Urinary System

Readiness Assessment Questions

1. What is the primary difference between the nephrons whose renal corpuscles are show in the insets?

- Nephron 1 has a significantly higher GFR than Nephron 2.
- Nephron 2 has a significantly higher GFR than Nephron 1
- Nephron 1 increases osmolality of the interstitium in the medullary
- Nephron 2 increases osmolality of the interstitium in the medullary



2. Which blood protein most readily passes across the indicated structure (kDa is molecular weight and isoelectric point is the pH at which the protein has no net electrical charge?

- Albumin (66 kDa, isoelectric point ~ 4.7)
- Fibrinogen (340 kDa, isoelectric point ~ 5.8)
- Plasminogen (92 kDa, isoelectric point ~ 7.4)
- Transferrin (80 kDa, isoelectric point ~ 5.7)



3. An antibody to which protein would most strongly label the apical surface of the cells indicate by the green arrow?

- SGLT2
- NKCC2
- ENaC
- Na/K ATPase





- 4. What is the dark material in the image below?
- Epithelium
- Endothelium
- Podocytes
- Basement membrane



5. How do cells in the tube indicated by the arrow respond to elevated sodium?

- Contract to reduce the diameter of the tube
- Increase expression of NKCC2 •
- Trigger constriction of the afferent arteriole
- Release renin •



6. How do the cells indicated by the arrow respond to aldosterone to increase blood pressure?

- Increase expression of ENaC
- Increase expression of aquaporin •
- Decrease expression of Na/K ATPase •
- Release renin •



7. ADH increases the amount of which protein in the apical membranes of the cells indicated by the arrow?

- ENaC
- Aquaporin
- Na/K ATPase
- ROMK



Application Questions

An 8-year old presents with a reset onset of facial edema. The child's temperature and blood pressure are normal. A urine dipstick measures a protein concentration of > 300 mg protein/dL (normal is < 30 mg/dL), and the ratio of protein to creatinine (UPR/Cr) in the urine is > 2.0 (normal < 0.2). A blood test is unremarkable except for a serum albumin level of 2.2 g/dL (normal is 3.5 to 5.5 g/dL). A kidney biopsy was processed by four different types of histological methods, resulting in the images below. Which component of the renal corpuscle shows a structural change that explains the child's condition?

- A. Mesangium
- B. Endothelium
- C. Basement membrane
- D. Podocytes



A 49-year old presents with with edema around the eyes and in the upper and lower extremities. The patients says the swelling began two months ago. The patient reports no other symptoms, and the patient's vital signs are normal. A blood test measures serum albumin at 1.5 g/dL, total cholesterol at 304 mg/dL, LDL at 211 mg/dL, and triglyceride 248 mg/dL. A urine dipstick tests measures protein concentration over 300 mg/dL. A kidney biopsy was processed by five different types of histological methods, resulting in the images below. What is best next step?

- Prescribe amoxicillin
- Prescribe cyclosporin
- Prescribe rituximab
- Order additional tests (which ones?)





