

The dialysis staff will clean the catheter at each treatment and change the dressing. No other care of the catheter is necessary unless the dressing gets wet or very dirty. Whenever the catheter is opened or the dressing is removed, both the patient and the staff must wear masks and the staff must wear clean gloves.

If the catheter starts to come out, tape it securely in place. Do not pull it out and never try to push it back in. If it falls out, apply pressure to the area for at least 10 minutes. Call the dialysis unit for instructions.

Call the dialysis unit or a doctor immediately if any signs of infection occur. Signs of infection include:

- fever
- chills
- redness
- swelling
- drainage
- or heat at the catheter site.

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Good vascular access for hemodialysis is the first step to ensure that enough waste products and fluids are removed from your body. This will help you lead a normal and productive life.

Your dialysis team is here to help you choose and care for the most appropriate type of vascular access, be it **fistula, graft or catheter.**

# Vascular Access *for* Hemodialysis



The Consumer Committee of the  
Southeastern Kidney Council (ESRD Network 6)

**Special Thanks to:**

Wake Dialysis Clinic Patients and Staff

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To insert the catheter, the skin is numbed and a small incision is made at the base of the neck. This incision is stitched closed once the catheter is tunneled under the skin. There may be some pain and swelling for the first day or two. There should be little to no bleeding. See a doctor immediately if blood soaks through and out from under the dressing.

**The advantages of a catheter are:**

- it can be used immediately
- and a catheter can be used when no other access is available

**The disadvantages of a catheter are:**

- blood flow is slower than from a fistula or graft, so the blood will not be filtered as well, and patient treatment times may be longer
- there may be a high risk of blood infection
- it can be pulled out accidentally with risk of blood loss
- a catheter may not be as comfortable as an arm access
- and catheter patients usually cannot take a shower or swim

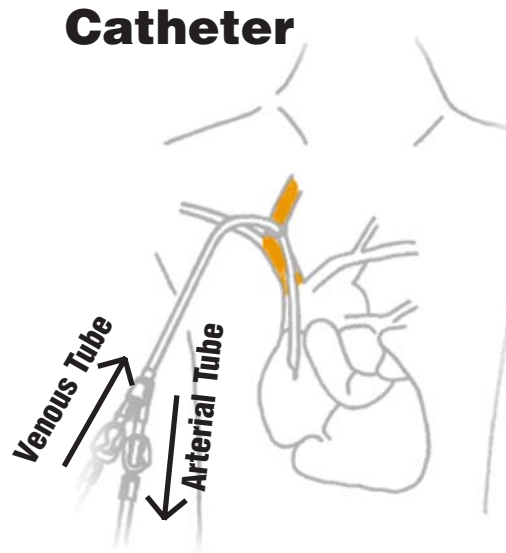
The patient must be careful to protect the catheter from being accidentally pulled out or damaged. No scissors or other sharp objects such as safety pins should be used near the catheter. The catheter should be secured comfortably to prevent it from catching on clothing. When securing the catheter, it should never be bent or kinked. The clamps should never be opened and the caps should never be unscrewed between treatments.

# The Catheter

Another way that patients can be connected to the hemodialysis machine is by placing a narrow tube called a catheter into a large vein in the patient's neck or chest.

The central veins are the best sites for catheters because they have the best flow of blood. This type of access is usually temporary but sometimes must be used for long-term treatment.

Catheters are divided into two parts: an **arterial tube** for the blood to flow out of the body and a **venous tube** for the blood to return to the body.



## Vascular Access *for* Hemodialysis

One very large vein that flows from the head and neck is called the internal jugular vein. There is one on each side of the neck. The right internal jugular at the base of the neck is easiest to access and is directly above the heart. It is the first choice when deciding where to place the catheter.

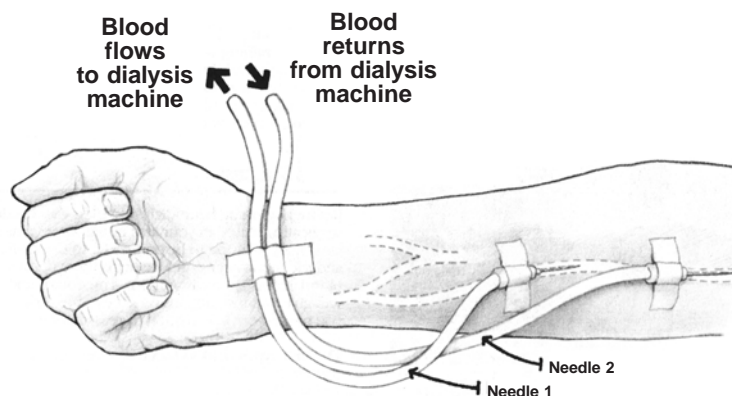
One type of catheter is designed to be left in the vein for weeks, months, or even years if necessary. This catheter is long enough to be tunneled under the skin into a comfortable position for the patient. This type of catheter also has a special fabric area called a cuff that secures the catheter into place and acts as a barrier to infection.

**D**eciding to begin hemodialysis has probably been one of the most important decisions of your life.

Understanding how dialysis works and how your body adapts to dialysis will help you make decisions and care for yourself. Taking the proper steps and precautions, and knowing what to look for in a healthy vascular access are of prime importance, and the dialysis staff is here to help you.

Hemodialysis is a process that removes waste products and fluid from the blood. The blood is routed outside the body to a filter that is attached to the dialysis machine. The blood flows through the filter and then returns to the patient's body.

Only about a cup of blood is outside the body at a time.



This filtering is a continuous process with new blood constantly flowing to the machine and returning to the body.

to large holes in the graft that cause a similar bulging. These bulges are called pseudoaneurysms and should be avoided by the person placing the needles. Usually this is a staff member in a dialysis unit, but many patients place their own needles. Or if dialyzing at home, the patient's dialysis partner may be the one placing the needles.

When the dialysis needles are removed from either a fistula or graft, the patient should hold pressure over the needle site for about 10 minutes to stop the bleeding. A small bandage will be applied and perhaps a small gauze dressing. Tape should never be placed all the way around the arm because it could stop the blood flow through the access. Any dressing should be removed within a couple of hours. The bandage should stay on until the next morning.

Occasionally the access will start bleeding on the way home or when the patient gets home. It is a good idea for patients to keep a supply of gauze and tape in their car and at home in case this occurs. If it does, the patient should stay calm and hold pressure over the sites. If the bleeding does not stop or keeps starting up again, the patient should go back to the dialysis unit or to the emergency room if the dialysis unit is closed.

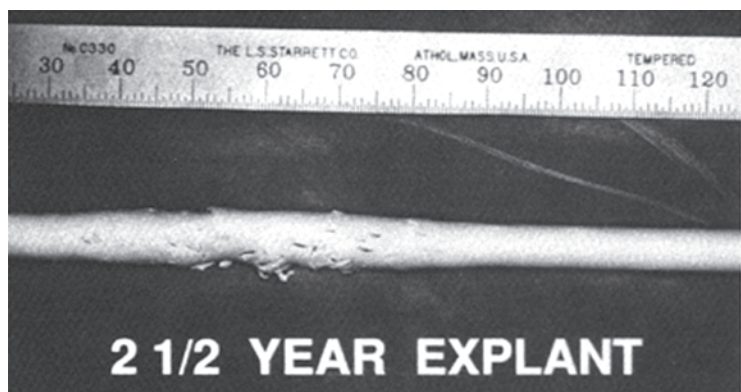
Call the dialysis clinic staff or a doctor if signs of infection occur at any time including:

- fever
- chills
- redness
- swelling
- drainage
- or heat at the access site.

Feeling for the vibration or “thrill” over the fistula or graft every day is important. Make sure the dialysis staff also check it at each treatment. The surgeon or the dialysis unit should be called if the vibration or “thrill” cannot be felt. This could be a sign that the access is clotted and is no longer working. It is usually difficult to restart a clotted fistula but grafts can usually be declotted, depending on what caused it to stop working.

Patients should keep their access sites as clean as possible to prevent infections from occurring. Patients should wash their arm with anti-bacterial soap before each dialysis treatment.

For both grafts and fistulas, it is very important that the needles be placed in different sites each time using all surfaces of the access. Sticking in one place over and over weakens the wall of the fistula causing it to thin and bulge out. It can lead

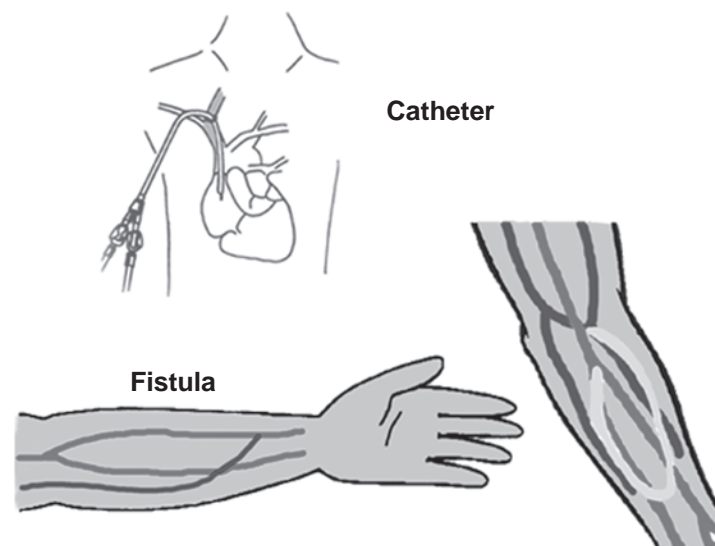


Photograph of graft explant courtesy of W.L. Gore and Associates, Inc.

This process is performed, on average, for **4-5 hours, three times a week**. During hemodialysis, all of the patient’s blood is filtered about **four times an hour**.

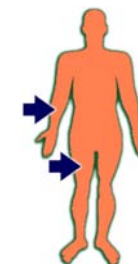
To adequately clean the blood of waste products, the blood must flow to and from the machine in a large volume at a relatively high speed. This makes it necessary to connect the patient to the machine using large blood vessels.

The connection to the blood system is called a “vascular access”. This vascular access is created by using a surgically inserted large blood vessel or a small tube, called a catheter, that has been inserted into a large vein.

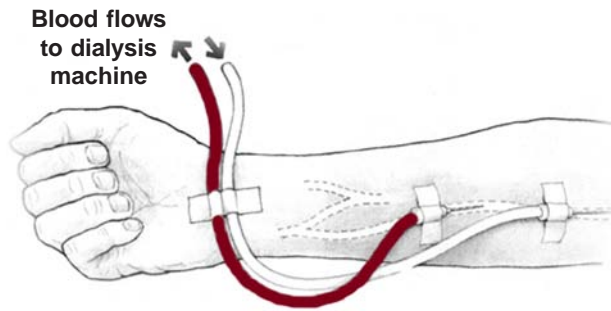


One type of **surgically created** vascular access is called a **fistula**. The other is called a **graft**.

Both types are usually placed in the patient’s arm, however, grafts are sometimes placed in the thigh.

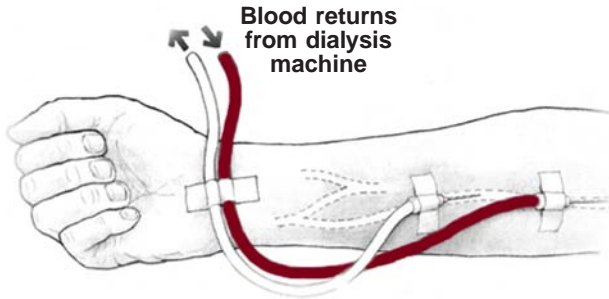


The large size of these blood vessels allows the two needles necessary for dialysis to be inserted. These needles are connected to tubes which go to and from the dialysis machine.



The **arterial** needle is placed to route the blood to the dialysis machine.

The **venous** needle is placed to return the filtered blood to the body.



The **type of access** used is highly individual and **depends upon many factors** including:

- the patient's medical condition, such as if the patient has diabetes
- long-term treatment plans
- physical factors, and
- personal preference.

The doctor and healthcare team will discuss each type of vascular access with the patient and family members and together will make a decision in regards to the best type for each patient.

The surgeon should be consulted before lifting bodybuilding weights. Using the hand will improve the circulation to the fingers and will prevent the hand from becoming stiff.

After the stitches are out, exercising the hand with a rubber ball several times a day may help expand the vein.

## Things to Remember

- Once the fistula or graft is placed, it is important that the circulation in the arm not be cut off because it can damage the access and could cause it to stop working. Brief pressure will not damage the flow.
- Patients should never allow medical personnel to take blood pressures in that arm or stick needles in that arm for blood draws, injections or IV's.
- No tight dressings, jewelry, or clothing should be worn on the arm because it might stop the blood flow.
- Patients should not sleep with their weight pressing on the access arm.
- Very low blood pressure should also be avoided as this can also affect the flow of blood in the access.
- Patients should avoid working with the fistula or graft exposed to sharp equipment or machinery.

## The advantages of a graft are:

- most patients are candidates
- the graft can be used in 2-3 weeks
- it has good blood flow immediately
- and it is easier to put needles in than fistulas at first

## The disadvantages of a graft are:

- a graft is a more complex surgery than a fistula
- grafts usually do not last as long as a fistula
- there is a higher risk of infection than a fistula
- and it is more likely to have pain and swelling after surgery than a fistula

Following surgery, patients should call the surgeon immediately if they experience any of the following:

- fever
- chills
- other signs of infection including redness, swelling, drainage, or heat at the access site
- cold, painful, or blue fingers

It is always a good idea to check the temperature and color of the other hand when trying to decide if there is a problem with the circulation to the fingers. When in doubt, patients should call and ask.

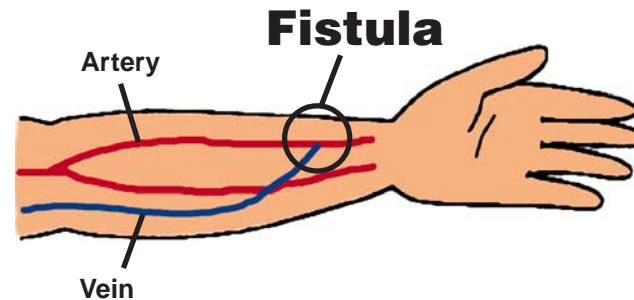
## Caring for Your Access

The hand and arm with the access should be used normally except for lifting heavy weights. Normal everyday lifting such as books, canned goods, and suitcases can be done after the stitches are removed.

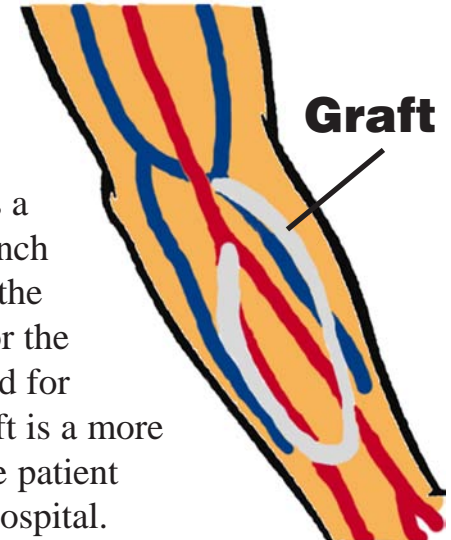
The fistula is created when an artery and a vein in the arm are surgically connected. The blood from the artery flows into the vein, making it bigger and stronger over time. It takes about 6-8 weeks for the fistula to develop or mature into a vascular access that can be used for dialysis.

This is a relatively minor surgical procedure and usually does not require an overnight stay in the hospital. This can be

done either by numbing a small area of the arm or numbing the whole arm.



The second type of surgically created vascular access is the graft. The graft is an artificial blood vessel that connects an artery to a vein. It is a soft plastic-like tube about 1/4-inch in diameter that is placed under the skin. It takes about 2-3 weeks for the graft to heal before it can be used for dialysis. The placement of a graft is a more complex surgical procedure. The patient usually spends the night in the hospital.



Before a surgical access is placed, the patient will meet with a surgeon. The surgeon will examine the patient's veins in each arm. The surgeon will ask a series of questions to prevent any complications.

Sometimes, if the surgeon suspects a problem, it may be necessary to have tests done with dye to make sure the blood vessels are normal.

## The Fistula

The fistula is the preferred type of surgically created access because it will usually last longer and is less likely to become infected than a graft. It is also a simpler surgery. About 70% of fistulas develop well enough to be used for hemodialysis. Fistulas can last several years and usually improve as time goes on.

Creating a fistula is a minor surgical procedure with a relatively small incision, about 1 1/2 inches long near the wrist.

There will be some pain at the incision site for the first 2 days for which a pain killer can be taken as needed. There is usually some swelling. Elevating the arm whenever sitting or lying down will help reduce any swelling. There should be little to no bleeding. See a doctor immediately if blood soaks through and out from under the dressing.

The fistula will not look any different at first but will get bigger as the blood from the artery continues to flow with increased force into the vein. A vibration or “thrill” will be felt over the fistula.

### **The advantages of a fistula are:**

- fistulas usually last longer than a graft
- have a lower risk of infection than a graft
- and it is a simpler surgery than a graft

### **The disadvantages of a fistula are:**

- fistulas are less likely than a graft to develop well enough to be used for dialysis
- more difficult than a graft to put needles in until it matures
- and you must wait 6-8 weeks for the fistula to develop before it can be used.

## The Graft

If there are no large veins in the arms that can be used to create a fistula, a graft will be placed. The entire arm will be numbed. There are usually two incisions that are longer and deeper than for a fistula. There will be pain in the arm which should subside after the first 2 or 3 days.

A pain killer can be taken as needed. Swelling can be extensive and is expected for the first 2-3 weeks. Elevating the arm on 2-3 pillows whenever sitting or lying down will help decrease the swelling. There should be little or no bleeding. See a doctor immediately if blood soaks through and out from under the dressing. Redness of the graft area is also expected in the first few weeks and is probably a reaction to the graft material. It may not be an infection but it should be checked by the surgeon or the dialysis unit if unsure.

The graft will appear as a ridge under the skin. A vibration or “thrill” should also be felt over the graft.