

National Kidney  
Foundation™

## Nutrition and Peritoneal Dialysis



## National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (NKF-KDOQI™)

The National Kidney Foundation is developing guidelines for clinical care to improve patient outcomes. The information in this booklet is based on the KDOQI™ recommended guidelines for nutrition. All KDOQI™ guidelines provide information and assist your doctor or health care team in making decisions about your treatment. The guidelines are available to doctors and other members of the health care team. If you have any questions about these guidelines, you should speak to your doctor or the health care team at your treatment center.

### Stages of Chronic Kidney Disease (CKD)

In February 2002, the National Kidney Foundation published clinical care guidelines for chronic kidney disease. These help your doctor determine your stage of kidney disease based on the presence of kidney damage and your glomerular filtration rate, which is a measure of your level of kidney function. Your treatment is based on your stage of kidney disease. (See the table below.) Speak to your doctor if you have any questions about your stage of kidney disease or your treatment.

Stages of Kidney Disease		
Stage	Description	Glomerular Filtration Rate (GFR)*
1	Kidney damage (e.g., protein in the urine) with normal GFR	90 or above
2	Kidney damage with mild decrease in GFR	60 to 89
3	Moderate decrease in GFR	30 to 59
4	Severe reduction in GFR	15 to 29
5	Kidney failure	Less than 15

\*Your GFR number tells your doctor how much kidney function you have. As chronic kidney disease progresses, your GFR number decreases.

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## Nutrition and Peritoneal Dialysis

If you are receiving peritoneal dialysis treatments, your diet is an important part of your overall care. This booklet will tell you about some things that are important to your diet including:

- getting the right amount of calories and protein
- getting and maintaining a healthy body weight
- other important nutrients in your diet

phosphorus and calcium

sodium and fluids

potassium

vitamins and minerals

- handling special diet needs

diabetes

vegetarian diets

- how your nutritional health is checked
- other resources that can help you.

This booklet has been written for adults who are receiving peritoneal dialysis treatment. The information is based on recommendations made by the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative. These recommendations have been developed to help your health care team provide the best care for you.

If you are receiving hemodialysis treatment, see *Nutrition and Hemodialysis*. For more information about diets for transplantation, see *Nutrition and Transplantation*. For information about diets for children with chronic kidney disease, see *A Parent's Guide to Nutrition for Children With Chronic Kidney Disease*. All are available from the National Kidney Foundation.

## Getting the Right Amount of Calories

Getting the right amount of calories is important to your overall health and how well you feel. Calories come from all the foods you eat. They are important because they:

- Give your body **energy**
- Help you maintain a **healthy weight**
- Help your body use protein for **building muscles and tissues**.

When you first start peritoneal dialysis, you may have difficulty eating well and getting enough calories. For a while, the dialysis solutions may give you a sense of fullness in your stomach. Eating smaller meals five or six times a day can provide the calories you need during the first weeks on peritoneal dialysis.

Over time, many people gain unwanted weight on peritoneal dialysis. The dialysis fluid used for exchanges contains a sugar called dextrose. Solutions that contain more dextrose help to remove extra fluid from your blood. However, dextrose is an extra source of calories for the body and can lead to unwanted weight gain. And if you have diabetes, the extra sugar from your dialysis solution can cause an increase in your blood sugar. The registered dietitian at your dialysis center can help you plan meals to prevent extra weight gain and high blood sugar. In addition, following the sodium and fluid instructions from your dietitian can help to prevent the need for the high sugar solutions. Your doctor will choose the dialysis solutions for your fluid removal. Also, your doctor may change your diabetic medications to help control blood sugar.

## Working With Your Dietitian

You may feel a bit confused by all the new information about your kidney disease and its treatment. You probably have many questions about your diet. Help is available to you. The staff at your dialysis center includes a registered dietitian with special training in diets for people with kidney disease. This dietitian can answer your questions about your diet and help you plan your meals to get the right foods in the right amounts.

### Steps to Take

- Speak to the registered dietitian at your dialysis center.
- Ask your dietitian to **help you plan meals** with the right amount of calories.
- Keep a **diary** of what you eat. Show this to your dietitian on a regular basis.
- Ask your doctor and dietitian what is your **best weight**. Weigh yourself each day in the morning.
- If you are **losing too much weight**, ask your dietitian how to add extra calories to your diet.
- If you are **slowly gaining too much body weight**, ask for suggestions on safely reducing your daily calorie intake and increasing your activity level.
- If you gain **weight rapidly**, speak to your doctor. A sudden increase in weight, along with swelling, shortness of breath and a rise in your blood pressure may be a sign that you have too much fluid in your body.



## Getting the Right Amount of Protein

Before you started dialysis, you may have been on a low protein diet to limit the amount of waste products in your blood. Now that you have begun peritoneal dialysis, your treatments will remove these waste products. Unfortunately, when your dialysis removes the unwanted wastes, it also carries out some good proteins that your body needs. Eating a higher protein diet can help you replace the lost protein.

Your body needs the right amount of protein for:

- building muscles
- repairing tissue
- fighting infection.

Protein-rich foods to eat daily include:

- fresh meats
- poultry (chicken and turkey)
- fish and seafood
- eggs or egg whites
- small amounts of dairy products.

Some of these protein-rich foods may also contain a lot of phosphorus, a mineral you may need to control in your diet. Your dietitian will help you plan the right amount of each protein source for good health and strength. (For more information about phosphorus, see page 9.)

### Steps to Take

- Ask your dietitian how much protein you need to eat each day.
- Show your daily food diary to your dietitian, and ask if you are eating the right amount of protein.

## Other Important Nutrients in Your Diet

### Sodium and Fluid

Sodium is a mineral found naturally in foods. It is found in large amounts in table salt and in foods that have added table salt such as:

- salty seasonings like soy sauce, teriyaki sauce and garlic or onion salt
- most canned foods (including canned soups and meats)
- most frozen dinners
- processed meats like ham, bacon, sausage and cold cuts
- salted snack foods like chips and crackers
- canned or dehydrated soups (like ramen noodle soup)
- most restaurant meals.

Eating too much sodium can make you thirsty and cause your body to hold more fluid. The extra sodium and fluid can cause:

- swelling or puffiness around eyes, hands or feet
- fluid weight gain
- shortness of breath
- a rise in blood pressure
- more work for your heart.



Be sure to follow your recommended sodium allowance. Learn to flavor your foods with herbs and spices instead of table salt. Do not use salt substitutes containing potassium unless approved by your doctor.

**TIP:** Try using fresh or dried herbs and spices instead of salt to enhance the flavor of your foods. Also, try adding a dash of hot pepper sauce or a squeeze of lemon juice for flavor.

## Phosphorus and Calcium

Phosphorus is a mineral found in all foods. Large amounts of phosphorus are found in:

- milk, yogurt and ice cream
- cheese
- nuts and peanut butter
- dried beans and peas
- dark cola drinks.

Eating foods high in phosphorus will raise the amount of phosphorus in your blood. Dialysis cannot remove all this phosphorus. When phosphorus builds up in the blood, calcium is pulled from the bones. Over time, this may cause bones to become weak and break easily. It may also cause calcium-phosphorus crystals to build up in your joints, muscles, skin, blood vessels and heart. These deposits may cause serious conditions such as bone pain, organ or heart damage, poor blood circulation and skin infection.

To keep blood phosphorus at safe levels, you will need to **limit phosphorus-rich foods**, and you will need to take a medicine called a **phosphate binder**. These binders are taken with every meal and snack.

**TIP:** Using nondairy creamers or recommended milk substitutes in place of milk is a good way to lower the amount of phosphorus in your diet.

Foods that are good sources of calcium are also high in phosphorus. The best way to prevent loss of calcium from your bones is to follow a diet that limits high-phosphorus foods and to take phosphate binders. Your doctor may also recommend that you take a **special prescription form of vitamin D**, called calcitriol, to help keep calcium and phosphorus in balance and prevent bone disease. Do not take over-the-counter vitamin D, however, unless recommended by your kidney doctor.

### Potassium

Potassium is another important mineral found in food. Potassium helps your muscles, and heart, to work properly. Too much or too little potassium in the blood can be dangerous. With peritoneal dialysis, you may need to increase or decrease the amount of potassium in your diet. Each person is different. Your blood level of potassium will be checked every month and your dietitian will help you plan a diet that will give you the right amount of potassium from your foods. If your potassium levels are very low, your doctor may ask you to take a potassium supplement to keep the right amount of potassium in your blood. Large amounts of potassium are found in:

- certain fruits and vegetables (like bananas, oranges, potatoes and some juices)
- milk and yogurt
- dried beans and peas
- most salt substitutes
- protein-rich foods like meats, poultry and fish.

## Vitamins and Minerals

Eating a variety of foods gives your body the vitamins and minerals it needs each day. Your doctor may order special vitamin and mineral supplements for two reasons. Dialysis treatment changes your vitamin needs. Also, your special diet may limit some important food groups. Take only those supplements your kidney doctor orders since certain vitamins and minerals can be harmful if you are on dialysis. Also check with your doctor before using any herbal remedies, as some of these may also be harmful for people with kidney disease.

## Handling Special Diet Needs

### Diabetes and Your Special Diet

You may need to make only a few changes in your diabetic diet to fit your needs on peritoneal dialysis. You may need to eat more protein and fewer carbohydrates. Your dietitian will help develop a meal plan especially for you.

### Vegetarian Diets (Plant-based diets)

Most vegetarian diets are not rich in protein. Eating enough calories is an important way to use these smaller amounts of protein for important jobs like building muscle, healing wounds and fighting infections. Talk with your dietitian about the best choices of vegetable protein with lower amounts of potassium and phosphorus.





Also check your blood protein (albumin) levels closely with your dietitian to make sure you are getting the right amount of calories and protein.

### **How Your Nutritional Health is Checked**

There are several different ways for your doctor and dietitian to know if you are eating the right amount of calories or protein. The following sections explain these tests. If your results are not as good as they should be, ask how to improve them. For more information, see “Understanding Your Lab Values” at the back of this booklet. You may also want to track your important test results by using the Dialysis Lab Log, available by calling the National Kidney Foundation’s toll-free number 800.622.9010.

## Dietary Interviews and Food Diaries

Your dietitian will speak to you at times about your diet. The dietitian may also ask you to keep a record of what you eat each day. If you are not getting enough protein, calories and other nutrients, the dietitian will give you ideas about foods that will improve your diet.

## Lab Tests for Protein Balance

### Serum Albumin

Albumin is a type of protein found in your blood. Your albumin level will be checked by a blood test each month. If your level is too low, it may mean you are not eating enough protein or calories. If your albumin continues to be low, you have a greater chance of getting infections, being hospitalized and not feeling well.

### nPNA (normalized Protein Nitrogen Appearance)

This is another way to find out if you are eating the right amount of protein. This measurement comes from lab studies that include urine collection and blood work. The results help to check protein balance in your body.

## Physical Nutrition Exam

Your dietitian will use a method called **Subjective Global Assessment (SGA)** to check your body for signs of nutrition problems. This involves asking you some questions about your daily food intake and checking the fat and muscle stores in your body. The dietitian will consider:

- changes in your weight
- changes in your face, arms, shoulders, hands and legs
- your food intake
- your activity and energy levels
- problems that might interfere with eating.

## Other Tests That Tell About Your Nutritional Health

### Amount of Dialysis You Receive

About every three to six months, tests will be performed to see if the amount of dialysis you are getting is enough to keep you in overall good health. The tests include a 24-hour urine collection, samples of your dialysis solution and a blood test. This information will measure the amount of dialysis you receive, called  $Kt/V$  (pronounced kay tee over vee) and **creatinine clearance**. A low  $Kt/V$  or a low creatinine clearance indicates you are not getting enough dialysis. Low amounts of dialysis can keep you from feeling well, sleeping soundly or eating well. It is very important to do all your dialysis exchanges as ordered by your doctor to keep your  $Kt/V$  and creatinine clearance levels as high as possible.

### Serum Creatinine

Creatinine is a waste product in your blood that comes from the normal function of your muscles. Your creatinine level may rise as your kidney function falls. Creatinine levels can be lowered by dialysis and by any remaining kidney function. Creatinine can also be lowered by not eating enough calories and protein and from weight loss. If your creatinine level is falling, ask your doctor or dietitian whether this change is related to your diet, dialysis or kidney function.

## Steps to Take

- Ask your doctor and dietitian what tests will be used to check your nutritional health.
- Ask for a copy of the Dialysis Lab Log and track your results.
- If your numbers are not in the normal range, ask your doctor and dietitian how you can improve them.





## **Other Resources**

Many other educational resources are available to help you. You may want to check the following publications from the National Kidney Foundation:

*Nutrition and Hemodialysis*

*Nutrition and Transplantation*

*Dining Out with Confidence: A Guide for Kidney Patients*

*How to Increase Calories in Your Special Diet*

*Keep Phosphorus Under Control*

*Keep Potassium Under Control*

*Keep Sodium Under Control: Spice Up Your Cooking*

*Vitamins and Minerals in Kidney Disease*



## Understanding Your Lab Values

Some or all of the following tests may be used to check your nutrition and general health. Ask your doctor and dialysis care team which tests you will have and how often they will be done. If your numbers are not in the normal range, ask how to improve them.

**Serum Albumin:** Albumin is a type of protein made from the protein you eat each day. A low level of albumin in your blood may be caused by not getting enough protein and calories from your diet. A low level of albumin may lead to health problems, such as difficulty fighting off infections. Ask your dietitian how to get the right amount of protein and calories from your diet.

**Blood Pressure:** Ask your doctor what your blood pressure should be. If your blood pressure is high, make sure to follow all the steps in your prescribed treatment. These steps may include taking high blood pressure medications, cutting down on the amount of salt in your diet, losing weight if you are overweight and following a regular exercise program.

**Blood Urea Nitrogen (BUN):** Urea nitrogen is a normal waste product in your blood that comes from the breakdown of protein from foods you eat. Healthy kidneys remove BUN from your blood, but when kidney failure occurs, your BUN rises. BUN is also removed from your blood by your dialysis. Your

BUN rises from not getting enough dialysis or from eating too much protein. It can fall from getting more dialysis or from eating the right amount of protein recommended by your doctor and dietitian.

### Body Weight:

Maintaining a healthy weight is important to your overall health. If you are losing weight without even trying, you may not be getting the right nutrition to stay healthy. Your dietitian can suggest how to safely add extra calories to your diet. On the other hand, if you are slowly gaining unwanted weight, you may need to reduce calories and increase your activity level. A sudden weight gain may also be a problem. If it is accompanied by swelling, shortness of breath and a rise in blood pressure, it may be a sign of too much fluid in your body. You should check your weight at home every morning. Speak to your doctor if your weight changes suddenly.

### Calcium:

Calcium is a mineral that is important for strong bones. Ask your doctor what your calcium level should be. To help balance the amount of calcium in your blood, your doctor may ask you to take calcium supplements or a special prescription form of vitamin D. Take only the medications recommended by your doctor.

## Cholesterol:

### Total

Cholesterol is a fat-like substance found in your blood. A high cholesterol level may increase your risk of having heart and circulation problems. However, a cholesterol level that is too low may mean you are not eating well enough to stay healthy. Ask your doctor if your cholesterol level is in the right range.

### HDL

HDL cholesterol is a type of “good” cholesterol that protects your heart. For many dialysis patients, the target level for HDL cholesterol is above 35.

### LDL

LDL cholesterol is a type of “bad” cholesterol. A high LDL level may increase your chance of having heart and circulation problems. For many dialysis patients, the target level for LDL cholesterol is below 100. If your LDL level is too high, your doctor may recommend changing your diet and increasing your activity level.

## Serum Creatinine:

Creatinine is a waste product in your blood that comes from the normal function of your muscles. Healthy kidneys remove creatinine from your blood, but when the kidneys are not working, your creatinine level rises. Your dialysis also removes creatinine from your blood. Not getting enough

dialysis can cause your creatinine level to rise, while getting more dialysis causes it to fall. Your creatinine level can also fall from not eating well over a long period of time.

**Creatinine Clearance:** Creatinine clearance is another measure of how well your dialysis clears wastes from your blood. Your dialysis care team will check your weekly creatinine clearance about once every four months to make sure you are getting the right amount of dialysis.

**Hematocrit:** Your hematocrit is a measure of the red blood cells your body is making. A low hematocrit can mean you have anemia and need treatment with EPO and extra iron. You will feel less tired and have more energy when your hematocrit is at least 33 to 36 percent.

**Hemoglobin:** Hemoglobin is the part of red blood cells that carries oxygen from your lungs to all the tissues in your body. Measuring your hemoglobin level tells your doctor if you have anemia, which makes you feel tired and have little energy. To treat your anemia, you may need to take a hormone called EPO along with iron. The goal of anemia treatment is to reach and maintain a hemoglobin level of at least 11 to 12.

Iron:

TSAT and  
Serum Ferritin

Your TSAT (pronounced tee sat) and serum ferritin (pronounced ferry tin) are measures of iron in your body. Your TSAT should be above 20 percent, and your serum ferritin should be above 100. This will help you build red blood cells. Your doctor will recommend iron when needed to reach your target levels.

Kt/V:

Kt/V (pronounced kay tee over vee) is a measure of the amount of dialysis you receive. Getting the right amount of dialysis is important to your overall health and can also affect how well you eat. Your target weekly Kt/V should be at least 2.0 for CAPD, 2.1 for CCPD and 2.2 for NIPD.

nPNA:

Your nPNA (normalized Protein Nitrogen Appearance) is a test that may tell if you are eating enough protein. This measurement comes from lab studies that include urine collection and blood work. Your dietitian may ask for an accurate food record to go with this test.

### Parathyroid Hormone (PTH):

High levels of parathyroid hormone (PTH) may result from a poor balance of calcium and phosphorus in your blood. This can cause bone disease. Ask your doctor if your PTH level is in the right range. Your doctor may order a special form of vitamin D to help lower your PTH. Caution: Do not take over-the-counter vitamin D unless ordered by your kidney doctor.

### Phosphorus:

A high phosphorus level in your blood can lead to weak bones, itching, bone pain and hardening of blood vessels. Ask your doctor what your phosphorus level should be. If your level is too high, your doctor may ask you to reduce your intake of foods that are high in phosphorus and take a phosphate binder with all your meals and snacks.

### Potassium:

Potassium is a mineral that helps your heart and muscles work properly. A potassium level that is too high or too low may weaken muscles and change your heart-beat. Whether you need to change your intake of high-potassium foods varies with each person on peritoneal dialysis. Ask your doctor or dietitian what your potassium level should be. Your dietitian can help you plan your meals to get the right amount of potassium.

Subjective Global  
Assessment (SGA):

Your dietitian may use SGA to help check for signs of nutrition problems. The dietitian will ask you some questions about your daily diet and check your weight and the fat and muscle stores in your face, hands, arms, shoulders and legs. Ask your dietitian about your score on the SGA. If your score is too low, ask how to improve it.

Triglyceride:

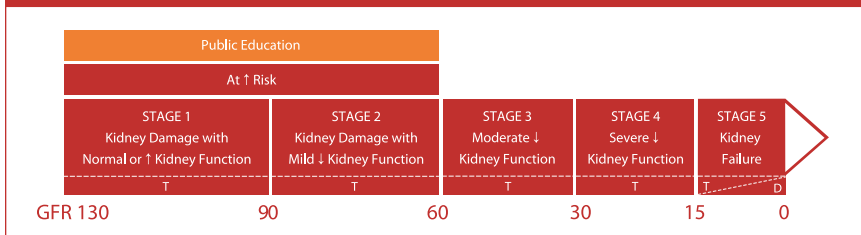
Triglyceride is another type of fat found in your blood. A high triglyceride level, along with high levels of total and LDL cholesterol, may increase your chance of having heart and circulation problems.

Urea Reduction  
Ratio (URR):

URR is another measure of how well your dialysis treatments are working to clear wastes from your blood. It uses blood tests but does not include urine collection. Your target URR should be 65 percent or higher.

More than 20 million Americans—one in nine adults—have chronic kidney disease, and most don't even know it. More than 20 million others are at increased risk. The National Kidney Foundation, a major voluntary health organization, seeks to prevent kidney and urinary tract diseases, improve the health and well-being of individuals and families affected by these diseases, and increase the availability of all organs for transplantation. Through its 47 affiliates nationwide, the foundation conducts programs in research, professional education, patient and community services, public education and organ donation. The work of the National Kidney Foundation is funded by public donations.

## Education Along the Continuum of Care



This arrow illustrates the potential scope of content for KLS resources. Lightshaded boxes indicate the scope of content targeted in this resource.  
GFR = Glomerular Filtration Rate; T = Kidney Transplant; D = Dialysis

## PARTNERS IN EDUCATION



United Resource Networks



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