EARLY DETECTION OF CHRONIC KIDNEY DISEASE

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Chronic kidney disease (CKD) is a slow and progressive loss of kidney function over several years. Eventually, a person may develop kidney failure.

CKD affects about 37 million people in the United States, which is approximately 15% of the population. It often goes undetected and undiagnosed until the condition is well advanced.

African American, Hispanic, Native American, and Asian American people have a greater chance of developing CKD than people who are white. This may be due to disparities in the primary care of People of Color.

As kidney disease advances, dangerous levels of waste can rapidly build up inside the body. Treatment aims to stop or slow the progression of kidney dysfunction by controlling the underlying cause.

Read on to learn more about CKD, including its causes, symptoms, and treatments.

Learn more about CKD here.

Symptoms

People who are at high risk of developing CKD should have regular kidney function checks. Early detection can help prevent severe kidney damage.

What is CKD?

CKD is a slow and gradually progressive condition that causes kidney dysfunction. However, if one kidney stops functioning correctly, the other may still carry out normal functions.

A kidney may deteriorateTrusted Source to a certain level of dysfunction and not get any worse. Sometimes, however, the condition may progress to kidney failure.

Most people with CKD are not aware that they have it because symptoms do not usually develop in the early stages of the condition. Typically, by the time a person notices any symptoms, the condition is at an advanced stage. Damage to the kidneys at this stage is irreversible.

How to recognize CKD

Symptoms of CKD can include:

- hypertension, or high blood pressure
- anemia
- edema, or swollen feet, hands, and ankles
- fatigue, or tiredness
- decreased urine output
- bloody urine, in some cases
- dark urine, in some cases
- decreased mental alertness, when the condition is severe
- a loss of appetite
- persistent itchy skin, when the condition is severe
- more frequent urination, especially at night, in some cases

Stages

Doctors use glomerular filtration rate (GFR) to determine how advanced a person's CKD is. The GFR shows how well a person's kidney is filtering waste. A person's GFR can depend on their body size, sex, and age.

A doctor can determine a person's GFR by testing the levels of creatinine in their blood. Creatinine is a waste product of creatine, which is an acid that helps supply energy to muscle cells.

When the kidneys are working correctly, they filter a relatively constant amount of creatinine from the blood. Changes in blood creatinine levels can indicate that a person has a problem with their kidneys.

A change in a person's GFR allows a doctor to classify CKD into stages, as follows.

Stage 1

Stage 1 CKD means that a person's GFR is at least 90 milliliters per minute (ml/min) per 1.73 meters squared (m2). This is normal kidney function but with evidence of kidney damage. Some signs of kidney damage in stage 1 CKD can include protein in a person's urine or physical damage.

Stage 2

If a person has stage 2 CKD, their GFR is 60 –89 ml/min per 1.73 m2. A GFR in this range usually means that a person's kidneys are working well. However, this GFR indicates that a person with stage 2 CKD has additional signs of kidney damage. These signs can include physical damage to the kidney or protein in a person's urine.

A person with stage 1 or 2 CKD can speak with a doctor about medications that can help protect their kidneys.

Stage 3

At stage 3 CKD, a person's GFR is 30 –59 ml/min per 1.73 m2. This range indicates that a person has some damage to the kidneys. A person's kidneys are not working as well as they should at stage 3 CKD.

Stage 3 CKD can be separated into two subcategories:

- **Stage 3a:** Stage 3a means that a person has a GFR of 45 –59 ml/min per 1.73 m2.
- **Stage 3b:** Stage 3b means that a person has a GFR of 30 –44 ml/min per 1.73 m2.

Although most people with stage 3 CKD do not have symptoms, some may experience:

- swelling in the hands and feet
- back pain
- more frequent urination
- anemia
- high blood pressure
- bone disease

A person with stage 1–3 CKD may be able to slow the damage to their kidneys by:

- controlling their blood sugar, if they have diabetes
- controlling their blood pressure
- eating a healthy diet
- not smoking or using tobacco
- being active for 30 minutes per day on 5 days per week
- maintaining a moderate weight
- meeting with a kidney doctor, or nephrologist

A person with stage 3 CKD may also want to speak with a dietitian about following a healthy diet. Additionally, a person with stage 3 CKD can speak with a doctor about angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs). These medications can lower blood pressure and may help prevent CKD from worsening.

Stage 4

By stage 4 CKD, a person's GFR is 15–29 ml/min per 1.73 m2. At this stage, a person's kidneys are moderately to severely damaged. Stage 4 CKD is a serious condition and the last stage before a person develops kidney failure.

A person with stage 4 CKD is more likely to experience symptoms such as swollen hands and feet, back pain, and more frequent urination. Complications such as anemia or bone disease are also more likely.

A doctor may recommend that a person with stage 4 CKD speaks with a nephrologist or dietitian. A doctor may also prescribe ACE inhibitors or ARBs.

Stage 5

A person with stage 5 CKD has a GFR of 15 ml/min per 1.73 m2 or less. At this stage, a person's kidneys have either failed or are close to failing.

Symptoms of kidney failure include:

- itching
- muscle cramps
- nausea
- vomiting
- swelling in the hands and feet
- back pain
- more frequent urination

- difficulty sleeping
- difficulty breathing

If a person has kidney failure, they will need to undergo dialysis or have a kidney transplant to survive. Kidney dialysis helps filter a person's blood when their kidneys are no longer able to.

Data suggest that there was a 15% increase in people developing stage 1 CKD in 2018. Meanwhile, the volume of people with CKD at stages 2–5 remained fairly steady.

It is essential that people receive an early diagnosis of and prompt treatment for kidney disease to prevent serious damage.

People with diabetes should have an annual test, which measures microalbuminuria — or small amounts of protein — in urine. This test can detect early diabetic nephropathy, which is kidney damage linked to diabetes.

Treating symptoms and side effects

Damage to a person's kidneys from CKD is usually permanent. However, some therapies can help control symptoms, reduce the risk of complications, and slow the progression of the condition.

Some conditions that CKD causes that require treatment include the following.

High blood pressure

High blood pressure can be the cause or a symptom of CKD. Lowering blood pressure is important to protect the kidneys and subsequently slow down the progression of CKD.

A person with high blood pressure may need to take certain medications. Additionally, making lifestyle changes such as eating healthily and getting regular exercise can help reduceTrusted Source a person's blood pressure.

Learn about normal blood pressure here.

Anemia

Hemoglobin is the substance in red blood cells that carries vital oxygen around the body. If hemoglobin levels are low, a person likely has anemia.

Injections of erythropoiesis-stimulating agents (ESAs) are the most common treatment for CKD and anemia. ESAs mimic the protein erythropoietin, which is secreted by the kidneys to stimulateTrusted Source red blood cell production.

Phosphate balance

The bodies of people with kidney disease may not be able to eliminate phosphate correctly. Treatment involves a person reducing their intake of nutritional phosphate. This usually means reducing their consumption of dairy products, red meat, eggs, and fish.

Learn more about phosphorus in the diet here.

Skin itching

Itching is a common problem for people in the advanced stages of CKD or who have kidney failure and are receiving dialysis.

It can be difficult to control itching, and a person may find that they have difficulty sleeping. A person can try speaking with a dermatologist about their itchy skin. The dermatologist may provide a person with medication or moisturizers to help reduce itching.

Learn more about itchy skin here.

Vitamin D deficiency

People with CKD are at high risk of vitamin D deficiency. Vitamin D is essential for healthy bones. The kidneys activate the vitamin D obtained from the sun or food before the body can use it. Low levels of vitamin D can lead to a loss of bone density, which can lead to osteoporosis or fractures.

People with vitamin D deficiency may require supplementation. However, the evidence on its effectiveness is limited, so doctors typically decide based on the individual's needs and health status.

Learn more about vitamin D deficiency here.

Fluid retention

People with CKD need to be careful with their fluid intake and restrict how much salt they consume. If the kidneys do not work correctly, a person is much more susceptible to fluid buildup and overload.

Consuming a lot of salt can also causeTrusted Source the body to retain even more fluid. Fluid retention due to sodium can lead to hypertension, which can lead to the progression of kidney disease and serious heart problems.

Learn more about salt intake here.

Treatment types

People may need to take many medications to treat the symptoms and conditions that develop due to CKD.

In addition, a person may need to try one of the following lifestyle changes or treatments, depending on the stage of their CKD.

Diet

Following a proper diet is a vital part of kidney failure treatment. Restricting the amount of protein in the diet may help slow down the progression of the condition, as consuming too much protein may overexert a person's kidneys.

However, the specific amount of protein a person should eat depends on their body size, overall health, and exercise regimen. A person should talk with a doctor or dietitian to find out the best sources of protein and how much to consume.

Making dietary changes may also help alleviate symptoms of nausea. A person should regulate their salt intake carefully to control hypertension. A person may also need to limit potassium and phosphorus, as these can be dangerous for people with CKD.

Learn about the best foods for healthy kidneys here.

Nonsteroidal anti-inflammatory drugs

People with CKD should avoid nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen, certain antibiotics, and the use of dye with a CT scan. This is due to an increased risk of side effects as a result of how the kidneys may metabolize these drugs.

End stage treatment

End stage treatment typically begins when a person is at stage 5 and their kidney is functioning at 15%Trusted Source of its normal capacity. It occurs when the kidneys cannot keep up with the waste and fluid elimination process despite the person making lifestyle changes, making dietary changes, and taking medications.

For this reason, a person with end stage renal disease will need dialysis or a kidney transplant to survive. Most doctors try to delay the need for dialysis or a kidney transplant for as long as possible because they can lead to potentially serious complications.

Learn more about end stage renal disease here.

Kidney dialysis

Dialysis is the mechanical removal of waste products and excessive fluids from the blood when the kidneys can no longer carry out this function. Dialysis has some serious risks, including infection.

There are two main types of kidney dialysis. They are:

- **Hemodialysis:** A dialyzer, or an artificial kidney, machine pumps blood out of the person's body. The machine filters out the waste, and the blood reenters the body through tubes. This procedure usually happens in the hospital or at a dialysis center, but it can also take place at home.
- **Peritoneal dialysis:** The person's abdomen filters the blood. This takes place in the peritoneal cavity, which contains a vast network of tiny blood vessels. A doctor implants a catheter into the abdomen and infuses and drains a dialysis solution for as long as is necessary to remove waste and excess fluid.

There are two subtypes of peritoneal dialysis:

- **Continuous ambulatory peritoneal dialysis:** This usually happens while a person goes about their daily activities.
- **Automated peritoneal dialysis:** This generally takes place during sleep.

Learn more about kidney dialysis here.

Kidney transplant

A kidney transplant is a better option than dialysis for those with no other health conditions apart from kidney failure. However, candidates for a kidney transplant may have to undergo dialysis until they receive a new kidney.

A kidney donor and recipient need to have blood types that work together. If a person receives a kidney from someone with incompatible blood, their body may reject it.

Siblings or very close relatives are usually the best types of donors. If a living donor is not available, the search will begin for a cadaver donor, and a person will get a kidney from someone who has recently died.

Learn more about organ transplants and how they work here.

Causes

Kidneys carry out the complex system of filtration in our bodies. This involves removing excess waste and fluid material from the blood and excreting it from the body.

Kidneys filter toxins and waste from a person's blood. However, problems can occur:

- if the blood flow does not reach the kidneys properly
- if the kidneys are not working properly because of damage or disease
- if an obstruction prevents urine outflow

CKD often happens as a result of either diabetes or hypertension.

When a person has uncontrolled diabetes, sugar (glucose) accumulates in the blood and can damage the kidneys.

High blood pressure, meanwhile, can damage the glomeruli. These are parts of the kidney that filter waste products.

Some other causes of CKD may include:

- **Obstructed urine flow:** Blocked urine can back upTrusted Source into the kidney from the bladder. Blocked urine flow increases pressure on the kidneys and undermines their function. Possible causes include an enlarged prostate, kidney stones, and a tumor.
- **Kidney diseases:** There are many different kidney diseases, including polycystic kidney disease, pyelonephritis, and glomerulonephritis.
- **Kidney artery stenosis:** This causes a narrowingTrusted Source or blockage of the renal artery before it enters the kidney.
- **Heavy metal poisoning:** Lead is a common source of poisoning.
- **Fetal developmental problems:** This can occur if the fetus' kidneys do not developTrusted Source correctly in the womb.
- **Systemic lupus erythematosus:** This is an autoimmune condition wherein the body's immune system attacks the kidneys as though they were foreign tissue.
- **Malaria and yellow fever:** These two mosquito-borne diseases may cause impaired kidney function.
- **Certain medications:** The overuse of certain drugs, including NSAIDs, can lead to kidney failure.
- **Illegal substance use:** Using substances such as heroin or cocaine can damage the kidneys.
- **Kidney injury:** Sustaining a sharp blow or another physical injury to the kidneys can cause damage.

Learn more about the causes of kidney failure here.

Risk factors

Most of the causes of CKD are also risk factors for the condition. In addition to diabetes and high blood pressure, some other risk factors include:

- having a family history of kidney disease

- being older, as CKD is much more common among people over 60 years of age
- having obesity
- having heart disease
- having sustained previous damage to the kidneys

Race and ethnicity

According to the National Institute of Diabetes and Digestive and Kidney DiseasesTrusted Source, African American, Hispanic, and Native American people are more likely to get CKD than people who are white.

- About 35% of people with kidney failure in the U.S. are African American, even though African Americans represent only 13% of the U.S. population. Diabetes and high blood pressure are primary causes of kidney failure in this group, and People of Color experience them at a higher rate than people who are white.
- The number of Hispanic people with kidney disease has grown by 70% since 2000, and they are 1.3 times more likely to receive a diagnosis than people from other groups.
- Native Americans and Alaska Natives are 1.2 times more likely to receive a diagnosis of kidney disease than white people. The leading cause in this group is diabetes.

Learn more about kidney disease in African American people here.

Diagnosis

When diagnosing CKD, a doctor may check for signs of CKD and ask the person about their symptoms. They may also order the following tests:

- **Urine test:** A urine test helps determine whether or not albumin is present. Albumin is present in urine when the kidneys are damaged.
- **Kidney scans:** Doctors typically use ultrasound scans to assess the size and shape of the kidney. They may also use an MRI or CT scan in rarer cases. CT scans involve dyes that are toxic to the kidneys, so they are not a common choice.
- **Kidney biopsy:** The doctor extracts a small sample of kidney tissue and examines it for cell damage. An analysis of kidney tissue makes it easier to make a precise diagnosis of kidney disease.
- **Chest X-ray:** The aim of a chest X-ray is to check for pulmonary edema, which is fluid retained in the lungs.
- **GFR:** This shows how well a person's kidney is filtering waste.

Learn more about diagnostic tests for kidney function here.

Complications

If CKD progresses to kidney failure, complications can include:

- anemia
- fluid retention
- gout
- heart disease
- hyperkalemia, which is when blood potassium levels rise, possibly resulting in heart damage
- metabolic acidosis, which is when acid builds up in the body
- osteomalacia, which is when bones become weak and break easily as a result of vitamin D deficiency
- pericarditis, which is when the sac-like membrane around the heart becomes inflamed

- secondary hyperthyroidism, which is when vitamin D, calcium, and phosphorus levels are out of balance

Prevention and management

Some conditions, such as diabetes, increase the risk of CKD. Controlling diabetes can reduce the risk of developing kidney failure. Individuals should follow their doctor's instructions, advice, and recommendations.

Diet

Eating a healthy diet can help a person lower their blood pressure. Some heart-healthy foods include:

- fruits and vegetables
- whole grains
- lean meats
- fish

Learn more about what constitutes a healthy diet here.

Physical activity

Getting regular physical activity is ideal for maintaining healthy blood pressure levels. It also helps control chronic conditions, such as diabetes and heart disease.

Individuals should check with a doctor about whether or not an exercise program is suitable for their age, weight, and health.

Learn about the benefits of exercise for physical and mental health here.

Avoiding certain substances

Excessive alcohol and drug use, as well as long-term exposure to heavy metals — such as lead, fuels, solvents, and other toxic chemicals — can contribute to kidney disease.

Learn how gasoline exposure can affect health here.

Prevention among at-risk groups

Systemic disparities in medical care that affect African American, Hispanic, Native American, and Asian American people can affect the diagnosis and treatment of kidney disease.

Research suggests that CKD may progress faster for people in these groups than for people who are white. A person may not realize that they have a problem until serious symptoms appear.

Studies indicate that people who reside in lower income areas may be less likely to receive predialysis care from a nephrologist or a kidney transplant than people who are white. When a person does qualify for a transplant, their wait might be longer.

For this reason, a person may want to reduce their risk of developing CKD by taking proactive steps to contact a doctor and get tested.

Learn more about racism in healthcare here.

Life expectancy

The life expectancy of a person with CKD can vary depending on what stage they have. Research from 2017Trusted Source notes that life expectancy is lower in people with a GFR of 60 ml/min per 1.73 m2 and below. However, the author does not mention life expectancy for people with stage 1 or 2 CKD.

If a person has end stage CKD, their life expectancy can depend on what kind of treatment they receive. It can also depend on how well they follow their treatment plan and whether or not they have any additional health conditions.

The average life expectancy for someone receiving dialysis is 5–10 years. However, people can go on to live for another 20–30 years while having dialysis.

It is important to understand that, even with dialysis, 20–50%Trusted Source of people with end stage CKD die within 2 years.

A person who receives a kidney transplant from a living donor can survive for 15–20 years before needing another kidney. A person who receives a kidney from a cadaver may need another one after 10–15 years.

Summary

CKD is a widespread condition that affects around 1 in 7 adults in the U.S. CKD is more likely to affect African American, Hispanic, Native American, and Asian American people than white people.

Often, people do not realize that they have the condition until their kidney function is down to 15%Trusted Source of its normal capacity. By this time, they already have CKD and will require dialysis or a kidney transplant.

Prevention depends largely on managing the primary causes, which are diabetes and hypertension. However, there are other conditions — including kidney injury and heavy metal poisoning — that can cause CKD.

People who are at risk of the condition or who are concerned should speak with a doctor about testing. Leading a healthy lifestyle through diet and exercise can also help prevent CKD.