

# DIURETICS

Diuretic drugs help to turn excess body water into urine. As the urine is expelled, two disorders are relieved: the tissues become less water-swollen (oedema) and the heart action improves because it has to pump a smaller volume of blood. There are several classes of diuretics, each of which has different uses, modes of action, and effects (see Types of diuretic, below). But all diuretics act on the kidneys, the organs that govern the water content of the body.

## Why they are used

Diuretics are most commonly used in the treatment of high blood pressure (hypertension). By removing a larger amount of water than usual from the bloodstream, the kidneys reduce the total volume of blood circulating. This drop in volume causes a reduction of the pressure within the blood vessels (see Antihypertensive drugs, p.60).

Diuretics are also widely used to treat heart failure in which the heart's pumping mechanism has become weak. In the treatment of this disorder, they remove fluid that has accumulated in the tissues and lungs. The resulting drop in blood volume reduces the work of the heart.

Other conditions for which diuretics are often prescribed include nephrotic syndrome (a kidney disorder that causes oedema), cirrhosis of the liver (in which fluid may accumulate in the abdominal cavity), and premenstrual syndrome (when hormonal activity can lead to fluid retention and bloating).

Less commonly, diuretics are used to treat glaucoma (see p.128) and Ménière's disease (see p.46).

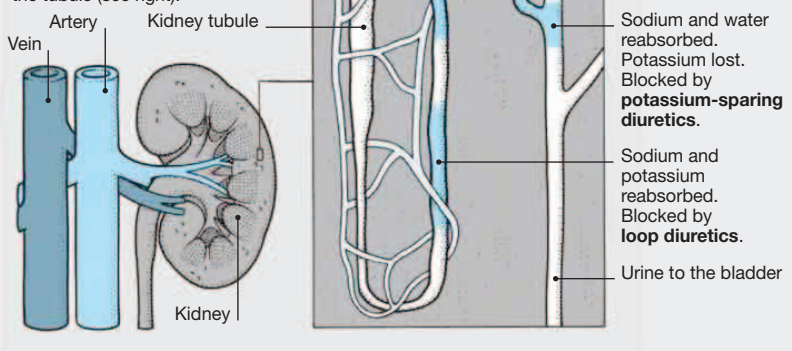
## How they work

The kidneys' normal filtration process takes water, salts (mainly potassium and sodium), and waste products out of the bloodstream. Most of the salts and water are returned to the bloodstream, but some are expelled from the body together with the waste products in the urine. Diuretics interfere with this filtration process by reducing the amounts of sodium and water taken back into the

## ACTION OF DIURETICS

As blood passes through the kidney, water, sodium and potassium salts, and waste products are filtered out of the bloodstream. Most of the water and filtered salts are then reabsorbed by the bloodstream from the tubule; the remainder is excreted as urine.

By blocking the movement of sodium back into the bloodstream, diuretics prevent the reabsorption of water, so that more is expelled from the body as urine. Different diuretic drugs act on different parts of the tubule (see right).



bloodstream, thus increasing the volume of urine produced. Modifying the filtration process in this way means that the water content of the blood is reduced; less water in the blood causes excess water present in the tissues to be drawn out and eliminated in urine.

## How they affect you

All diuretics increase the frequency with which you need to pass urine. This is most noticeable at the start of treatment. People who have suffered from oedema may notice that swelling – particularly of the ankles – is reduced, and those with heart failure may find that breathlessness is relieved.

## Risks and special precautions

Diuretics can cause blood chemical imbalances, of which a fall in potassium levels (hypokalaemia) is the most common. Hypokalaemia can cause confusion, weakness, and trigger abnormal heart rhythms (especially in people taking digitalis drugs). Potassium supplements or a potassium-sparing diuretic usually corrects the imbalance. A diet that is rich in potassium (containing plenty of fresh fruits and vegetables) may be helpful.

Some diuretics may raise blood levels of uric acid, increasing the risk of gout. They may also raise blood sugar levels, causing problems for diabetics.

## TYPES OF DIURETIC

**Thiazides** The diuretics most commonly prescribed, thiazides may lead to potassium deficiency and they are, therefore, sometimes given together with a potassium supplement or in conjunction with a potassium-sparing diuretic (see right).

**Loop diuretics** These fast-acting, powerful drugs increase the output of urine for a few hours, and are therefore sometimes used in emergencies. They may cause excessive loss of potassium, which may need to be countered as for thiazides. Large doses given into a vein may disturb hearing.

**Potassium-sparing diuretics** These mild diuretics are usually used in conjunction with a thiazide or a loop diuretic to prevent excessive potassium loss.

**Osmotic diuretics** Prescribed only rarely, these drugs are used to maintain the flow of urine through the kidneys after surgery or injury, and to reduce pressure rapidly within fluid-filled cavities.

**Acetazolamide** This mild diuretic drug is used principally in the treatment of acute glaucoma (see p.128).

## COMMON DRUGS

### Loop diuretics

Bumetanide \*  
Furosemide/  
frusemide \*  
Torasemide

### Potassium-sparing diuretics

Amiloride \*  
Eplerenone  
Spironolactone \*  
Triamterene \*

### Thiazides

Bendroflumethiazide \*  
Chlortalidone  
Cyclopenthiiazide  
Hydrochlorothiazide \*  
Hydroflumethiazide  
Indapamide \*  
Metolazone  
Xipamide

\* See Part 3