

**Sub Name: PRINCIPLES OF FOOD ENGINEERING**

**Sub Code: BVFPS202**

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# DIALYSIS

## INTRODUCTION

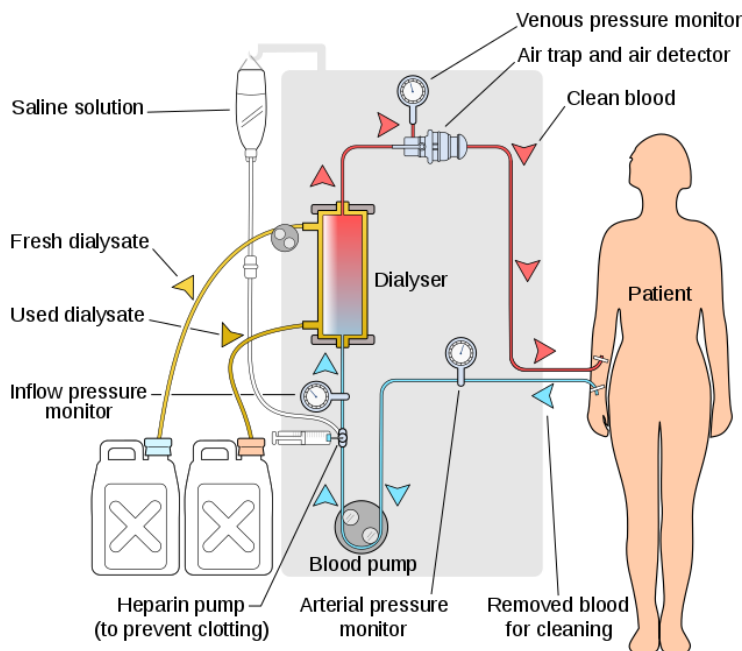
Dialysis is used in patients with rapidly developing loss of kidney function, called acute kidney injury (previously called acute renal failure), or slowly worsening kidney function, called Stage 5 chronic kidney disease, (previously called chronic kidney failure, end-stage renal disease, and end-stage kidney disease)

## PRINCIPLE

Dialysis works on the principles of the **diffusion** of solutes and **ultrafiltration** of fluid across a **semi-permeable membrane**. Diffusion is a property of substances in water; substances in water tend to move from an area of high concentration to an area of low concentration.<sup>[7]</sup> Blood flows by one side of a semi-permeable membrane, and a dialysate, or special dialysis fluid, flows by the opposite side. A semipermeable membrane is a thin layer of material that contains holes of various sizes, or pores. Smaller solutes and fluid pass through the membrane, but the membrane blocks the passage of larger substances (for example, red blood cells, large proteins). This replicates the filtering process that takes place in the kidneys when the blood enters the kidneys and the larger substances are separated from the smaller ones in the **glomerulus**.

## TYPES

### 1.Hemodialysis

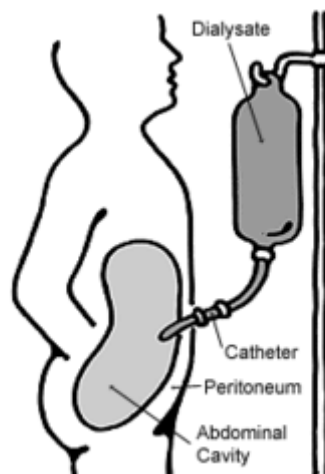


In hemodialysis, the patient's blood is pumped through the blood compartment of a dialyzer, exposing it to a partially permeable membrane. The dialyzer is composed of thousands of tiny hollow synthetic fibers. The fiber wall acts as the semipermeable membrane. Blood flows through the fibers, dialysis solution flows around the outside of the fibers, and water and wastes move between these two solutions.<sup>[8]</sup> The cleansed blood is then returned via the circuit back to the body. Ultrafiltration occurs by increasing the hydrostatic pressure across the dialyzer membrane. This usually is done by applying a negative pressure to the dialysate compartment of the dialyzer. This pressure gradient causes water and dissolved solutes to move from blood to dialysate and allows the removal of several litres of excess fluid during a typical 4-hour treatment.

## **2.Peritoneal dialysis**

Peritoneal dialysis, a sterile solution containing glucose (called dialysate) is run through a tube into the peritoneal cavity, the abdominal body cavity around the intestine, where the peritoneal membrane acts as a partially permeable membrane.

This exchange is repeated 4–5 times per day; automatic systems can run more frequent exchange cycles overnight. Peritoneal dialysis is less efficient than hemodialysis, but because it is carried out for a longer period of time the net effect in terms of removal of waste products and of salt and water are similar to hemodialysis. Peritoneal dialysis is carried out at home by the patient, often without help. This frees patients from the routine of having to go to a dialysis clinic on a fixed schedule multiple times per week. Peritoneal dialysis can be performed with little to no specialized equipment (other than bags of fresh dialysate).



## **3.Hemofiltration**

Hemofiltration is a similar treatment to hemodialysis, but it makes use of a different principle. The blood is pumped through a dialyzer or "hemofilter" as in dialysis, but no dialysate is used. A pressure gradient is applied; as a result, water moves across the very permeable membrane rapidly, "dragging" along with it many dissolved substances, including ones with large molecular weights, which are not cleared as well by hemodialysis. Salts and water lost from the blood during this process are replaced with a "substitution fluid" that is infused into the extracorporeal circuit during the treatment.

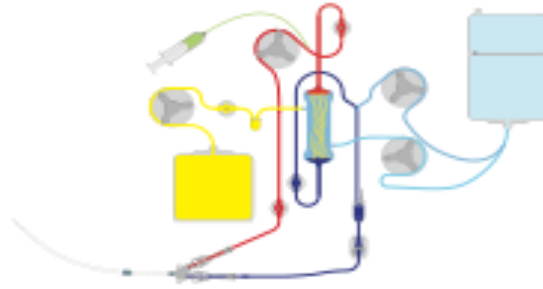
Continuous veno-venous haemofiltration with pre- and post-dilution (CVVH)



## **4.Hemodiafiltration**

Hemodiafiltration is a combination of hemodialysis and hemofiltration, thus used to purify the blood from toxins when the kidney is not working normally and also used to treat acute kidney injury (AKI).

## Continuous veno-venous haemodiafiltration (CVVHDF)



### **5. Intestinal dialysis**

In intestinal dialysis, the diet is supplemented with soluble fibres such as acacia fibre, which is digested by bacteria in the colon. This bacterial growth increases the amount of nitrogen that is eliminated in fecal waste.