Excretory System Disorders

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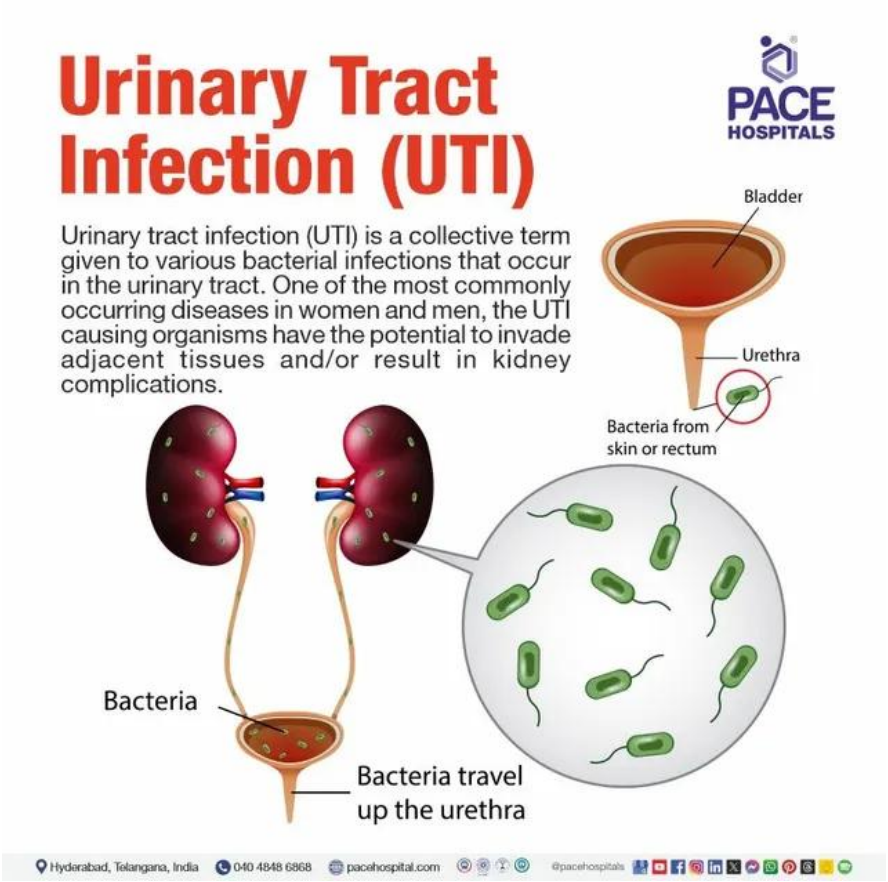
Urinary Tract Infections

More common in females than males (proximity of urethra and anus in females)

Symptoms:

- painful burning sensation during urination
- A frequent need to urinate
- bloody or brown urine
- if infections reach the kidneys can cause kidney failure

Preventative measures: proper hygiene and hydration



Kidney Stones

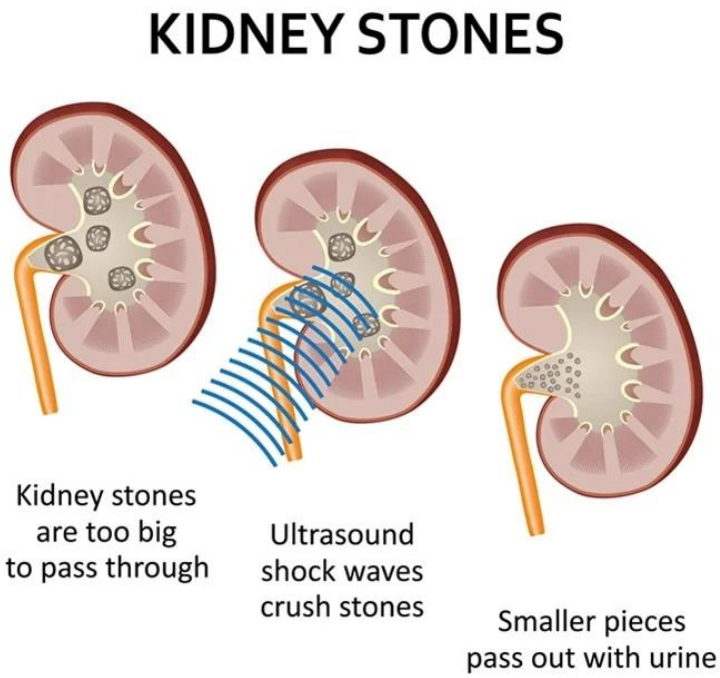
Crystalline formations

Form due to **excess calcium** in the urine

Presence of calcium compounds may be due to urinary tract infections, chronic dehydration, or low activity levels

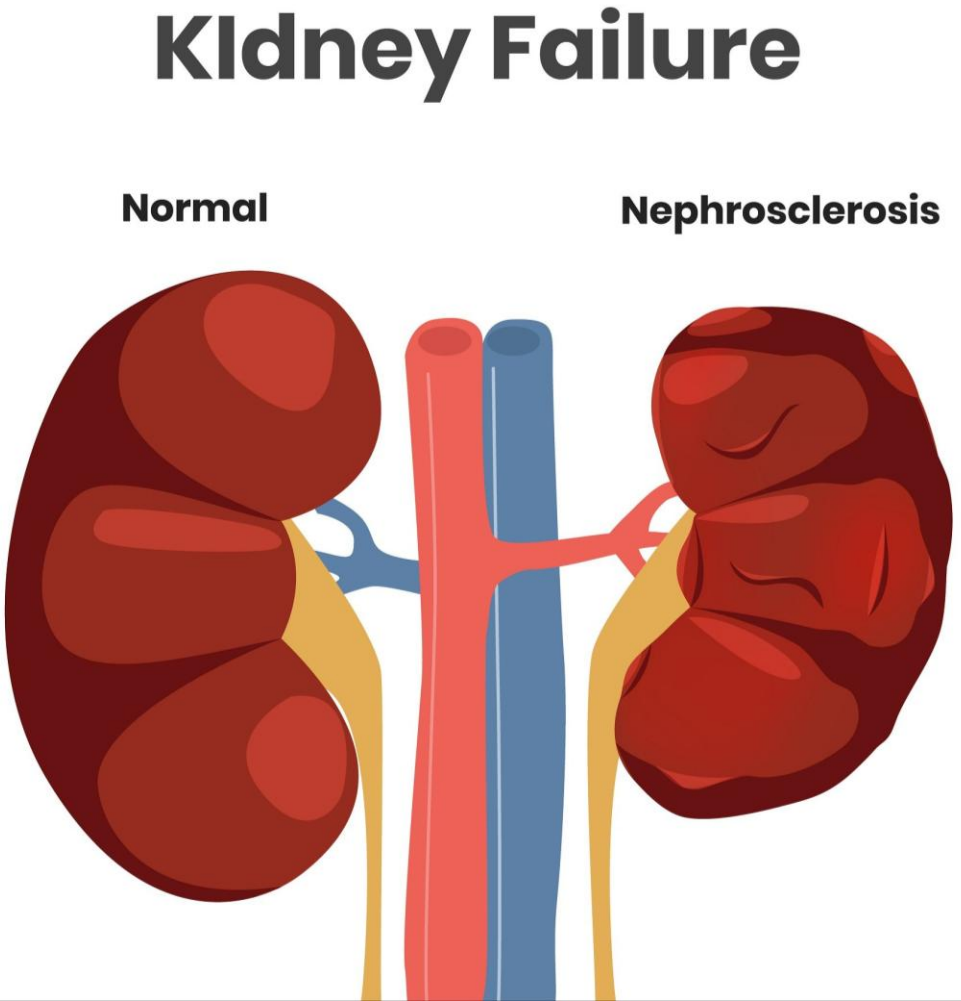
Treatment (depends on the size of the stones):

- Some stones pass through the urinary tract
- Others require medications to help break down the calcium crystals
- Large stones may require surgery to remove them.



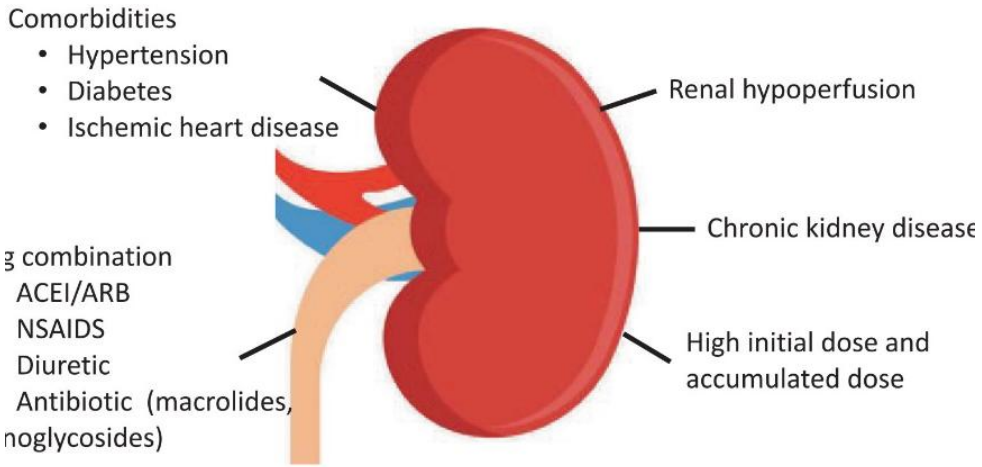
Renal Insufficiency

- A state in which the kidneys cannot maintain homeostasis due to nephron damage.
- If 75% or more of the nephrons are destroyed, homeostasis can no longer be maintained, and a kidney transplant is required



Renal Insufficiency – Causes:

- Kidney infection
- High blood pressure (one of the main causes)
- Polycystic kidney disease (a genetic disorder)
- Trauma to the area surrounding the kidneys
- Poisoning by heavy metals (mercury, lead)
- Atherosclerosis (reduces blood flow to the kidneys)
- Blockage of tubules
- Diabetes mellitus

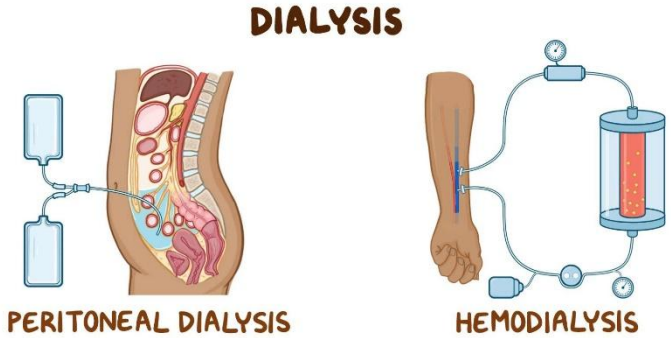


Dialysis

The diffusion of dissolved substances through a semipermeable membrane.

These substances move across a membrane from an area of greater concentration to an area of lower concentration.

Is used to remove wastes and excess fluid from blood when kidney function fails.

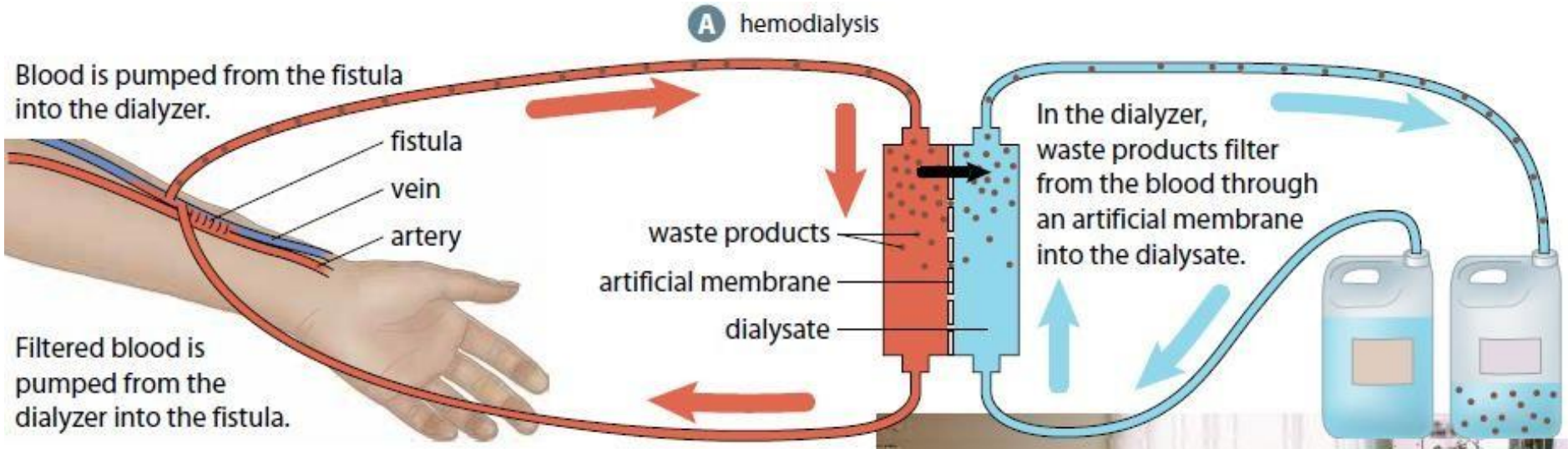


Hemodialysis

A type of kidney dialysis

Uses an artificial membrane in an external device

The device is connected to an artery and a vein in the person's arm to filter the blood, removing waste and excess fluid.

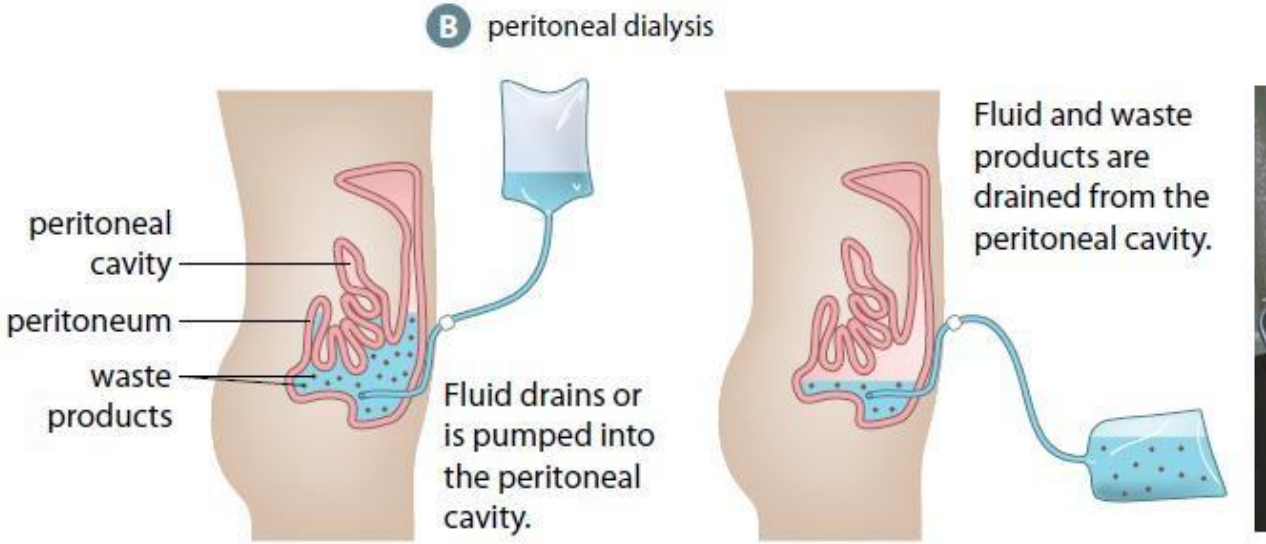


A In hemodialysis, blood is pumped from an artery to a dialysis machine and returned to the body by way of a vein. (The artery and vein are surgically joined, forming what is called a fistula, to enable easier long-term access to the person's blood.) Each hemodialysis treatment takes three to five hours and is performed three or four times a week. A person must remain seated or lying down during the procedure.

Peritoneal Dialysis

A type of kidney dialysis.

Uses the lining of the intestines, called the peritoneum, as the dialysis membrane to remove waste and excess fluid from the blood.



B In peritoneal dialysis, a catheter (flexible tube) is surgically inserted into the abdominal cavity and dialysate may be delivered, removed, and replaced. Because dialysate is always present, the blood is continuously filtered. The full name for this type of dialysis is continual peritoneal dialysis, or CPD. There are several types of CPD. In continuous ambulatory peritoneal dialysis (CAPD), the procedure can be done at home, work, or school—any place that is clean and convenient. Usually, three to five exchanges of fresh dialysate for used dialysate are needed each day. In automated peritoneal dialysis (APD), a machine performs the exchange, which often is done at night for a period of up to 12 hours.

Kidney Transplants

Individuals with less than 10% kidney function will eventually require a kidney transplant.

Success rate for kidney transplants is around 95 to 98%

The need for kidneys is much greater than the supply.

Overall rate of organ donation in Canada is low compared to other developed countries (about 14 donors per one million people).

Urinalysis

A diagnostic tool for health and kidney function.

The composition of urine reflects the amount of water and solutes that the kidneys must remove from or retain in the body to maintain homeostasis.

Urine composition varies through the day due to diet, physical activity, stress, and fatigue.

Table 10.4 Normal Values from Selected Common Urine Tests

Urine Test	Accepted Healthy Value*
Acetone and ketones	0
Albumin (protein)	0–trace
Bilirubin (a breakdown product of hemoglobin)	0
Calcium	< 150 mg/day
Colour and clarity	Pale yellow to light amber; transparent
Glucose	0
pH	4.5–8.0
Urea	25–35 g/day
Uric acid	0.5–1.0 g/day

** These values may vary with the type of equipment used for analysis.*

Blood Tests

Can also be used to analyze kidney functions.

Urea

High amounts in the blood indicate that the kidneys are not functioning properly.

Creatinine

A metabolic waste produced by muscles.

High amounts in the blood indicate that the kidneys are not filtering the blood properly.

Video animations

Kidney function:

- https://www.youtube.com/watch?v=9_h0ZXx1lFw

Kidney failure:

- https://www.youtube.com/watch?v=AuTlwFreqlc

Urination reflex:

- https://www.youtube.com/watch?v=US0vNoxsW-k