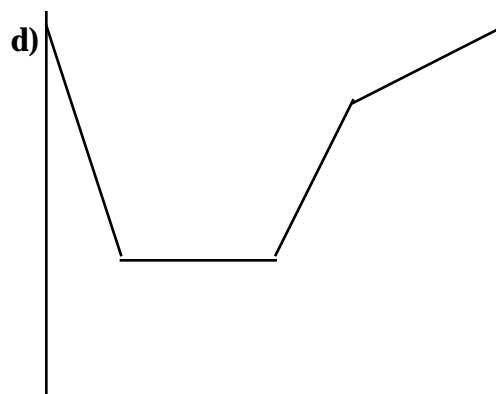
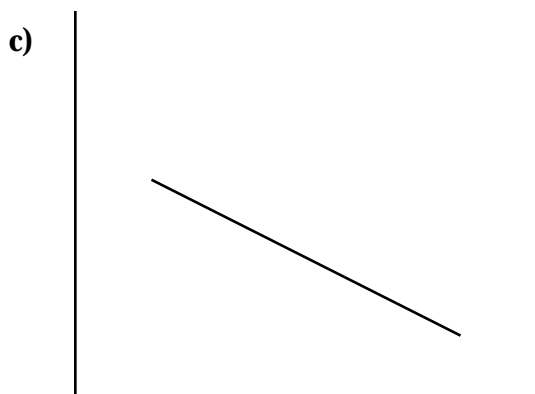
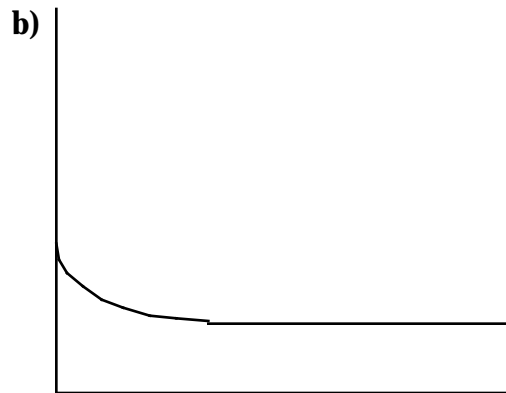
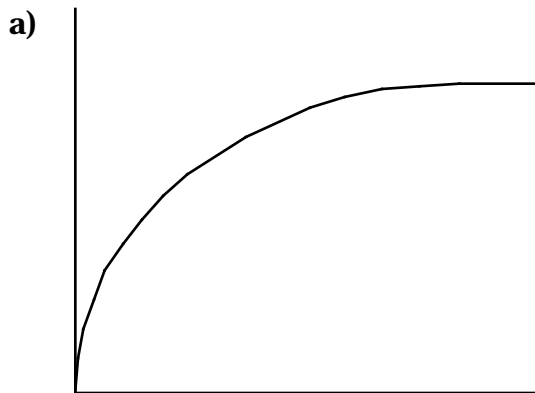


Biology of the Salivary Glands 513 (KEY)
MID-TERM Examination
June 1, 1998

1. In the two stage hypothesis of saliva production, the concentration of sodium ions
- a. in primary saliva is the same regardless of flow rate. (A)
 - b. in primary saliva is highest after increasing the flow with a parasympathomimetic drug.
 - c. in final saliva is not dependent on salivary flow rate.
 - d. is altered by manipulating the rate of sodium resorption by the salivary ducts.

Study the graphs below:



2. The x axis is flow in ml/min (from 0 to 40) and the y axis is concentration in mEq/l (from 0 to 160). Which graph (a, b, c or d) represents the relationship between salivary flow rate and concentration of sodium ions in final saliva. (A)

3. The x axis is flow in ml/min (from 0 to 40) and the y axis is concentration in mEq/l (from 0 to 160). Which graph (a, b, c or d) represents the relationship between salivary flow rate and concentration of potassium ions in final saliva. **(B)**
4. The x axis is frequency in Hz (from 0 to 20) and the y axis is flow expressed as % of maximum. Which graph (a, b, c or d) represents the relationship between salivary flow rate and the rate at which action potentials reach the gland synapses. **(A)**
5. The x axis is concentration of isoproterenol (from 0 to 30mg/kg) and the y axis is area of secretory granules in μm^2 (from 0 to 150). Which graph (a, b, c or d) represents the relationship between the increased stimulation of adrenoreceptors and secretion of salivary protein? **(C)**
6. The x axis is flow in ml/min (from 0 to 2) and the y axis is concentration in pH units (from 5.6 to 7.8). Which graph (a, b, c or d) represents the relationship between salivary flow rate and salivary pH? **(A)**
7. The x axis is flow in ml/min (from 0 to 40) and the y axis is concentration in mEq/l (from 0 to 160). Which graph (a, b, c or d) represents the relationship between salivary flow rate and concentration of bicarbonate ions in final saliva? **(A)**
8. The x axis is time in minutes (from 0 to 20) and the y axis is plaque pH. Which graph (a, b, c or d) represents the relationship between plaque pH and time after an oral rinse with sucrose when saliva has access to the plaque? **(D)**
9. Which of the following is not one of the general rules common to all salivary glands?
 - a. Secretomotor nerves invariably control flow.
 - b. The tonicity of saliva is usually lower than plasma.
 - c. Tonicity decreases as flow rate increases. **(C)**
 - d. Saliva contains potassium ions at 2-10 times the concentration found in serum.
 - e. Saliva contains a high level of amylase.
10. Atropine is a powerful muscarinic receptor blocker. If you administered this drug to a rat you would predict that:
 - a. all salivary secretion would stop. **(A)**
 - b. only saliva flow under parasympathetic control would stop.
 - c. only saliva flow under sympathetic control would stop.
 - d. degranulation of the salivary acinar cells would occur.
 - e. saliva under parasympathetic control would increase and saliva under sympathetic control would decrease.

11. Which of the following is *least* essential for salivary gland development?
- Cytodifferentiation of secretory acinar cells.
 - Interaction between the epithelial bud (salivary gland bud) and appropriate mesenchyme.
 - Parallel differentiation of autonomic nerve axons.
 - Recruitment of plasma cells for secretory IgA production. **(D)**
 - none of the above.
12. The primary saliva, which is an isotonic solution, becomes modified to a hypotonic solution rich in potassium and bicarbonate ions during the transport through the salivary ducts. This modification takes place **mainly** in the:
- Acinar lumen
 - Intercalated duct
 - Striated duct **(C)**
 - Interlobular duct
 - none of the above.
13. The saliva sample obtained directly from the ductal opening of this gland is serous secretion which includes α -amylase. The gland is likely to be the:
- Parotid gland **(A)**
 - Sublingual gland
 - Submandibular gland
 - von Ebner's gland
 - none of the above.
14. The microscopic examination of a biopsy sample from a salivary gland revealed serous demilunes and a large number of lipid granules, as well as lipofuscin granules. The sample is *most* likely to be from the:
- Sublingual gland of a 25 year old person.
 - Parotid gland of a 25 year old person.
 - Submandibular gland of an 80 year old person. **(C)**
 - von Ebner's gland of an 80 year old person.
 - none of the above.

15. The stimulation of salivary gland acinar cells through α -adrenergic receptors will most likely increase the release of which of the following components?
- α -amylase (A)
 - Secretory IgA
 - Sodium ions
 - Water
 - none of the above.
16. You have an elderly patient (older than Dr. Lopatin) who complains of having a dry mouth. He has been seeing a number of physicians for a variety of minor complaints unrelated to xerostomia. You suspect that his dry mouth complaints are the result of:
- the natural aging process.
 - spending too much time chewing sugarless gum.
 - taking a variety of drugs that have xerostomia as a side effect. (C)
 - none of the above.
 - all of the above.
17. You are evaluating a patient for xerostomia. You check his salivary flow over several visits and find that each time he comes in the parotid flow rate is significantly different than what you measured the previous time. You know that he isn't taking any medications and that you are getting a truly random sampling of his salivary flow since he drops in at all times of the day when he is free. What do you suspect is giving you these fluctuations in salivary flow measurements?
- You are detecting the normal circadian rhythm of saliva secretion and you wouldn't see such wild variation if you took measurements at the same time each day. (A)
 - Saliva flow fluctuates wildly throughout the day and there is no predictable pattern that can be detected.
 - The patient is trying to drive you nuts by spitting a different amount of whole saliva into a tube each time you make a measurement.
 - all of the above.
 - none of the above.

18. A pharmaceutical company has just developed new tooth coating that prevents pellicle formation. What do you anticipate might happen to bacterial colonization of the tooth surface?
- I expect no changes.
 - I expect that colonization by some bacteria might decrease because they would not be able to adhere to pellicle proteins which normally adsorb to the tooth surface.
 - I expect that colonization by specific bacteria might decrease because soluble antimicrobial proteins would enhance clearance of the bacterial in the absence of a pellicle.
 - b and c **(D)**
 - none of the above.
19. You are trying to develop an artificial saliva for use in patients who have undergone radiation therapy. You observe in your clinical trials that patients using your saliva have a significant amount of demineralization of their enamel. What do you think might need to be adjusted in your recipe?
- I think the mucin content of the saliva is too low and the patients are swallowing it too rapidly.
 - There is no antimicrobial agent in the saliva and, as a result, the teeth may become highly colonized by acid-producing bacteria.
 - I expect that the calcium phosphate in the artificial saliva is not supersaturated and, as a result, calcium phosphate is leaching out of the enamel
 - b and c. **(D)**
 - All of the above.
20. There is a common mechanism by which proteins or particulate material (eg. bacteria) are transported through a cell. This mechanism is described in which of the following choices?
- The substance is bound by a receptor and pulled into a vesicle. The vesicle is transported to the cell membrane, fuses with the membrane and the contents of the vesicle released. **(A)**
 - The substances pass through pores in the cell membrane and released.
 - The substances bind to cAMP receptors and are pumped through channels by phosphate pumps.
 - all of the above.
 - none of the above.

21. The reason that numerous distinct stimuli are capable of triggering similar cellular events is because:
- Regardless of the stimulus, the same cellular receptor is triggered.
 - Many different receptors recognize the same ligand.
 - Only one receptor is present on any cell surface.
 - Once a specific receptor is triggered, there is often a common “second messenger” such as cAMP. **(D)**
 - none of the above.
22. Transepithelial transport of proteins not produced by acinar cells is important because:
- Acinar cells tend to produce proteases that destroy proteins that it did not produce.
 - proteins not produced by the acinar cells will clog the ducts and cause damage to the acinar cell.
 - Proteins that are not made by the acinar cells must be able to get into the saliva. **(C)**
 - a and b
 - none of the above
23. What is the significance of the ability of salivary molecules to complex with each other?
- Complexing of salivary proteins results in concentration of antimicrobial proteins on tooth surfaces.
 - Complexing of mucins results in the lubrication and viscoelastic properties of mucins.
 - Complexing of salivary proteins enhances their secretion from helicobacter types of calcium channels.
 - a and b **(D)**
 - none of the above.

24. You have a patient who recently had radiation therapy. He is now experiencing rampant caries, especially on the coronal surfaces. Why is this happening?
- a. The patient is no longer producing the necessary lubricants and the tooth surfaces are grinding against each other.
 - b. There are no antimicrobial substances preventing colonization and growth of acid producing bacteria.
 - c. There is insufficient buffering capacity of acids produced by bacteria and the teeth are being demineralized.
 - d. all of the above. **(D)**
 - e. none of the above.
25. Salivary dysfunction can cause significant problems for denture wearers because:
- a. reduced fluid will affect retention and stability of the denture.
 - b. there will be a greater chance for *Candida* infection.
 - c. there will be a greater chance of gastric reflux.
 - d. a and b. **(D)**
 - e. none of the above.