CONDITION

Chronic kidney disease

Learn how chronic kidney disease affects kidney function, how it is diagnosed, and how treatment and follow-up can protect kidney and heart health.

WHAT IT IS
Chronic kidney damage or reduced function

BODY SYSTEM
Kidneys and urinary system

MAIN SYMPTOMS
Swelling, tiredness, shortness of breath, nausea

WHAT CAUSES IT
Diabetes, high blood pressure, other kidney damage

HOW IT IS DIAGNOSED
Persistent abnormal eGFR or urine albumin tests

MAIN TREATMENT
Cause management and kidney-protective treatment

CAN IT BE CURED?
No, treatment can slow further damage

IS IT AN EMERGENCY?
Sometimes, with severe trouble breathing

LONG-TERM OUTLOOK
May not progress or may reach kidney failure

Overview

Chronic kidney disease, often called CKD, means the kidneys have had reduced function or signs of damage for at least three months. The kidneys filter waste and extra water from the blood. They also help regulate blood pressure, balance minerals, support red blood cell production, and keep bones healthy.

CKD can be present even when a person feels well. It may be found through a blood test that estimates kidney filtering ability or a urine test that detects albumin, a type of protein. Healthy kidneys usually keep albumin in the blood. Albumin in the urine can be an early sign of kidney damage.

Doctors describe CKD using its cause, the estimated glomerular filtration rate, or eGFR, and the amount of albumin in the urine. A lower eGFR generally means less filtering ability. Higher

urine albumin levels suggest greater kidney damage. Both measurements help estimate the risk of CKD getting worse.

CKD matters because it can raise the risk of heart disease, stroke, anemia, mineral and bone problems, and kidney failure. However, CKD does not always progress to kidney failure. Finding it early and treating its causes can help protect kidney function and overall health.

CKD is different from acute kidney injury. Acute kidney injury is a sudden decline in kidney function over hours or days. A person can have acute kidney injury on top of CKD, so sudden changes still require medical assessment.

Symptoms

Early CKD usually causes no symptoms. The kidneys can lose some filtering ability before a person notices a change. This is why testing is important for people with conditions that increase kidney risk.

Symptoms may develop as CKD becomes more advanced. They can include:

These symptoms are not specific to CKD. They can have many other causes, and symptoms alone cannot show how well the kidneys are working. Blood and urine tests are needed.

The amount of urine may stay normal even in advanced CKD. A normal-looking urine pattern therefore does not rule out kidney disease.

- Swelling in the feet, ankles, legs, hands, or around the eyes
- Tiredness, weakness, or difficulty concentrating
- Shortness of breath
- Nausea, reduced appetite, or an unusual taste in the mouth
- Itching or dry skin
- Muscle cramps
- Changes in urination, including more frequent nighttime urination
- Foamy urine, which may occur when urine contains excess protein
- Trouble sleeping

Causes and risk factors

Diabetes and high blood pressure are major causes of CKD. High blood sugar can damage the

kidneys' small blood vessels and filtering units. High blood pressure can also injure these structures. Kidney disease may then make blood pressure harder to control.

Other possible causes include:

Risk is also higher among people with cardiovascular disease, a family history of kidney disease, obesity, or a history of smoking. Risk tends to rise with age, but CKD is not an unavoidable part of aging.

Some over-the-counter medicines can affect kidney function. Nonsteroidal anti-inflammatory drugs like ibuprofen or naproxen , or NSAIDs, include ibuprofen and naproxen. Regular or high-dose use can be harmful, especially in people with CKD, dehydration, heart failure, or certain medication combinations. Herbal products and supplements may also contain unsafe or undeclared ingredients.

Having a risk factor does not mean a person has CKD. Testing is needed to determine whether kidney damage is present.

- Glomerular diseases, which damage the kidneys' filtering units
- Inherited disorders such as polycystic kidney disease
- Autoimmune conditions, including lupus
- Repeated kidney infections
- Long-term blockage of urine flow, such as from certain prostate or urinary tract problems
- Congenital differences in kidney or urinary tract development
- Repeated or severe episodes of acute kidney injury
- Medicines or substances that damage the kidneys

Diagnosis

CKD is diagnosed through medical history, examination, blood tests, urine tests, and sometimes imaging or a kidney biopsy. Doctors also look for previous test results because abnormalities generally need to be present for at least three months to meet the definition of CKD.

A blood creatinine test is used to calculate eGFR. Creatinine is a waste product from normal muscle activity. An eGFR below 60 for at least three months may indicate CKD. Because creatinine is affected by factors such as muscle mass, age, and some medicines, the estimate must be interpreted in context.

A cystatin C blood test may sometimes provide another estimate of kidney function. It can

help confirm CKD or improve accuracy when a creatinine-based result may be less reliable.

A urine albumin-to-creatinine ratio, often shortened to UACR or ACR, measures albumin in a urine sample. It adjusts for how concentrated the urine is. Persistent albumin in the urine can indicate kidney damage even when eGFR is 60 or higher. Temporary albumin increases can occur with fever, infection, vigorous exercise, or other short-term stresses, so repeat testing may be needed.

Other tests may include:

A biopsy uses a needle to remove a small kidney tissue sample for examination. It is not needed for every person with CKD.

CKD is grouped by eGFR category and urine albumin category. This classification helps guide monitoring and treatment. One abnormal result does not always mean chronic disease, particularly during an acute illness.

- Urinalysis to look for blood, protein, infection, or unusual cells
- Blood tests for potassium, bicarbonate, blood count, calcium, and phosphorus
- Ultrasound to examine kidney size, structure, cysts, or urinary blockage
- Tests for diabetes, autoimmune disease, infections, or inherited conditions
- Kidney biopsy when the cause is unclear or a specific kidney disorder is suspected

Treatment and management

Treatment aims to address the cause of CKD, slow further damage, lower cardiovascular risk, and manage complications. The plan depends on kidney function, urine albumin, other medical conditions, and personal priorities.

Blood pressure management is central to kidney and heart protection. This may involve activity, nutrition changes, and medication. Angiotensin-converting enzyme inhibitors like lisinopril or ramipril, called ACE inhibitors, and angiotensin receptor blockers, called ARBs, are often considered when CKD is accompanied by increased urine albumin. These medicines can affect potassium and kidney test results, so monitoring is important.

Sodium-glucose cotransporter-2 inhibitors, or SGLT2 inhibitors, may slow CKD progression and reduce heart-related risks in many eligible adults. Their benefits can apply to some people with or without diabetes. Whether they are appropriate depends on kidney function, urine albumin, medical history, and other factors.

Additional medicines may be considered for selected people. These can include treatments for

diabetes, cholesterol, fluid retention, anemia, excess acid in the blood, or mineral and bone changes. Some people with type 2 diabetes and CKD may benefit from a nonsteroidal mineralocorticoid receptor antagonist or a GLP-1 receptor agonist. These medicines require individualized review and laboratory monitoring.

Nutrition can support CKD care, but there is no single kidney diet for everyone. A registered dietitian with kidney expertise can help tailor food choices. Depending on test results and disease stage, the plan may address:

People should not severely restrict protein, potassium, phosphorus, or fluids without professional guidance. Unnecessary restrictions can lead to poor nutrition.

Other helpful steps may include regular physical activity, avoiding tobacco, maintaining a weight that supports health, limiting alcohol, and receiving recommended vaccines. A clinician or pharmacist should review prescription medicines, nonprescription products, and supplements. Medication doses sometimes need adjustment as kidney function changes.

NSAIDs should not be started or used regularly without checking with a healthcare professional if CKD is present. People should also tell healthcare teams about CKD before procedures, scans, or new prescriptions. Contrast material can often still be used when medically necessary, but the risks and protective steps should be reviewed.

If CKD progresses to kidney failure, treatment options may include dialysis, kidney transplantation, or comprehensive conservative care without dialysis. Dialysis removes some waste and extra fluid from the blood. A transplant replaces kidney function with a donated kidney. Conservative care focuses on symptom control and quality of life. Planning before kidney failure allows time to understand these choices.

- Sodium to help manage blood pressure or swelling
- Protein amount and protein sources
- Potassium if blood levels are too high or too low
- Phosphorus if it builds up in the blood
- Carbohydrates and overall eating patterns for diabetes management

Complications

CKD can affect many parts of the body. Possible complications include:

Not everyone develops these complications. Routine laboratory testing helps find many of them before severe symptoms occur.

- Cardiovascular disease, including heart attack, stroke, and heart failure
- High blood pressure or difficulty controlling blood pressure
- Anemia, meaning too few healthy red blood cells
- Fluid retention, which may cause swelling or shortness of breath
- High potassium, which can affect heart rhythm
- Metabolic acidosis, an unhealthy buildup of acid in the blood
- Mineral and bone disorder involving calcium, phosphorus, vitamin D, and bone strength
- Poor appetite, malnutrition, itching, sleep problems, or reduced quality of life
- Acute kidney injury during infection, dehydration, surgery, or medication changes
- Kidney failure requiring replacement therapy or conservative care

Follow up

Follow-up usually includes blood pressure checks, eGFR testing, urine albumin testing, and medication review. The timing depends on CKD severity, how quickly results are changing, and whether treatment has recently changed. More advanced CKD or higher urine albumin generally requires closer monitoring.

Routine visits are a time to discuss home blood pressure readings, nutrition, medicine safety, vaccinations, pregnancy plans, and ways to reduce cardiovascular risk. Some medicines require potassium and kidney-function testing after they are started or adjusted.

A kidney specialist, called a nephrologist, may be involved when the cause is uncertain, kidney function is falling quickly, urine albumin is very high, complications are difficult to manage, or planning for kidney replacement therapy may be needed.

Contact a healthcare professional promptly for a sudden decrease in urination, new or rapidly worsening swelling, persistent vomiting or diarrhea, inability to keep fluids down, or symptoms of a urinary infection. New severe weakness or palpitations also need prompt assessment because they can occur with electrolyte problems.

Seek emergency care for severe trouble breathing, chest pain, fainting, a seizure, new marked confusion, or difficulty waking. Very little or no urine together with worsening breathlessness or major swelling also warrants emergency assessment. These are different from routine CKD follow-up and should not wait for the next scheduled appointment.

Sources

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