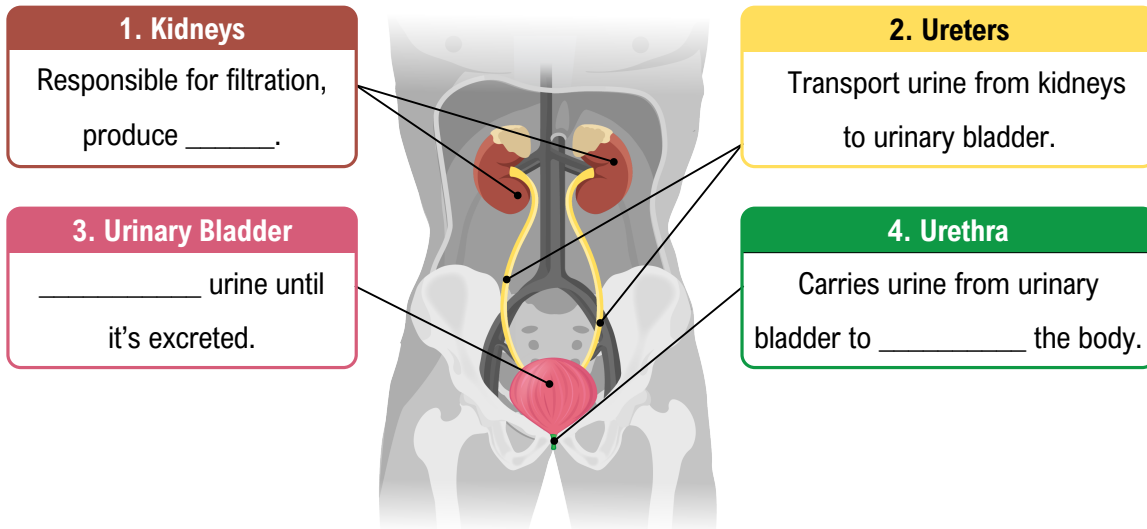


CONCEPT: OVERVIEW OF THE URINARY SYSTEM

Introduction to Urinary System

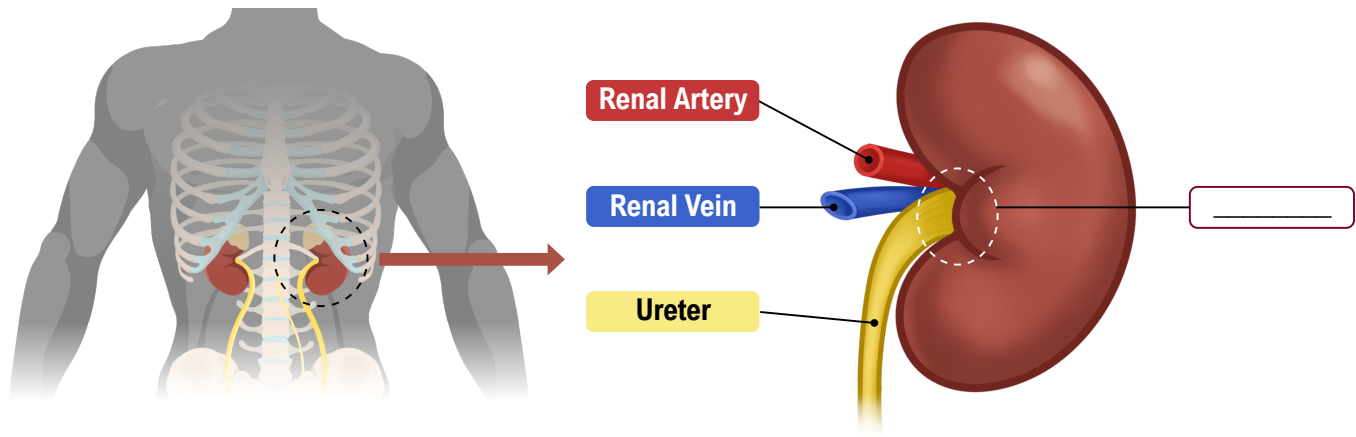
- ◆ Comprises of organs responsible for filtering metabolic _____ from bloodstream and eliminating it through excretion.



CONCEPT: OVERVIEW OF THE URINARY SYSTEM

External Anatomy of Kidney

- ◆ Located in the _____ region above the waist on the two sides of the vertebral column.
- ◆ **Renal Hilum:** A concave/indented area on the _____ surface, gives kidneys their characteristic bean shape.
 - **Renal artery** enters the kidney while **renal vein** and **ureter** leave the kidney through the hilum.



EXAMPLE

Which of the following about the urinary system is true?

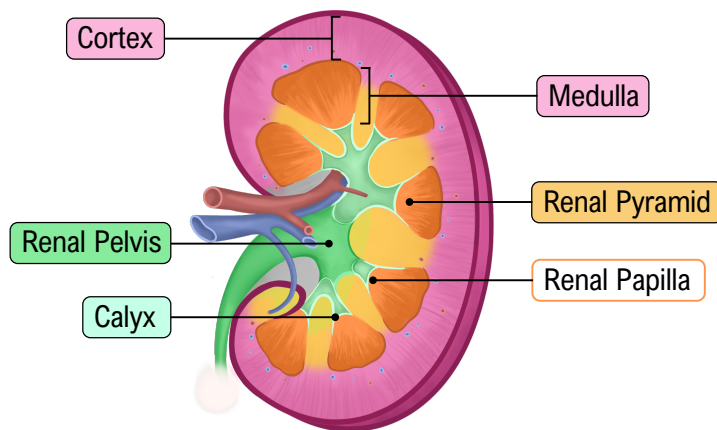
- The kidneys are located on the sides of the spine in the hypochondriac region.
- The urinary bladder absorbs minerals from the filtrate produced by the kidneys.
- The ureters and urethra serve the same purpose in the urinary system.
- The hilum is an indentation on the medial side of the kidneys.

CONCEPT: OVERVIEW OF THE URINARY SYSTEM

Internal Anatomy of Kidney

◆ There are ___ main regions within the kidney.

1. **Renal Cortex:** Outermost region of the kidney.
2. **Renal Medulla:** Inner region, contains about a dozen triangular areas called **renal _____**.
 - **Renal Papilla:** The tip of a renal pyramid, points towards the _____.
3. **Renal Pelvis:** Collects urine as it is formed, _____ arises from it.
 - **Calyx:** _____-shaped tube continuous with the pelvis.
 - Each pyramid opens into a calyx.



EXAMPLE

Use the words in the word-bank to fill in the blanks and complete the sentences.

Word-Bank: Hilum Cortex Pelvis Pyramids Medulla Papilla

The kidney of an adult person contains about a dozen triangular structures called renal _____. The tip of each structure is the renal _____ that points towards the _____. The produced urine flows through the calyces into the renal _____ from where it is carried by the ureter to the urinary bladder.

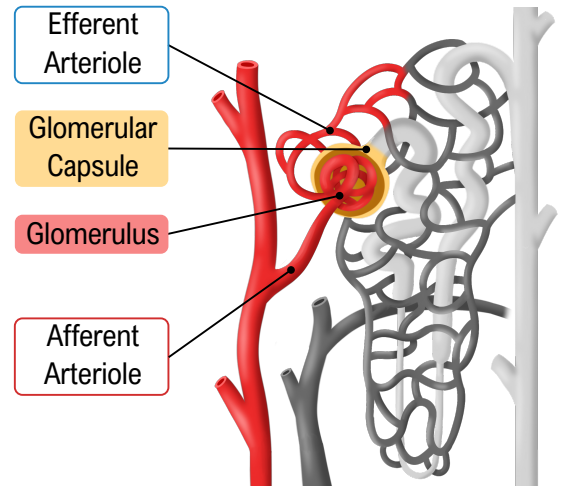
CONCEPT: OVERVIEW OF THE URINARY SYSTEM

Structure of Nephron

◆ Functional unit of a kidney, consists of:

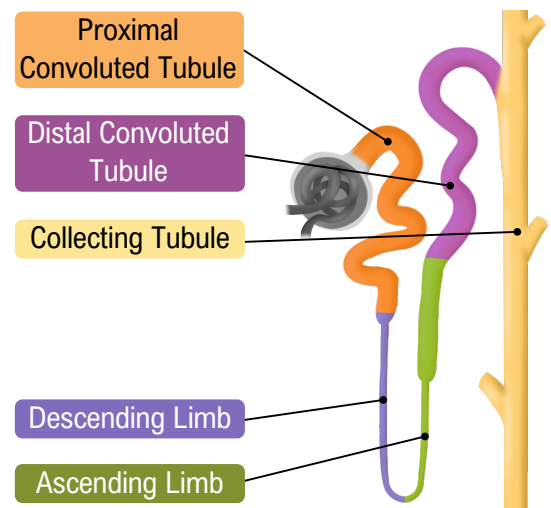
1. Renal Corpuscle

- ◆ Cluster of capillaries inside a _____ – the blood filtering part of a nephron.
- ◆ Consists of two parts:
 - ▶ **Glomerular (Bowman's) Capsule:** Double-walled _____ structure encases glomerulus.
 - ▶ **Glomerulus:** Cluster of capillaries allows waste to filter out of the blood.
- ◆ **Afferent** arterioles carry blood **to**, and **efferent** arterioles carry blood **away** from the glomerulus.



2. Renal Tubule

- ◆ Reabsorbs needed substances (_____, electrolytes, etc.) and removes waste.
- ◆ Divided into 4 sections:
 - ▶ **Proximal convoluted tubule**
 - ▶ **Nephron loop (Loop of Henle):** Subdivided into **descending** and **ascending** limbs.
 - ▶ **Distal convoluted tubule**
 - ▶ **Collecting tubule**



EXAMPLE

Which of the following about the structure of a nephron is false?

- a) The glomerulus is a network of capillaries located inside the Bowman's capsule.
- b) The renal tubule reabsorbs water from the filtrate produced in the renal corpuscle.
- c) The afferent arteriole brings blood toward the glomerulus.
- d) The distal convoluted tubule is the farthest from the collecting duct.

CONCEPT: OVERVIEW OF THE URINARY SYSTEM

Urinary Bladder

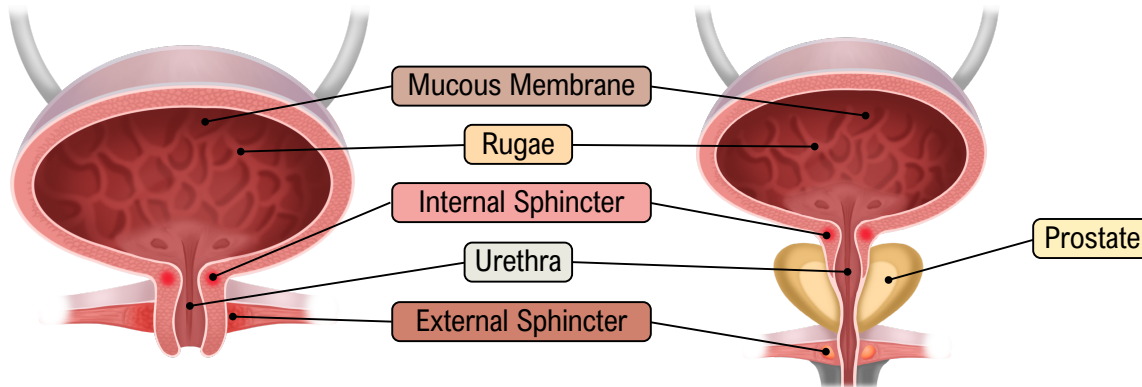
Urinary Bladder Anatomy

- ◆ Elastic muscular sac located in the anterior portion of _____ cavity.
 - Male anatomy includes a **prostate** located _____ to the urinary bladder.
- ◆ Composed of 3 layers of _____ muscle lined with **mucous membrane** containing **rugae**.
- ◆ When filled with urine, the bladder signals a need to _____ and wall muscles begin to contract.
 - **Internal Sphincter**: Comprised of _____ muscle, relaxes during bladder contraction.
 - **External Sphincter**: Comprised of _____ muscle, relaxes voluntarily during urination.

Rugae



Allow urinary bladder to _____ when it fills with urine.



EXAMPLE

Which of the following about the urinary bladder is false?

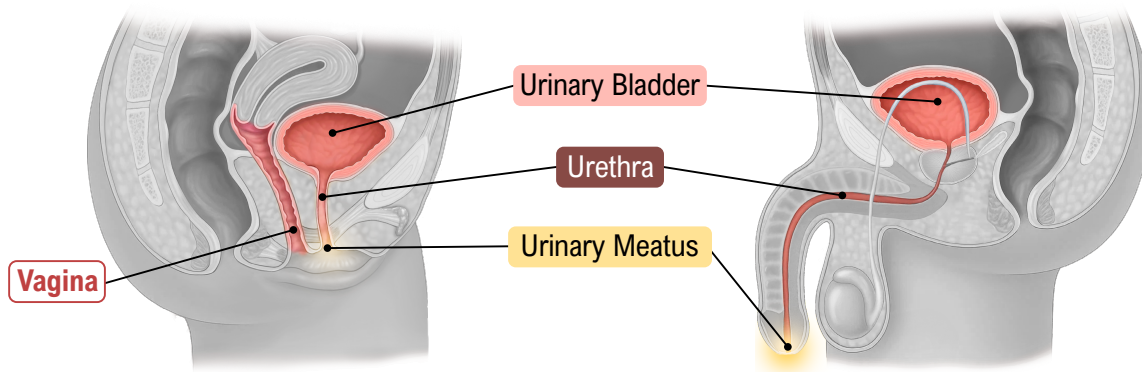
- The urinary bladder is a hollow, muscular organ that stores urine before excretion.
- The skeletal muscle walls of the urinary bladder allow conscious control over urination.
- During urination, the urinary bladder contracts and the internal sphincter is relaxed.
- The external sphincter is made from skeletal muscle and therefore under voluntary control.

CONCEPT: OVERVIEW OF THE URINARY SYSTEM

Urethra

Female and Male Urethra Anatomy

- ◆ **Urethra:** Tubular ____ that carries urine from **urinary bladder** to the outside of the body.
- ◆ **Urinary Meatus:** External opening at the ____ of the urethra from which urine exits the body.
- ◆ Female urethra is anterior to **vagina** and _____ than the male urethra.
- ◆ Female urethra _____ carries urine while male urethra carries semen in addition to urine.



EXAMPLE

Which of the following statements is correct?

- Male urethra is not continuous with the urinary bladder because of the prostate.
- The urethra transports urine produced in the kidneys to the urinary bladder.
- Female urethra is longer than male urethra and therefore less prone to urinary tract infections.
- The urinary meatus is the external opening of the urethra, not covered by a sphincter muscle.

PRACTICE

Which of the following statements about the urinary system is incorrect?

- Papilla in the kidney open into calyces which are continuous with the renal pelvis.
- The urinary bladder is composed of 3 layers of smooth muscle and lined by mucous membrane.
- Filtration of blood in the renal corpuscle produces a filtrate that is further processed in the renal tubule.
- The indented medial surface of the kidney gives way to the ureters that open into the urinary meatus.