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17/MHS01/001
PHYSIOLOGY ASSIGNMENT

1.) **PATHOPHYSIOLOGY OF RENAL FAILURE**

A normal kidney contains approximately 1 million nephrons, each of which contributes to the total glomerular filtration rate (GFR). In the face of renal injury (regardless of the etiology), the kidney has an innate ability to maintain GFR, despite progressive destruction of nephrons, as the remaining healthy nephrons manifest, hyper filtration and compensatory hypertrophy. This nephron adaptability allows for continued normal clearance of plasma solutes. Plasma levels of substances such as urea and creatinine start to show measurable increases only after total GFR has decreased 50%.

The plasma creatinine value will approximately double with a 50% reduction in GFR. The hyper filtration and hypertrophy of residual nephrons, although beneficial for the reasons noted, has been hypothesized to represent a major cause of progressive renal dysfunction. The increased glomerular capillary pressure may damage the capillaries, leading initially to secondary focal and segmental glomerulosclerosis (FSGS) and eventually to global glomerulosclerosis. This hypothesis is supported by studies of five-sixths nephrectomized rats, which develop lesions identical to those observed in humans with chronic kidney disease (CKD).

Factors other than the underlying disease process and glomerular hypertension that may cause progressive renal injury include the following:

i.) Systemic hypertension

ii.) Nephrotoxins (eg, non-steroidal anti-inflammatory drugs [NSAIDs]

iii.) Decreased perfusion (eg, from severe dehydration or episodes of shock

iii.) Proteinuria

iv.) Hyperlipidemia

V.) Hyperphosphatemia with calcium phosphate depositions

Vi.) Smoking

Vii.) Uncontrolled diabetes

2.) **TYPES OF DIALYSIS**

Dialysis is a way of cleaning your blood when your kidneys can no longer do the job. It gets rid of your body's wastes, extra salt and water, and helps to control your blood pressure. There are two kinds of dialysis. In hemodialysis, blood is pumped out of your body to an artificial kidney machine, and returned to your body by tubes that connect you to the machine. In peritoneal dialysis, the inside lining of your own belly acts as a natural filter. Wastes are taken out by means of a cleansing fluid called dialysate, which is washed in and out of your belly in cycles.

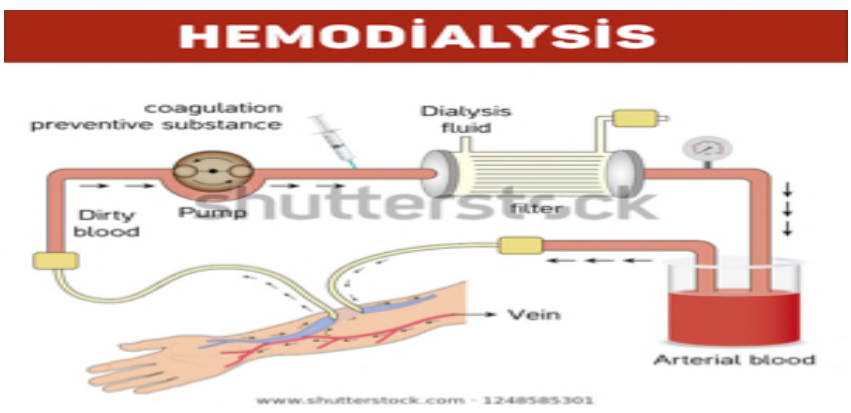
A.) HEMODIALYSIS

Hemodialysis, also spelled **haemodialysis**, or simply **dialysis**, is a process of purifying the blood of a person whose kidneys are not working normally. This type of dialysis achieves the extracorporeal removal of waste products such as creatinine and urea and free water from the blood when the kidneys are in a state of kidney failure.

Hemodialysis is one of three renal replacement therapies (the other two being kidney transplant and peritoneal dialysis). An alternative method for extracorporeal separation of blood components such as plasma or cells is apheresis. Hemodialysis is the choice of renal replacement therapy for patients who need dialysis acutely, and for many patients as maintenance therapy. It provides excellent, rapid clearance of solutes. This process restricts independence, as people undergoing this procedure cannot travel around because of supplies' availability.

Hemodialysis often involves fluid removal (through ultrafiltration), because most patients with renal failure pass little or no urine. Side effects caused by removing too much fluid and/or removing fluid too rapidly include low blood pressure, fatigue, chest pains, leg-cramps, nausea and headaches. These symptoms can occur during the treatment and can persist post treatment; they are sometimes collectively referred to as the dialysis hangover or dialysis washout. The severity of these symptoms is usually proportionate to the amount and speed of fluid removal. However, the impact of a given amount or rate of fluid removal can vary greatly from person to person and day to day.

These side effects can be avoided and/or their severity lessened by limiting fluid intake between treatments or increasing the dose of dialysis e.g. dialyzing more often or longer per treatment than the standard three times a week, 3–4 hours per treatment schedule. There are (3) types of hemodialysis, namely: a.) Conventional hemodialysis b.) Daily hemodialysis c.) Nocturnal hemodialysis



B.) PERITONEAL DIALYSIS

Peritoneal dialysis (**PD**) is a type of dialysis which uses the peritoneum in a person's abdomen as the membrane through which fluid and dissolved substances are exchanged with the blood. It is used to remove excess fluid, correct electrolyte problems, and remove toxins in those with kidney failure. Peritoneal dialysis has better outcomes than hemodialysis during the first couple of years. Other benefits include greater flexibility and better tolerability in those with significant heart disease.Complications may include infections within the abdomen, hernias, high blood sugar, bleeding in the abdomen, and blockage of the catheter. Use is not possible in those with significant prior abdominal surgery or inflammatory bowel disease. It requires some degree of technical skill to be done properly.

In peritoneal dialysis, a specific solution is introduced through a permanent tube in the lower abdomen and then removed. This may either occur at regular intervals throughout the day, known as continuous ambulatory dialysis, or at night with the assistance of a machine, known as automated peritoneal dialysis. The solution is typically made of sodium chloride, hydrogen carbonate, and an osmotic agent such as glucose.The volume of dialysate removed as well as patient's weight are monitored. If more than 500ml of fluid are retained or a liter of fluid is lost across three consecutive treatments, the patient's physician is generally notified.

Excessive loss of fluid can result in hypovolemic shock or hypotension while excessive fluid retention can result in hypertensionand edema. Also monitored is the color of the fluid removed: normally it is pink-tinged for the initial four cycles and clear or pale yellow afterward. The presence of pink or bloody effluent suggests bleeding inside the abdomen while feces indicates a perforated bowel and cloudy fluid suggests infection. The patient may also experience pain or discomfort if the dialysate is too acidic, too cold or introduced too quickly, while diffuse pain with cloudy discharge may indicate an infection. Severe pain in the rectum or perineum can be the result of an improperly placed catheter. The dwell can also increase pressure on the diaphragm causing impaired breathing, and constipation can interfere with the ability of fluid to flow through the catheter.