

## Clinical Module 4 – Renal Disease

### Module 4 Questions

#### I. Definitions:

A. What are renal calculi? What diet would be ordered for a patient with this condition? Is this similar to or different from the recommendations for end-stage renal failure?

Renal calculi are more commonly known as kidney stones. Kidney stones are made up of salt and minerals from the urine that have crystalized. Fluid intake for patients with kidney stones need to be very high (2 L/day). The aim is to have clear urine. Plenty of fruits and vegetables are also recommended. A heart-healthy diet such as the DASH diet is a good example of a general diet to follow. However, depending on the type of kidney stones one has, there are specific dietary treatments to recommend.

For calcium oxalate stones, consumption of animal protein, oxalates, and sodium should be reduced while maintaining calcium consumption between 800 mg – 1200 mg. High sources of oxalate include rhubarb, spinach, strawberries, beets, swiss chard, almonds, mixed nuts, miso, tahini, and soybeans. On the other hand, consumption of citrate and potassium should be increased.

For patients with calcium citrate stones, a diet containing normal calcium and low in animal protein along with lemonade and citrus juices is recommended.

For patients with cysteine stones 3.5 L of fluids per day is needed. Intake of animal protein should be reduced. Vegetables with high citrate and malate content should be consumed.

There are no current diet recommendations for patients with struvite stones besides avoiding urinary alkalization.

For patients with uric acid stones, weight loss is encouraged as well as trying a more vegetarian diet, and reduction of animal protein intake.

The diet for kidney stones has some similarities to the diet for end-stage renal failure patients. Both end-stage renal disease and kidney stones recommend low-protein diets. On the other hand, while patients with kidney stones need to consume large amounts of fluids, end-stage renal patients have fluid restrictions.

B. What is nephrotic syndrome? What diet would be ordered for a patient with this condition? Is this similar to or different from the recommendations for end-stage renal failure?

Nephrotic syndrome is a combination of symptoms that shows signs of kidney damage. The symptoms that are indicative of nephrotic syndrome are albuminuria (large amounts of protein in urine), hyperlipidemia (high fat and cholesterol levels), edema, and hypoalbuminemia (low levels of albumin in blood).

For patients with nephrotic syndrome, a diet low in saturated fat, cholesterol, and sodium is recommended to control hyperlipidemia. Fluid restrictions are also needed to control edema.

The only similarity between the diets of patients with nephrotic syndrome and end-stage renal disease are sodium restrictions.

C. How is “dry” weight of a patient on dialysis determined? What dietary factor would be impacted the most by a patient’s daily weight versus dry weight?

Dry weight is a person’s weight without the additional fluid that builds up between treatment. Doctors have different ways in determining the dry weight of a patient such as looking at a patient’s weight when he/she has normal blood pressure, absence of edema, neck veins that are not enlarged, absence of rales and crackles, absence of shortness of breath or congestive heart failure, or a normal size heart on an x-ray.

High sodium intake causes water retention so for dialysis patients it is important to control lowering sodium intake.

## **II. Pathophysiology:**

A. Besides diabetes, what are some common causes of renal failure?

Some common causes of renal failure include lupus, IgA nephropathy, polycystic kidney disease, nephrotic syndrome, and urinary tract problems. Acute renal failure can be caused by heart attack, drug use, and lack of blood flow to the kidneys.

B. Describe the clinical symptoms of a patient with chronic renal failure.

Symptoms that may indicate chronic renal failure include nausea, vomiting, loss of appetite, fatigue, weakness, sleep problems, change in urine amounts, decreased mental sharpness, muscle twitches and cramps, swelling of ankles and feet, persistent itching, chest pain, shortness of breath, and difficult to control high blood pressure.

C. Indicate normal values\* for healthy individuals and accepted values for dialysis patients for each of the following:

<b>Lab Value</b>	<b>Normal Value for healthy individuals</b>	<b>Accepted Value for dialysis patients</b>
BUN	7 – 20 mg/dL	Before dialysis: 20 – 80 mg/dL After dialysis: 10 – 20 mg/dL
Creatinine	0.84 – 1.21 mg/dL	Before dialysis: 2 -14 mg/dL After dialysis: 1 – 2 mg/dL
K+	3.6 – 5.2 mmol/L	3.5 – 5.1 meq/L
Ca++	8.5 – 10.2 mg/dL	8.6 – 10 mg/dL

Phosphorous	2.5 – 4.5 mg/dL	3.5 -5.5 mg/dL
Hematocrit	Men: 38.8% - 50% Women: 34.9% - 44.5%	30% - 36%
Hemoglobin	Men: 13.5 – 17.5 g/dL Women: 12 – 15.5 g/dL	10 -12 g/dL
Triglycerides	< 150 mg/dL	< 150 mg/dL

### **III. Drug Therapy:**

A. Briefly discuss the use of the following drugs. Include classification, indication and contraindication for use with the renal patient, effect of the drug on nutrient absorption and utilization, effect of nutrients on drug absorption and utilization.

<b>Drug</b>	<b>Classification</b>	<b>Indication for use with renal patient</b>	<b>Contraindication for use with renal patient</b>	<b>Effect of the drug on nutrient absorption &amp; utilization</b>	<b>Effect of nutrients on drug absorption &amp; utilization</b>
Prednisone	Corticosteroid	Anti-inflammatory and immunosuppressive agent for certain renal diseases.	Some patients may be allergic to prednisone or its ingredients	Take with food to lower GI effects.	Calcium and Vitamin D also needed for long term use  May also need to increase potassium, phosphorous, Vitamin A, and Vitamin C.  Limit caffeine intake to lower GI effects.
Kayexalate	Antihyperkalemia	Indicated for treatment of hyperkalemia	Contraindicated for patients with hypokalemia, patients with a history of hypersensitivity to polystyrene sulfonate resins, and obstructive bowel disease.	Do not heat.	Avoid potassium supplements.  Low sodium diet.  Take calcium or magnesium supplements or antacids separately by several hours.
Phos-Lo	Phosphate binder	Used for treatment of hyperphosphonatremia  Used for end-stage renal failure to lower serum phosphate concentration.	Hypercalcemia	Take with meals.	Avoid calcium supplement/antacid  Take iron supplement separately.
Solumedrol	Corticosteroid	Anti-inflammatory and immunosuppressive agent for certain renal diseases.	Some patients may be allergic to solumedrol or its ingredients	Take with food to lower GI effects.	Low sodium diet.  Calcium and Vitamin D also needed for long term use/

					<p>May also need to increase potassium, phosphorous, Vitamin A, and Vitamin C.</p> <p>Limit caffeine intake to lower GI effects.</p>
Erythropoietin (EPO)	Antianemic	Indicated for treatment of anemia associated with chronic renal failure.	Contraindicated in patients with uncontrolled hypertension, hypersensitivity to mammalian cell-derived products, or known hypersensitivity to albumin.	N/A	May need iron, Vitamin B12, or folate supplement.
Os-cal	Mineral supplement	Used to treat or prevent low calcium levels	Contraindicated for sarcoidosis, increased activity of the parathyroid gland, high amount of calcium in the blood, extreme loss of body water, constipation, kidney stones, kidney disease, high amount of phosphate in blood, and excessive amount of Vitamin D.	<p>Take with meals as supplement or potassium binder.</p> <p>Take 1-3 hours after meals as antacid.</p>	<p>Take separately from high fiber, high oxalate, or high phytate foods.</p> <p>Take iron, zinc, or magnesium, separately by 1-2 hours since Os-cal may lower absorption.</p> <p>Consume adequate Vitamin D.</p> <p>Watch caffeine intake</p>

#### **IV. Nutritional Management:**

A. Define high biological value protein and discuss the rationale for its use with renal patients. List 5 foods that contain high biological value protein.

High biologic value proteins are protein foods that have the best combinations of amino acids and produce the least amount of waste. When an individual consumes protein foods, the more the kidneys need to work to get rid of the extra amino acids that are not used in the body. Consuming high biologic proteins still give the body the amino acids it needs but not too much of it so that the extra amino acids don't end up being filtered by the kidneys therefore giving the kidneys less work.

Animal products are the best sources of high biological proteins. Five examples of high biological proteins are meat, poultry, eggs, fish, and milk.

B. Describe the clinical rationale for a protein restricted diet for a patient with renal failure not on dialysis.

For individuals with renal failure not on dialysis, it is recommended to consume 0.6 g/kg of protein per kg of body weight. It is important for renal failure patients not on dialysis to ensure their kidneys do as little work filtering as possible.

C. Discuss vitamin/mineral supplementation appropriate for the renal patient on hemodialysis.

Vitamin B6, B12, and folic acid are needed to prevent anemia. Other B vitamins help convert foods consumed into energy. Iron supplements are also needed in order to treat anemia. Vitamin C is needed for wound healing and preventing infections. Vitamin D is needed to maintain healthy bones and may also be helpful in preventing heart disease. Lastly, calcium is also needed for bone health. However, calcium intake should be monitored.