

STEIN GRADED QUIZ 7 -- BIOLOGY 3058 -- APRIL 20, 2020 -- PAGE 1 of 4

There are 6 physiology questions (Q2-Q7) in this Biology 3058 GRADED QUIZ. All these questions are "A, B, C, D, E, F, G, H" questions worth one point each.

There is a total of 6 points in this exam.

The format for this exam is:

Select A if A is the only correct answer.

Select B if B is the only correct answer.

Select C if C is the only correct answer.

Select D if both A and B are correct (and C is NOT correct).

Select E if both A and C are correct (and B is NOT correct).

Select F if both B and C are correct (and A is NOT correct).

Select G if A and B and C are all correct.

Select H if none of the above is correct (A is NOT correct, B is NOT correct, and C is NOT correct).

ONLY SELECT ONE LETTER PER PHYSIOLOGY QUESTION.

There are two honor questions, Q1 and Q8. In order to receive credit for this GRADED QUIZ, you must truthfully answer TRUE for both questions. If you answer FALSE for either question or if you do not answer either question, your GRADED QUIZ grade is 0 (zero).

Honor Question 1.

Q7.2. Consider the case of a rare mutant in which the concentration of solutes in the kidney medulla interstitial spaces is equal to the concentration of solutes in the liquid in the lumen of the medullary collecting duct in the kidney. The defective molecules associated with this rare mutation are **NOT** located in the epithelial cells of the kidney medullary collecting duct; the defective molecules are located in other cells of the kidney. The epithelial cells of the kidney medullary collecting duct are all normal. In this rare mutant, an increase in the amount of vasopressin that binds to V2 Receptors in the kidney will lead to

- A. no change in the water permeability of the luminal membranes of the medullary collecting duct epithelial cells.
- B. an increase in the amount of water that is reabsorbed into the blood plasma from the lumen of the medullary collecting duct.
- C. an increase in the net flux of water from the luminal spaces of the medullary collecting duct to the interstitial spaces of the kidney medulla.
- D. A and B.
- D. A and B.
- E. A and C.
- F. B and C.
- G. A, B, and C.
- H. None of the above.

Q7.3. SGLT2 (sodium-glucose co-transporter 2) is

- A. located in luminal membranes of epithelial cells in the early proximal tubule of the kidney.
- B. located in luminal membranes of epithelial cells of the small intestine.
- C. responsible for the net flux of glucose from luminal spaces to intracellular spaces in the late proximal tubule of the kidney.
- D. A and B.
- E. A and C.
- F. B and C.
- G. A, B, and C.
- H. None of the above.

- Q7.4. Healthy Person W is a human who has volunteered to take experimental drug Z. Person W has a normal dinner at 6 PM on May 1 and then does not eat for 12 hours. At 5 PM on May 2, W takes a dose of Z that completely blocks the net flux of glucose via all sodium-glucose cotransporters (both SGLT1 and SGLT2) in the kidney for the next 12 hours. Drug Z has no direct effect on cells located outside of the kidney. Person W has a normal dinner at 6 PM on May 2 and then does not eat for 12 hours.
- A. At 8 PM on May 2, the net flux of glucose from intracellular spaces of early proximal tubule epithelial cells in W's kidney to interstitial spaces surrounding these cells will be lower than the net flux of glucose from intracellular spaces of early proximal tubule epithelial cells in W's kidney to interstitial spaces surrounding these cells at 8 PM on May 1.
 - B. At 8 PM on May 2, the amount of glucose in W's urine will be higher than the amount of glucose in W's urine at 8 PM on May 1.
 - C. At 8 PM on May 2, the amount of glucose in the cytosol of early proximal tubule epithelial cells in W's kidney will be lower than the amount of glucose in the cytosol of early proximal tubule epithelial cells of W's kidney at 8 PM on May 1.
 - D. A and B.
 - E. A and C.
 - F. B and C.
 - G. A, B, and C.
 - H. None of the above.
- Q7.5. Healthy Person H takes a new drug named ANTICAMPCOLLDUCT that blocks the production of cyclic AMP (cAMP) in collecting duct epithelial cells in response to vasopressin binding to V2 Receptors and results in a condition in which intracellular levels of cAMP in collecting duct epithelial cells are continuously very low. A single dose of the new drug creates this condition within one hour and this condition lasts for one week. Which of the following is true for Person H during the third day after taking the new drug?
- A. The total amount of AQP2 channels stored in intracellular vesicles will be lower than pre-drug levels.
 - B. Person H will produce a greater volume of urine compared with the volume of urine produced by Person H prior to taking the drug.
 - C. Water permeability of the luminal membranes of the collecting duct epithelial cells will be lower than pre-drug levels.
 - D. A and B.
 - E. A and C.
 - F. B and C.
 - G. A, B, and C.
 - H. None of the above.

- Q7.6 Which of the following is true for the plasma membranes of epithelial cells in the Loop of Henle of the kidney?
- A. NKCC2 (sodium-potassium-2chloride co-transporter) molecules are located in the basolateral membranes of epithelial cells in the descending limb of the Loop of Henle.
 - B. Sodium-potassium-ATPase pump molecules are located in the luminal membranes of epithelial cells in the ascending limb of the Loop of Henle.
 - C. AQP1 (Aquaporin 1) molecules are located in the basolateral membranes of epithelial cells in the descending limb of the Loop of Henle.
 - D. A and B.
 - E. A and C.
 - F. B and C.
 - G. A, B, and C.
 - H. None of the above.
- Q7:7. Which of the following serves as an effector, or as part of an effector, in a negative feedback system?
- A. Action potentials in cells that release vasopressin into the blood plasma.
 - B. AQP2 channels in the luminal membranes of medullary collecting duct epithelial cells.
 - C. Osmoreceptor neurons in the hypothalamus.
 - D. A and B.
 - E. A and C.
 - F. B and C.
 - G. A, B, and C.
 - H. None of the above.

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ANSWER KEY:

Honor1: TRUE

Q7:2 H

Q7.3 A

Q7.4 G

Q7.5 F

Q7.6 C

Q7:7 B

Honor2:TRUE

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