

# Kidney Disease

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## WHAT IS KIDNEY DISEASE?

Kidney disease is when your kidneys are damaged and not functioning as they should. When kidney disease is not going away it is called chronic kidney disease or CKD. When the kidney is suddenly injured that is called acute kidney injury or AKI.

1. **Waste isn't removed.** When you have chronic kidney disease waste products and salts and water are not cleared from your body the way they should be.
2. **Waste products build up.** Waste products and fluid build up in the body when you have chronic kidney disease.
3. **Progression.** Chronic kidney disease usually progresses slowly over time but how fast it progresses may be different from person to person.
4. **Signs or symptoms may not be obvious.** The build-up of waste products usually does not result in any specific signs or symptoms at the early stages of kidney disease. Often, few symptoms appear until kidney function is reduced to less than 15% of normal.
5. **Other organs.** The kidneys talk to many other body systems, including the heart, lungs, brain, blood, and skin. These too may be affected when there is kidney disease.

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## RISK FACTORS FOR KIDNEY DISEASE

1. **Diabetes and high blood pressure.** Other medical conditions, such as diabetes or high blood pressure, can cause kidney disease.
2. **Family history.** If someone in your family has kidney disease, has been on dialysis or got a kidney transplant, you may have a higher chance of developing kidney disease than someone without this family history.
3. **Medicines.** Some medications, such as over-the-counter pain medications (NSAIDs), may cause or worsen kidney disease.
4. **Age and race.** Older people and some racial groups may be more likely to develop kidney disease.

## TESTS TO DETECT OR DIAGNOSE KIDNEY DISEASE

1. **eGFR.** A blood test called eGFR (estimated Glomerular Filtration Rate) tells you and your doctor how well your kidneys remove wastes from your body. Normal eGFR is over 100. An eGFR of less than 60 may be because of kidney disease.
2. **Urine protein.** Protein is natural in your body but is not normally found in the urine. A test can be done to check for protein in a urine sample. Too much protein could be a sign of damage to the kidney.
3. **High blood pressure.** High blood pressure may be a sign and a cause of kidney disease.
4. **Ultrasound.** A picture of your kidneys taken with an ultrasound machine can check the size of your kidneys and for cysts or kidney stones. This can help your doctor tell if blood and urine are flowing through your kidney normally.

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## TREATMENT STRATEGIES FOR KIDNEY DISEASE

1. **Blood pressure.** People with chronic kidney disease should discuss with their doctor the best blood pressure goal for them. For some people, less than 130/80 is recommended to prevent progression of kidney damage.
2. **Medicines.** Patients with chronic kidney disease should receive an angiotensin converting enzyme inhibitor (ACEI) or an angiotensin receptor blocker (ARB) to slow progression of kidney disease, if recommended by their doctor.
3. **Healthy Lifestyle.** Patients with kidney disease should not smoke, should be physically active and maintain the weight recommended by their doctor.
4. **Managing other complications.** Patients with chronic kidney disease should be evaluated and treated for complications related to kidney disease such as anemia and mineral and bone disorders.

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## TAKING ACTION: MEMBERS ON YOUR HEALTH TEAM

1. **Team care.** You will be working together with different professionals on a health team to care for your kidney disease.
2. **Managing your health.** You are the most important member of the team. You should be an active member on your care team. Learn about kidney health, ask questions, and talk regularly with your health team.
3. **Working with your doctor.** You will work closely with your primary care provider and nephrologist (a medical doctor specializing in kidney disease) to come up with the plan of care to make you feel your best.
4. **Working with other team members.** A registered dietitian may work with you to set goals for your diet; a physical therapist may help you set goals for exercise and physical activity, and a social worker may help you locate community resources and cope with your kidney disease.

## QUESTIONS TO ASK YOUR TEAM ABOUT KIDNEY DISEASE

1. **My kidney health.** What is the health of my kidney? What is the cause of my kidney disease?
2. **Medicines.** Will I need new or different medicine to treat my kidney disease?
3. **Diet.** What type of changes in my diet will help protect my kidneys?
4. **Progression of kidney disease.** How will I know if my kidney disease is getting worse?

# End Stage Kidney Disease

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## WHAT IS END STAGE KIDNEY DISEASE (KIDNEY FAILURE)?

- End Stage Kidney Disease (ESKD), also known as kidney failure, means that your kidneys cannot remove wastes, extra fluid, or keep you feeling okay. Talk to your kidney doctor (also known as a nephrologist) or other health care provider to find out why this happened.
- ESKD is permanent, and there is little chance of your kidneys regaining their function.
- Talking with your health care team is important to choose the best treatment for ESKD.
- Another term for end stage kidney disease is end stage renal disease, or ESRD.

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## WHAT ARE YOUR CHOICES?

You have several choices to treat ESKD. These include kidney transplant, dialysis, and supportive care. Your choice can help you live longer, improve your quality of life or reduce the risk of other health issues.

- **Kidney transplant.** This is a treatment where you have someone else's kidney placed into your body. You can use a kidney from someone who is alive (family member, a friend, or someone else) or from someone who has died. See the Transplant module for more detailed information.
- **There are two types of dialysis:** Hemodialysis. In this type of treatment your blood flows through a machine to remove wastes and fluid from your body. There are many different kinds of hemodialysis. This includes undergoing dialysis during the day, overnight while you sleep, three times a week, or sometimes more frequently, 4-6 times per week.
- **Peritoneal dialysis.** This type of treatment uses a tube in your abdomen to remove the waste and fluid from your body. You place dialysis fluid into your body through the tube and it extracts the wastes and fluid. This dialysis fluid with the waste is then drained from your body. This type of dialysis is done, everyday. It can be done during the day, or overnight while you sleep.

Dialysis can be given either at home or at a dialysis clinic. Peritoneal dialysis is performed at home. Hemodialysis can take place either at home or at a dialysis clinic. You and your care partner(s) are trained by your dialysis team so that you know what you need to do.

Your doctor can talk with you about which option may be best for you.

- **Supportive care.** You can also choose to have no dialysis treatments and continue to have supportive care from your internist and nephrologist.

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## WHAT ELSE CAN YOU DO FOR YOUR HEALTH?

When your kidneys are not working any more, it is important that you talk to your doctor about how you can feel your best by watching your diet, the fluids that you drink, taking your medications as recommended, staying as physically active as you can, and talking to others for emotional support.

# Transplant

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## WHY WOULD YOU NEED A TRANSPLANT?

When kidneys do not work well enough and are not expected to improve, people may need either dialysis or a kidney transplant to stay alive. A kidney transplant is when a surgeon places a working kidney into a person with a failing kidney. A kidney transplant may be the best treatment for kidney failure. It is important to discuss this option with your doctor.

- **After a transplant.** In general, patients who get a kidney transplant have better health, better quality of life, and experience fewer medical complications than if they stay on dialysis.

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## ARE YOU A CANDIDATE FOR A TRANSPLANT?

Ask your kidney doctor when and where you should be evaluated for a kidney transplant.

- **Evaluation.** This evaluation may happen before you need dialysis and requires a complete health evaluation including visits with a kidney specialist, a surgeon, a social worker, and others.
- **Waiting list.** Keep in mind that you may be eligible to be placed on a waiting list for a kidney from someone who has died (known as a deceased-donor kidney) at different centers at the same time depending on your insurance coverage. Placement on more than one waiting list may increase your chances of getting a kidney in a shorter period of time.

## DO YOU NEED TO REPLACE BOTH KIDNEYS?

Only 1 healthy kidney is needed to do the job of 2 failed kidneys. The healthy kidney can come from a living donor or from a person who has died.

- **Living donor kidney.** Your transplant team will work with you to find out if there is a living donor option for you. This may be one of your family members, friends, or possibly someone you do not even know.
- **Deceased donor.** If a living donor is not available, your name will be placed on a waiting list for a kidney from someone who has died.
- **Waiting lists for transplant.** Each region of the United States has a different waiting list. All lists are controlled in the U.S. by the non-profit United Network for Organ Sharing (UNOS) to maintain fairness. Times of waiting are sometimes different depending on the location and types of patients on the list. Waiting times can vary, so be sure to ask your doctor about average wait times in your area.

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## WHAT SHOULD YOU DO WHILE WAITING FOR A NEW KIDNEY?

While waiting for a kidney transplant, it's important to stay healthy.

- **Take your medications.** Take your medications as prescribed by your health care team.
- **Eat healthy and exercise.** Follow your diet, perform some physical activity every day and try to remain stress-free.
- **Keep your medical appointments.** Keep all appointments with your health care team.
- **Stay in contact.** Make sure the transplant team knows where to reach you.

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## WHAT HAPPENS AFTER A TRANSPLANT?

There are several things to expect after a kidney transplant. Taking care of yourself is required to keep your donated kidney healthy.

- **Hospital stay.** You will spend at least 3-5 days in the hospital.
- **Outpatient checkups.** You will have frequent checkups with your transplant team to make sure the donated kidney is working well.
- **Medications.** You will need to take medications for as long as the donated kidney is working in your body. This is to prevent your body from rejecting the transplanted kidney.

## WHAT IF SOMEONE WANTS TO DONATE A KIDNEY?

Living kidney donors must have a complete medical exam to determine that they are healthy enough to donate and are a good match for the potential recipient. There are a few things to keep in mind when donating a kidney.

- **Donating is a big commitment.** Kidney donation involves major surgery. As with all surgeries, risks include bleeding, infection, and others.
- **Recovery time.** After the surgery, you will spend a few days in the hospital recovering.
- **Yearly checkups.** After donation, it's important to follow your doctor's instructions, have a yearly checkup and monitor blood pressure and kidney function.
- **Contact from your transplant center.** The United Network for Organ Sharing requires that your transplant center contact you 6 months, 1 year, and 2 years after your donation.

# Acute Kidney Injury (AKI)

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## WHAT IS ACUTE KIDNEY INJURY?

Acute kidney injury (AKI), also known as acute kidney failure or acute renal failure, is a sudden loss of kidney function that occurs over hours to days.

- **Where it happens.** AKI is more likely to occur in patients who are in the hospital, but can happen outside the hospital also.
- **AKI and chronic kidney disease.** After AKI kidney function usually improves, but in some cases patients may not fully recover. These patients may go on to develop chronic kidney disease (CKD).

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## WHAT CAUSES AKI? ?

Acute kidney injury can occur from a lower blood flow to the kidneys, direct damage to the kidneys, or blockage of urine coming out of the kidneys.

- **Causes.** Kidneys may be injured suddenly by:
  - Severe health problems such as a heart attack, serious infections (known as sepsis), or a blockage of urine such as from kidney stones
  - Medications that may have harmful effects on the kidneys such as nonsteroidal anti-inflammatory drugs (also known as NSAIDs) or herbal supplements
  - Certain types of dye used for medical imaging
  - Dehydration such as from poor eating and drinking, vomiting, diarrhea, or bleeding

## WHO IS AT RISK FOR AKI?

Acute kidney injury can occur from a lower blood flow to the kidneys, direct damage to the kidneys, or blockage of urine coming out of the kidneys.

- People with diabetes
- People with chronic kidney disease (CKD)
- People undergoing cardiac catheterization, a medical procedure used to diagnose and treat certain heart conditions.
- People undergoing cardiac bypass surgery, an operation to restore the flow of blood through the arteries that supply blood to the heart, or to repair or replace a heart valve
- People with heart failure
- People with liver disease
- The elderly

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## HOW IS AKI DETECTED?

Changes in blood levels of the protein creatinine give information about the filtration rate and the kidney's ability to clean toxins from the body. When there is a sudden rise in this blood level, it may be because of AKI, or a sudden loss of kidney function.

The amount of urine made also is used to detect problems with kidney function. Little or no urine suggests damage to the kidney.

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## HOW DOES AKI AFFECT YOUR BODY?

Damage to the kidneys results in the buildup of waste products and fluid in the body because the kidneys cannot effectively remove them.

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## WHAT CARE DO YOU NEED?

The treatments for AKI depend on how severe it is and the reason that caused the injury

- **Stopping the cause of AKI.** The most common treatment is to try to remove or limit what is causing injury to the kidneys.
- **Dialysis.** If AKI is severe, dialysis may be needed short term to remove waste and fluid from the body. Rarely, dialysis may be needed long term.
- **Care after discharge.** It may be important to see a kidney specialist for evaluation after discharge to home. Let your doctor know that you recently had AKI.

## IS AKI PERMANENT?

If detected early, AKI may be reversible once the reason is identified and treated. However, some people may develop chronic kidney disease (CKD) problems later in life. Continue to talk to your doctor about your current kidney health.

# Kidney Stones

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## WHAT ARE KIDNEY STONES?

A kidney stone is a hard deposit of minerals or a collection of crystals that forms in the kidney and looks like a stone.

These stones can sometimes block the flow of urine, which can cause pain or blood in the urine.

Kidney stones are common and occur on average in one in every ten people in the US.

- **Chance of another stone.** People who have one kidney stone have approximately a 50% chance of having another stone in the next 10 years.
- **Family history.** People with a family history of kidney stones are 2-times more likely to get a kidney stone than someone without a family history. This may be because of inherited genes or common lifestyle factors.

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## WHY DO PEOPLE GET KIDNEY STONES?

Usually, it is because there is too much of a substance that causes crystals to form in too little urine.

This is similar to what happens when you are mixing a powdered drink: too much powder and too little water means it won't be well mixed and powder (like stones) will be left over. Not drinking enough fluid is important and may cause stones to grow.

Some people may have too little of another substance in their body that helps to dissolve the stones.

## ARE THERE DIFFERENT KINDS OF KIDNEY STONES?

There are many different kinds of kidney stones. Prevention and treatment advice may depend on the type of stone. Capturing the stone by straining urine will allow the stone to be sent to the laboratory to determine the type.

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## WHAT ARE THE TYPES OF KIDNEY STONES?

- **Most common types.**
  - **Calcium oxalate.** For calcium oxalate stones, there may be too much calcium and too much oxalate in the urine. There also may be a low level in the urine of a naturally occurring kidney stone preventer called citrate.
  - **Calcium phosphate.** For calcium phosphate stones, there may be too much calcium and too little acid in the urine.
- **Less common or rare types.**
  - **Uric acid.** For uric acid stones, there is too much acid, and maybe too much uric acid
  - **Cysteine.** For cystine stones, there is too much cystine – a part of a protein called an amino acid. An abnormal inherited gene causes this type of stone.
  - **Struvite.** For struvite stones, there is infection in the urine.
  - **Mixed types.** Some stones are a mixture of various types.



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## WHAT CAN YOU AND YOUR DOCTOR DO TO PREVENT KIDNEY STONES?

Your doctor may ask you to collect all your urine for a whole day to measure the specific components in the urine. It may be helpful to do this 24-hour collection more than 1 time. Depending on the results, there are things patients and doctors can do that may be helpful to prevent new stones, or prevent existing stones from growing bigger.

- **Drink liquids.** Drinking more liquid—just about any kind of liquid is fine, except for sugar-sweetened beverages like soda. The goal is to drink enough that your body will make at least 2 quarts of urine each day.
- **Change your diet.** For calcium stones, if the urine calcium is high, patients need to eat a low sodium and low animal protein diet. If this is not effective, then a pill called a thiazide diuretic can reduce the amount of calcium in the urine. Patients should not eat a low calcium diet as this treatment does not work. It will also cause calcium from bones to go out in the urine.
- If the urine oxalate is high, then patients need to follow a low oxalate diet. High oxalate foods include spinach and rhubarb. Moderate oxalate foods include potatoes and nuts. If these are eaten, also drink a lot of fluid and consider eating at the same time food with calcium such as milk or yogurt.
- **Take medicine to reduce urine acid levels.** If the urine acid level is high, you can take prescription pills like potassium citrate to help reduce it. But if the acid level is low there is not much that can be done to raise it.
- **Take medicine for low urine citrate.** Adding more citrate to the urine by taking potassium citrate pills can help prevent stones in people with low urine citrate or even with normal urine citrate levels.
- **Combine medicine and diet.** For any type of stone or urine results, fluids, diet, and prescription pills can be combined.
- **Work with your doctor.** The most effective treatments require a dedicated plan based on the urine test results and your health goals.

## WHAT KINDS OF DOCTORS CAN HELP YOU?

Nephrologists are doctors who specialize in kidney medicine and focus on stone prevention. Urologists are doctors who are trained as surgeons and help remove existing stones and can also prescribe treatments for prevention. Both types of doctors work together to prevent and treat kidney stones.