**Efretuei Ruth k**

**17/MHS01/101**

**RENAL PHYSIOLOGY**

**1. Discuss the pathophysiological process involved in renal failure.**

**2. With the aid of diagrams, discuss the types of dialysis you know?**

**ANSWERS**

**1** The pathophysiological process of renal failure is as a result of the kidneys to permanently loose their function hence resulting in Chronic Kidney Disease (CKD). It can be caused by a variety of things such as:

Hypertension

Infection

Diabetes

Glomerulonephritis

Lupus

For better understanding of this condition and how the effect comes into play.

Step 1. Trigger that damages the nephron

This process or first trigger arises mostly from acute renal failure, which results such that the nephros have little or no more elasticity due to shrinking of the capillaries involved.

Step 2. Damaged nephrons can't filter blood as well

These damaged nephrons reduce the filtration process and hence cause accumulation of more wastes and body fluid in the body.

Step 3. Healthy nephrons compensate and increase their glomerular filtration rate (GFR)

Due to the damage of the first set of nephrons, remaining healthy nephrons would compensate for the failed ones and attempt to increase the filtration rate.

The glomerular filtration rate is the amount of blood filtered by the glomeruli in a minute.

Step 4. RAA System is Triggered.

When the Renin Angiotensin Aldosterone System is triggered upon the the increased GFR, which causes increased blood pressure. This occurs first but it tends to fail due to thickening of the lumen of the the capillaries of the glomeruli. The RA pathway releases Renin, which increases this body pressure, which intends to reach out to more blood to the kidney. It's worthy of note that the RAA system causes increased heart rate as well as hypertension.

Step 5. Complications

The complications begin to appear and this includes Proteinuria, decreased GFR, increased keratine and urine levels, anemia, as well as fluid and electrolyte inbalance.

**2.**There are two types of dialysis, which are Hemodialysis and Peritoneal Dialysis.

The term dialysis in physiological sense refers to the diffusion of solutes from an area of higher concentration to the area of lower concentration through a semipermeable

membrane. This principle has been used to dialyse the blood of patients with renal failure especially those developing uraemia. Uraemia develops when more than 75% of nephrons are damaged and is characterized by:Accumulation of nitrogenous waste products in the blood,Metabolic acidosis and Hyperkalaemia.

By dialysis, the dissolved crystalloids of the plasma pass through a semipermeable membrane so that their levels are brought down to lower levels. Two types of dialysis procedures are available:

Haemodialysis or artificial kidney and Peritoneal dialysis.

**HEMODIALYSIS**

Haemodialysis machine is also called artificial kidney. Haemodialysis is done in a hospitalized patient through intravenous (IV) line for 3–5 h. During haemodialysis, the patient’s radial artery is connected to the haemodialysis machine. Inside the haemodialysis machine, the blood is passed through a long and coiled cellophane tube immersed in a dialysis fluid. Heparin is used as an anticoagulant while passing the blood through the machine.Dialyzing fluid.

The composition of a dialyzing fluid is similar to that of the plasma, except it is free of waste products like urea, uric acid, etc. The fluid contains less amount of sodium, potassium and chloride ions than in the uraemic blood. But the quantity of glucose, bicarbonate and calcium ions are more in the dialyzing fluid than in the uraemic blood.

During haemolysis.

The semipermeable cellophane membrane permits the free diffusion of the constituents of plasma except proteins. In this way, the dialysis of patient’s blood removes the toxic waste products and restores normal electrolyte concentration in the plasma. The dialysed blood is returned back to the patient’s body through a peripheral vein. At a time about 500 mL is passed through the artificial kidney. Haemodialysis is done usually thrice a week in severe uraemia. Haemodialysis can save the life in many types of acute renal failure. The intermittent haemodialysis may prolong the life of many patients with chronic renal failure, which may lead an active life for many useful years.The dialysis can partially replace the excretory function of the kidneys but does not replace endocrine and metabolic functions.

**PERITONEAL DIALYSIS**

Peritoneal dialysis is a form of long-term dialysis done by the patients at home or at work. In this type of dialysis, the peritoneum acts as a semipermeable membrane.

Two litres of dialyzing fluid is introduced through a intraperitoneal catheter. It is then kept in the peritoneal cavity for exchange to take place for a period of 15–20 min called dwell time. Fluid is then drained out and measured. A strict input and output chart is maintained.

The whole procedure constitutes one cycle. It is done at 6 h intervals (4 cycles/day), even when the patient is ambulatory or mobile. There is no need for hospitalization. It is useful for young children and old patients with cardiovascular disorders. It prolongs survival in patients with chronic renal failure for many years. Peritoneal dialysis is not very suitable for drug poisoning cases.