



# POTASSIUM AND CHRONIC KIDNEY DISEASE

## Introduction

Potassium is a mineral which helps your nerves and muscles work well. Normally, healthy kidneys will keep the right amount of potassium in your body to keep your heartbeat regular and your muscles working right. If your kidneys are not working well, the potassium level in your blood can be too high or too low. This can affect your heartbeat. A very high or low level of potassium is DANGEROUS, as it can cause an irregular heartbeat or a heart attack.

Most of the potassium comes from the foods and beverages we consume. Almost all foods have potassium, but some have much more than others. The amount of potassium your body can tolerate depends on several factors: your body size, the medications you are taking, how well your kidneys are functioning and, if you are on dialysis, how well your dialysis treatments are working.

### People with CKD

Some people in the early stages of CKD do not need to limit their potassium intake, while others may need to restrict it. There is no benefit to restricting potassium unless your blood levels are high. If you need to restrict potassium, your registered dietitian and/or doctor will tell you how much potassium you should have each day to keep your blood levels in the healthy range.

#### **Important:**

If you are on hemodialysis, you may need to limit your potassium intake to avoid too much build-up between treatments. With peritoneal dialysis, you may be able to enjoy a variety of higher potassium foods, but check with your registered dietitian and/or doctor to be sure.

### What Is a Safe Level of Potassium in My Blood?

Normal blood potassium levels for adults are 3.5 to 5.0 mmol/L. The goal is less than 5.0 if you are on peritoneal dialysis, and less than 5.5 if you are on hemodialysis. A normal amount of potassium in a typical diet is about 3500 to 4500 milligrams per day. A potassium restricted diet is typically about 2000 to 3000 milligrams per day. Your dietitian can advise you as to the specific level of restriction you need based on your individual health.

## How Can I Keep My Potassium Level from Getting Too High?

Different foods have very different potassium contents. Your Registered Dietitian will help you make an eating plan that gives you the right amount of potassium.

Traditionally, dietary guidelines for people with chronic kidney disease recommended avoiding many plant-based foods. However, a more plant-based diet is associated with many health benefits such as lowering blood pressure and cholesterol, better management of diabetes and weight, and even slowing the progression of kidney disease.

Recent studies<sup>iii</sup> suggest that potassium in unprocessed plant foods is much less well absorbed than potassium in animal products and additives due to the cell membrane in plants. Therefore, potassium restriction should be consistent with the rest of the CKD diet: reducing animal proteins (which are rich sources of potassium), reducing processed foods with added potassium (which are often high in salt) and avoiding all types of juice (fruit or vegetable) and cola, since the potassium is more concentrated and more easily absorbed because of the high sugar and salt content.

## Serving Size Matters

- Foods that contain a smaller amount of potassium may have a different serving size than foods with a higher amount of potassium.

Example: Lychees contain a small amount of potassium, so a serving size equals 10 fruit. Mangoes have a much higher potassium content, so a serving size is limited to ½ fruit

- The number of servings you have each day is important. Even low potassium foods can make your potassium level high if you are having too many of them. Speak with your Registered Dietitian about the number of servings that is right for you.
- The cooking process may change the content of potassium in a certain food, mainly increasing the content of potassium as water is removed from the food during heating, however the cooking method will reduce the potassium for vegetables like potatoes, or with certain legumes.
- Other foods will shrink to a smaller serving size when cooked, but the potassium content remains the same.

Example: ½ cup of raw spinach will shrink to 1 tbsp when cooked. Eating ½ cup of cooked spinach will have a much higher potassium content than ½ cup of raw spinach.

## Low Potassium Diets

- If your dietitian recommends a low potassium diet, avoid foods that list potassium additives on the ingredient list. Look for words that include 'potassium', such as:
  - potassium lactate
  - potassium chloride
  - potassium phosphate
- When buying sodium reduced foods, look out for potassium additives on the ingredient list and look for potassium on Nutrition Facts table.
- Try to choose fresh, uncooked meat, poultry and fish as often as possible.
- Do not use the liquid from canned, cooked or frozen fruits and vegetables.
- If you are on dialysis, be sure to complete all your dialysis treatments.

## Cooking Methods

Cooking methods can affect the potassium content in some foods. Double-boiling, or leaching is a process by which some potassium can be pulled out of the vegetable.

## Potassium Additives in Meat

Potassium additives are very commonly found in deli meats including those at fast-food restaurants. They can legally be added to any fresh or frozen meat products so be sure to check your labels and avoid it. Potassium Chloride is commonly found in low sodium products. Potassium additives provide a very concentrated source of potassium. Just 1 serving (3 slices) of deli meat provides over 700mg of potassium. This can provide a dangerous amount of potassium to a kidney patient. Always read your labels and, if in doubt, check with your dietitian.

### Alternatives

Use additive-free sandwich fillings such as thinly sliced leftover cooked chicken/turkey/pork/beef, egg or no-added-salt canned fish. Some cold cuts are promoted as being additive-free, but beware – all prepared meats have a high sodium content.

## How to Double-Boil Vegetables:

Boiling vegetables twice is considered the best way to remove the most potassium from root vegetables such as potatoes and sweet potatoes. This method will remove about 50% of the potassium from potatoes, but a potato with 50% less potassium is still considered a high potassium vegetable. New studies suggest better ways to leach potassium when cooking potatoes.<sup>iii</sup>

## Leaching Potassium in Potatoes

### Fresh Potatoes:

- Peel the potatoes
- Cut into strips (1.2 cm x 1.2 cm) or dice (2 cm x 2 cm x 2 cm)
- Boil in water (1.5 L) for 8 minutes
- Drain potatoes
- Add clean water (1.5 L) and soak for 12 hours
- Use as required, e.g. mash, potato salad, home fries, baked

### Canned Potatoes:

- Wash and drain
- Soak in water (1.5L) for 12 hours
- Use as required

### Frozen French fries:

- Soak frozen fries in water (1.5L) for 12 hours
- Drain and dry fries
- Prepare in the usual way

Type of potato (100 g)	Potassium (mg)
Raw	454
Strip cut, boiled	287
Dice cut, boiled	295
Strip cut, boiled for 8 minutes then soaked in water for 12 hours	41
Strip cut, boiled for 8 minutes then soaked in water for 12 hours then deep-fried*	153
Dice cut, boiled for 8 minutes then soaked in water for 12 hours	122
Canned	105 – 118
Canned soaked in water for 12 hours	23 – 31
Frozen fries, fried*	600 - 700
Frozen fries, soaked in water for 12 hours then fried*	70 - 90

\*frying potatoes will increase the potassium content due to moisture loss

Read the blog, [Lower Potassium Potatoes](#), on the Kidney Community Kitchen

### For Sweet Potatoes, Carrots, Beets, Winter Squash, and Rutabagas:

- Wash and peel the vegetable.

- Dice or thinly slice the vegetable.
- Place the vegetable in room temperature water. Use two times the amount of water to the amount of vegetable.
- Bring the water to a boil.
- Drain off the water and add fresh, room temperature water. Use two times the amount of water to the amount of vegetable.
- Bring the water to a boil again and cook until the vegetable is soft and tender.
- Drain and discard the boiling water.

## How to Reduce Potassium in Legumes

Traditionally, patients with a kidney disease have been advised against eating legumes. Legumes, in addition to vitamins and fibers, contain a lot of protein and minerals. Emerging research shows that potassium from plant-based foods such as beans, lentils, nuts and whole grains is poorly absorbed. The amount of potassium in plant-based foods can vary. For example, tofu and chickpeas are lower in potassium than soybeans and white beans. <sup>iv</sup>

Fortunately, a recent study has found a way for chronic kidney disease patients to safely enjoy legumes (Martínez-Pineda, 2019<sup>1</sup>).

You can reduce the potassium in dried beans and legumes by more than 80% by following these 3 easy steps:

1. Let the legumes soak in a bowl of water for 12 hours or more (do it before bedtime!)
2. Then, get rid of the soaking water (now full of potassium and sodium), and rinse the legumes
3. Cook them in a pressure cooker or boil in lots of fresh water

Cooking the legumes effectively gets rid of much of the potassium they contain. If you want a simpler and faster method for preparing low potassium and low phosphorus chickpeas and lentils, buy them canned! You only need to rinse out the salt and you are good to go.

It should be noted that the study results showed that, in most cases, different soaking types were able to significantly reduce the final content of potassium but not that of phosphorus, both in dried chickpeas and lentils. Always consult your dietitian when incorporating legumes into your diet.

Read the blog, [Reducing Potassium in Legumes](#), on the Kidney Community Kitchen

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<sup>1</sup> Martínez-Pineda, Montserrat, et al. "Cooking Legumes: A Way for Their Inclusion in the Renal Patient Diet." *Journal of Renal Nutrition* 29.2 (2019): 118-125.

## Grains

Whole grains are the fruits of a plant which, when unprocessed, include three edible parts – the bran, the germ and the endosperm. Whole grains include wheat, corn, rice, oats, barley, quinoa, rye and even popcorn. Typically, whole grains were discouraged in a renal diet because of the higher phosphorus and potassium content in these foods. Recent studies<sup>y</sup> have shown that these minerals are much less absorbed in unprocessed foods, and the other health benefits associated with incorporating them into a well-balanced diet can be beneficial in improving digestive health, lowering cholesterol and decreasing the risk of heart disease and stroke. Whole grains can also help people on dialysis meet their protein needs. Breads and cereals made from whole grains can provide an additional source of protein. Consult your Registered Dietitian about how to safely introduce whole grains into your diet.

### Whole Grains

<b>Lower Potassium Choices</b>	<b>Higher Potassium Choices</b> <i>Speak to your dietitian about how to safely incorporate these choices in your diet.</i>
<ul style="list-style-type: none"><li>• Barley</li><li>• Buckwheat (kasha)</li><li>• Bulgur</li><li>• Popcorn</li><li>• Wild rice</li></ul>	<ul style="list-style-type: none"><li>• Amaranth</li><li>• Brown Rice</li><li>• Millet</li><li>• Oats</li><li>• Quinoa</li><li>• Sorghum</li><li>• Spelt</li><li>• Teff</li><li>• Triticale</li><li>• Wheat berries</li></ul>

## Fruits

Lower Potassium Choices		Higher Potassium Choices <i>Speak to your dietitian about how to safely incorporate these choices in your diet.</i>	
<ul style="list-style-type: none"> <li>• Apple (1)</li> <li>• Apple rings (5)</li> <li>• Applesauce</li> <li>• Blackberries</li> <li>• Blueberries</li> <li>• Boysenberries</li> <li>• Canned fruit, all types</li> <li>• Casaba melon</li> <li>• Cherries (10)</li> <li>• Clementine (1)</li> <li>• Crab-apple</li> <li>• Cranberries</li> <li>• Currants</li> <li>• Fruit cocktail</li> <li>• Gooseberries</li> <li>• <b>Grapefruit*</b>(½) <b>(Potential Drug Interaction – Speak to your Pharmacist or Registered Dietitian)</b></li> <li>• Grapes (20)</li> <li>• Jackfruit, canned</li> <li>• Kumquats (5)</li> <li>• Lemon (1)</li> </ul>	<ul style="list-style-type: none"> <li>• Lime (2)</li> <li>• Loganberries</li> <li>• Lychees (10)</li> <li>• Mandarin orange</li> <li>• Mango (½)</li> <li>• Peach (1)</li> <li>• Pear (1)</li> <li>• Pineapple</li> <li>• Plum (1)</li> <li>• Pomegranate ½</li> <li>• Prunes (2)</li> <li>• Raspberries</li> <li>• Rhubarb</li> <li>• Sapodilla (½)</li> <li>• Strawberries</li> <li>• Tangelo (1)</li> <li>• Tangerine (1)</li> <li>• Watermelon</li> </ul>	<ul style="list-style-type: none"> <li>• Apricots</li> <li>• Banana</li> <li>• Breadfruit</li> <li>• Cantaloupe</li> <li>• Coconut (dried)</li> <li>• Coconut (raw)</li> <li>• Dates</li> <li>• Dried fruit, all types</li> <li>• Durian</li> <li>• Elderberries</li> <li>• Figs</li> <li>• Guava</li> <li>• Honeydew melon</li> <li>• Jackfruit, fresh</li> <li>• Kiwi (1)</li> <li>• Medjool Date (2)</li> <li>• Nectarine</li> </ul>	<ul style="list-style-type: none"> <li>• Orange (large)</li> <li>• Papaya</li> <li>• Passion fruit</li> <li>• Persimmon</li> <li>• Pomelo (½)</li> <li>• Prickly pear (1)</li> <li>• Raisins (1 box)</li> <li>• Sapote</li> <li>• Soursop</li> <li>• Sugar apple</li> <li>• <b>Starfruit (Do NOT consume. Speak to your Registered Dietitian. Starfruit may also be called carambala, bilimbi, belimbing, Chinese starfruit or star apple)</b></li> <li>• Tamarind</li> </ul>

## Vegetables

Lower Potassium Choices		Higher Potassium Choices <i>Speak to your dietitian about how to safely incorporate these choices in your diet.</i>	
<ul style="list-style-type: none"> <li>• Alfalfa sprouts</li> <li>• Arugula, raw (1 cup)</li> <li>• Asparagus (6)</li> <li>• Bamboo shoots, canned</li> <li>• Beans, green</li> <li>• Bean sprouts</li> <li>• Beet greens, raw</li> <li>• Broadbeans, fresh/boiled</li> <li>• Broccoli</li> <li>• Carrots, regular</li> <li>• Cauliflower</li> <li>• Celeriac, cooked</li> <li>• Celery (1 stalk)</li> <li>• Chayote</li> <li>• Chicory greens (1 cup)</li> <li>• Collard greens</li> <li>• Corn</li> <li>• Cress, raw</li> <li>• Cucumber</li> <li>• Dandelion greens</li> <li>• Eggplant</li> <li>• Endive (1)</li> <li>• Escarole</li> <li>• Fennel</li> <li>• Fiddlehead greens, boiled</li> </ul>	<ul style="list-style-type: none"> <li>• Kale</li> <li>• Leeks</li> <li>• Mushrooms:               <ul style="list-style-type: none"> <li>○ Canned, drained</li> <li>○ Shitake, raw</li> <li>○ White, raw</li> </ul> </li> <li>• Mustard greens</li> <li>• Okra</li> <li>• Onion, all types</li> <li>• Peas, green</li> <li>• Peppers</li> <li>• Radish</li> <li>• Rapini, raw</li> <li>• Snow peas (raw – 10)</li> <li>• Spaghetti squash</li> <li>• Spinach (raw – 1 cup)</li> <li>• Swiss chard, raw</li> <li>• Tomato, cherry (5)</li> <li>• Tomato (1/2)</li> <li>• Turnip</li> <li>• Turnip greens</li> <li>• Watercress (raw)</li> <li>• Water chestnuts, canned</li> <li>• Wax beans</li> <li>• Zucchini, raw</li> </ul>	<ul style="list-style-type: none"> <li>• Acorn squash</li> <li>• Artichoke</li> <li>• Avocado (1/2)</li> <li>• Bamboo shoots, fresh</li> <li>• Baked Beans</li> <li>• Beans:               <ul style="list-style-type: none"> <li>○ Adzuki, Black, Kidney, Lima, Mung, Navy, Pinto, Red, Roman, White (see cooking instruction - <b>How to reduce Potassium in Legumes</b> above)</li> </ul> </li> <li>• Beets</li> <li>• Broadbeans, canned</li> <li>• Bok choy</li> <li>• Brussel sprouts (4)</li> <li>• Burdock root</li> <li>• Butternut squash</li> <li>• Cassava</li> <li>• Celeriac, raw</li> <li>• Chickpeas (see cooking instructions - <b>How to reduce Potassium in Legumes</b> above)</li> <li>• Cress, cooked</li> <li>• Dock (sorrel)</li> <li>• French fries</li> <li>• Kohlrabi</li> <li>• Lentils (see cooking instructions - <b>How to reduce Potassium in Legumes</b> above)</li> <li>• Lotus root</li> <li>• Mushrooms (dried and portabella)</li> </ul>	<ul style="list-style-type: none"> <li>• Parsnips</li> <li>• Plantain</li> <li>• Potatoes (See cooking instructions - <b>How to double-boil vegetables</b> above)</li> <li>• Potato chips</li> <li>• Rapini, cooked</li> <li>• Rutabaga</li> <li>• Snow peas, cooked</li> <li>• Soybeans</li> <li>• Spinach, cooked</li> <li>• Split peas</li> <li>• Succotash</li> <li>• Sweet Potatoes (See cooking instructions - <b>How to double-boil vegetables</b> above)</li> <li>• Swiss chard, cooked</li> <li>• Taro, cooked</li> <li>• Tempeh</li> <li>• Tomato paste (2 tbsp)</li> <li>• Tomato sauce (1/4 cup)</li> <li>• Water chestnuts, raw</li> <li>• Yam (See cooking instructions - <b>How to double-boil vegetables</b> above)</li> <li>• Zucchini, cooked</li> </ul>

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No one associated with The Kidney Foundation of Canada will answer medical questions via e-mail. Please consult a healthcare professional for specific treatment recommendations.

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<sup>i</sup> <https://www.ncbi.nlm.nih.gov/pubmed/28394274>

<sup>ii</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5986180/>

<sup>iii</sup> [https://www.jrnjournal.org/article/S1051-2276\(19\)30271-7/abstract](https://www.jrnjournal.org/article/S1051-2276(19)30271-7/abstract) - Montserrat Martinez-Pineda, Cristina Yague-Ruiz, Antonio Vercet-Tormo: Is it possible to include potato in the diet of chronic kidney disease patients? New culinary alternatives for limiting potassium content; Journal of Renal Nutrition, Vol 30, No 3 (May), 2020 pp 251-260

<sup>iv</sup> <https://www.ncbi.nlm.nih.gov/pubmed/20093346>

<https://www.ncbi.nlm.nih.gov/pubmed/21183586>

<sup>v</sup> <https://www.ncbi.nlm.nih.gov/pubmed/24496192>, <https://www.karger.com/Article/Fulltext/356683>