ESRD Treatment – When kidney function is almost completely compromised, this is called end-stage renal disease (ESRD). Patients with ESRD require either dialysis or a kidney transplant to stay alive.

- Kidney Transplant – A Kidney Transplant is replacing the your damaged kidney with a doner kidney. Kidney transplant is the best option for ESRD treatment for quality of life and the closest method in medicine to restoring the body to its natural kidney function. While this is the best option for ESRD treatment, it is not available for every patient because you have to meet transplant guidelines.
    - The procedure – A kidney Transplant is done in a hospital setting and is a major surgery that will take time for healing and recovery. The transplanted kidney will be placed in your abdomen, and connected to your body's blood vessels and bladder. If the surgery is successful, it will take over functions from the failed kidneys, including producing urine and filtering blood. Your two original kidneys, meanwhile, will remain in place, unless they're causing secondary issues like infection or hypertension. For your body to accept the new organ, you will need to take immunosuppressant drugs. These help prevent your immune system from rejecting the new kidney, and will be required for the rest of your life. Your Kidney is replaced with a healthy Donor Kidney and after healing and recovery you should be able to return to your normal daily activities.
    - Donors – A donor kidney can come from a living donor or from a recently deceased donor. You may have family members or friends that wish to offer you a kidney but they must meet health guidelines and be a match in order to donate. If you do not have a living donor, you will work with your transplant team and will be put on the Kidney Transplant list.

- Home Dialysis – The hemodialysis process extracts blood from your body and passes it through a dialyzer — a special membrane that functions like an artificial kidney — which cleans and chemically balances it. The clean and healthy blood is then returned to your body, where it goes back into circulation. Home Dialysis is the best option for patients, as Dialysis is done daily and at the schedule of the patient. It can be done with traveling and allows for the patients to have a normal productive life. Home dialysis is not always an option for every patient as you have to have a support system at home and a clean environment that is safe for you to do your treatment. There are two forms of Home Dialysis peritoneal dialysis (PD) and Home Hemodialysis.
    - Peritoneal Dialysis (PD) - PD uses the natural membrane from the lining of your abdomen — called the peritoneum — to get the filtering done. It's also a continuous process, much like the filtering done by healthy kidneys, this makes it gentler on your body.

      You will have a have a minor surgery to have a PD catheter placed in the abdomen. Once it is placed you will have training with a nurse on how to perform the treatment. During PD, you use the catheter to fill your abdomen with a fluid called dialysate. This fluid, full of a sugar called dextrose, will draw waste and fluid from your blood through the peritoneal lining. Then, you will use your catheter to extract the waste-filled fluid from your abdomen, and replace it with clean dialysate. After that the cycle begins again. These cycles are called exchanges and the number of exchanges will be determined by your PD Team. After you have completed your training you will do your treatments at home nightly. You will be monitored by your physician and the PD nurse remotely and will return to the center monthly for labs and a visit with your PD team to discuss your treatment plan.

    - Home Hemodialysis (HHD) – HHD is a form of renal replacement therapy (RRT) where a kidney patient uses a dialysis machine, passing his or her blood through a filter and cleansing it in the process, at home. This offers you more frequent dialysis sessions at your convenience, allowing you to take control of your treatment. HHD can be performed during the day or at night.

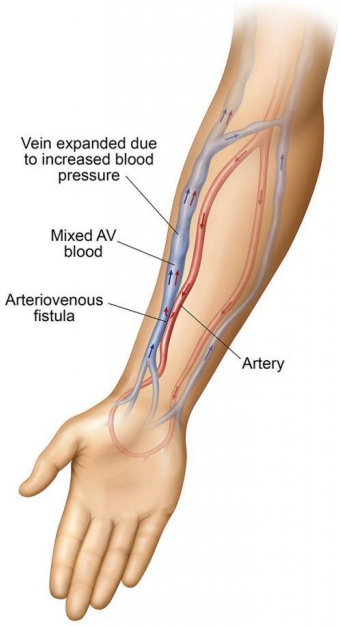
      For HHD you will need to have a permanent dialysis access placed, this is either a AV Fistula or an AV graft (see Dialysis Access Section). HHD requires you or a care giver to canulate (needle stick) your access and connect the dialysis lines to the dialysis machine. This machine then cycles your blood through a filter to clean the waste and toxins from your body.

To start HHD, you will be trained by a Home Hemo Nurse, after the training is complete you will start performing Dialysis at home and will be monitored remotely by the Home Hemo Nurse and your physician. HHD patients can dialysis for shorter durations 5 to 7 days a week, this process cleans the blood more frequent which provides stable labs and a better quality of life for the patients.

- In Center Dialysis - a special membrane that functions like an artificial kidney — which cleans and chemically balances it. The clean and healthy blood is then returned to your body, where it goes back into circulation. This process is done at an outpatient dialysis setting and it performed by a trained staff. In -Center Dialysis is the most common form of dialysis and is available to anyone with End Sage Renal Disease.

  To start the process, you will need to have an access placed, to start you may have a temporary access call a CVC (see Access information) but you will need to have a permeant access placed. The Permeant access is either an AV Fistula or AV Graft (See Access Section). Once your access is placed the dialysis team with connect your access to the Dialysis machine to start the process of cleaning your blood. In Center Dialysis is preformed 3 times a week for around 4 hours per treatment.

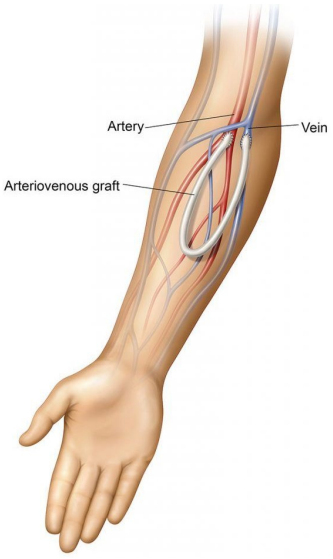
- Dialysis Access –
  - **AV-Fistula** - An AV Fistula is a surgical connection between one of your arteries and one of your veins. Most of the time, a fistula is created in your non-dominant arm, but it can also be placed in your leg if the arteries and veins in your arm are not large or healthy enough. The AV fistula creation procedure is considered minor surgery and can be performed on an outpatient basis. The entire procedure usually takes about one hour to complete. After you've been mildly sedated, your vascular specialist will use local anesthesia to numb the area in your arm or leg where the fistula will be created. Next, a small incision will be made in order to locate the vein and artery that will be used to create the fistula. Once they are located, the vein will be connected to the artery and the skin incision will be sutured closed. AV fistulas need time to heal and mature completely before they can be used as a dialysis access. After the surgical procedure, you may experience some pain, swelling and bruising near your access site for a few days. This is normal. You may also notice a vibration coming from your access site. This is called a "thrill," and it, too, is normal. In fact, over the first week following your surgery, this thrill will strengthen. Before your AV fistula can be used, it needs time to mature. This can take 4 ½ months, on average. AV Fistula is the best option for a dialysis because it allows more blood to flow through your vein at a faster rate and therefore will increase the pressure within the vein. This increased venous pressure stretches and strengthens the vein, allowing more blood to flow back and forth from your vein to the dialyzer. It is also created from your body and no external components are used, making it less of a risk for having a reaction. AV Fistula's can be used for years and have a much less chance of infection or clotting.



AV fistula is your best option for a dialysis access and your provider will send you for evaluation to have an AV Fistula placed when are at stage 4 kidney disease, this will allow time for the access to mature and be ready to use if you need to start on Dialysis. Even if you need immediate dialysis, your provider suggests that you consider having an AV fistula created for long-term treatment.

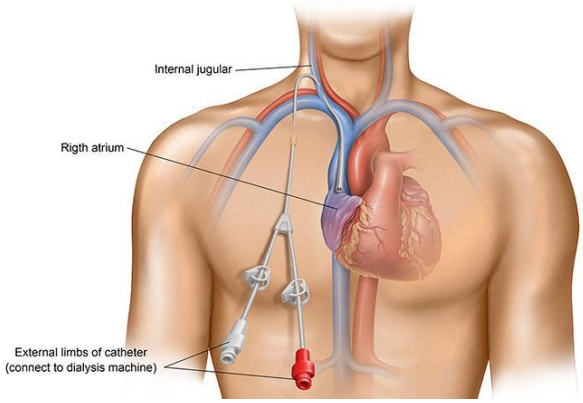
To have an AV Fistula placed you must have veins that are healthy. To determine whether your veins are healthy enough and large enough for an AV fistula, you will need to have a procedure, known as vessel mapping, performed. This can be done using an ultrasound machine or by injecting contrast dye into your veins while under fluoroscopy (a type of x-ray) so an image, or map of your veins, can be obtained and evaluated.

- **AV Graft** - An AV fistula is usually the preferred option, if you're a good candidate. When veins are too small or too weak to support an AV fistula an AV - graft is the next best option. Just like with an AV fistula, an AV graft is created surgically. But instead of connecting an artery directly to a vein, like with an AV fistula, for an AV graft, a vascular specialist will connect one end of a small synthetic tube, the actual graft, to one of your veins, and the other end to one of your arteries.



If you and your doctor decide an arteriovenous graft is your best option, you will undergo a procedure called vessel mapping, which can be performed on an outpatient basis. You'll be given local anesthetic, and a sedative before a vascular specialist makes two small incisions at the selected site for AV graft placement, usually in your non-dominant arm. The vascular specialist will then access the artery and vein and connect them by sewing one end of the graft (or synthetic tube) to your vein and the other end to your artery. AV grafts are ready to use in a much shorter time than an AV fistula, which may be a consideration in selecting the best type of access for you. After dialysis access surgery, you may experience some pain and swelling near the access site. This is normal and should improve within a few days. But before your AV graft can be used, it needs to heal. An AV graft will usually heal and be ready for use within 3 to 4 weeks from the time it was placed. In selected cases an "early stick graft" may be used, which will reduce the time needed between placement and first use to a few days. On average an AV fistula takes 4 months before it is ready for use. Once your graft has been placed, you'll be able to feel it beneath your skin. You will feel a vibration, or thrill if you place your fingers over the graft. This vibration is an indication of the blood flowing through your graft. This vibration, or thrill, is an important indicator of how well your graft is working. If you place your ear over the graft, you'll be able to hear the blood moving through it. This sound is called a bruit. Some advantages of a AV-Graft are it is easy to implant and can be ready to use in 3-4 weeks. It also offers less of a chance of infection compared to a CVC.

- **<u>Central venous catheter (CVC)</u>** - A central venous catheter (CVC) access is most often used on a temporary basis. It's not the best long-term option. A CVC catheter is a long, plastic, y-shaped, flexible tube. During an outpatient procedure, a physician who specializes in vascular access makes a small incision in the skin over the selected vein located in the neck, upper chest, or groin. Then, using a guide wire the catheter is inserted into the vein.



The Y end of the CVC remains outside your body. The two flexible tubes at the Y end of your CVC are connected to the bloodlines during dialysis, allowing for the transfer of blood to and from your body to the dialysis machine and back. A protective cap is placed at the end of the Y-shaped tubes when they are not being used. To make sure your central venous catheter continues to work properly and to reduce the chance of infection, you need to take care of your catheter just as you would care for any part of your body.

- You cannot until your doctor says that you can and you'll need to cover your access site with a waterproof bandage to prevent it from getting wet.
- Never immerse your access site in water – no swimming or baths.
- Leave the bandage that covers your access site alone.
- Never remove the caps on the ends of the Y-shape tubes. This should only be done under sterile conditions by a member of your dialysis team.
- Always wear a mask when a member of your dialysis team removes the protective caps for treatment.
- Check for signs of infection every day. Signs of infection can include redness, warmth, swelling and discharge.

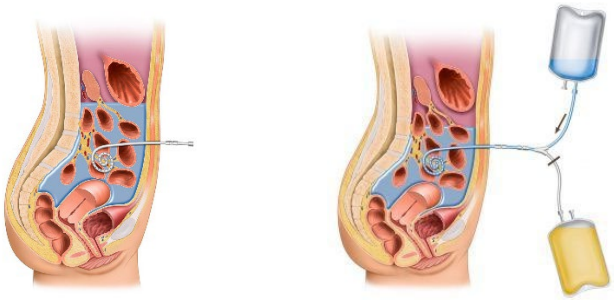
Knowing you need to have a central venous catheter placed, or having just had one placed, can be scary. But the advantages is the ability to have a CVC placed and removed quickly to provides you with an immediate lifeline that can connect you to your dialysis machine The disadvantage to a CVC are:

- It often takes longer to perform dialysis using a CVC than with other access options.
- You won't be able to swim or taking baths is not recommended as you can't submerge your chest in the bath.
- Injury or damage to your central veins can occur when the CVC is being placed. According to some studies, arterial punctures occur in 4.2–9.3% of Central Venous Catheter placement procedures. i, ii Despite these rare occurrences, having a catheter placed so you can immediately receive dialysis is often a matter of life or death.
- There is risk of infection. Infection is a serious complication and can lead to sepsis, shock and even death – this is why it's so critical to follow your health care providers' instructions on how to care for your catheter. We always say it not a matter of if you will get an infection but when you will get an infection with a CVC.
- Catheter malfunction may include blockage or clotting of the catheter, breakage, or dislodgement of the catheter.

If your kidney function has deteriorated to the point where you need immediate dialysis, a temporary CVC might be necessary. If you fall into this category, your doctor will likely also mention a more permanent option, such as an AV fistula or AV graft. Both of these options require a healing period before they can be used, which is why many people, particularly in urgent cases, start dialysis with a temporary CVC.

For some people, a permanent CVC might be indicated, but in general, these catheters are considered a temporary solution.

- **Peritoneal dialysis Cather** - The peritoneal dialysis catheter is placed through the abdomen and into the peritoneum. A sterile fluid is instilled through the catheter into your peritoneum to clean the blood inside your body. You or your caregiver can perform this at home. If you and your doctor decide that PD is your best option, you will first need a peritoneal dialysis catheter, or PD catheter. PD catheter placement is a minimally invasive procedure that can be done either in a hospital setting or in an outpatient setting by a surgeon. Prior to the procedure, you will be given a local anesthetic, or in some cases a general anesthetic may be used. Your surgeon will then make a small incision, where the catheter will be introduced. The catheter is then threaded through a "tunnel," secured in place, and covered by a sterile dressing over the point where the catheter was placed.



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