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Urinary System

Answers and Explanations

I. Introduction to the Urinary System

A. Multiple Choice Questions

1. (b) – The respiratory system excretes CO₂; the urinary system excretes metabolic wastes in urine; the integumentary system excretes salts and other wastes in perspiration; and the digestive system excretes fecal wastes.
2. (a) – Micturition includes the physiological mechanisms that occur during urination.
3. (c) – The fact that 20%–25% of the blood flowing from the heart goes directly to the kidneys for filtration attests to the importance of continuously cleansing the blood.

B. True–False Questions

1. True – The retention of urea or creatinine within the blood would be poisonous to body cells.
2. False – The urinary bladder and the urethra are both unpaired organs of the urinary system.
3. True – This volume represents approximately 20%–25% of the cardiac output.

II. Kidneys

A. Multiple Choice Questions

1. (d) – The kidneys are positioned between the levels of the twelfth thoracic and third lumbar vertebrae.
2. (a) – The kidneys are retroperitoneal; they are not covered by the parietal peritoneum.
3. (b) – Urine is formed within the urinary tubule. It then passes into the calyces and is funneled through the renal pelvis toward the urinary bladder, where it is stored until it is passed from the body through the urethra.
4. (d) – Filtration of the blood occurs at the glomeruli because the blood vessels are at a capillary level.
5. (a) – The sequence of venous blood flow from the kidney is the reverse of that of arterial blood flow into the kidney.
6. (b) – The nephron loop extends into the renal medulla.

B. True–False Questions

1. False – The kidneys are reddish in color due to a high blood content.
2. False – The kidneys are retroperitoneal. They are within the abdominal cavity, but not the peritoneal cavity.
3. True – Excessive weight loss, as in anorexia, may result in the loss of supportive fat and subsequent renal ptosis.
4. False – The nephron is the basic functional unit of the kidney.
5. False – Cuboidal epithelium lines the lumen of a convoluted tubule.
6. False – Juxtamedullary nephrons have longer loops than do cortical nephrons.

III. Ureters, Urinary Bladder, and Urethra

A. Multiple Choice Questions

1. (a) – The ureters, along with the kidneys, are retroperitoneal.
2. (b) – The mucosa is the inner layer of the wall of the ureter.
3. (d) – Most calculi develop within the urinary bladder and tend to block the flow of urine from the renal pelvis into the ureter.
4. (e) – The mucosa of the urinary bladder is composed of transitional epithelium that is folded into rugae—both features permit distention.
5. (e) – The urethra has both an internal and an external urethral sphincter.
6. (b) – Each seminal vesicle empties into the ejaculatory duct on its respective side.
7. (e) – Located in the sacral segment of the spinal cord, the micturition reflex center may become dysfunctional in patients with sacral injuries. Frequently, these people experience enuresis.
8. (d) – Parasympathetic nerve impulses travel to the detrusor muscle, causing it to contract, and to the internal urethral sphincter, causing it to relax.

B. True–False Questions

1. False – The wall of the urinary bladder consists of four layers: the mucosa, submucosa, muscularis, and adventitia.
2. False – Peristaltic waves move urine through the ureter to the urinary bladder.
3. True – The ureter has an extensive blood supply from three arteries.
4. False – The urinary bladder is not retroperitoneal. The kidneys and ureters are retroperitoneal.
5. True – The internal urethral sphincter consists of smooth muscle, and the external urethral sphincter consists of skeletal muscle.
6. False – The volume of urine produced by an adult averages about 1,200 ml per day.

IV. Developmental Exposition of the Urinary System

A. Multiple Choice Questions

1. (d) – Despite its position on the superior border of the kidney, the adrenal gland is part of the endocrine system.
2. (a) – The three developmental stages of a kidney are, from first to last, the pronephros kidney, the mesonephros kidney, and the metanephros kidney.
3. (b) – The ninth week following conception is the first week of fetal development. The kidneys are formed during the last 2 weeks of embryonic development but do not become functional until the very early fetal period.
4. (e) – During development, the tubular channels within the kidney that derive from the metanephrogenic mass connect with the ureter that derives from the stalk of the ureteric bud.

B. True–False Questions

1. True – Because they arise from similar developmental tissue, the urinary system and the reproductive system are frequently referred to collectively as the urogenital system.
2. True – Urine is a metabolic waste that must be eliminated from the developing fetus. It is expelled into the amniotic fluid contained within the amniotic sac.
3. False – The urinary bladder develops from the urogenital sinus, which is connected to the embryonic umbilical cord by the fetal membrane called the allantois.
4. False – The urachus is a remnant of the allantois that connects from the urinary bladder to the umbilicus.

V. Clinical Considerations

A. Multiple Choice Questions

1. (e) – A renal calculus is a renal (kidney) stone and is not congenital.
2. (e) – Urinary tract infections are common clinical problems of the urinary system; they are frequently marked by painful urination.
3. (e) – Enuresis and incontinence are both used with reference to the inability to control micturition.

B. True–False Questions

1. False – In male hypospadias, the urethra opens on the underside of the penis; in female hypospadias, the urethra opens into the vagina.
2. True – Cystitis, or infection and inflammation of the urinary bladder, is more common in females than in males because of the shorter urethra of the female.
3. True – The normal adult output of urine is 50–60 cc per hour.

VII. Chapter Review

A. Completion Questions

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| 1. mesodermal | 8. glomeruli |
| 2. mesonephros | 9. renal corpuscle |
| 3. urachus | 10. Juxtamedullary |
| 4. hilum | 11. calculus |
| 5. ptosis | 12. detrusor |
| 6. cortex/medulla | 13. osmosis |
| 7. nephron | 14. Nephritis |