

Nutrition for Advanced Chronic Kidney Disease in Adults

National Kidney and Urologic Diseases Information Clearinghouse



National Institute of
Diabetes and Digestive
and Kidney Diseases

ADULT UROLOGY &
PEDIATRIC
UROGYNECOLOGY

Why is nutrition important for someone with advanced chronic kidney disease (CKD)?

A person may prevent or delay some health problems from CKD by eating the right foods and avoiding foods high in sodium, potassium, and phosphorus. Learning about calories, fats, proteins, and fluids is important for a person with advanced CKD. Protein foods such as meat and dairy products break down into waste products that healthy kidneys remove from the blood.

As CKD progresses, nutritional needs change. A health care provider may recommend that a patient with reduced kidney function choose foods carefully.

What do the kidneys do?

The kidneys remove wastes and extra water from the blood and make urine. To keep the body working properly, the kidneys balance the salts and minerals—such as calcium, phosphorus, sodium, and potassium—that circulate in the blood. The kidneys also release hormones that help make red blood cells, regulate blood pressure, and keep bones strong.

What are the effects of CKD?

CKD usually takes a long time to develop and does not go away. In CKD, the kidneys continue to work—just not as well as they should. Wastes may build up so gradually that the body becomes used to having those wastes in the blood. Salts containing

phosphorus and potassium may rise to unsafe levels, causing heart and bone problems. Anemia—low red blood cell count—can result from CKD because the kidneys stop making enough erythropoietin, a hormone that causes bone marrow to make red blood cells. After months or years, CKD may progress to permanent kidney failure, which requires a person to have a kidney transplant or regular blood filtering treatments called dialysis.

What is medical nutrition therapy (MNT)?

MNT is the use of nutrition counseling by a registered dietitian to help promote a medical or health goal. A health care provider may refer a patient to a registered dietitian to help with the patient's food plan. Many insurance policies cover MNT when recommended by a health care provider. Anyone who qualifies for Medicare can receive a benefit for MNT from a registered dietitian or nutrition professional when a health care provider provides a referral indicating that the person has diabetes or kidney disease.

One way to locate a qualified dietitian is to contact the Academy of Nutrition and Dietetics at www.eatright.org and click on "Find a Registered Dietitian." Users can enter their address or ZIP code for a list of dietitians in their area. A person looking for dietary advice to prevent kidney damage should click on "Renal (Kidney) Nutrition" in the specialty field. Dietitians who specialize in helping people with CKD are called renal dietitians.

Why is knowing about calories important for someone with advanced CKD?

As CKD progresses, people often lose their appetites because they find that foods do not taste the same. As a result, they consume fewer calories—important units of energy in food—and may lose too much weight. Renal dietitians can help people with advanced CKD find healthy ways to add calories to their diet if they are losing too much weight.

Why is knowing about protein important for someone with advanced CKD?

Protein is an essential part of any diet. Proteins help build and maintain muscle, bone, skin, connective tissue, internal organs, and blood. They help fight disease and heal wounds. But proteins also break down into waste products that must be removed from the blood by the kidneys. Eating more protein than the body needs may put an extra burden on the kidneys and cause kidney function to decline faster.

Health care providers recommend that people with CKD eat moderate or reduced amounts of protein. However, restricting protein could lead to malnutrition, so people with CKD need to be careful. The typical American diet contains more than enough protein. Learning about portion sizes can help people limit protein intake without endangering their health.

What is the right meat portion size?

Most people—with or without CKD—can get the daily protein they need by eating two 3-ounce servings of meat or meat substitute. A 3-ounce serving of meat is about the size of a deck of cards or the palm of a person's hand.

A renal dietitian can help people learn about the amount and sources of protein in their diet. Animal protein in egg whites, cheese, chicken, fish, and red meats contain more of the essential nutrients a body needs. With careful meal planning, a well-balanced vegetarian diet can also provide these nutrients. A renal dietitian can help people with advanced CKD make small adjustments in their eating habits that can result in significant protein reduction. For example, people can lower their protein intake by making sandwiches using thinner slices of meat and adding lettuce, cucumber slices, apple slices, and other garnishes. The following table lists some high-protein foods and suggestions for low-protein alternatives that are better choices for people with CKD trying to limit their protein intake.

High- and Low-protein Foods

High-protein Foods	Low-protein Alternatives
Ground beef	Egg substitutes
Halibut	Shrimp
Salmon	Tofu
Tuna	Imitation crab meat
Roasted turkey	Roasted chicken
Chili con carne	Beef stew

Source: United States Department of Agriculture (USDA) National Nutrient Database for Standard Reference, Release 25. USDA website. www.ars.usda.gov/SP2UserFiles/Place/12354500/Data/SR25/nutrlist/sr25a203.pdf. Released 2012. Accessed November 6, 2012.

When kidney function declines to the point where dialysis becomes necessary, patients should include more protein in their diet because dialysis removes large amounts of protein from the blood.

Why is knowing about fat important for someone with advanced CKD?

Everyone should know about fat sources because eating the wrong kinds of fat and too much fat increases the risk of clogged blood vessels and heart problems. Fat provides energy, helps produce hormonelike substances that regulate blood pressure and other heart functions, and carries fat-soluble vitamins. Everyone needs dietary fat, but some fats are healthier than others. People with CKD are at higher risk of having a heart attack or stroke. Therefore, people with CKD should be especially careful about how dietary fat affects their heart health.

People with advanced CKD should talk with a dietitian about healthy and unhealthy sources of fat. Saturated fats and trans-fatty acids can raise blood cholesterol levels and clog blood vessels. Saturated fats are found in animal products such as red meat, poultry, whole milk, and butter. These fats are usually solid at room temperature. Trans-fatty acids are often found in commercially baked goods such as cookies and cakes and in fried foods like doughnuts and french fries.

A dietitian can suggest healthy ways to include fat in the diet, especially if more calories are needed. Vegetable oils such as corn or safflower oil are healthier than animal fats such as butter or lard. Hydrogenated vegetable oils should be avoided because they are high in trans-fatty acids. Monounsaturated fats—olive, peanut, and canola oils—are healthy alternatives to animal fats. The table below shows the sources of fats, broken down into three types of fats that should be eaten less often and good fats that can be eaten more often.

Sources of Fats	
Eat Less Often	Eat More Often
Saturated fats <ul style="list-style-type: none">• red meat• poultry• whole milk• butter• lard	Monounsaturated fats <ul style="list-style-type: none">• corn oil• safflower oil• olive oil• peanut oil• canola oil
Trans-fatty acids <ul style="list-style-type: none">• commercially baked goods• french fries• doughnuts	
Hydrogenated vegetable oils <ul style="list-style-type: none">• margarine• shortening	

Why is knowing about sodium important for someone with advanced CKD?

Too much sodium in a person's diet can be harmful because it causes blood to hold fluid. People with CKD need to be careful not to let too much fluid build up in their bodies. The extra fluid raises blood pressure and puts a strain on the heart and kidneys. A dietitian can help people find ways to reduce the amount of sodium in their diet. Nutrition labels provide information about the sodium content in food. The U.S. Food and Drug Administration advises that healthy people should limit their daily sodium intake to no more than 2,300 milligrams (mg), the amount found in 1 teaspoon of table salt. People who are at risk for a heart attack or stroke because of a condition such as high blood pressure or kidney disease should limit their daily sodium intake to no more than 1,500 mg. Choosing sodium-free or low-sodium food products will help them reach that goal.

Sodium is found in ordinary table salt and many salty seasonings such as soy sauce and teriyaki sauce. Canned foods, some frozen foods, and most processed meats have large amounts of salt. Snack foods such as chips and crackers are also high in salt.

Alternative seasonings such as lemon juice, salt-free seasoning mixes, and hot pepper sauce can help people reduce their salt intake. People with advanced CKD should avoid salt substitutes that use potassium, such as AlsoSalt or Nu-Salt, because CKD limits the body's ability to eliminate potassium from the blood. The table below provides some high-sodium foods and suggestions for low-sodium alternatives that are healthier for people with any level of CKD who have high blood pressure.

High- and Low-sodium Foods

High-sodium Foods	Low-sodium Alternatives
Salt	Salt-free herb seasonings
Regular canned vegetables	Low-sodium canned foods
Hot dogs and canned meat	Frozen vegetables without sauce
Packaged rice with sauce	Fresh, cooked meat
Packaged noodles with sauce	Plain rice without sauce
Frozen vegetables with sauce	Plain noodles without sauce
Frozen prepared meals	Fresh vegetables without sauce
Canned soup	Homemade soup with fresh ingredients
Regular tomato sauce	Reduced-sodium tomato sauce
Snack foods	Unsalted pretzels
	Unsalted popcorn

Source: United States Department of Agriculture (USDA) National Nutrient Database for Standard Reference, Release 25. USDA website. www.ars.usda.gov/SP2UserFiles/Place/12354500/Data/SR25/nutrlist/sr25a307.pdf. Released 2012. Accessed November 6, 2012.

Why is knowing about potassium important for someone with advanced CKD?

Keeping the proper level of potassium in the blood is essential. Potassium keeps the heart beating regularly and muscles working right. Problems can occur when blood potassium levels are either too low or too high. Damaged kidneys allow potassium to build up in the blood, causing serious heart problems. Potassium is found in many fruits and vegetables, such as bananas, potatoes, avocados, and melons. People with advanced CKD may need to avoid some fruits and vegetables. Blood tests can indicate when potassium levels have climbed above normal range. A renal dietitian can help people with advanced CKD find ways to limit the amount of potassium they eat. The potassium content of potatoes and other vegetables can be reduced by boiling them in water. The following table gives examples of some high-potassium foods and suggestions for low-potassium alternatives for people with advanced CKD.

High- and Low-potassium Foods

High-potassium Foods	Low-potassium Alternatives
Oranges and orange juice	Apples and apple juice
Melons	Cranberries and cranberry juice
Apricots	Canned pears
Bananas	Strawberries, blueberries, raspberries
Potatoes	Pineapple
Tomatoes	Cabbage
Sweet potatoes	Boiled cauliflower
Cooked spinach	
Cooked broccoli	
Beans (baked, kidney, lima, pinto)	

Source: United States Department of Agriculture (USDA) National Nutrient Database for Standard Reference, Release 25. USDA website. www.ars.usda.gov/SP2UserFiles/Place/12354500/Data/SR25/nutrlist/sr25a306.pdf. Released 2012. Accessed November 6, 2012.

Why is knowing about phosphorus important for someone with advanced CKD?

Damaged kidneys allow phosphorus, a mineral found in many foods, to build up in the blood. Too much phosphorus in the blood pulls calcium from the bones, making the bones weak and likely to break. Too much phosphorus may also make skin itch. Foods such as milk and cheese, dried beans, peas, colas, canned iced teas and lemonade, nuts, and peanut butter are high in phosphorus. A renal dietitian can help people with advanced CKD learn how to limit phosphorus in their diet.

As CKD progresses, a person may need to take a phosphate binder such as sevelamer hydrochloride (Renagel), lanthanum carbonate (Fosrenol), calcium acetate (PhosLo), or calcium carbonate (Tums) to control the phosphorus in the blood. These medications act like sponges to soak up, or bind, phosphorus while it is in the stomach. Because it is bound, the phosphorus does not get into the blood. Instead, it is removed from the body in the stool.

The table below lists some high-phosphorus foods and suggestions for low-phosphorus alternatives that are healthier for people with advanced CKD.

High- and Low-phosphorus Foods

High-phosphorus Foods	Low-phosphorus Alternatives
Dairy foods (milk, cheese, yogurt)	Liquid nondairy creamer
Beans (baked, kidney, lima, pinto)	Sherbet
Nuts and peanut butter	Cooked rice
Processed meats (hot dogs, canned meat)	Rice, wheat, and corn cereals
Cola	Popcorn
Canned iced teas and lemonade	Peas
Bran cereals	Lemon-lime soda
Egg yolks	Root beer
	Powdered iced tea and lemonade mixes

Source: United States Department of Agriculture (USDA) National Nutrient Database for Standard Reference, Release 25. USDA website. www.ars.usda.gov/SP2UserFiles/Place/12354500/Data/SR25/nutrlist/sr25a305.pdf. Released 2012. Accessed November 6, 2012.

Why is regulating fluid intake important for someone with advanced CKD?

People with advanced CKD may need to limit how much they drink because damaged kidneys can't remove extra fluid. The fluid builds up in the body and strains the heart. Patients should tell their health care provider about any swelling around the eyes or in the legs, arms, or abdomen.

How can understanding and keeping track of lab reports help someone with advanced CKD make healthy food choices?

Learning how to read and understand lab reports lets a person see how different foods can affect the kidneys. A health care provider should order regular blood tests for people with CKD. Patients can ask their health care provider for copies of their lab reports and ask to have them explained, noting any results out of the normal range. Keeping track of these lab results can help people see whether they are making progress or getting worse. People with CKD should talk with their health care provider or dietitian about how they can make healthier food choices. For example, if a test shows that a person with advanced CKD has a high potassium level, that person should concentrate on reducing potassium in the diet by limiting high-potassium foods.

Points to Remember

- A person may prevent or delay some health problems from chronic kidney disease (CKD) by eating the right foods and avoiding foods high in sodium, potassium, and phosphorus.
- The kidneys remove wastes and extra water from the blood and make urine.
- Medical nutrition therapy (MNT) is the use of counseling by a registered dietitian to help promote a medical or health goal.
- Dietitians who specialize in helping people with CKD are called renal dietitians.
- People with advanced CKD often lose their appetites and consume fewer calories—important units of energy in food—and may lose too much weight.
- Eating more protein than the body needs may put an extra burden on the kidneys and cause kidney function to decline faster. Most people—with or without CKD—can get the daily protein they need by eating two 3-ounce servings of meat or meat substitute.
- People with CKD are at higher risk of having a heart attack or stroke.
- Everyone needs dietary fat, but some fats are healthier than others.
- Too much sodium in a person's diet can be harmful because it causes blood to hold fluid. People with CKD need to be careful not to let too much fluid build up in their bodies.

- People with advanced CKD should avoid salt substitutes that use potassium because CKD limits the body's ability to eliminate potassium from the blood.
- Damaged kidneys allow potassium to build up in the blood, causing serious heart problems. Potassium is found in many fruits and vegetables, such as bananas, potatoes, avocados, and melons.
- Too much phosphorus in the blood pulls calcium from the bones, making the bones weak and likely to break.
- People with advanced CKD may need to limit how much they drink because damaged kidneys can't remove extra fluid.
- Many patients find that keeping track of their test results helps them see how their treatment is working. Patients can ask their health care provider for copies of their lab reports and ask to have them explained, noting any results out of the normal range.

Hope through Research

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) has many research programs aimed at slowing the progression of CKD. For example, the NIDDK is sponsoring the Chronic Renal Insufficiency Cohort study to determine the risk factors for rapid decline in kidney function and development of cardiovascular disease. This study of about 3,000 patients with chronic renal insufficiency, another way of describing CKD, will reflect the racial, ethnic, and gender composition of the people in the United States who have permanent kidney failure. The data collected and specimens obtained from people in this study will serve as a national resource for investigating CKD, as well as cardiovascular disease. Establishing this group of patients and following them into the future will also provide an opportunity to examine genetic, environmental, behavioral, nutritional, quality-of-life, and health resource use factors in this population. The main part of the study will consist of monitoring participants and following up at regular clinic visits with kidney function measurements, cardiovascular studies, and lab tests. In addition, participants will answer questionnaires to assess various demographic, nutritional, and quality-of-life factors.

Participants in clinical trials can play a more active role in their own health care, gain access to new research treatments before they are widely available, and help others by contributing to medical research. For information about current studies, visit www.ClinicalTrials.gov.

Additional Reading

The following fact sheets and brochures, as well as other information, are available on request from the organizations listed. Most of these resources can also be found online at the web addresses given.

Dining Out With Confidence: A Guide for Patients With Kidney Disease

Nutrition and Chronic Kidney Disease

National Kidney Foundation

30 East 33rd Street
New York, NY 10016
Phone: 1-800-622-9010 or 212-889-2210
Fax: 212-689-9261
Internet: www.kidney.org

Facts About the DASH Eating Plan

National Heart, Lung, and Blood Institute Information Center

P.O. Box 30105
Bethesda, MD 20824-0105
Phone: 301-592-8573
TTY: 240-629-3255
Fax: 240-629-3246
Email: nhlbiinfo@nhlbi.nih.gov
Internet: www.nhlbi.nih.gov

A Healthy Food Guide for People with Chronic Kidney Disease

Academy of Nutrition and Dietetics

120 South Riverside Plaza, Suite 2000
Chicago, IL 60606-6995
Internet: www.eatright.org

Kidney Beginnings: A Patient's Guide to Living with Reduced Kidney Function

American Association of Kidney Patients

2701 N Rocky Point Drive, Suite 150
Tampa, FL 33607
Phone: 1-800-749-2257 or 813-636-8100
Fax: 813-636-8122
Email: info@aakp.org
Internet: www.aakp.org

What I need to know about Eating and Diabetes

National Diabetes Information

Clearinghouse

1 Information Way
Bethesda, MD 20892-3560
Phone: 1-800-860-8747
TTY: 1-866-569-1162
Fax: 703-738-4929
Email: ndic@info.niddk.nih.gov
Internet: www.diabetes.niddk.nih.gov

Eating Right for Kidney Health: Tips for People with Chronic Kidney Disease (CKD) (online only)

Your Kidney Test Results (online only)

National Kidney Disease Education Program

3 Kidney Information Way
Bethesda, MD 20892
Phone: 1-866-4-KIDNEY (1-866-454-3639)
TTY: 1-866-569-1162
Fax: 301-402-8182
Email: nkdep@info.niddk.nih.gov
Internet: www.nkdep.nih.gov

For More Information

American Kidney Fund

11921 Rockville Pike, Suite 300

Rockville, MD 20852

Phone: 1-866-300-2900

Fax: 301-881-0898

Email: helpline@kidneyfund.org or
patientservice@kidneyfund.org

Internet: www.kidneyfund.org

Food and Nutrition Information Center

National Agricultural Library

10301 Baltimore Avenue, Room 108

Beltsville, MD 20705-2351

Phone: 301-504-5414

Fax: 301-504-6409

Email: fnic@ars.usda.gov

Internet: www.nal.usda.gov/fnic

Medical Education Institute, Inc.

414 D'Onofrio Drive, Suite 200

Madison, WI 53719

Phone: 608-833-8033

Fax: 608-833-8366

Email: schatell@meiresearch.org

Internet: www.kidneyschool.org

The information in this fact sheet should not be used in the nutritional counseling of infants, children, and adolescents with CKD. Families of pediatric patients with CKD should seek age-appropriate nutritional counseling from a pediatric renal dietitian.

About the Nutrition for Chronic Kidney Disease Series

The NIDDK Nutrition for Chronic Kidney Disease Series includes three fact sheets:

- *Nutrition for Early Chronic Kidney Disease in Adults*
- *Nutrition for Advanced Chronic Kidney Disease in Adults*
- *Nutrition for Chronic Kidney Disease in Children*

For free, single, printed copies of this series, please contact the National Kidney and Urologic Diseases Information Clearinghouse.

Acknowledgments

Publications produced by the Clearinghouse are carefully reviewed by both NIDDK scientists and outside experts. This publication was originally reviewed by Lisa Murphy-Gutekunst, M.S.Ed., R.D., C.S.R., Cleve-Hill Dialysis, Buffalo, NY, and Marcy Bushman, M.P.H., R.D., L.D.N., Sigma-Tau Pharmaceuticals.

ADULT PEDIATRIC UROLOGY & UROGYNECOLOGY

10707 Pacific Street, Ste 101

Omaha, NE 68114

402-397-7989

www.adultpediatricuro.com

National Kidney Disease Education Program

3 Kidney Information Way
Bethesda, MD 20892
Phone: 1-866-4-KIDNEY
(1-866-454-3639)
TTY: 1-866-569-1162
Fax: 301-402-8182
Email: nkdep@info.niddk.nih.gov
Internet: www.nkdep.nih.gov

The National Kidney Disease Education Program (NKDEP) is an initiative of the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, U.S. Department of Health and Human Services. The NKDEP aims to raise awareness of the seriousness of kidney disease, the importance of testing those at high risk, and the availability of treatment to prevent or slow kidney disease.

You may also find additional information about this topic by visiting MedlinePlus at www.medlineplus.gov.

This publication may contain information about medications. When prepared, this publication included the most current information available. For updates or for questions about any medications, contact the U.S. Food and Drug Administration toll-free at 1-888-INFO-FDA (1-888-463-6332) or visit www.fda.gov. Consult your health care provider for more information.

The U.S. Government does not endorse or favor any specific commercial product or company. Trade, proprietary, or company names appearing in this document are used only because they are considered necessary in the context of the information provided. If a product is not mentioned, the omission does not mean or imply that the product is unsatisfactory.

National Kidney and Urologic Diseases Information Clearinghouse

3 Information Way
Bethesda, MD 20892-3580
Phone: 1-800-891-5390
TTY: 1-866-569-1162
Fax: 703-738-4929
Email: nkudic@info.niddk.nih.gov
Internet: www.kidney.niddk.nih.gov

The National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIDDK is part of the National Institutes of Health of the U.S. Department of Health and Human Services. Established in 1987, the Clearinghouse provides information about diseases of the kidneys and urologic system to people with kidney and urologic disorders and to their families, health care professionals, and the public. The NKUDIC answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and Government agencies to coordinate resources about kidney and urologic diseases.

This publication is not copyrighted. The Clearinghouse encourages users of this publication to duplicate and distribute as many copies as desired.

This publication is available at
www.kidney.niddk.nih.gov.

ADULT PEDIATRIC UROLOGY & UROGYNECOLOGY

10707 Pacific Street, Ste 101
Omaha, NE 68114
402-397-7989
www.adultpediatricuro.com



NIH National Institute of
Diabetes and Digestive
and Kidney Diseases

NIH Publication No. 11-5572
April 2011