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**COURSE TITLE: RENAL PHYSIOLOGY,BODY FLUID AND TEMPERATURE REGULATION**

**COURSE CODE: PHS303**

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

Chronic renal failure is caused by a progressive decline of all kidney functions, ending end with terminal kidney damage. During this time, there is modulation and adaptation in the still-functional glomeruli, which keeps the kidneys functioning normally for as long as possible. The remaining glomeruli, therefore, experience a rise in pressure through hyperfiltration. The release of various cytokines and growth factors leads to hypertrophy and hyperplasia. At the same time, the function of the glomeruli suffers due to the excessive demands on them, leading to increased permeability and proteinuria. Increased protein concentrations in the proximal tube system are direct nephrotoxins and can further impair kidney function.

There are four phases of chronic renal failure:

**1. Reduction in Excretory Function** Breakdown of excretory function is the consequence of an accumulation of endogenous and extraneous substances. This leads to changes in pharmacokinetics and an increase in the concentration of various medications. Breakdown occurs when the remaining glomeruli are confronted by a surplus of waste products, leading to osmotic diuresis. There is a reduction in the maximal concentrating capacity of the kidney. In order to filter the physiological quantity of dissolved substances, the nephrons produce between 3 and 4 times as much urine during renal failure, resulting in an accumulation of waste substances.

**2. Reduction in Incretory Renal Function** Because the kidney plays a part in the regulation of many important hormonal cycles, chronic renal failure also has endocrinal consequences. Through a shortage of erythropoietin, there is a reduction in erythrocyte synthesis, which leads to renal anemia; uremia then leads to a reduction of functional erythrocytes due to hemolysis or hemorrhages.Vitamin D production is also impaired, and phosphate excretion is reduced. Secondary hyperparathyroidism and the associated renal osteopathy (‘high-turnover’ osteopathy) develop as a result of hyperphosphatemia. Parallel to this, other pathomechanisms lead to a disruption in bone metabolism: osteomalacia occurs due to a disruption of mineralization, and adynamic [bone](https://www.lecturio.com/magazine/bones-fundamentals-of-anatomy/) disease occurs due to a reduction in bone cell activity (particularly in dialysis patients).

**3. Over-hydration and the Disruption of Electrolyte Balance**

As long as the glomeruli can manage to compensate, diuresis and fractional sodium excretion rise. If the glomerular filtration rate noticeably drops, then the ability to compensate is exhausted, leading to increased retention of water and electrolytes.Hypertension, pulmonary edema, and peripheral edema result from overhydration. Water and salt excretion are thereby inextricably linked. Diuretics can aid in water and salt excretion where critical glomerular damage is present. Early loss of salts as a result of the disturbance in the resorption process can actually be made worse by the use of diuretics.Thus, as the glomeruli adapt to compensate, the tubular transport mechanisms also adapt in order to prevent hyperkalemia through increased potassium secretion. Hyperkalemia only develops as a result of hyperstimulation of the resorption capacity. As many patients are treated with calcium-sparing diuretics due to previous conditions, it is vital to refer to patient’s medication history and adapt the treatment plan accordingly.Acidosis also rises alongside hyperkalemia. The kidneys can no longer sufficiently eliminate accumulating protons due to a strongly reduced glomerular filtration rate. This metabolic acidosis leads to increased bone calcium release and strengthening renal osteopathy, an increase in gastrointestinal problems, and the impairment of protein metabolism.

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

The kidneys filter your blood by removing waste and excess fluid from your body. This waste is sent to the bladder to be eliminated when you urinate.

Dialysis performs the function of the [kidneys](https://www.healthline.com/human-body-maps/kidney) if they’ve [failed](https://www.healthline.com/health/kidney-failure). According to the National Kidney Foundation, end-stage kidney failure occurs when the kidneys are performing at only [10 to 15 percent](https://www.kidney.org/atoz/content/dialysisinfo) of their normal function.

Dialysis is a treatment that filters and purifies the blood using a machine. This helps keep your [fluids](https://www.healthline.com/health/hypervolemia) and [electrolytes](https://www.healthline.com/health/food-nutrition/how-to-prevent-an-electrolyte-imbalance) in balance when the kidneys can’t do their job.

**Types of dialysis**

There are three different types of dialysis.

**Hemodialysis**

Hemodialysis is the most common type of dialysis. This process uses an artificial kidney (hemodialyzer) to remove waste and extra fluid from the blood. The blood is removed from the body and filtered through the artificial kidney. The filtered blood is then returned to the body with the help of a dialysis machine.

To get the blood to flow to the artificial kidney, your doctor will perform surgery to create an entrance point (vascular access) into your blood vessels. The three types of entrance points are:

* **Arteriovenous (AV) fistula**. This type connects an artery and a vein. It’s the preferred option.
* **AV graft.** This type is a looped tube.
* **Vascular access catheter.** This may be inserted into the large vein in your [neck](https://www.healthline.com/human-body-maps/internal-jugular-vein).

Both the AV fistula and AV graft are designed for long-term dialysis treatments. People who receive AV fistulas are healed and ready to begin hemodialysis two to three months after their surgery. People who receive AV grafts are ready in two to three weeks. Catheters are designed for short-term or temporary use.

Hemodialysis treatments usually last three to five hours and are performed three times per week. However, hemodialysis treatment can also be completed in shorter, more frequent sessions.

Most hemodialysis treatments are performed at a hospital, doctor’s office, or dialysis center. The length of treatment depends on your body size, the amount of waste in your body, and the current state of your health.

After you’ve been on hemodialysis for an extended period of time, your doctor may feel that you’re ready to give yourself dialysis treatments at home. This option is more common for people who need long-term treatment.



**Peritoneal dialysis**

Peritoneal dialysis involves surgery to implant a peritoneal dialysis (PD) catheter into your [abdomen](https://www.healthline.com/human-body-maps/abdomen). The catheter helps filter your blood through the peritoneum, a membrane in your abdomen. During treatment, a special fluid called dialysate flows into the peritoneum. The dialysate absorbs waste. Once the dialysate draws waste out of the bloodstream, it’s drained from your abdomen.

This process takes a few hours and needs to be repeated four to six times per day. However, the exchange of fluids can be performed while you’re sleeping or awake.

There are numerous different types of peritoneal dialysis. The main ones are:

* **Continuous ambulatory peritoneal dialysis (CAPD).** In CAPD, your abdomen is filled and drained multiple times each day. This method doesn’t require a machine and must be performed while awake.
* **Continuous cycling peritoneal dialysis (CCPD).** CCPD uses a machine to cycle the fluid in and out of your abdomen. It’s usually done at night while you sleep.
* **Intermittent peritoneal dialysis (IPD).** This treatment is usually performed in the hospital, though it may be performed at home. It uses the same machine as CCPD, but the process takes longer.