

DIALYSIS

Dialysis is a medical procedure used to remove waste products, excess fluids, and toxins from the blood when the kidneys are unable to perform their normal function. It is mainly used in patients suffering from kidney failure or severe kidney disease.

Definition

Dialysis is the process of separating small molecules from large molecules in a solution by using a semi-permeable membrane.

Principle of Dialysis

Dialysis works on the principles of:

- **Diffusion** – movement of solutes from higher concentration to lower concentration
- **Osmosis** – movement of water across a semi-permeable membrane
- **Ultrafiltration** – removal of excess fluid using pressure

A semi-permeable membrane allows waste substances like urea and creatinine to pass through while retaining blood cells and proteins.

Types of Dialysis

1. Hemodialysis

- Blood is removed from the body and passed through a machine called a **dialyzer (artificial kidney)**
- Waste products are filtered out and clean blood is returned to the body
- Usually done 2–3 times per week in hospitals or dialysis centers

Advantages:

- Efficient removal of toxins

- Short treatment duration

Disadvantages:

- Requires hospital visits
- Risk of infection and blood clotting

2. Peritoneal Dialysis

- Uses the **peritoneum (lining of the abdomen)** as a natural membrane
- Dialysis fluid is introduced into the abdominal cavity
- Waste products diffuse into the fluid and are later drained

Types:

- Continuous Ambulatory Peritoneal Dialysis (CAPD)
- Automated Peritoneal Dialysis (APD)

Advantages:

- Can be done at home
- More flexible lifestyle

Disadvantages:

- Risk of peritonitis (infection)
- Requires patient training

Indications

Dialysis is required in:

- Chronic kidney failure
- Acute kidney injury
- Severe electrolyte imbalance

- Poisoning or drug overdose

Complications

- Low blood pressure (hypotension)
- Muscle cramps
- Infection
- Fatigue
- Nausea and vomiting

Dialysis is a life-saving procedure for patients with kidney failure. Although it does not cure kidney disease, it helps maintain normal body functions and improves the quality of life until recovery or kidney transplantation.

19. HEAMO FILTRATION

Hemofiltration is a renal replacement therapy used to remove waste products and excess fluids from the blood in patients with kidney failure. It is commonly used in critically ill patients, especially in intensive care units (ICU).

Definition

Hemofiltration is a process in which blood is filtered through a semi-permeable membrane to remove toxins and excess fluids by convection.

Principle of Hemofiltration

Hemofiltration works mainly on the principle of:

- **Convection** – movement of solutes along with water due to pressure gradient
- **Ultrafiltration** – removal of fluid by applying hydrostatic pressure

In this process:

- Blood passes through a filter (hemofilter)
- Plasma water carrying dissolved waste substances is removed
- Replacement fluid is added to maintain fluid balance

Procedure

1. Blood is withdrawn from the patient through a vascular access
2. It is passed through a **hemofilter**
3. Waste products and fluid are removed
4. Replacement fluid (electrolyte solution) is infused
5. Clean blood is returned to the body

Types of Hemofiltration

- **Continuous Venovenous Hemofiltration (CVVH)** – used in ICU for continuous treatment
- **Intermittent Hemofiltration** – done for shorter durations

Indications

Hemofiltration is used in:

- Acute kidney failure
- Fluid overload
- Sepsis and critical illness
- Electrolyte imbalance
- Patients unstable for hemodialysis

Advantages

- Better hemodynamic stability
- Continuous and gentle fluid removal
- Suitable for critically ill patients

Disadvantages

- Expensive
- Requires specialized equipment and monitoring
- Risk of infection and clotting

Complications

- Hypotension
- Electrolyte imbalance
- Infection

- Bleeding (due to anticoagulants)

Hemofiltration is an effective and continuous method of blood purification, especially useful in critically ill patients. It helps maintain fluid and electrolyte balance when the kidneys fail to function properly.