PHOSPHORUS (PHOSPHATE) AND CHRONIC KIDNEY DISEASE

What is Phosphorus?

Phosphorus is a mineral which helps keep your bones strong and healthy. As kidney function declines, your blood phosphate level may rise, causing itchy skin or painful joints, and loss of calcium from your bones. You may need to limit the amount of high and moderate phosphorus foods you eat.

You should be on the lookout for phosphate additives, chemicals that are added to food for preservation, which are often found in processed foods such as some deli meats, frozen meals, and frozen seafoods. Natural sources of phosphate are found in dairy products, meats, fish, and poultry. A registered dietitian will help you ensure you have included enough protein, dairy products or alternatives in your daily eating plan for overall good nutrition.

Phosphate Additives and Label Reading

Phosphorus is often added to foods to enhance flavour and to act as a preservative or phosphate additive. Many processed foods as well as beverages, especially colas, contain added phosphates. The amount of phosphorus a food contains does not legally need to be included on the Nutrition Facts Panel of packaged goods, so even if it is not listed as a nutrient, the food may still contain phosphorus. Look instead at the list of ingredients for "hidden" sources of phosphorus such as ***phos****phoric acid* and *sodium* ***phos****phate.* The word "seasoned" on meat may also indicate the presence of phosphate additives.

Medications to Control Phosphate Level

Your doctor may prescribe *phosphate binders*. These are usually calcium supplements which are taken with the meal. These calcium supplements act like a sponge to soak up the phosphorus in your foods. For phosphate binders to work properly, you must always take them with food: they are best taken in the *middle* of your meal or snack. Do not take phosphate binders at the same time as iron supplements.

What Is a Safe Level of Phosphate in My Blood?

A normal blood phosphate level for adults is 0.8-1.45 mmol/L but *your* target level may be different. Speak to your nephrologist or your dietitian about this.

What Can I Eat?

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. Nuts and seeds can fit into a healthy kidney diet. Talk to your dietitian about what portions to include. The phosphorus in legumes is very poorly absorbed, therefore these can be included safely in your diet. Choose either plain canned beans and legumes or see the cooking instructions below for cooking dried legumes.

Emerging studies suggest that phosphorus in unprocessed plant foods is much less well absorbed than phosphorus in animal products and additives due to the cell membrane in plants. Therefore, phosphorus restriction should be consistent with the rest of the CKD diet: reducing animal proteins (which are rich sources of phosphorus), reducing processed foods with added phosphorus (which are often high in salt and phosphate additives) and avoiding all cola.

Typically, whole grains were discouraged in a renal diet because of the higher phosphorus and potassium content in these foods. Recent studies have shown that these minerals are much less absorbed in unprocessed foods, and the other health benefits associated with incorporating whole grains into a well-balanced diet. These include 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.

Dairy products can be enjoyed in moderation, which include milk and yogurt, Aim for a target of of 1 cup per day.

Choose fresh, unprocessed foods more often and consult your registered dietitian will give you a protein recommendation based on your body size, your nutritional needs and your stage of kidney failure.

Important: If you are vegetarian or vegan, speak to a registered dietitian about how you can best meet your protein needs.

Phosphorus Guidelines for Choosing Foods

Note: The food lists below show examples of foods to choose and to avoid. The lists below are a guide and are not all-inclusive. Consult with your dietitian about what is best for you.

Dairy and dairy-substitutes	
Higher Phosphorus Choices	**Lower Phosphorus Choices**
Processed cheese spread (Cheese Whiz, powdered cheese products, cheese slices, Laughing Cow)	¼ cup low sodium cottage cheese or cream cheese, Cheese: cheddar, mozzarella or Swiss – limit to 1 oz. (size of thumb) every second day
Malted milk (E.g.: Ovaltine)	Tea, hot apple cider
Soy beverages containing phosphate food additives	Beverages made with unfortified rice beverage or unfortified almond beverage without phosphate additives

Meat and Other Proteins	
Higher Phosphorus Choices	**Lower Phosphorus Choices**
Look for phosphate additives in frozen fish, bones from canned fish and bone broth	Untreated Fish and seafood
"Seasoned" meats containing phosphate additives, processed meats	Unseasoned beef, chicken, pork, turkey, veal, eggs

Beverages	
Higher Phosphorus Choices	**Lower Phosphorus Choices**
Cola soft drinks	Non-cola soft drinks (ginger ale, lemon/lime flavoured soda, root beer)
Alcohol: beer, stout, ale	Alcohol: gin, vodka, whiskey, wine (**note:** use alcohol only as advised by your doctor)
Fresh or frozen juices with added calcium	Lemonade (with no added phosphates)
Iced tea with phosphate additives	Homemade iced tea
Cocoa, hot chocolate	Tea, hot apple cider

Snacks and Miscellaneous Items	
Higher Phosphorus Choices	**Lower Phosphorus Choices**
Nuts, sesame or sunflower seeds; **avoid** pumpkin seeds	Unsalted popcorn, unsalted pretzels, unsalted corn chips
Chocolate bars	Hard candy, fruit flavoured candy or jellybeans
Chocolate hazelnut spread, nut butters, tahini	Jam*, jelly* and honey*
*These items are high in sugar. Limit or avoid if you have diabetes unless you are treating a low blood sugar.	

If you are making your own baked goods at home, try this low phosphorus alternative: use ¼ tsp baking soda + ½ tsp cream of tartar *instead of* 1 tsp baking powder. If you are buying prepared baked goods, check the label for phosphate additives.

Cooking 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. Unfortunately, these minerals can be dangerous because, without proper kidney function, they accumulate in the blood, causing conditions like hyperkalemia (excess of potassium) and hyperphosphatemia (excess of phosphorus). Fortunately, a recent study has found a way for chronic kidney disease patients to safely enjoy legumes like chickpeas and lentils (Martínez-Pineda, 2019i).

You can reduce the potassium and phosphorus in dried chickpeas and lentils by following these are the 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 most of the potassium they contain. 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.

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.

For information and tools to help you manage your kidney-friendly diet, visit:

www.kidneycommunitykitchen.ca

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i 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.