

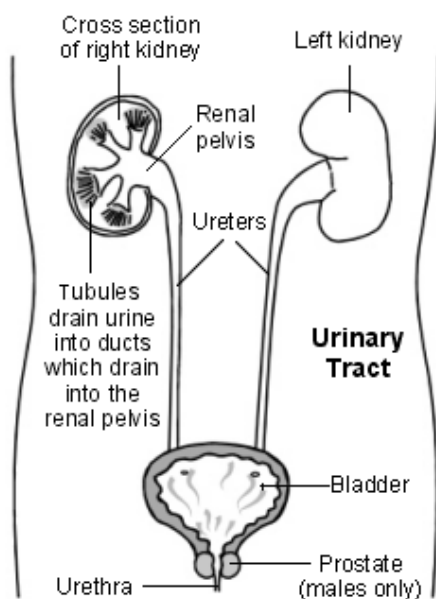
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What do kidneys do?

The kidneys clear waste materials from the body and maintain a normal balance of fluids and chemicals in the body. They also help to control your blood pressure, make certain hormones and regulate the acidity of your blood.

The urinary tract collects and stores urine, and provides the system of tubes necessary to release it from the body. In men, the urethra also carries sperm during ejaculation.

What are the kidneys and urinary tract?



The kidneys are a pair of organs on the left and right sides of the tummy (abdomen). The kidneys have a number of important functions which include:

- Maintaining the body's fluid balance.
- Clearing waste substances from the blood.
- Regulating blood pressure.
- Making certain hormones.

- Balancing the levels of certain chemicals in the blood.

The urinary tract is a series of tubes and storage vessels that take the urine produced by the kidneys from inside the body to the outside. This includes the ureters, bladder and urethra. The ureters take urine produced by the kidneys to the bladder. The bladder stores urine until it is ready to be passed out. The urethra forms the passage between the bladder and the outside world. In men, the urethra also carries sperm.

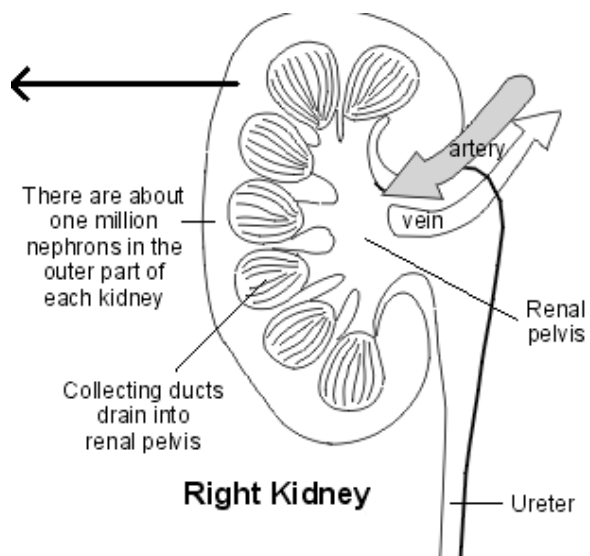
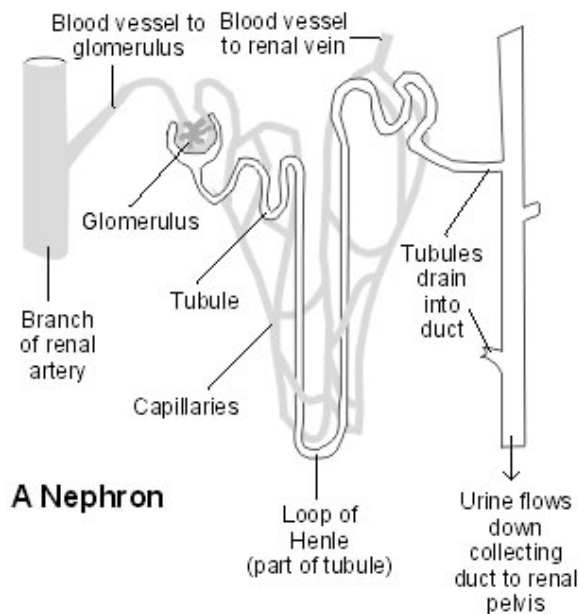
Where are the kidneys and urinary tract situated?

The two kidneys lie to the sides of the upper tummy (abdomen), behind the intestines and either side of the spine. Each kidney is about the size of a large orange but bean-shaped. The ureters descend through the abdomen, one from each kidney, into the pelvis. Here they enter the bladder. The urethra is the tube leading from the floor of the bladder to the outside. A woman's urethra is much shorter than a man's. This may be why women are more likely to have urinary tract infections, as germs (bacteria) have less far to travel to cause an infection. In a man the urethra passes through the prostate gland and then through the penis. It also has several other glands associated with it. [See separate leaflet called The Male Reproductive System for more details.](#)

How do the kidneys and urinary tract work?

A large blood vessel called the renal artery takes blood to each kidney. The renal artery divides into many tiny blood vessels (capillaries) throughout the kidney. In the outer part of the kidneys, tiny blood vessels cluster together to form structures called glomeruli.

Each glomerulus is like a filter. The structure of the glomerulus allows waste products and some water and salt to pass from the blood into a tiny channel called a tubule, while keeping blood cells and protein in the bloodstream. Each glomerulus and tubule is called a 'nephron'. There are about one million nephrons in each kidney.



As the waste products, water and salts pass along the tubule, there is a complex adjustment of the content. For example, some water and salts may be absorbed back into the bloodstream, depending on the current level of water and salt in your blood. Tiny blood vessels next to each tubule enable this 'fine tuning' of the transfer of water and salts between the tubules and the blood.

The liquid that remains at the end of each tubule is called urine. This drains into larger channels (ducts) which drain into the inner part of the kidney (the renal pelvis). From the renal pelvis, the urine passes down a tube called a ureter which goes from each kidney to the bladder. Urine is stored in the bladder until it is passed out through the urethra when we go to the toilet. The 'cleaned' (filtered) blood from each kidney collects into a large blood vessel called the renal vein. This takes the blood back towards the heart.

Balancing the level of fluid in your body is complicated. Too much fluid in the bloodstream can cause swelling of the body's tissues (oedema). Too little fluid can cause a drop in the amount of blood being sent to your vital organs. The kidneys monitor the level of fluid in your blood, and your blood pressure.

When special cells in the kidneys sense a drop in your blood pressure they respond by releasing a chemical (an enzyme) called renin. Renin changes a substance in the blood, called angiotensinogen, into angiotensin I. Another enzyme called angiotensin-converting enzyme (ACE) converts the angiotensin I into angiotensin II.

Angiotensin II works to increase blood pressure. It does this by slowing down the amount of water and other substances passing from the glomerulus into the tubule. It also makes more salt pass back into the bloodstream. This salt attracts water, so more water is reabsorbed back into the blood. It also encourages the adrenal glands (found sitting on top of the kidneys) to release a hormone called aldosterone. This hormone also helps more salt to be reabsorbed, and therefore more water. All these steps help to increase your blood pressure.

Some of the medicines that help to keep blood pressure low stop ACE working efficiently. They are known as ACE inhibitors. By blocking ACE, less angiotensin II is produced.

Your brain also plays a part in regulating your blood pressure and fluid balance. Special cells that monitor changes in the body (receptors) in the brain measure the make-up of your blood. If these sensors find that your body needs more fluid, they send signals via the nervous system to another part of the brain called the posterior pituitary. This part of the brain releases a hormone known as antidiuretic hormone (ADH). ADH travels in the bloodstream to the kidneys. Here, ADH makes the last part of the tubule more 'leaky'. This allows water to move back into the blood instead of becoming urine.

The kidneys also play a role in the absorption of certain minerals, including calcium and magnesium. Certain cells in the kidney produce the hormone calcitriol which is the active form of vitamin D. Another hormone produced by cells in the kidney is epo (erythropoietin). Epo stimulates the production of red blood cells in the bone marrow.

The urinary tract collects and stores urine and provides a passage for urine to be expelled from the body. The ureters are about 25–30 cm long and carry urine from the kidneys to the bladder. Although the ureters are thin tubes they have muscle within their walls. This helps to push urine towards the bladder.

The bladder is a hollow muscular organ. When empty, it collapses on itself. As it fills with urine it becomes pear-shaped and rises into the tummy (abdominal) cavity. The bladder holds around 700–800 millilitres (mls) of urine.

Passing urine (urination) occurs by a combination of voluntary and involuntary muscle contractions. The wall of the bladder has special receptors which can tell if the bladder is stretched. When the amount of urine in the bladder reaches between 200–400 mls, these receptors send signals to the spinal cord. These signals trigger an involuntary action (a reflex). Signals are sent back from the spinal cord to the bladder wall. These signals cause contraction of some of the bladder muscles and relaxation of others. This causes urination. Although emptying of the bladder is a reflex, we learn to control this voluntarily during childhood.

Some disorders of the kidneys and urinary tract

- [Bedwetting](#)

- Cancer of the bladder
- Cancer of the kidney
- Cancer of the penis
- Cancer of the prostate
- Chronic kidney disease
- Cystitis
- Diabetic kidney disease
- Genitourinary (GU) prolapse
- Incontinence (stress)
- Incontinence (urge)
- Incontinence (urinary)
- Kidney infection
- Kidney stones
- Mild-to-moderate chronic kidney disease
- Nephrotic syndrome
- Overactive bladder syndrome
- Polycystic kidney disease
- Prostate gland enlargement
- Prostatitis - acute
- Prostatitis - chronic
- Urethral stricture
- Urethritis
- Urine infection in men
- Urine infection in children

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