

## THE URINARY TRACT: THE BASICS

### The Urinary Tract

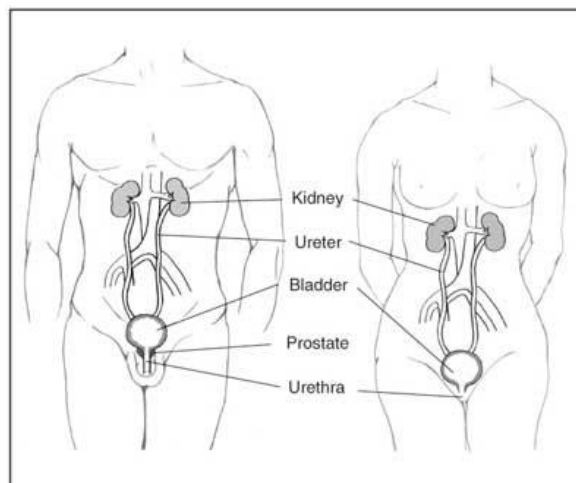
The human urinary tract or urinary system could be described as your “plumbing system”. It removes excess fluid and waste products from your blood in the form of urine. It collects and stores the urine and then releases it from your body. The urinary tract ensures that the right balance of water, chemicals and salts is maintained in the body in order to keep you healthy.

The normal urinary tract consists of:

- 2 kidneys
- 2 ureters
- bladder
- urethra

The kidneys and ureters form the upper urinary tract, the bladder and urethra form the lower urinary tract.

*Illustration courtesy of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)*



### Kidneys

The kidneys are bean-shaped organs located on each side of your spine in the middle of your back, below the diaphragm. Each kidney consists of a network of filters that remove waste products (urea) and excess fluid from the blood, return the clean blood to your blood circulation and send the waste fluid (urine) further down the urinary tract for later disposal (urination).

### Ureters

You have two ureters, one leading from each kidney into the bladder. Ureters are narrow tubes which carry the urine from the kidneys into your bladder.

### Bladder

The bladder is a balloon-like organ, with a wall of smooth muscle fibres (detrusor) and elastic connective tissue that can expand and contract. It consists of four layers: the innermost mucosal layer is the urothelium, also sometimes called the epithelium. It is covered with a protective mucin layer known as the glycosaminoglycan (GAG) layer. Beneath the mucosa lies the submucosal layer containing a network of blood vessels, nerves and loose connective tissue known as the lamina propria, below that the smooth muscle detrusor layer and finally the outer serosal layer which is continuous with the peritonium. The inner urothelium consists of many tiny folds which allow it to stretch when filling with urine. The function of the bladder is to store urine without leakage and then empty the urine at your convenience when the bladder is full. Most people empty their bladder 4-8 times a day without having to get up in the night.

### Trigone

The trigone is a muscular triangular area at the base of the bladder, located between the ureteral openings and the neck of the bladder.

### Urethra

The urethra is the hollow passage or tube, connected to the neck of the bladder, which carries the urine from the bladder to the outside of the body when you urinate. In women the urethra is short,

but in men it is longer since it passes through the penis. In men, the urethra also transports seminal fluid to the outside of the body during ejaculation.

### Urethral sphincter

The urethral sphincter is a ring of two muscles which normally close off the bladder so that urine cannot escape. When you need to urinate and are ready to do so, the sphincter relaxes and allows the urine to pass out of the body.

### Prostate

The prostate is a walnut-shaped gland in men that surrounds the urethra at the bladder neck. The prostate supplies the fluid that mixes with semen to form seminal fluid.

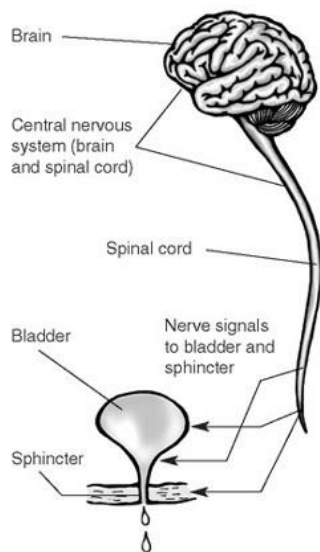
### Pelvic floor

The pelvic floor is a sling or hammock comprising a combination of muscles, ligaments and connective tissues that support the organs located in the pelvis including the bladder, rectum, uterus and vagina. It helps to hold these organs in place and to control the muscles that open and close the anus and urethra.

### How does the bladder work?

The balloon-like bladder has a wall made of muscle (the detrusor) that can stretch and contract as it stores and empties urine. The ureters carry urine into the bladder from the kidneys and, as the bladder fills, the muscle in the bladder wall relaxes to allow the bladder to expand. When you feel the need to urinate and go to the toilet, the detrusor muscle then contracts to expel the urine out of the bladder into the urethra where the sphincter muscle relaxes to allow the urine to pass through.

### Role of the nervous system



The nervous system, comprising the brain, spinal cord and peripheral nerves, also plays an important role in this storage and emptying function. When the bladder is full, nerves in the bladder send a message to the brain to say that it is now time to empty the bladder. The brain then gives you the sensation of needing to empty your bladder. When you have actually reached the toilet and are ready to urinate, the brain sends a message to the sphincter and pelvic floor muscles to tell them to relax and allow the urine out and at the same time tells the bladder muscle to contract to squeeze out all the urine.

*Illustration courtesy of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)*

Further information for patients on the bladder and urinary tract:

<https://www.niddk.nih.gov/health-information/urologic-diseases/urinary-tract-how-it-works>

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