to you by her physician.

17. You are concerned about xerostomia so you do a salivary flow test. You use citric acid to obtain a stimulated flow rate over a period of 3 minutes. Her stimulated flow rate is determined to be 0.5 ml/min. What is your conclusion and what will you do?
  - (a) She has a flow rate within the normal range. Tell her not to worry about it.
  - (b) You do not know. Refer her to a hospital dental clinic.
  - (c) Diagnose her with xerostomia. Review treatment modalities with her. **correct**
  - (d) Tell her she has sialolithiasis. Put her on antibiotics for 10 days.
  - (e) a, d
  
18. She has been getting a lot of "mouth infections" since diagnosed with Sjögren's Syndrome. She is concerned about this and asks if her lack of saliva could possible have anything to do with it. What is you answer?
  - (a) No. On the contrary, saliva is so full of bacteria that it probably contributes to infection.
  - (b) No. Saliva acts only as a lubricant.
  - (c) Yes. Saliva has many anti-microbial properties. **correct**
  - (d) Yes. Saliva is sterile and keeps the oral tissues sterile.
  - (e) None of the above.
  
19. She has heard much about gene therapy techniques in the news to treat human diseases. She is wondering if there are any available to help her make more saliva. What will you tell her?
  - (a) There is no feasible way to transfer genes into salivary tissue.
  - (b) The only way to replace her saliva is to transplant a rat salivary gland to replace hers.
  - (c) Successful gene therapy techniques have been developed in rodent models and are being refined for application in humans. **correct**
  - (d) What are gene therapy techniques?
  - (e) You refer her to the University of Michigan School of Dentistry since you know gene therapy is currently being done there on patients.

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20. Her 4 year-old son has a friend recently diagnosed with sIgA deficiency. She was told it had something to do with saliva but can't quite remember what. She is concerned that the condition may be infectious and that her son may catch it. What do you tell her?
- (a) sIgA is an antibody made by our immune system and is found in large quantities in saliva.
  - (b) sIgA inhibits binding of microorganisms to gut mucosa.
  - (c) sIgA helps digest fats as they travel down the gastrointestinal tract.
  - (d) all of the above
  - (e) a, b **correct**
21. Her son's friend was also recently discovered to have a food allergy. She can't believe that it would take this long to finally determine the 4 year-old had a food allergy and asks you for your opinion. Upon further questioning, you discover the boy was breast fed until he was 2 1/2 years old. What do you tell her?
- (a) It is common for breast fed children to develop food allergies.
  - (b) sIgA is found in breast milk.
  - (c) The boy got the food allergy from his mother through the breast milk.
  - (d) sIgA inhibits food antigens from passing the gut mucosa.
  - (e) b, d **correct**

**Case H:**

A 30 year-old patient of yours comes in with complaints of a toothache, again! He has been with you for the last five years and it has been a challenge to keep his caries and periodontal disease under control. His medical history is remarkable for cigarette smoking (10 pack years = 1 pack per day for 10 years) and he takes OTC pain medication PRN on occasion for aches or pains. He is getting very frustrated with the situation. In exasperation he asks if there is a vaccine available to prevent cavities and gum disease.

22. You tell him that vaccine development for caries and periodontal disease has been slow and difficult for the following reasons:
- (a) Dental infections are poly-microbial in nature.
  - (b) Dental vaccine development has not been a high priority since dental infections are generally non-life threatening.
  - (c) Vaccines are too expensive. It is cheaper to treat the disease.
  - (d) a, b **correct**
  - (e) b only

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23. You are very concerned about his chronic periodontal disease and wonder about patient compliance at home. More specifically, you are concerned that he may not be following his 'stop smoking' protocol, particularly given that smoking has been scientifically shown to be a risk factor for periodontal disease. You take a saliva sample and a GCF flow rate. How will this help substantiate your suspicions?
- (a) An elevated GCF flow rate is indicative of inflammation.
  - (b) A decreased GCF flow rate is indicative of inflammation.
  - (c) Cotinine, a metabolic by product of nicotine, can be found in saliva.
  - (d) a, c **correct**
  - (e) b, c

**Case I:**

A 75 year-old woman is referred to your office by her physician. Her medical history is remarkable only for the presence of a rare condition: an inactivating mutation in Gs, the GTP-binding protein. Surprisingly, she is not taking any xerostomic medications, only an occasional OTC medication for pain or indigestion. She is referred to you because of problems with her saliva.

24. What do you expect to find regarding the quality of her saliva?
- (a) Nothing. Quality of saliva doesn't change in the healthy elderly.
  - (b) Impaired protein secretion due to the Gs inactivating mutation. **correct**
  - (c) Nothing. Gs has nothing to do with salivary protein secretion.
  - (d) Increased protein secretion due to healthy aging.
  - (e) Decreased protein secretion due to healthy aging.
25. What do you expect to find regarding the quantity of her saliva?
- (a) Nothing. Quantity of saliva doesn't change in the healthy elderly.
  - (b) Salivary fluid impairment due to cross-talk in signaling pathways. **correct**
  - (c) Nothing. Gs has nothing to do with salivary fluid release.
  - (d) Increased fluid release due to healthy aging.
  - (e) Decreased fluid release due to healthy aging.

**End of Cases**



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26. Future gene therapy procedures may enable clinicians to
- (a) add new metabolic functions to cells that previously did not have those functions.
  - (b) Introduce biopharmaceuticals into tissues susceptible to specific infections.
  - (c) introduce anti-metabolic activities to disrupts tumor cell growth.
  - (d) a and c, but not b.
  - (e) all of the above. **Correct**
27. Mucosal immunity provides little of its protection by
- (a) blocking microbial receptors specific for colonization.
  - (b) activating the complement cascade. **correct**
  - (c) blocking penetration of undigested food products into the mucosal tissues.
  - (d) a and c
  - (e) none of the above
28. Currently, a common feature of viral-based gene therapy methods is that:
- (a) the viruses are usually not tissue or host specific.
  - (b) the viruses stimulate immune responses because they are antigens.
  - (c) the viruses are potential biohazards.
  - (d) b and c **correct**
  - (e) none of the above
29. Sensitization to foods via the gut route is minimized by:
- (a) The inflammatory response that occurs in the presence of food, these antibodies and complement.
  - (b) Destroying the antigen presenting cells that would normally present the food antigens to T cells in the gut.
  - (c) Secretory IgA antibodies which blocking the penetration of intact food products into the gut. **correct**
  - (d) All of the above
  - (e) None of the above

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30. Immune defects in the newborn secretory IgA system would be more detectable after breast feeding ceases because:
- (a) Breast milk contains maternal sIgA antibodies which mask a lack of sIgA antibodies in the neonate.
  - (b) Protective levels of sIgA do not appear until the child is several years old.
  - (c) Breast feeding stimulates the production of IgE in the newborn, resulting in protective antibodies to most pathogens.
  - (d) a and b **correct**
  - (e) None of the above.

**TRUE OR FALSE (mark “a” for true, “b” for false)**

31. Stimulation of muscarinic receptors results in reduced saliva flow because of increased protein release. **False**
32. If a patient had amplified cAMP production in the salivary gland, fluid secretion would not occur. **False**
33. A patient with badly damaged muscarinic and adrenergic receptors would have no xerostomia problems because of constitutive secretion of proteins. **False**
34. 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. **True**
35. In the same patient mentioned in the previous question, there would also be effects on salivary fluid release because of cross-talk between the signaling pathways. **True**
36. Protection of the oral cavity is only derived from the mucosal immune system. **False**
37. Inflammatory reactions are rarely associated with mucosal immune activity. **True**
38. Secretory component is synthesized by the plasma cells to enable transport onto the mucosal surface. **False**
39. Langerhans cells are antigen presenting cells located in mucosal tissue. **True**
40. Whole saliva contains IgG derived from gingival crevicular fluid. **True**

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**Multiple Choice (Choose the BEST answer)**

41. The strands of mucous in Bill Cosby's sketch on the dentist's office were caused by:
- (a) An excess of saliva in his mouth due to the stress of being in the dentist's office
  - (a) Absence of mucins in the saliva.
  - (b) High water content of saliva.
  - (c) Anesthetics used in the procedure
  - (d) None of the above **correct**
42. Gene therapy may provide new options for patients who have had head and neck irradiation and no longer make saliva because:
- (a) It may be possible to introduce secretory functions into ductal cells.
  - (b) It may be possible to introduce biopharmaceuticals into ductal cells.
  - (c) It may be possible to convert the damaged acinar cells to insulin-producing cells.
  - (d) It may be possible to make the remaining ductal cells more radioresistant.
  - (e) a and b **correct**
43. Saliva is an excellent window into the body for diagnostic and therapy because:
- (a) Parotid saliva is easy to collect by having the patient spit into a tube.
  - (b) Many drugs equilibrate between the saliva and serum, making drug level monitoring easier. **correct**
  - (c) Saliva is free of bacteria and other contaminants that complicate laboratory analysis.
  - (d) a and b
  - (e) non of the above
44. Organized mucosa-associated lymphoid tissue is
- (a) the location of the initial antigen response prior to homing to diffuse MALT. **Correct**
  - (b) located in primary lymphoid organs.
  - (c) filled with plasma cells that are producing antibodies.
  - (d) composed primarily of M-cells and L-cells.
  - (e) none of the above

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45. Transepithelial transport of antigen is important because without it
- (a) antigen would not be detected. **Correct**
  - (b) antigen would be detected by the lymphoid cells associated with the alternate complement pathway.
  - (c) polymeric antibody would be pumped through the epithelial cells
  - (d) vascular addressins would target the wrong cell types.
  - (e) none of the above

**TRUE OR FALSE (mark "A" for true, "B" for false)**

46. M-cells may provide a mechanism for some pathogens to penetrate the epithelial cell layer of the mucosa. **True**
47. One would expect to find secretory components associated with serum IgA. **True**
48. Homing is a process by which cells leave the O-MALT and randomly migrate until they encounter vascular addressins that bind to their cell surface receptors in D-MALT. **True**
49. Secretory IgA is a very efficient activator of complement. **False**
50. A variety of age-independent factors compromise salivary gland function in the elderly patient and one should not simply accept that salivary gland function normally diminishes with advancing age. **True**