

Lifeline for a Lifetime:

Planning for Your Vascular Access



www.esrdncc.org





Contents

Introduction.....	3
Starting Out: Understanding My Treatment Choices.....	3
Step #1: Making an Access Plan	5
Step #2: Finding the Best Place for My Access.....	6
Step #3: Going to See the Surgeon	7
Step #4: Going for Surgery	9
Step #5: Waiting For My Access to Mature or Heal	12
Step #6: Using My Fistula or My Graft.....	13
Step #7: Getting My Catheter Taken Out.....	15
Step #8: Taking Care of My Lifeline for a Lifetime.....	16
Appendix	17

Introduction

Kidney failure means that your kidneys can't clean your blood of the waste products and the fluid that builds up in your body. When your kidneys start to fail, it may take a few years for them to stop working. Once they stop working, it is called kidney failure.

If you have kidney failure, you will need dialysis or a kidney transplant to stay alive. A kidney transplant is surgery to place a healthy kidney into a person with kidney failure. Most people need to do dialysis while they are checked to see if they can get a transplant. The amount of time you have to wait for a new kidney is different for every person. It depends on a lot of things. Your practitioner or dialysis care team will help you understand what this means for you.

Starting Out: Understanding My Treatment Choices

When you start dialysis, you may have questions about your treatment choices. There are three main types of treatment:

- **Hemodialysis (HD):** a type of dialysis done at home or in a clinic;
- **Peritoneal dialysis (PD):** another type of dialysis that is done at home; and
- **Kidney transplant:** receiving a new kidney from a living or deceased donor.

If you think peritoneal dialysis is the best for you, you will need to have an access made especially for PD. Talk to your care team about this type of access.

Your dialysis care team can help you learn more about each choice.

How Do I Choose a Treatment?

It is important for you to review each of your treatment choices. If you have questions about the types of treatments, there are materials in the appendix that you can review. Talk with your practitioner or dialysis care team to help you decide which is the best choice for you.

If you think hemodialysis is best for you, you will need to have a vascular access made. You need this so your blood can be cleaned by the dialysis machine.

I Am Going to Do Hemodialysis and Need an Access Plan

If you and your dialysis care team decide that hemodialysis is the best choice for you, you will need to have a vascular access made. This is important because an access is your lifeline for a lifetime. Your dialysis care team will tell you about the types of vascular accesses you can have. For most people, an AV fistula is the best type of access. You need a vascular access so blood can flow in and out of the dialysis machine. The dialysis machine will clean your blood of the wastes and fluids that have built up as it moves in and out of the machine.

This guide is meant to help you get started in making a vascular access for hemodialysis. In order to get started, you will need an access plan to help guide you through all the steps to-

The guide below lists all the steps in your access plan. You can use this guide to keep track of the access planning steps. After you review all the steps, you should be able to see what step you are on. Some of you may need to start at the beginning and go through all the steps. Some of you may already have an access in place. If you are at Step 8, you should be doing your daily one minute access check.

Step #	Step Name	What Does This Step Mean For Me?
Step 1	Making an access plan	This step shows you what is in an access plan. Once you review it, you will see what step you are on.
Step 2	Finding the best place for my access	This step tells you how the surgeon will find the best place for your access to go.
Step 3	Going to see the surgeon	You will need to go see the surgeon before you get scheduled for your surgery. This step tells you how to prepare for the visit and what will happen on the visit.
Step 4	Going for surgery	This is a big step, so make sure you read it carefully. You will learn what will happen when you go for surgery and about going back to see the surgeon.
Step 5	Waiting for my access to mature or heal	How long this step takes will depend on what kind of access you have. Your dialysis care team will help you understand what this means for you.
Step 6	Using my access	This step tells you what to expect when the dialysis care team starts to use your access for your dialysis. They will have a plan for how to do this.
Step 7	Getting my catheter out	Once you are using your access without any problems, you will need to go to have your catheter taken out.
Step 8	Taking care of my lifeline for a lifetime	This step tells you how to do your daily one minute access check. Your care team will teach you how to do the check.

Step #1: Making an Access Plan

What is an access plan?

In order to get started, you will need an access plan to help guide you through all the steps toward a fistula or graft. You and your dialysis care team will make this plan together. For most people, a fistula is the best type of access. An access plan helps guide you through the steps you need to take in order to make sure you have the best access for you. It is important to note that you may need more than one access over your lifetime. There is a simple checklist in this manual that will help you keep track of your plan. Make sure you have a copy of the plan.

The eight steps in your access plan are:

1. Making my access plan
2. Finding the best place for my access
3. Going to see the surgeon
4. Going for surgery
5. Waiting for my access to mature or heal
6. Using my access
7. Getting my catheter out
8. Taking care of my lifeline for a lifetime



Step #2: Finding the Best Place for My Access

How will the surgeon know what type of access is best for me and where it should go?



To find the best place for your access, the surgeon needs to have a picture of your blood vessels before he or she does surgery. This test is called “vessel mapping.” It is a simple test done with an ultrasound machine. No needles are used during the test.

Some surgeons do their own vessel maps. But since not all do, you might need to go to someone other than your surgeon to have the map done. This test will be set up by either your surgeon or your dialysis care team.

After the test, your surgeon will review the vessel map. The map will help the surgeon decide what type of access is the best for you and where it should go.

I have my vessel map. What should I do now?

While you are waiting to meet with your surgeon, you need to take care of your veins. Here are some tips to help you do that.

DO:

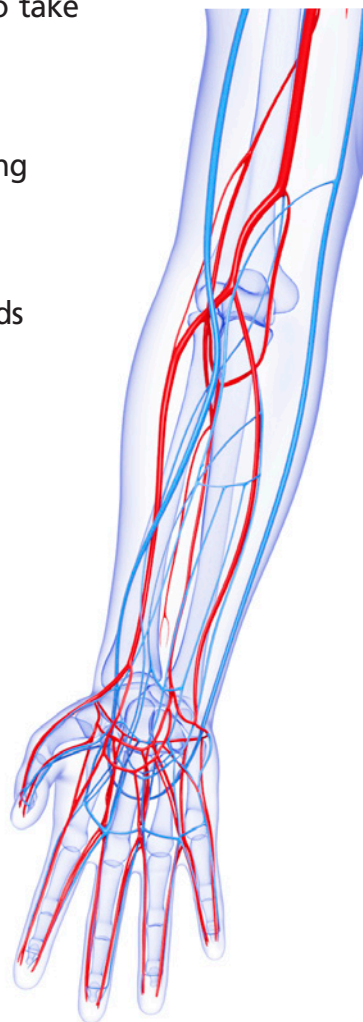


- Tell the person taking your blood that you are going to have an access in your arm, or that you already have one in your arm.
- Ask them to use the veins on the back of your hands

DON'T:



- Let anyone take blood from the veins in your arms above your wrists.
- Let anyone give you a shot in your upper arm.
- Let anyone take your blood pressure in the arm with your access.



Step #3: Going to See the Surgeon

Why do I need to go see the surgeon before my surgery is scheduled?

The surgeon is an expert at making vascular accesses. He or she needs to see you before surgery to make sure you are ready. Be sure you know where to go for the visit. Allow plenty of time to make it to your visit. Take a list of questions with you to ask about what to expect when you have the surgery to make your vascular access.

A list of questions which you can take with you is available in the back of this manual.

At your appointment, your surgeon will review your vessel map. The map will help the surgeon see what type of access is best for you and where it should be placed. The surgeon will also record your medical history and check the blood vessels in your arms. He or she will ask you about:

- Your health
- IV lines you have had
- Your medicines
- Allergies
- Other surgeries you have had

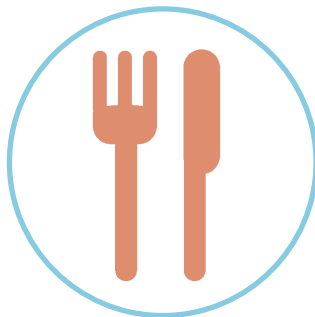
These are questions most people have about their surgery. Your surgeon can answer these for you:

- Should I take all my medicines before I come in for my surgery?
- How long will I be at the hospital or surgery center when I have my **surgery**?
- Will I need to be put to sleep for the surgery?
- Will I have to stay in the hospital overnight?
- Should someone come with me?
- Can I drive myself home after my surgery?
- Will you give me something for pain to take home with me?
- Can I use my arm after I have surgery?
- Will the arm with my access look different?

Ask your surgeon to:

- Talk with your dialysis care team so they know the plans for your surgery
- Send your care team a report from your visit
- Give you a copy of the report, too





How can I stay healthy before surgery?

Once the surgeon has seen you, he or she will make sure you have a date for surgery scheduled. It may be a few weeks before you go in for surgery. You should take good care of yourself until then.

- Go to all your dialysis treatments.
- Stay on the dialysis machine for your full treatment time.
- Stick to the diet made especially for you.
- Take your medications.
- Get enough rest.
- Try to exercise every day.
- Take care of the veins in your arms.
- Let your care team know the date your surgery is scheduled.

My Visit to the Surgeon

If the visit is on your dialysis day:

- Your dialysis care team will help you work this out.
- You will need to do both.
- You may need to change your dialysis day.
- Your care team will help you make the change.

If the visit is not on your dialysis day:

- You are good to go
- If you have questions, ask the dialysis care team to help you



Step #4: Going for Surgery

What is going to happen when I go for surgery?

Going in for surgery is your next step. This is when you will have a fistula made or a graft placed. Your surgery to get your access could take place at a surgery center or hospital. Make sure you know how to get there and give yourself enough time to do so. The surgery team will tell you what to do before you come in for surgery.

When you go for surgery you will be seen by several people on the team. Some of the questions they ask you will be the same. Try not to get upset by all this—they want to make sure you are safe. Here are some of the things you need to know to be prepared.

What do I need to do to get ready for surgery?

Make a list of your medicines to take with you. The surgery team will need to know if you take:

- A blood thinner
- Medicine for a heart problem, diabetes, pain, anxiety, depression, or psychiatric illness
- Over-the-counter medicines like herbs, vitamins, or minerals
- Home remedies

Tell the surgery team other health information such as if you:

- Have allergies
- Have a pacemaker or other heart device
- Have sleep apnea
- Have had a problem with anesthesia
- Are pregnant
- Are allergic to latex
- Smoke
- Drink alcohol
- Do not agree to take blood transfusions

When is My Surgery Scheduled?

If your surgery is on your dialysis day:

- Your dialysis care team will help you work this out.
- You will need to do both.
- You may need to change your dialysis day.
- Your care team will help you make the change.

If your surgery is not on your dialysis day:

- You are good to go.
- If you have questions, ask the care team to help you.



On the day of your surgery

Take off nail polish and artificial nails. Wear glasses, not your contacts. Do not put on lotion, cream, deodorant, powder, makeup or perfume.

Make sure you have the contact information for the surgery team and your dialysis care team.

After your surgery

You might have to go to the recovery room for a while. Before you leave to go home, a member of the surgery team will give you:

- A handout on how you can take care of your access
- A prescription for pain medicine
- The date and time to come back to have your access checked

Also, before you leave, ask the surgery team to:

- Send a report to the dialysis care team with a drawing of your access
- Give you a copy of the report

Here are some of the things you need to know after your surgery.

What do I need to do while my surgery site is healing?

Do not let the area around your incision get wet. Your surgeon will tell you how to take care of your surgery site. Make sure you understand what he/she wants you to do and for how long you should do it.

Tell your dialysis care team that you have had your surgery. Ask them to check the site to make sure it is healing properly.

Ask the dialysis care team how to contact them and the surgeon during business hours and after hours.



Let your dialysis care team know:

- If your sites are bleeding or leaking other fluid.
- If your surgery site is getting red, is hot, or starts to swell.
- If you start having more pain.

Let the surgeon know:

- If your hand starts to hurt a lot, gets numb, becomes weak, or feels cold.

Step #5: Waiting For My Access to Mature or Heal

Fistula or Graft?

Your surgeon should tell you and the dialysis care team what kind of access you have. It will be either a fistula or a graft. A fistula is made by joining your own artery to your own vein. When the surgeon places a graft, he or she will use a plastic tube to connect an artery to a vein. If you are not sure what you have, ask your care team to tell you.

If You Have a Fistula: Going Back to See the Surgeon

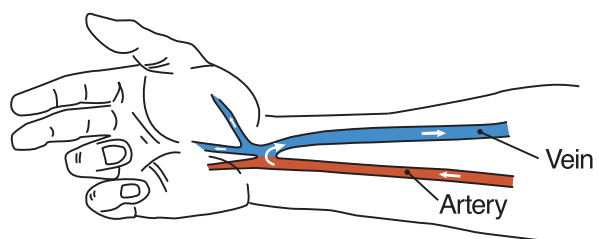
Most surgeons will ask you to see them about two weeks after the surgery so they can make sure your access is healing as it should.

After that, most surgeons will also ask you to come back again about six weeks after your surgery. On this visit, they will want to make sure the fistula is growing as it should. It can take several weeks for the fistula to grow enough to use it. The surgeon will let you know when it is ready to use.

If it is not growing as it should, you may need to have some tests. The tests might be:

- An ultrasound test
- A test where they put dye in your access and take x-rays

Many access problems can be fixed if they are found early.



Fistula

If You Have a Graft: Going Back to See the Surgeon

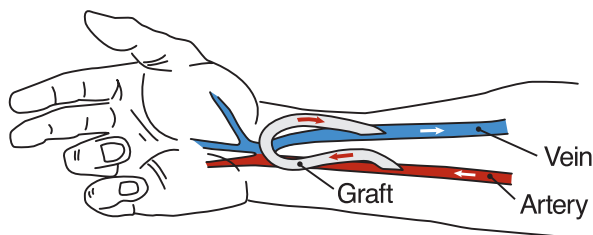
Most surgeons will ask you to see them about two weeks after the surgery so they can make sure your access is healing as it should.

At this visit, the surgeon will let you know when you can use your graft. A graft may be ready to use in three to four weeks.

If there is a problem with your graft, you may need to go for tests. Those tests might be:

- An ultrasound test
- A test where they put dye into the access and take x-rays.

Many access problems can be fixed if they are found early.



Graft

Step #6: Using My Fistula or My Graft

When can I start using my fistula for my treatments?

If you have a fistula, it will take several weeks for it to grow before you can start using it. How will you know when your fistula is ready to use? The dialysis care team will check your fistula each time you have dialysis. They will also teach you how to check it and what you should check for. You will need to check your fistula every day.

If the care team has questions about how it is growing, they may send you back to see the surgeon who put it in, a kidney doctor who is an access expert, or an x-ray doctor who knows about accesses.

If there is a problem, you may need to have it fixed.

The care team will be able to tell when your fistula is ready. They will talk with your surgeon about starting to use your fistula. When your fistula is ready for use, your care team will have a plan for how to put the needles in your fistula. The plan will include these steps:

- Putting one needle into your fistula and using your catheter, too.
- Using small needles for your fistula.
- Using your fistula with needles that are a bit bigger.

Many patients have questions about the needles when they start using their access. Ask your care team. There is a list of questions in the appendix which you may want to ask.

These steps will take a few weeks. When your care team is sure your fistula is working well, you and your care team can start making plans to get your catheter taken out. Make sure you are doing your **one minute access check**.

Look



Listen



Feel



When can I start using my graft for my treatments?

It will take a few weeks for your graft to heal before it can be used for dialysis. How will you know when it is time to start using it? The care team will check your graft each time you have dialysis. They will also teach you how to check your graft and what you should check for. You will need to check your graft each day.

The care team will be able to tell when your graft is ready and will talk with your surgeon about starting to use your graft. Most of the time, this will be three to four weeks after it was put in. If the care team has questions about whether it is ready or not, they may send you back to see the surgeon who put it in, a kidney doctor who is an access expert, or an x-ray doctor who knows about accesses. If there is a problem, you may need to have it fixed.

The care team will have a plan for how they put the needles into your graft. The plan will tell them to:

- Put a needle into both parts of your graft.
- Use needles that are the best size for your graft.

When they are sure your graft is working well, you and your care team can start making plans to have your catheter taken out. Make sure you do your one minute access check while you are waiting to use the graft. Go to Step 8 to learn how to do the one minute access check.

Many patients have questions about the needles when they start using their access. Ask your care team if you have any questions. There is a list of questions in the appendix which you may want to ask.



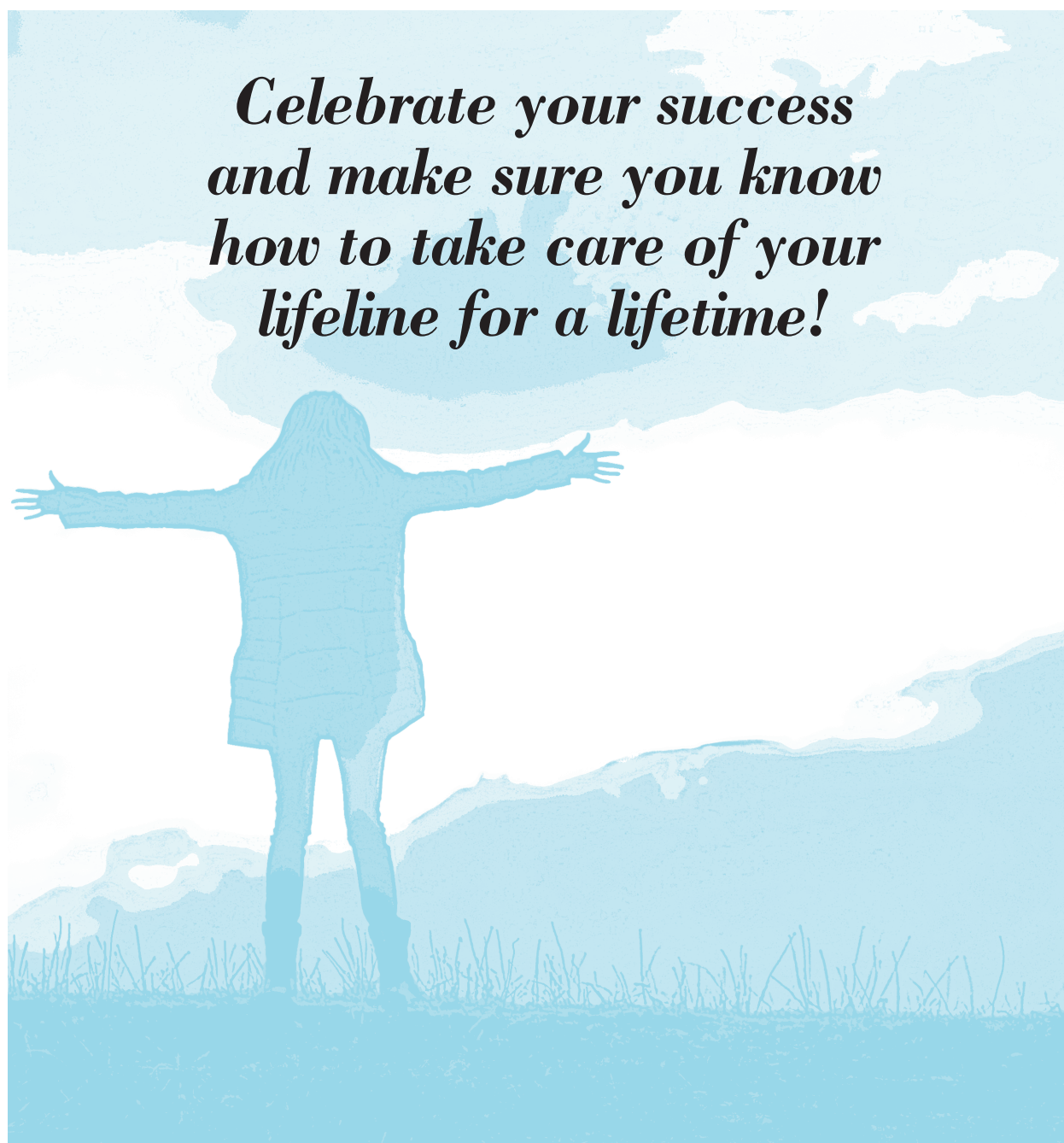
Step #7: Getting My Catheter Taken Out

When can I have my catheter taken out?

When the dialysis care team is sure your access is working well, they will send you to have your catheter taken out. This may be done:

- In the surgeon's office
- At the access center
- In the x-ray department

Be sure to let your dialysis care team know that your catheter has been taken out.



Step #8: Taking Care of My Lifeline for a Lifetime

How do I check my access to make sure it is working like it should?

To make sure your access keeps working well, you should do your **one minute access check** to save your lifeline for a lifetime. Ask your dialysis care team to teach you how to do this. If you are already doing your dialysis access checks, keep up the good work!

What will happen if I have a problem with my access?

It is important to make sure your lifeline for a lifetime keeps working as it should. Sometimes there will be problems with your access and you may have to go for tests. If the tests show a problem that can be fixed, it might be fixed on that day. Other problems might need to be fixed with surgery.

In a new fistula or graft, some problems may come up when you are waiting for it to grow or heal. Others may happen when you start using it. If there is a problem, the dialysis care team will send you to the surgeon, a kidney doctor who is an access expert, or an x-ray doctor who knows how to work on accesses.

If your fistula or graft has been in for a while, you and your care team may find a problem when you do the one minute access check. If that happens, they will send you to a surgeon, a kidney doctor who is an access expert, or an x-ray doctor who knows how to work on accesses. They will check your access to find the problem. Again, many problems can be fixed on that day.

Doing your daily one minute access checks will help keep your lifeline for a lifetime healthy and working well.

There are resources in the appendix to help you plan for and check your lifeline for a lifetime.



My Access Plan

Use the table on the next page as a guide through the eight steps of your access plan. You can keep track of the steps along the way.

- A.** Review all the steps, and pick which step you are on.
- B.** Check with your care team to make sure you picked the right step.
- C.** Work together with your care team to get things scheduled.
- D.** Put the dates on the checklist.
- E.** If you miss a date or it changes, your care team will work with you to make sure you stay on track.
- F.** Each time you complete a step, write in the date it was done.
- G.** When you are on step 7, you can start doing your daily one minute access check.
- H.** Keep up the good work!

Notes

MY ACCESS PLAN

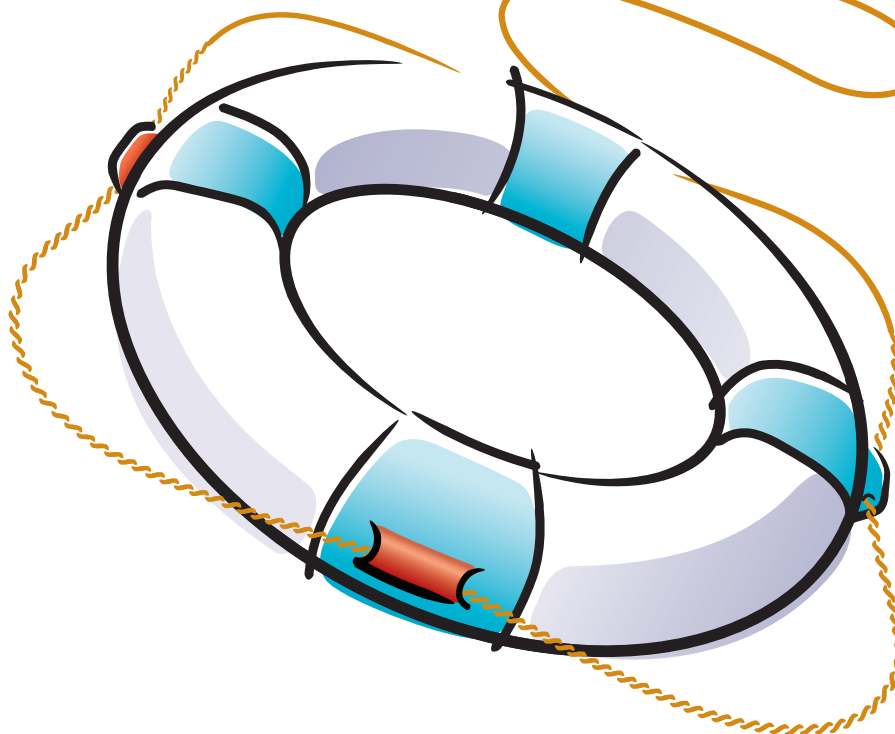
Step #	Step Name	Date Scheduled	What Does This Step Mean For Me?	Date Step Completed
Step 1	Making an access plan		This step shows you what is in an access plan. Once you review it, you will see what step you are on.	
Step 2	Finding the best place for my access		This step tells you how the surgeon will find the best place for your access to go.	
Step 3	Going to see the surgeon		You will need to go see the surgeon before you get scheduled for your surgery. This step tells you how to prepare for the visit and what will happen on the visit.	
Step 4	Going for surgery		This is a big step, so make sure you read it carefully. You will learn what will happen when you go for surgery and about going back to see the surgeon.	
Step 5	Waiting for my access to mature or heal		How long this step takes will depend on what kind of access you have. Your dialysis care team will help you understand what this means for you.	
Step 6	Using my access		This step tells you what to expect when the dialysis care team starts to use your access for your dialysis. They will have a plan for how to do this.	
Step 7	Getting my catheter out		Once you are using your access without any problems, you will need to go to have your catheter taken out.	
Step 8	Taking care of my lifeline for a lifetime		This step tells you how to do your daily one minute access check. Your care team will teach you how to do the check.	

Appendix

What should I expect when the needles are put in and taken out?

Many patients have questions about the needles when they start using their access. Ask your care team if you have any questions. Here are some of the questions you may want to ask them:

- Do the needles hurt when they go in?
- If the needles hurt me, is there something that can be done to help with the pain?
- What can I do to get used to the needles?
- Will I have any problems with the needles during my treatment?
- How can we make sure the needles stay in during my treatment?
- Am I going to put the needles in or will the dialysis care team?
- What will happen when you take the needles out?
- What should I do if my access starts to bleed when I am not at the dialysis clinic?



[illegible]

***The ESRD National Coordinating Center and the
Fistula First Catheter Last Workgroup Coalition
thank the ESRD Networks, provider community,
and renal experts for their invaluable work
which helped to develop this tool.***



End Stage Renal Disease National Coordinating Center

website: www.esrdncc.org • e-mail: ncc@ncc.esrd.net • (516) 209-5253



www.facebook.com/esrd.ncc



@ESRDNCC



This publication was developed under Contract Number HHSM-500-2013-NW002C, titled "End Stage Renal Disease National Coordinating Center (ESRD NCC)," sponsored by the Centers for Medicare & Medicaid Services (CMS), Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy.

Kidney Failure

CHOOSING A TREATMENT THAT'S RIGHT FOR YOU

Excerpts from the Booklet

NIDDK | NATIONAL INSTITUTE OF
DIABETES AND DIGESTIVE
AND KIDNEY DISEASES

NATIONAL INSTITUTES OF HEALTH
National Institute of Diabetes and Digestive and Kidney Diseases



Contents

Introduction 1

When Your Kidneys Fail 1

Treatment Choice: Hemodialysis 2

Treatment Choice: Peritoneal Dialysis 9

Treatment Choice: Kidney Transplantation 14

Points to Remember 20

Acknowledgments 23



Introduction

Your kidneys filter wastes from your blood and regulate other functions of your body. When your kidneys fail, you need treatment to replace the work your kidneys normally perform.

Developing kidney failure means you have some decisions to make about your treatment. You may choose to forgo treatment. If you choose to receive treatment, your choices include hemodialysis, which requires a machine used to filter your blood outside your body; peritoneal dialysis, which uses the lining of your belly to filter your blood inside the body; and kidney transplantation, in which a new kidney is placed in your body. Each treatment has advantages and disadvantages. Your choice of treatment will have a big impact on your day-to-day lifestyle, such as being able to keep a job if you are working. You are the only one who can decide what means most to you. Reading this booklet is a good way to learn about your options so you can make an informed choice. And, if you find that your choice is not a good fit for your life, you can change treatments. With the help of your health care team, family, and friends, you can lead a full, active life.



When Your Kidneys Fail

Healthy kidneys clean your blood by removing excess fluid, minerals, and wastes. They also make hormones that keep your bones strong and your blood healthy. When your kidneys fail, harmful wastes build up in your body, your blood pressure may rise, and your body may retain excess fluid and not make enough red blood cells. When this happens, you need treatment to replace the work of your failed kidneys.

Treatment Choice: Hemodialysis

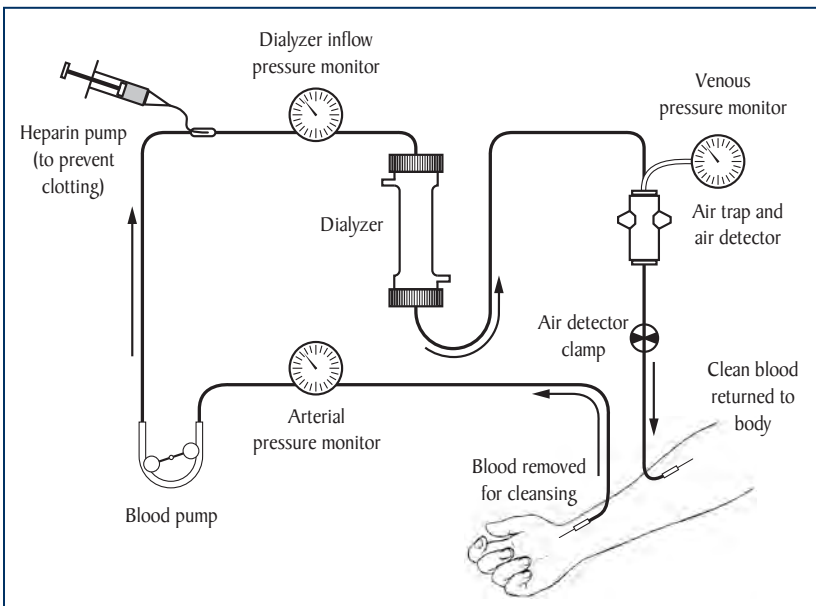
Purpose

Hemodialysis cleans and filters your blood using a machine to temporarily rid your body of harmful wastes, extra salt, and extra water. Hemodialysis helps control blood pressure and helps your body keep the proper balance of important chemicals such as potassium, sodium, calcium, and bicarbonate.

Dialysis can replace part of the function of your kidneys. Diet, medications, and fluid limits are often needed as well. Your diet, fluids, and the number of medications you need will depend on which treatment you choose.

How Hemodialysis Works

Hemodialysis uses a special filter called a dialyzer that functions as an artificial kidney to clean your blood. The dialyzer is a canister connected to the hemodialysis machine.



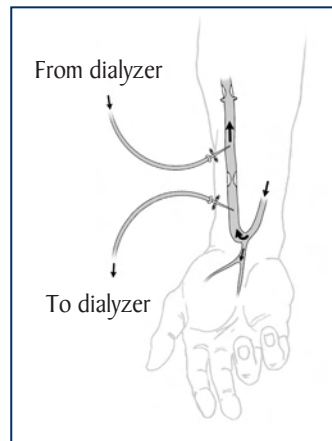
Hemodialysis.

During treatment, your blood travels through tubes into the dialyzer, which filters out wastes, extra salt, and extra water. Then the cleaned blood flows through another set of tubes back into your body. The hemodialysis machine monitors blood flow and removes wastes from the dialyzer.

Hemodialysis is usually done three times a week. Each treatment lasts from 3 to 5 or more hours. During treatment, you can read, write, sleep, talk, or watch TV.

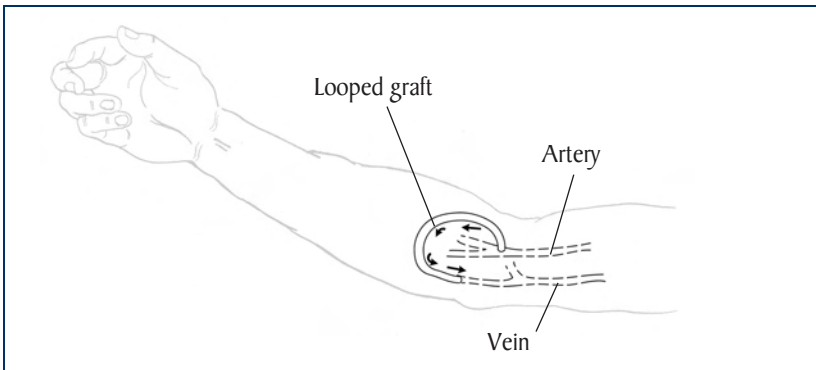
Getting Ready

Several months before your first hemodialysis treatment, an access to your bloodstream will need to be created. You may need to stay overnight in the hospital, but many patients have their access created on an outpatient basis. This access provides an efficient way for blood to be carried from your body to the dialyzer and back without causing discomfort. The two main types of access are a fistula and a graft.



Arteriovenous fistula.

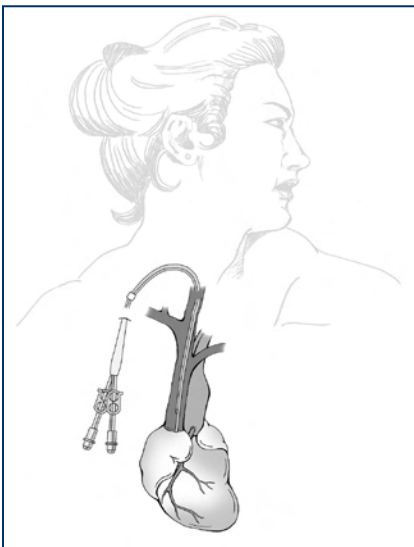
- A surgeon makes a fistula by using your own blood vessels; an artery is connected directly to a vein, usually in your forearm. The increased blood flow makes the vein grow larger and stronger so it can be used for repeated needle insertions. This kind of access is the preferred type. It may take several weeks to be ready for use.
- A graft connects an artery to a vein by using a synthetic tube. It doesn't need to develop as a fistula does, so it can be used sooner after placement. But a graft is more likely to have problems with infection and clotting.



Graft.

Before dialysis, needles are placed into the access to draw out the blood.

If your kidney disease has progressed quickly, you may not have time to get a permanent vascular access before you start hemodialysis treatments. You may need to use a catheter—a small, soft tube inserted into a vein in your neck, chest, or



Catheter for temporary access.

leg near the groin—as a temporary access. Some people use a catheter for long-term access as well. Catheters that will be needed for more than about 3 weeks are designed to be placed under the skin to increase comfort and reduce complications.

For more information about vascular access, see the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) fact sheet *Vascular Access for Hemodialysis*.

Who Performs Hemodialysis

Hemodialysis is most often done in a dialysis center by patient care technicians who are supervised by nurses. Medicare pays for three hemodialysis treatments each week. If you choose in-center treatment, you will have a fixed time slot three times per week on Monday-Wednesday-Friday or Tuesday-Thursday-Saturday. If you do not get the time slot you want at first, you can ask to be put on a waiting list for the time slot you prefer. For a special event, you may be able to trade times with someone else. You will want to think about the dialysis schedule if you work or have children to care for. Some centers offer in-center nocturnal dialysis. This treatment is done for a longer period at night, while you sleep at the center. Getting more dialysis means fewer diet and fluid limits, and this treatment leaves your days free for work, child care, hobbies, or other tasks.

You can choose to learn how to do your own hemodialysis treatments at home. When you are the only patient, it is possible to do longer or more frequent dialysis, which comes closer to replacing the steady work healthy kidneys do. Daily home hemodialysis (DHHD) is done 5 to 7 days per week for 2 to 3 hours at a time, and you set the schedule. If your health plan will pay for more than three treatments, you might do the short treatments in the mornings or in the evenings. Nocturnal home hemodialysis (NHHD) is done 3 to 6 nights per week while you sleep. Either DHHD or NHHD will allow a more normal diet and fluids, with fewer blood pressure and other medications. Most programs want people doing hemodialysis at home to have a trained partner in the home while they do treatments. Learning to do home hemodialysis is like learning to drive a car—it takes a few weeks and is scary at first, but then it becomes routine. The dialysis center provides the machine and training, plus 24-hour support if you have a question or problem. New machines for home dialysis are smaller and easier to use than in-center ones.

You have a choice of dialysis centers, and most towns have more than one center to choose from. You can visit a center to see if it has the treatments you want or the time slot you need. Some centers will let you use a laptop or cell phone or have visitors, and others will not. Medicare has a list of all U.S. centers on its Dialysis Facility Compare website (www.medicare.gov/dialysis) with quality ratings for each. Your health plan may have a list of centers you can use. If you choose in-center treatment, you may want the center to be close to your home to reduce your travel time. If you do a home treatment, once you are trained you only need to visit the center once a month. So, the center can be as far away as you are willing to travel once a month.

Possible Complications

Vascular access problems are the most common reason for hospitalization among people on hemodialysis. Common problems include infection, blockage from clotting, and poor blood flow. These problems can keep your treatments from working. You may need to undergo repeated surgeries in order to get a properly functioning access.

Other problems can be caused by rapid changes in your body's water and chemical balance during treatment. Muscle cramps and hypotension—a sudden drop in blood pressure—are two common side effects. Hypotension can make you feel weak, dizzy, or sick to your stomach.

You'll probably need a few months to adjust to hemodialysis. Side effects can often be treated quickly and easily, so you should always report them to your doctor and dialysis staff. You can avoid many side effects if you follow a proper diet, limit your liquid intake, and take your medicines as directed.

Diet for Hemodialysis

Hemodialysis and a proper diet help reduce the wastes that build up in your blood. A dietitian is available at all dialysis centers to help you plan meals according to your doctor's orders. When choosing foods, remember to

- eat balanced amounts of high-protein foods such as meat, chicken, and fish.
- control the amount of potassium you eat. Potassium is a mineral found in salt substitutes; some fruits, such as bananas and oranges; vegetables; chocolate; and nuts. **Too much potassium can be dangerous to your heart.**
- limit how much you drink. When your kidneys aren't working, water builds up quickly in your body. Too much liquid makes your tissues swell and can lead to high blood pressure, heart trouble, and cramps and low blood pressure during dialysis.
- avoid salt. Salty foods make you thirsty and make your body hold water.
- limit foods such as milk, cheese, nuts, dried beans, and dark colas. These foods contain large amounts of the mineral phosphorus. Too much phosphorus in your blood causes calcium to be pulled from your bones, which makes them weak and brittle and can cause arthritis. To prevent bone problems, your doctor may give you special medicines, which you must take with meals every day as directed.

For more information about choosing the right foods, see the NIDDK booklet *Eat Right to Feel Right on Hemodialysis*.

Working with Your Health Care Team

Questions you may want to ask:

- Is hemodialysis the best treatment choice for me? Why?
- If I'm treated at a center, can I go to the center of my choice?
- What should I look for in a dialysis center?
- Will my kidney doctor see me at dialysis?
- What does hemodialysis feel like?
- What is self-care dialysis?
- Is home hemodialysis available in my area? How long does it take to learn? Who will train my partner and me?
- What kind of blood access is best for me?
- As a hemodialysis patient, will I be able to keep working? Can I have treatments at night?
- How much should I exercise?
- Who will be on my health care team? How can these people help me?
- With whom can I talk about finances, sexuality, or family concerns?
- How/where can I talk with other people who have faced this decision?

For more information about hemodialysis, see the NIDDK booklet *Treatment Methods for Kidney Failure: Hemodialysis*. Or see the chart on pages 21 and 22 that summarizes three treatment options.

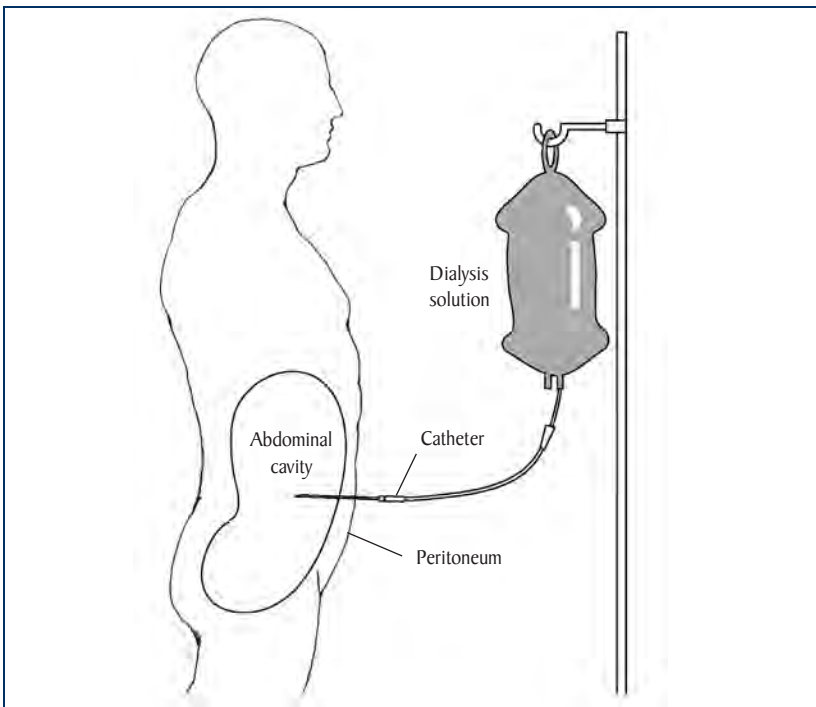
Treatment Choice: Peritoneal Dialysis

Purpose

Peritoneal dialysis is another procedure that removes wastes, chemicals, and extra water from your body. This type of dialysis uses the lining of your abdomen, or belly, to filter your blood. This lining is called the peritoneal membrane and acts as the artificial kidney.

How Peritoneal Dialysis Works

A mixture of minerals and sugar dissolved in water, called dialysis solution, travels through a catheter into your belly. The sugar—called dextrose—draws wastes, chemicals, and extra water from the tiny blood vessels in your peritoneal



Peritoneal dialysis.

membrane into the dialysis solution. After several hours, the used solution is drained from your abdomen through the tube, taking the wastes from your blood with it. Then your abdomen is refilled with fresh dialysis solution, and the cycle is repeated. The process of draining and refilling is called an exchange.

Getting Ready

Before your first treatment, a surgeon places a catheter into your abdomen or chest. The catheter tends to work better if there is adequate time—usually from 10 days to 2 or 3 weeks—for the insertion site to heal. Planning your dialysis access can improve treatment success. This catheter stays there permanently to help transport the dialysis solution to and from your abdomen.

Types of Peritoneal Dialysis

Three types of peritoneal dialysis are available.

- **Continuous Ambulatory Peritoneal Dialysis (CAPD)**
CAPD requires no machine and can be done in any clean, well-lit place. With CAPD, your blood is always being cleaned. The dialysis solution passes from a plastic bag through the catheter and into your abdomen, where it stays for several hours with the catheter sealed. The time period that dialysis solution is in your abdomen is called the dwell time. Next, you drain the dialysis solution into an empty bag for disposal. You then refill your abdomen with fresh dialysis solution so the cleaning process can begin again. With CAPD, the dialysis solution stays in your abdomen for a dwell time of 4 to 6 hours, or more. The process of draining the used dialysis solution and replacing it with fresh solution takes about 30 to 40 minutes. Most people change the dialysis solution at least four times a day and sleep with solution in their abdomens at night. With CAPD, it's not

necessary to wake up and perform dialysis tasks during the night.

- **Continuous Cycler-assisted Peritoneal Dialysis (CCPD)**
CCPD uses a machine called a cycler to fill and empty your abdomen three to five times during the night while you sleep. In the morning, you begin one exchange with a dwell time that lasts the entire day. You may do an additional exchange in the middle of the afternoon without the cycler to increase the amount of waste removed and to reduce the amount of fluid left behind in your body.
- **Combination of CAPD and CCPD**
If you weigh more than 175 pounds or if your peritoneum filters wastes slowly, you may need a combination of CAPD and CCPD to get the right dialysis dose. For example, some people use a cycler at night but also perform one exchange during the day. Others do four exchanges during the day and use a minicycler to perform one or more exchanges during the night. You'll work with your health care team to determine the best schedule for you.

Who Performs Peritoneal Dialysis

Both types of peritoneal dialysis are usually performed by the patient without help from a partner. CAPD is a form of self-treatment that needs no machine. However, with CCPD, you need a machine to drain and refill your abdomen.

Possible Complications

The most common problem with peritoneal dialysis is peritonitis, a serious abdominal infection. This infection can occur if the opening where the catheter enters your body becomes infected or if contamination occurs as the catheter is connected or disconnected from the bags. Infection is less

common in presternal catheters, which are placed in the chest. Peritonitis requires antibiotic treatment by your doctor.

To avoid peritonitis, you must be careful to follow procedures exactly and learn to recognize the early signs of peritonitis, which include fever, unusual color or cloudiness of the used fluid, and redness or pain around the catheter. Report these signs to your doctor or nurse immediately so that peritonitis can be treated quickly to avoid additional problems.

Diet for Peritoneal Dialysis

A peritoneal dialysis diet is slightly different from an in-center hemodialysis diet.

- You'll still need to limit salt and liquids, but you may be able to have more of each, compared with in-center hemodialysis.
- You must eat more protein.
- You may have different restrictions on potassium. You may even need to eat high-potassium foods.
- You may need to cut back on the number of calories you eat because there are calories in the dialysis fluid that may cause you to gain weight.

Your doctor and a dietitian who specializes in helping people with kidney failure will be able to help you plan your meals.

Working with Your Health Care Team

Questions you may want to ask:

- Is peritoneal dialysis the best treatment choice for me? Why? If yes, which type is best?
- How long will it take me to learn how to do peritoneal dialysis?
- What does peritoneal dialysis feel like?
- How will peritoneal dialysis affect my blood pressure?
- How will I know if I have peritonitis? How is it treated?
- As a peritoneal dialysis patient, will I be able to continue working?
- How much should I exercise?
- Where do I store supplies?
- How often do I see my doctor?
- Who will be on my health care team? How can these people help me?
- Whom do I contact with problems?
- With whom can I talk about finances, sexuality, or family concerns?
- How/where can I talk with other people who have faced this decision?

For more information about peritoneal dialysis, see the NIDDK booklet *Treatment Methods for Kidney Failure: Peritoneal Dialysis*. Or see the chart on pages 21 and 22 that summarizes three treatment options.

Dialysis Is Not a Cure

Hemodialysis and peritoneal dialysis are treatments that help replace the work your kidneys did. These treatments help you feel better and live longer, but they don't cure kidney failure. Although patients with kidney failure are now living longer than ever, over the years kidney disease can cause problems such as heart disease, bone disease, arthritis, nerve damage, infertility, and malnutrition. These problems won't go away with dialysis, but doctors now have new and better ways to prevent or treat them. You should discuss these complications and their treatments with your doctor.



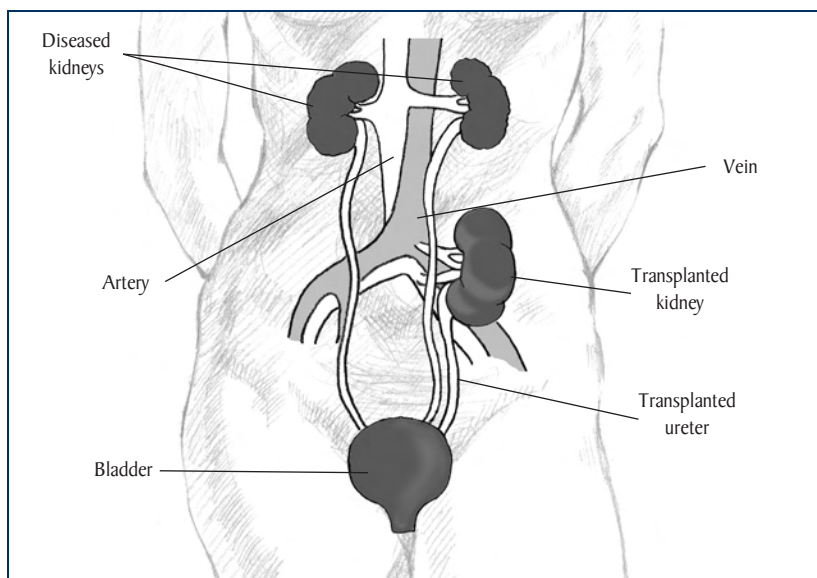
Treatment Choice: Kidney Transplantation

Purpose

Kidney transplantation surgically places a healthy kidney from another person into your body. The donated kidney does enough of the work that your two failed kidneys used to do to keep you healthy and symptom free.

How Kidney Transplantation Works

A surgeon places the new kidney inside your lower abdomen and connects the artery and vein of the new kidney to your artery and vein. Your blood flows through the donated kidney, which makes urine, just like your own kidneys did when they were healthy. The new kidney may start working right away or may take up to a few weeks to make urine. Unless your own kidneys are causing infection or high blood pressure, they are left in place.



Kidney transplantation.

Getting Ready

The transplantation process has many steps. First, talk with your doctor because transplantation isn't for everyone. You could have a condition that would make transplantation dangerous or unlikely to succeed.

You may receive a kidney from a deceased donor—a person who has recently died—or from a living donor. A living donor may be related or unrelated—usually a spouse or a friend. If you don't have a living donor, you're placed on a waiting list for a deceased donor kidney. The wait for a deceased donor kidney can be several years.

The transplant team considers three factors in matching kidneys with potential recipients. These factors help predict whether your body's immune system will accept the new kidney or reject it.

- **Blood type.** Your blood type (A, B, AB, or O) must be compatible with the donor's. Blood type is the most important matching factor.
- **Human leukocyte antigens (HLAs).** Your cells carry six important HLAs, three inherited from each parent. Family members are most likely to have a complete match. You may still receive a kidney if the HLAs aren't a complete match as long as your blood type is compatible with the organ donor's and other tests show no problems with matching.
- **Cross-matching antigens.** The last test before implanting an organ is the cross-match. A small sample of your blood will be mixed with a sample of the organ donor's blood in a tube to see if there's a reaction. If no reaction occurs, the result is called a negative cross-match, and the transplant operation can proceed.

The Time Kidney Transplantation Takes

How long you'll have to wait for a kidney varies. Because there aren't enough deceased donors for every person who needs a transplant, you must be placed on a waiting list. However, if a voluntary donor gives you a kidney, the transplant can be scheduled as soon as you're both ready. Avoiding the long wait is a major advantage of living donation.

The surgery takes 3 to 4 hours. The usual hospital stay is about a week. After you leave the hospital, you'll have regular follow-up visits.

In a living donation, the donor will probably stay in the hospital about the same amount of time. However, a new technique for removing a kidney for donation uses a smaller incision and may make it possible for the donor to leave the hospital in 2 to 3 days.

Between 85 and 90 percent of transplants from deceased donors are working 1 year after surgery. Transplants from living relatives often work better than transplants from unrelated or deceased donors because they're usually a closer match.

Possible Complications

Transplantation is the closest thing to a cure. But no matter how good the match, your body may reject your new kidney. A common cause of rejection is not taking medication as prescribed.

Your doctor will give you medicines called immunosuppressants to help prevent your body's immune system from attacking the kidney, a process called rejection. You'll need to take immunosuppressants every day for as long as the transplanted kidney is functioning. Sometimes, however, even these medicines can't stop your body from rejecting the new kidney. If this happens, you'll go back to some form of dialysis and possibly wait for another transplant.

Immunosuppressants weaken your immune system, which can lead to infections. Some medicines may also change your appearance. Your face may get fuller; you may gain weight or develop acne or facial hair. Not all patients have these problems, though, and diet and makeup can help.

Immunosuppressants work by diminishing the ability of immune cells to function. In some patients, over long periods of time, this diminished immunity can increase the risk of developing cancer. Some immunosuppressants can cause cataracts, diabetes, extra stomach acid, high blood pressure, and bone disease. When used over time, these drugs may also cause liver or kidney damage in a few patients.

Diet for Kidney Transplantation

Diet for transplant patients is less limited than it is for dialysis patients, although you may still have to cut back on some foods.

Your diet will probably change as your medicines, blood values, weight, and blood pressure change.

- **You may need to count calories.** Your medicine may give you a bigger appetite and cause you to gain weight.
- **You may have to eat less salt.** Your medications may cause your body to retain sodium, leading to high blood pressure.

Working with Your Health Care Team

Questions you may want to ask:

- Is transplantation the best treatment choice for me? Why?
- What are my chances of having a successful transplant?
- How do I find out whether a family member or friend can donate?
- What are the risks to a family member or friend who donates?
- If a family member or friend doesn't donate, how do I get placed on a waiting list for a kidney? How long will I have to wait?
- What symptoms does rejection cause?
- How long does a transplant work?
- What side effects do immunosuppressants cause?
- Who will be on my health care team? How can these people help me?
- With whom can I talk about finances, sexuality, or family concerns?
- How or where can I talk with other people who have faced this decision?

For more information about transplantation, see the NIDDK booklet *Treatment Methods for Kidney Failure: Kidney Transplantation*. Or see the chart on pages 21 and 22 that summarizes three treatment options.



Points to Remember

- Your kidneys filter wastes from your blood and regulate other functions of your body.
- When your kidneys fail, you need treatment to replace the work your kidneys normally perform.
- Your three choices for treatment are hemodialysis, peritoneal dialysis, and kidney transplantation.
- The choice you make will affect your diet, your ability to work, and other life style issues.
- You have the right to refuse or withdraw from treatment if you choose.
- Medicare and Medicaid pay much of the cost of treatment for kidney failure.

This chart summarizes information about your choices for treatment.

	Hemodialysis	
	In Center	Home
Schedule	Three treatments a week for 3 to 5 hours or more.	More flexibility in determining your schedule of treatments.
Location	Dialysis center.	Home.
Availability	Available in most communities; may require travel in some rural areas.	Generally available, but not widely used because of equipment requirements.
Equipment and Supplies	No equipment or supplies in the home.	Hemodialysis machine connected to plumbing; chair.
Training Required	Little training required; clinic staff perform most tasks.	You and a helper must attend several training sessions.
Diet	Must limit fluids, sodium, potassium, and phosphorus.	
Level of Freedom	Little freedom during treatments. Greater freedom on nontreatment days.	More freedom to set your own schedule. You're still linked to a machine for several hours a week.
Level of Responsibility	Some patients prefer to let clinic staff perform all tasks.	You and your helper are responsible for cleaning and setting up equipment and monitoring vital signs. Can be stressful on family helpers.

Peritoneal Dialysis		Kidney Transplantation	
CAPD	CCPD	Deceased	Living
Four to six exchanges a day, every day.	Three to five exchanges a night, every night, with an additional exchange begun first thing in the morning.	You may wait several years before a suitable kidney is available.	If a friend or family member is donating, you can schedule the operation when you're both ready.
		After the operation, you'll have regular checkups with your doctor.	
Any clean environment that allows solution exchanges.		The transplant operation takes place in a hospital.	
Widely available.	Widely available.	Transplant centers are located throughout the country. However, the demand for kidneys is far greater than the supply.	
Bags of dialysis solution take up storage space.	Cycling machine; bags of dialysis solution.	No equipment or supplies needed.	
You'll need to attend several training sessions.		You'll need to learn about your medications and when to take them.	
Must limit sodium and calories.		Fewer dietary restrictions.	
You can move around, exercise, work, drive, etc., with solution in your abdomen.	You're linked to a machine during the night. You're free from exchanges during the day.	Offers the greatest amount of freedom.	
You must perform exchanges four to six times a day, every day.	You must set up your cyclor every night.	You must take immunosuppressants every day for as long as the transplanted kidney functions.	



Acknowledgments

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) thanks these dedicated health professionals for their careful review of the original version of this publication.

William Owen Jr., M.D.
Duke University Medical Center

Richard D. Swartz, M.D.
University of Michigan Health System

Thank you to Dorian Schatell, M.S., Medical Education Institute, for her review of the 2007 version of this publication.

The individuals listed here facilitated field-testing for this publication. The NIDDK thanks them for their contribution.

Kim Bayer, M.A., R.D., L.D.
BMA Dialysis
Bethesda, MD

Cora Benedicto, R.N.
Clinic Director
Gambro Health Care
N Street Clinic
Washington, DC

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.

About the Kidney Failure Series

You and your doctor will work together to choose a treatment that's best for you. The publications of the NIDDK Kidney Failure Series can help you learn about the specific issues you will face.

Booklets

- *Kidney Failure: Choosing a Treatment That's Right for You*
- *Treatment Methods for Kidney Failure: Hemodialysis*
- *Treatment Methods for Kidney Failure: Peritoneal Dialysis*
- *Treatment Methods for Kidney Failure: Transplantation*
- *Eat Right to Feel Right on Hemodialysis*
- *Kidney Failure Glossary*

Fact Sheets

- *Kidney Failure: What to Expect*
- *Vascular Access for Hemodialysis*
- *Home Hemodialysis*
- *Hemodialysis Dose and Adequacy*
- *Peritoneal Dialysis Dose and Adequacy*
- *Amyloidosis and Kidney Disease*
- *Anemia in Kidney Disease and Dialysis*
- *Renal Osteodystrophy*
- *Financial Help for Treatment of Kidney Failure*

Learning as much as you can about your treatment will help make you an important member of your health care team.

The NIDDK will develop additional materials for this series as needed. Please address any comments about this series and requests for copies to the National Kidney and Urologic Diseases Information Clearinghouse. This series is also on the NIDDK website at www.niddk.nih.gov; click on "Kidney and Urologic Diseases" under Health Information for the Public.



National Kidney and Urologic Diseases Information Clearinghouse

3 Information Way
Bethesda, MD 20892-3580
Phone: 1-800-891-5390
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.

Publications produced by the Clearinghouse are carefully reviewed by both NIDDK scientists and outside experts.

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

This booklet is also available at www.kidney.niddk.nih.gov.

This publication may contain information about medications used to treat a health condition. When this publication was prepared, the NIDDK included the most current information available. Occasionally, new information about medication is released. For updates or for questions about any medications, please contact the U.S. Food and Drug Administration at 1-888-INFO-FDA (463-6332), a toll-free call, or visit their website at www.fda.gov. Consult your doctor for more information.