

**Al-Mamoun university collage**

**Physiology**

Medical lab Tech

Second stage

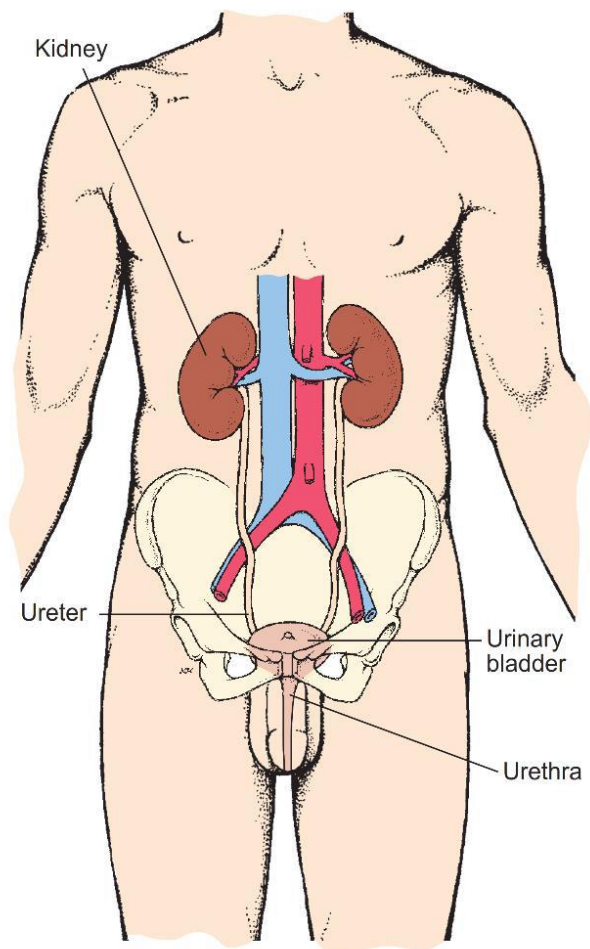
**Ass.lec Dhuha Ali Abass**

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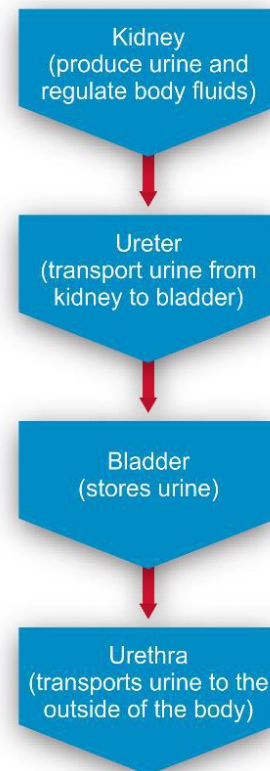
**Lecture 12**

## The Urinary System

The urinary system is composed of the kidneys, ureters, urinary bladder, and urethra. The primary function of the urinary system is to remove wastes and toxins from the body.



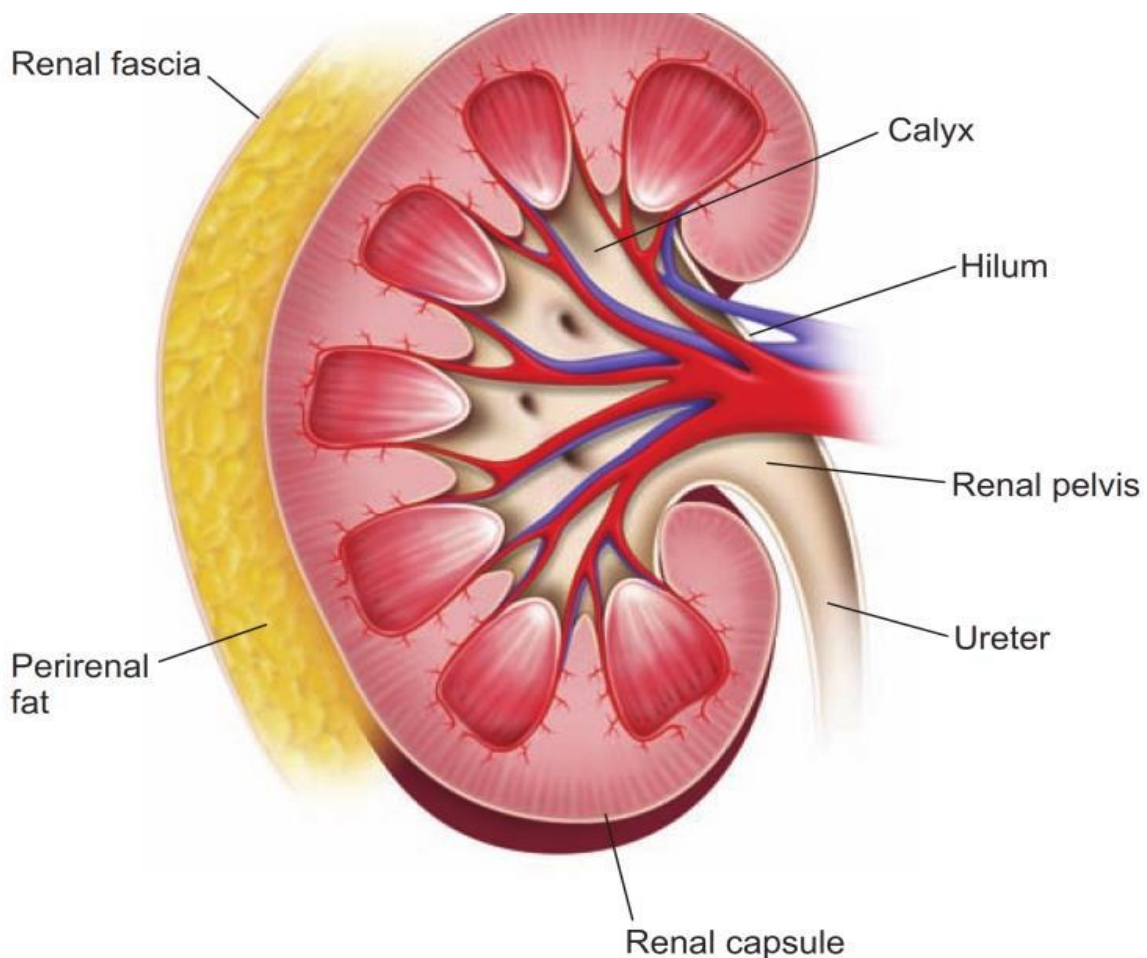
**FIGURE 13-1** Primary structures of the urinary system. Anterior view of the kidneys, ureters, bladder, and urethra (male). From *Stedman's Medical Dictionary*. 27th ed. Baltimore, MD: Lippincott Williams & Wilkins; 2000.



Flow chart illustrating the process of urine formation and excretion. The process of urine formation begins in the kidneys. The kidneys filter waste products from the blood and convert them to urine. The urine is transported from the kidneys by the ureters to the bladder, where it is stored until it is expelled through the urethra via the process of urination.

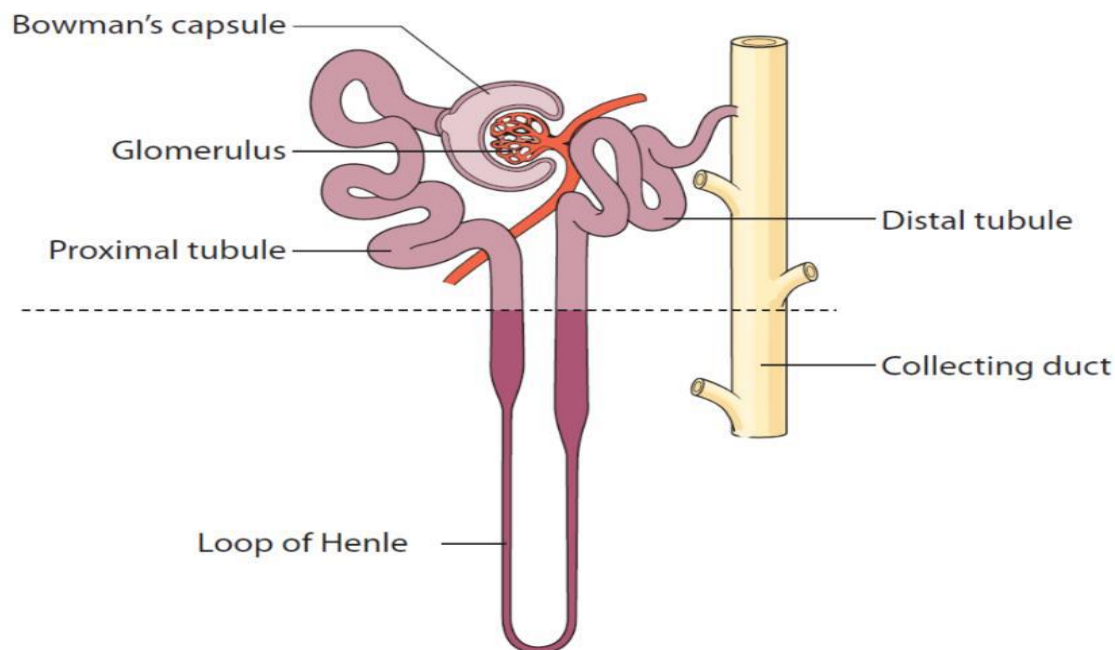
## The kidneys

The kidneys are bean-shaped organs and are about the size of a man's fist; they lie at the back of the abdominopelvic cavity, along each side of the spinal column. Each kidney is covered by a thin membrane called the **renal capsule**. A thicker layer of fatty tissue called the **perirenal fat**, surrounds the renal capsule and thus provides protection for this vital organ. Finally, a thin layer of connective tissue, called the **renal fascia**, forms each kidney's outer covering



The kidneys produce **urine** and remove two natural products of metabolism, **urea** and **uric acid**, along with other waste products from the blood. The kidneys also filter, reabsorb, and secrete non waste products back into the system.

Filtration and the urine production process begin in the **nephrons**, which are the functional units of the kidneys. Each kidney has approximately 1 million nephrons, and each nephron contains a tiny filtration unit called the **glomerulus** which consists of a cluster of capillaries. Blood travels through the capillaries, which permit waste products within the urine to enter the ureter, where it is carried to and stored in the urinary bladder.



The bladder collects the urine until the volume triggers the urge to urinate, an event known as the micturition reflex. Urination is regulated by two sphincters, the circular muscles that surround the urethra. They are the internal urethral sphincter, which is located at the entrance to the

urethra and is involuntarily controlled, and the external urethral sphincter, which is located at the distal end of the urethra and is under conscious control.

### Disorders of the Renal System

- Dysuria: painful, difficult urination.
- Incontinence: the loss of urinary control.
- Retention: the inability to empty the bladder.
- Cystitis: inflammation of the bladder.
- Pyelonephritis: inflammation of the renal or kidney pelvis due to local bacterial infection.
- Glomerulonephritis renal disease characterized by inflammation of glomeruli.
- Renal failure: kidneys stopping urine production