

Owner's Manual: Nutrition Care for Your Kidney Transplant



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Intended Audience: Kidney Transplant Patients, Practitioners

CHRONIC KIDNEY FAILURE is well known to have a detrimental impact on nutritional status, and in particular, patients with end-stage renal disease (ESRD) are at increased risk for malnutrition.¹ Renal transplantation is the preferred treatment for ESRD, but the procedure can have increased risks with critical nutritional challenges related to recovery from major surgery, immune-suppressive pharmacotherapy, or pre-existing comorbidities.² The guidance of a registered dietitian is required by the Centers for Medicare and Medicaid Services for patients in advance of the renal transplantation procedure and as needed throughout the process.³ Many ESRD patients are nutritional compromised and can optimize recovery from the transplantation procedure in conjunction with adherence to dietary recommendations under the guidance of a registered dietitian. Because recovery of renal function after successful renal transplantation generally leads to improvement in nutritional status, it is often assumed that nutritional intervention is not needed in the posttransplant phase.^{1,4} It is important for patients to understand, however, that renal transplantation comes with its own set of nutritional risks.¹ Even as it should result in nutritional improvement, appropriate nutritional interventions after surgery are associated with improved health and quality of life.^{5,6}

The focus of this article is on the often overlooked posttransplant phase and recommended nutritional

“best practices” in patient status after a successful renal transplant procedure. Different guidelines are needed in the case where there is postoperative rejection. There are several short term and long term health and medical risks that are notable in patients after renal transplantation. These are due to a variety of factors. Patients are at risk for pharmacological factors, which include potential reactions to anti-rejection medications. Pre-existing comorbidities and sedentary lifestyle also factor into posttransplant risk. In addition, improved appetite and metabolic changes associated with successful renal transplantation can lead to risks if the diet is unregulated by nutrition interventions. To highlight a few complications that are specific risks for posttransplant patients, there is increased risk for weight gain and obesity, posttransplant insulin resistance (or drug-induced diabetes from steroids), hypertension, hyperkalemia, cardiovascular disease, bone disease, and food-borne infection (related to immune-suppressing medication).^{1,7} In all these cases, nutrition (along with adequate physical activity) can be a first-line modifiable intervention for management or prevention.⁷

Diet therapy approaches vary slightly from acute post-transplant phase to chronic posttransplant phase. The early phase after transplantation (4–6 weeks postoperatively) needs to focus on optimizing nutrition for the patient who enters transplant surgery in a malnourished state and addresses provision of adequate nutrients for postoperative catabolism.⁶ During this period, nutrition intervention should focus on recovery. Patients who have developed malnutrition from being on dialysis or from a prolonged uremic state are at higher risk for complications postsurgically. The focus for these individuals is on gaining adequate nutrition with a functional organ and to successfully recover muscle mass and fat losses.⁷ There is also some risk for obese patients, but effortful weight loss is not a focus at this stage. Recommended nutrient needs for energy are 30–35 kcal/kg/day and 1.2–2.0 g of protein/kg/day.^{7,8}

As far as the chronic post-transplant maintenance (beyond the first 6 weeks), a general healthy diet is the appropriate approach, with an emphasis on disease prevention.⁹ As long as there are no other underlying issues, diet recommendations for this population should not differ

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vastly from the general population. Energy needs can be calculated based on 23–35 kcal/kg/day or adequate intake to meet a healthy weight goal.⁸ Protein recommendations in the chronic posttransplant population can vary based on diabetes status. A patient without diabetes (DM) may have estimated protein needs of 0.6–0.8 g/kg/day, whereas a patient with a DM diagnosis would have slightly higher protein needs that are estimated as 0.8–0.9 g/kg/day.⁸

General food safety is recommended, and information can be found through the Centers for Disease Control. Owing to the risk for excessive weight gain, maintaining a healthy weight (body mass index <30) and emphasizing consumption of a healthy diet in appropriate portions can address other potential comorbidities associated with obesity, such as increased risk for DM, hypertension, hyperlipidemia, and cardiovascular disease.^{4,6} Aim to control lipids through diet by consumption of <30% of total calories from fat per day. It is important to emphasize consumption of monounsaturated and polyunsaturated fat, low intake of saturated fat, and minimal intake of trans fat. Should lipids be persistently elevated, a medical doctor may need to evaluate for the need of a lipid-lowering medication. Maintain moderate sodium intake, approximately 2,000 mg/day, and emphasize high fiber, whole grain, and complex carbohydrate consumption. This can help to control lipid levels, reduce the risk for posttransplant DM, or manage a preexisting diagnosis of DM. According to the National Kidney Foundation, carbohydrates should provide 50–70% of nonprotein calories in the acute posttransplant phase.⁸ However, in the chronic posttransplant phase, they should be reduced to 45–50% of total calories.⁸ Bone health is also important as prolonged use of steroids and (prior) renal dysfunction can be detrimental to bones. As needed, consider supplementation of calcium, vitamin D, magnesium, or phosphorus.⁴ Exercise should be encouraged as a conjunctive therapy for weight management, glycemic improvement, and benefits to heart and bone health.^{1,6}

In conclusion, medical nutrition therapy plays an important role in posttransplant recovery. It is important to monitor routine markers in laboratories, vitals, and anthropometric measurements to address appropriate nutrition intervention. Diet education and modification play an important role in reducing comorbid risk factors for long-term maintenance of the renal allograft. Diet compliance remains a challenge in the transplant population, and therefore, routine follow-up with a registered dietitian may be indicated to maintain motivation and promote optimal results.⁸

Medical Nutrition Therapy Considerations After Kidney Transplant⁸

Medical Nutrition Therapy	Acute Posttransplant Phase	Chronic Posttransplant Phase
Optimize nutrition status	Increased energy and protein needs to address postoperative catabolism	With a well-functioning allograft, diet recommendations align with those of healthy individuals
Estimated calorie needs	30–35 kcal/kg/d	23–35 kcal/kg/d or adequate intake to meet healthy weight goal
Estimated protein needs	1.2–2.0 g of protein/kg/d	Without DM: 0.6–0.8 g/kg/d With DM: 0.8–0.9 g/kg/d
Medication side effects	Adjust diet to address the potential for hyperglycemia and hyperkalemia; observe food safety practices to minimize the risk for food-borne infections	
Bone health	Monitor laboratory values. Consider need for supplementation of calcium, magnesium, phosphorus, and vitamin D	

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Websites of Interest

Centers for Disease Control and Prevention (CDC)—
<https://www.cdc.gov/foodsafety/index.html>.

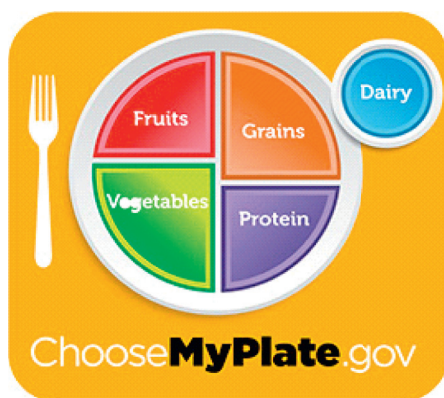
Centers for Medicare and Medicaid Services (CMS)—
<http://www.cms.gov>.

National Kidney Foundation (NKF)—<https://www.kidney.org/>.

Organ Procurement and Transplantation Network (OPTN)—<https://optn.transplant.hrsa.gov/>.

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After kidney transplantation, many renal-related diet restrictions are no longer necessary. This is exciting, and you should enjoy eating from the increased variety of food choices. However, the long-term success of your transplant will depend on maintaining a healthy diet and lifestyle. Eating a balanced and nutritious diet is key to achieving this goal. Seek advice from a registered dietitian to support your nutritional needs following your kidney transplant.



Balance: Know your food groups and consume foods from each group to provide your body with a variety of nutrients. Use the “My Plate” method to make a balanced meal. Fill $\frac{1}{4}$ of your plate with a lean protein food, $\frac{1}{4}$ of your plate with a fibrous carbohydrate and fill the last $\frac{1}{2}$ of your plate with fruits and vegetables. This tool is great for supporting portion control, a balanced diet and to achieve and maintain a healthy weight.

Fresh is Best: Try to eat foods that are cooked from fresh ingredients, such as minimally refined grains, unprocessed protein, and fresh or frozen fruits and vegetables. This will help you to avoid excess sodium intake and added sugars. It is also important to eat fresh foods from the perspective of food safety. Keep your kitchen space clean. Track the date foods were cooked and monitor expiration dates to avoid eating foods that have spoiled.

Beverages and Fluids:

- Drink water as your beverage of choice.
- Tea and coffee are acceptable choices. Consider drinking unsweetened, minimally sweetened or with artificial sweetener to reduce added calories and sugar.
- Select low fat milk as a good source of calcium, protein and other nutrients.
- For milk alternatives, like soy milk or almond milk, look for “unsweetened” and fortified.
- Limit high calorie, high sugar beverages such as soda, fruit juices, energy and sport drinks.
- Read nutrition fact labels. Even “all-natural” juice with no sugar added can be high in sugar.
- Consider carrying a reusable water bottle so that you have a healthy drink available at all times.
- If your transplanted kidney is working well, your fluid intake will be unrestricted.



Healthy Fats: Dietary fat comes from meat, dairy, oils and some plant-based food sources. Choose foods with fat as part of your diet, but monitor portions to reduce overall calorie intake. Also read food labels and select foods with less saturated fat.



- Choose healthier oils, like canola oil and olive oil, for cooking and in dressings. Nuts and avocados are rich in healthy fats and taste great in salads or as a snack.
- Limit fried foods and minimize high fat foods with little nutritional value (cakes, cookies, ice cream).

Lean Proteins: Protein can come from animal or plant sources. Select fresh or frozen items and limit intake of processed meats, particularly those high in sodium.

- If eating animal protein, aim for poultry, like chicken or turkey, without the skin.
- Red meat is acceptable in moderation. Choose once or twice a week.
- Fish, eggs and low-fat dairy are also good sources of lean protein.
- For plant-based protein sources, try legumes (beans, lentils, peanuts) and tree nuts (almonds, cashews, pistachios, pecans and walnuts).
- Quinoa is a healthy grain alternative and provides dietary protein.



Breads, Grains, Cereals and Legumes: As part of your diet following kidney transplantation, aim to eat high-fiber, complex carbohydrates.

- Try to ensure that $\frac{1}{2}$ the grains you eat are whole grains.
- Choose 100% whole wheat bread, brown rice or whole grain pastas.



- Oats, multigrain cereals, legumes, corn and sweet potatoes are also good options.
- Minimize refined carbohydrate food choices made with white flour and added sugars.
- Use “the fist method” to determine an accurate serving of carbohydrate per meal. Consume a serving that is equal to 1 or 1.5 times the size of your fist.

Vegetables: Enjoy a variety of vegetables with your meals. The USDA recommends eating 2-3 cups of vegetables per day.

- Eat them raw, as a snack, in salad, roasted as a side dish, or cooked into a soup or stew.
- Vegetables are a great source of fiber and are a filling, low calorie food.
- Try a variety of different vegetables in your diet.



Red and Purple	Beets, cabbage (purple), eggplant, pepper, onion (red), radicchio, radish, rutabaga, tomato, turnip
Orange and Yellow	Carrots, pepper, pumpkin, summer squash, sweet potato, winter squash, yam
Green	Artichoke, asparagus, broccoli, celery, leafy greens (arugula, bok choy, chard, kale, lettuce, mustard green, spinach, water cress), okra, scallion, string beans
White and Brown	Cabbage, cauliflower, daikon, fennel, garlic, horseradish, jicama, kohlrabi, onion, parsnip, turnip

- Remember portions when consuming starchy vegetables, such as potatoes, corn and peas. Use “the fist method” (described in carbohydrates section) for measuring.

Fruit: Eat a variety of fruit. The USDA recommends 1.5-2 cups of fruit per day, but this amount can vary based on your nutritional needs. Choose fresh or frozen. Limit fruit items canned in syrup.

- A single portion of fruit can be a great option for a sweet dessert or to satisfy a sweet craving.

How to measure a serving of fruit:

- A whole medium sized fruit, like an apple or an orange, would be a serving.
- One cup of fresh cut fruit, like watermelon or pineapple would be a serving.
- When it comes to fruit that comes in small pieces, like grapes, cherries, or berries consider eating an amount that would fill a cup, like 12-15 grapes or 8-10 cherries.

