Excretion in humans

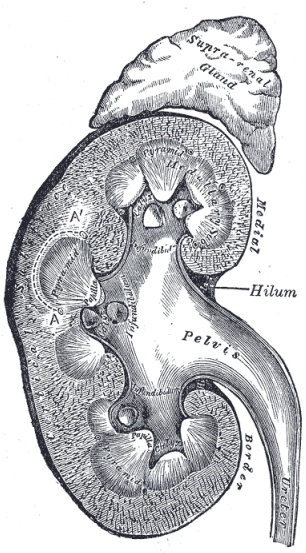
IGCSE Biology

Excretion

Excretion 排泄 is the removal of the waste products of metabolism, and of substances the body has in excess. Two main wastes are removed:

- **carbon dioxide** 二氧化碳—made during respiration, and breathed out through the lungs.
- **urea** 尿素—made in the **liver** 肝脏, and removed by the kidneys together with excess water and **ions** 离子.

The urinary system

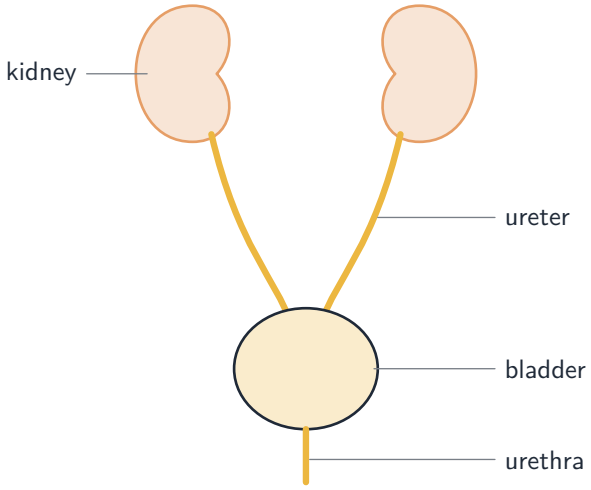


The kidneys filter the blood and make urine.

Image: Henry Vandyke Carter, Public domain (commons.wikimedia.org)

The **kidneys** 肾脏 clean the blood and make **urine** 尿液. The urine then passes through:

- the **ureters** 输尿管—tubes from the kidneys to the bladder.
- the **bladder** 膀胱—stores the urine.
- the **urethra** 尿道—carries the urine out of the body.



The kidneys make urine, which flows down the ureters to the bladder and out of the urethra

If the kidneys stop working, a **dialysis** 透析 machine can do their job. The patient's blood flows through the machine, where waste and excess water pass out across a thin membrane, and the clean blood returns to the body.

A dialysis machine cleans the blood when the kidneys stop working

Inside the kidney (Supplement)

A kidney has two regions: an outer **cortex** 皮质 and an inner **medulla** 髓质.

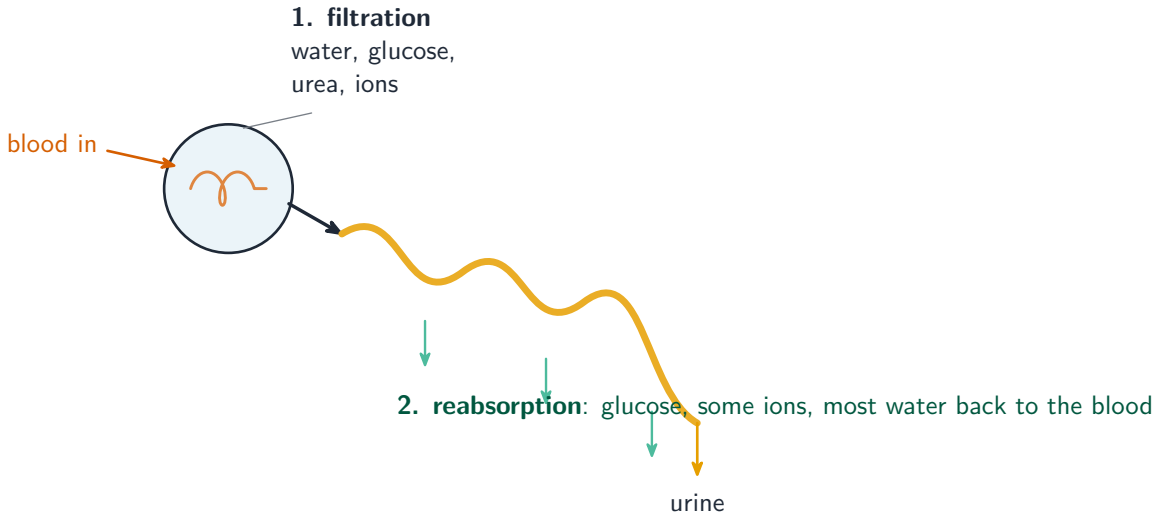
The nephron

Each kidney holds millions of tiny tubes called **nephrons** 肾单位. A nephron cleans the blood in two steps:

1. **Filtration** 过滤: at the **glomerulus** 肾小球 (a knot of capillaries), high pressure forces water, **glucose** 葡萄糖, urea and ions out of the blood and into the nephron.

2. **Reabsorption** 重吸收: as the liquid flows along the nephron, the blood takes back **all** of the glucose, **some** of the ions, and **most** of the water.

What is left behind —urea, excess water and excess ions —becomes the urine.

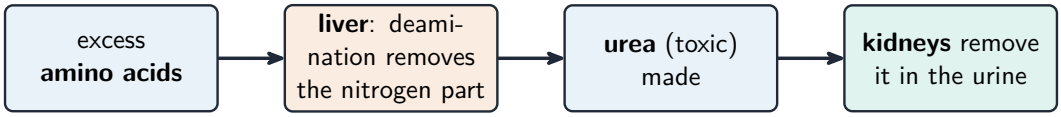


A nephron filters the blood, then reabsorbs the useful substances; what is left is urine

The liver, amino acids and urea (Supplement)

The liver carries out the **assimilation** 同化 of **amino acids** 氨基酸: it joins them together into the **proteins** 蛋白质 that the body needs.

The body cannot store extra amino acids. The liver breaks the excess down by **deamination** 脱氨基作用—it removes the **nitrogen** 氮-containing part of each amino acid. This part is then turned into urea.



The liver makes urea from excess amino acids; the kidneys excrete it

Urea must be excreted because it is **toxic** 有毒 (poisonous) if it is allowed to build up in the blood.

Exam tips

- Excretion removes metabolic wastes. Carbon dioxide leaves through the lungs; urea, excess water and excess ions leave through the kidneys.
- Urine path: kidney → ureter → bladder → urethra.
- Nephron: the glomerulus **filters** the blood; the nephron **reabsorbs** all the glucose, some ions and most of the water. What is left is urine.
- Urea is made in the **liver** from excess amino acids by **deamination**.
- We must excrete urea because it is **toxic** to the body.