

RENAL NUTRITION GUIDE



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THE RENAL DIET

A proper diet is vital to maintaining overall health. It's especially important for those facing compromised or declining kidney function and for those individuals seeking to maintain and prolong native kidney function. While many facing a kidney disease, including Alport syndrome, often feel there are many aspects of their health journey they cannot control,

simple changes in daily diet can have a quantifiable impact on lab work. Alport Syndrome Foundation is proud to offer this Nutrition Guide for those new to the diet, those seeking further tips on how to refine food choices to fit their needs, and for those who simply want a refresher on what the renal diet entails.

What is the renal diet?

The renal diet is characterized by reductions in sodium, phosphorus and protein. As native kidney function worsens, some patients may also be required to limit potassium, calcium, and especially fluids when on hemodialysis. There is no one "renal diet" and the restrictions

that you require may be different from others, even those who also have Alport syndrome. While the suggestions in this guide are valid for those in all five stages of kidney disease, always ask your doctor or kidney dietitian about your specific restrictions.

Why be proactive?

Following the dietary recommendations prescribed by your doctor or dietitian can help to prevent or control some of the complications that come with late stage kidney disease. For example, reducing salt intake

can improve high blood pressure and reducing phosphorus intake when blood levels are too high can help to prevent kidney disease-associated bone disease.

STAGES OF KIDNEY DISEASE

Before we delve into renal nutrition, it's important to understand the five stages of kidney disease and the respective declining Glomerular Filtration Rate (GFR) values. A GFR blood test indicates how well your kidneys are filtering and their overall function. A higher GFR corresponds to better function, while lower GFR indicates kidney decline.

Stages 1–2: Symptoms of kidney disease are not apparent

- Diet changes include limiting sodium to <2000mg or as instructed by your doctor.
- Medication such as ACE (angiotensin converting enzyme) inhibitors and ARBs (angiotensin receptor blockers) are prescribed to help slow renal decline.*
- Patients on ACE inhibitors can experience increased Potassium levels and may need to limit potassium in the diet if they are instructed by their doctor.
- Ingestion of fruits, veggies and whole grains is advised.
- Control of cholesterol, blood sugar and blood pressure.
- Exercise/staying active is recommended to maintain a normal weight (BMI < 25 for adults or <95% for age in children).
- No smoking.
- Regular Checkups to monitor GFR and urine protein.

GFR category	GFR (ml/min/1.73m ²)	Terms
G1	≥ 90	Normal or high
G2	60–89	Mildly decreased**
G3a	45–59	Mildly to moderately decreased
G3b	30–44	Moderately to severely decreased
G4	15–29	Severely decreased
G5	< 15	Kidney Failure

Kidney Failure Abbreviations:

CKD: chronic kidney disease

GFR: glomerular filtration rate

BUN: blood urea nitrogen

* Please note: For Alport patients, starting an ACE is recommended not at a certain stage of kidney function or GFR but when the urine protein to creatinine ratio is above 0.2 as measured in a simple urinalysis test. Regular measurement of urine protein levels is recommended beginning at one year of age in children with Alport syndrome and at least annually for all ages of patients.

**Relative to young adult level in the absence of evidence of kidney damage, neither GFR category G1 nor G2 fulfill the criteria for CKD.

Stage 3:

At this stage, symptoms of kidney disease may become apparent. These may include fluid retention, and fatigue due to anemia.

- Finding a nephrologist is essential at this stage. Consultation with a dietitian is also recommended and this is usually available in the nephrologist's office.
- The dietitian can work with your individual needs in consult with your nephrologist to evaluate your protein intake, phosphorus, potas-

sium, uric acid, and hemoglobin (iron) levels.

- Phosphorus: You may need to restrict your phosphorus intake depending on your lab result. Maintaining all the treatment recommendations from stages 1–2 is crucial.
- Medication such as ACE (angiotensin converting enzyme) inhibitors and ARBs (angiotensin receptor blockers) are prescribed to help slow renal decline.*

Stage 4:

In addition to the aforementioned symptoms of kidney disease listed in the previous stages, patients with stage 4 CKD can experience a decrease in their appetite, and a foul, metallic taste in their mouth/bad breath due to excess urea in the blood (BUN).

- At this stage, dialysis and/or kidney transplantation are likely in the near future. Your nephrologist will review the types of dialysis and options for transplant with you in preparation.

Patients may become anemic during stage 4 as their red blood cell count drops.

- Phosphorus may be restricted in the diet or you may need to take phosphorus "binders"—medications that bind to phosphorus in your stomach so that it can't be absorbed into your blood stream.
- You may need to restrict potassium in stage 4 CKD, however, talk to your doctor about your specific limitations.

Stage 5

Loss of appetite and limited urine output are common during this stage. Swelling in extremities can result due to sodium and fluid imbalance. Patients may experience itching due to high phosphorus levels in the blood.

- The only treatments for stage 5 are hemodialysis, peritoneal dialysis or kidney transplantation.

Potassium intake is closely monitored and may be restricted along with fluid intake.

- For patients who are on dialysis, a specific nephrology vitamin is often prescribed to make up for water-soluble vitamins lost during the dialysis procedure. Consult with your doctor about whether vitamins or supplements are right for you.

SODIUM

What is sodium and why do we need it?

Sodium is a major electrolyte in the body which helps with muscle contraction and nerve conduction. It also helps maintain blood pressure.

Sodium is extracellular; that is to say it is a major component of body fluid outside the cells.

Why do we monitor it?

Increased dietary sodium leads to increased serum (blood) sodium resulting in a sensation of thirst. Increasing your fluid intake increases extracellular volume, which in turn increases cardiac output, and, naturally, blood pressure.

So what does all this mean? End Stage Renal Disease (ESRD) patients

with decreased urinary output should reduce sodium intake, as it encourages an individual to quench their thirst. Too much fluid intake will result in increased fluid retention/swelling in extremities and this puts unwanted pressure on your heart and kidneys.

Low Sodium is considered < 2,000 mg/day.



What can you do to avoid excessive sodium?

As a general rule of thumb, according to the National Kidney Foundation (NKF), "If salt is listed in the first five ingredients, the item is probably too high in sodium to use."

Naturally, the fresher the food, the less sodium it will contain.¹ Fresh fruit, vegetables, chicken, meat, fish and grains all have low amounts of naturally occurring sodium.

Conversely, processed foods, such as frozen foods and canned foods often contain very high sodium content for taste. Cured and processed meats, such as deli meats which are a frequent choice for packed lunches at school or work, are also significantly high in sodium as additional sodium is added for preservation.

For packaged foods, Low sodium foods are those containing < 150 mg /serving, Moderate sodium is considered between 150–400 mg / serving and High Sodium foods are those containing over 400 mg/serving. If a food item contains 400 mg or more for a single serving, it should be avoided by renal patients.

For those accustomed to adding salt to food items, be aware it is possible to substitute salt with herbs and spices to ensure the item is still flavorful.* NKF recommends basil, caraway, curry, dill, thyme and sage as just a few potential replacements. The NKF sodium resource listed at the end of this guide even includes seasoning recipes you can try at home.

Low sodium foods < 150 mg /serving

Moderate sodium foods 150–400 mg /serving

High sodium foods > 400 mg /serving



* Please note: Many kidney patients frequently ask about "Salt Substitutes." As many "Salt Substitutes" contain potassium, which should be limited in those with impaired renal function, we advise you to speak with your dietitian and nephrologist before use.

POTASSIUM

What is potassium and why do we need it?

Potassium, a major intracellular electrolyte in the body, has vital functions including:

- Controlling the electrical conductivity of the heart.
- Controlling acid-base balance.
- Helping control blood pressure.

Why do we monitor it?

As part of your care, your nephrologist will also likely prescribe medications to protect your kidneys. Angiotensin Converting Enzyme (ACE) inhibitors have been shown to slow down the loss of kidney function in those with Alport syndrome. One of the side effects of these medications is the body retaining potassium in the blood. This condition is called *hyperkalemia*.

Potassium Ranges

Normal Range 3.5–5.0 mEq/L

Mild 5.1–6.0 mEq/L

Moderate 6.1–7.0 mEq/L

Severe > 7.0 mEq/L

(These ranges are examples and may vary from lab to lab and for young children. Ask your nephrologist what the normal range for potassium is for your lab.)



What can you do to avoid excessive potassium?

If you have been following the healthy diet previously mentioned that is rich in potassium, you may be asking, "Now what can I eat?"

There are always options! The amount of potassium you need to limit in your diet should be individualized and is based on several factors including age and weight, among others.

Foods that are high in potassium include dairy foods like fluid milk and yogurt. Almond milk and rice milk are lower potassium alternatives to dairy milk. Soy milk is rich in potassium and

should be avoided. Salt substitutes typically contain potassium and should not be used. Herb blends that are low in sodium are good alternatives.

Other foods that have a lot of potassium include chocolate, nuts and nut butters.

As far as fruit and vegetable choices, the one that typically comes to mind when discussing high potassium is bananas; however, there are others that need to be limited. See the list on page 8.



High Potassium Levels

Cantaloupe	Broccoli (cooked)
Kiwi	Brussels sprouts
Mango	Dried beans, peas
Nectarine	and legumes
Orange	Dark leafy greens
Pomegranate	(spinach, bok choy)
Prunes	Potato (white, sweet)
	Tomato/tomato products
	Winter squash



Low Potassium Levels

Apples	Carrots
Blueberries	Cauliflower
Peach	Celery
Grapes	Cucumber
Watermelon	Green beans
Raspberries	Zucchini



PROTEIN

What is protein and why do we need it?

Proteins are large biomolecules consisting of amino acids that must be supplied in the diet in order to account for essential amino acids that the human body cannot synthesize. These amino acids and others that the human body partially or wholly

synthesize support various functions at the cellular level. While protein is most commonly associated with building muscle, it is also "required for the structure, function and regulation of the body's tissues and organs."⁵

When should we limit protein?

Dietary protein restriction as a means of slowing the progression of kidney disease has been a controversial subject in the past and you may hear various opinions about this online or from your own physicians.

International guidelines suggest decreasing protein intake in the diet when your GFR is <25–30 (CKD stage 4) to [0.6–0.8 g/kg/day](#) (~33–44g/day for a 121lb/55kg person). For example, one egg contains 6 grams of protein and one cup of skim milk has 8.5 grams of protein.

Children with CKD have protein restricted in their diet only very rarely due to the need for protein for growth and development. Be sure to talk to your child's doctor before restricting protein in the diet.

Note: The protein that is spilled in the urine is not related to the protein in your diet. For example, restricting protein in your diet will not decrease your level of proteinuria.



One technique to reduce potassium in vegetables unknown to many renal patients is called "leaching." This process for potatoes, sweet potatoes, carrots, beans, winter squash and rutabagas can be performed by using the following steps, according to the NKF's guide to Potassium & Your CKD Diet:

1. Peel and place the vegetable in cold water so they won't darken.
2. Slice vegetable 1/8 inch thick.
3. Rinse in warm water for a few seconds.
4. Soak for a minimum of two hours in warm water. Use ten times the amount of water to the amount of vegetables. If soaking longer, change the water every four hours.
5. Rinse under warm water again for a few seconds.
6. Cook vegetable with five times the amount of water to the amount of vegetable.

PHOSPHORUS

What is phosphorus and why do we need it?

Phosphorus, a mineral component of your bones, teeth and cell membranes, is required in your body for making proteins, and for the

growth and repair of cells and tissue. Phosphorus also plays a crucial role in helping your body create and use energy.

Why do we monitor it?

Those affected by kidney disease experience increased phosphorus levels, which can be controlled by medications known as phosphorus or phosphate binders. Binders are taken a few minutes before or after ingesting meals and snacks.

Patients with chronic kidney disease are advised to reduce phosphorus intake to less than 1,000mg/day.

High phosphorus levels drive up levels of Fibroblast growth factor 23 (FGF23), a protein, which triggers the rise of Parathyroid hormone (PTH). This can ultimately lead to weakened bones, fractures, and heart-related issues, such as arteriosclerosis (a hardening of the arteries). These heart issues resulting from elevated phosphorus levels, if left untreated, are associated with an increased risk of death.

What can you do to avoid excessive phosphorus?

Phosphorus is naturally occurring in dairy foods, meats, fish, poultry, egg yolks, organ meats, nuts, beans, seeds, and whole grain cereals. High-phosphorus foods include, but are not limited to, milk, cheese, yogurt, ice cream, beer, chocolate, pizza, nuts, dried beans, corn and processed meats.²

In addition to natural occurring phosphorus, many commonly consumed foods and beverages now contain "hidden" phosphorus in the form of phosphorus additives. These are added for a variety of reasons, including allowing foods to be creamier, allowing foods that wouldn't normally melt to melt, maintaining the juiciness of meat and prevent-

ing beverages from separating into individual ingredients.³

Flavored waters, iced teas, sodas, enhanced meat and chicken products, breakfast (cereal) bars, nondairy creamers and bottled coffee beverages are foods patients with chronic kidney disease need to be aware of. When scanning the ingredient list, look for phrases ending in "-ate," such as polyphosphate and sodium phosphate.³

So what's left to eat?

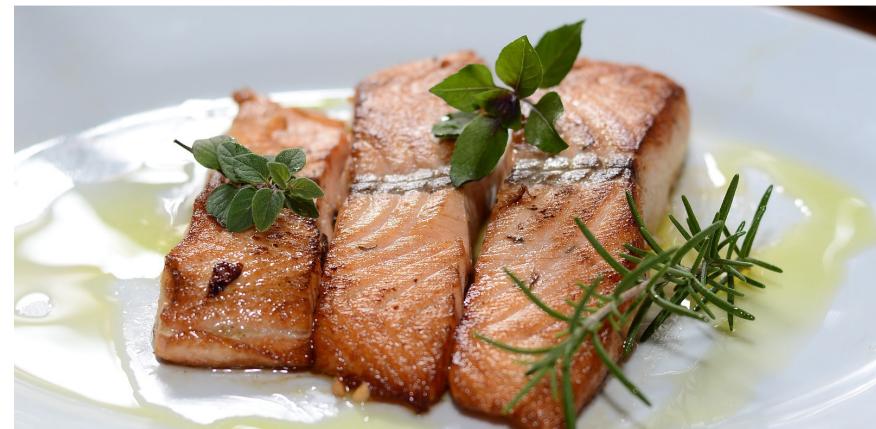
Fortunately, there are plenty of low-phosphorus choices. Fresh and frozen meats lacking breading, and marinades/sauce are always a great choice. Many seafood selections,

such as Mahi Mahi, Salmon, Tuna (even canned) and Lobster are delicious low-phosphorus options.

Since dairy products are naturally high in both calcium and phosphorus, substitutes such as Almond Milk, Soy Milk and non-dairy creamer are recommended. When possible, choose a sherbet over an ice cream. Consider pasteurized egg whites over whole eggs. Blue cheese, Parmesan,

Cottage, Feta and Cream Cheese are all lower phosphorus dairy choices.

Chocolate, beloved by most children and adults, is high in phosphorus and potassium. Instead of reaching for a candy bar, choose to snack instead on fruit, such as apples, pineapples and blueberries. Even gummy fruit candies are OK!⁴



Renal Diet Resources for Patients

DaVita Kidney-Friendly Recipes:

www.davita.com/recipes/

Sodium and Your CKD Diet: How to Spice Up Your Cooking:

www.kidney.org/atoz/content/sodiumckd

Sodium Content of Your Food:

www.midwestear.com/pdfs/Sodium_content.pdf

KDOQI Clinical Practice Guidelines for Nutrition in Chronic Renal Failure:

kidneyfoundation.cachefly.net/professionals/KDOQI/guidelines_nutrition/doqi_nut.html

Delay the Need for Dialysis with Good Renal Nutrition:

www.rsnhope.org/health-library/delay-dialysis-good-nutrition-kidneys/

Potassium and Leaching:

www.kidney.org/atoz/content/potassium

Low Protein Recipes:

www.kidney.org/atoz/content/lowprotrecipes

Works Cited

¹ "Sodium and Your CKD Diet: How to Spice Up Your Cooking." *The National Kidney Foundation*, 3 Feb. 2017, www.kidney.org/atoz/content/sodiumckd. Accessed 20 Sept. 2017.

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³ "Hidden Phosphorus in Your Diet and How to Control It." *Hidden Phosphorus In Your Diet and How to Control It—High and Low Phosphorus Foods—DaVita*, www.davita.com/kidney-disease/diet-and-nutrition/diet-basics/hidden-phosphorus-in-your-diet-and-how-to-control-it/e/5322. Accessed 20 Sept. 2017.

⁴ "Top Low-Phosphorus Food Choices for a Kidney Diet." *Handpicked Low-Phosphorus Foods for a Kidney Diet—DaVita*, www.davita.com/kidney-disease/diet-and-nutrition/lifestyle/handpicked-low-phosphorus-foods-for-a-kidney-diet/e/7475.

⁵ "What are proteins and what do they do?—Genetics Home Reference." *U.S. National Library of Medicine*, National Institutes of Health, <https://ghr.nlm.nih.gov/primer/howgeneswork/protein>.

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