CONDITION

Diabetes and kidney disease

Diabetes can gradually damage the kidneys and reduce their ability to filter the blood.

WHAT IT IS
Long-term kidney damage linked to diabetes

BODY SYSTEM
Kidneys and urinary system

MAIN SYMPTOMS
Often none, ankle swelling, fatigue, foamy urine

WHAT CAUSES IT
Long-term diabetes damage to kidney filters

HOW IT IS DIAGNOSED
Repeated urine albumin and blood kidney-function tests

MAIN TREATMENT
Diabetes, blood-pressure, and kidney-protective medicines

CAN IT BE CURED?
No - established kidney damage may persist

IS IT AN EMERGENCY?
Sometimes - severe breathlessness or confusion

LONG-TERM OUTLOOK
Often manageable; some people progress to kidney failure

Overview

Diabetes and kidney disease is a long-term condition in which diabetes damages the kidneys. The kidneys normally filter waste and extra water from your blood. They also help control blood pressure, make red blood cells, and keep minerals balanced.

High blood glucose can injure the kidneys' tiny blood vessels and filtering units. High blood pressure can add further damage. Over time, protein called albumin may leak into the urine, and the kidneys may become less able to clean the blood.

Kidney damage is often silent at first. You may feel well even when tests show early changes. Regular blood and urine tests matter because treatment is most helpful before symptoms appear.

Not everyone with diabetes develops kidney problems. When the condition does occur, its

course differs from person to person. Good diabetes and blood-pressure management, together with kidney-protective treatment when suitable, can slow further damage.

Symptoms

Early kidney damage usually causes no symptoms. It is commonly found during routine diabetes checks rather than because someone feels unwell.

Symptoms may develop as kidney function declines. They can include:

These symptoms have many possible causes. Foamy urine, for example, can occur simply because urine hits the toilet water quickly. A urine test is needed to find out whether excess protein is present.

Blood in the urine, pain when urinating, fever, or one-sided back pain are not typical features of diabetes-related kidney damage. They may point to another urinary or kidney problem.

- Swelling around the ankles, feet, legs, hands, or eyes
- Foamy or frothy urine caused by protein in the urine
- Tiredness, weakness, or difficulty concentrating
- Reduced appetite, nausea, or an unusual taste in the mouth
- Itchy or dry skin
- Muscle cramps
- Needing to urinate more often, especially at night
- Shortness of breath from fluid build-up or anaemia

Causes and risk factors

Diabetes can expose the kidneys to high glucose levels over many years. This changes blood vessels and raises pressure inside the kidney filters. The filters may then leak albumin and gradually lose function.

Kidney damage can occur with either type 1 or type 2 diabetes. Risk is higher when diabetes has been present for a long time, but duration alone does not predict what will happen.

Factors linked with a greater risk include:

Some ethnic groups have a higher risk of diabetes-related kidney complications. This reflects a mix of inherited, social, economic, and healthcare factors rather than ethnicity alone.

Kidney problems in a person with diabetes are not always caused by diabetes. Infections, medicines, inherited conditions, immune disorders, urinary blockage, and other kidney conditions can produce similar test results.

- Blood glucose that remains above your agreed target
- High blood pressure
- Smoking
- Heart or blood-vessel conditions
- A family history of kidney failure
- Previous acute kidney injury, meaning a sudden drop in kidney function
- Overweight or obesity
- Older age

Diagnosis

Two main tests are used.

A urine albumin-to-creatinine ratio, often shortened to UACR or ACR, checks for albumin leaking into the urine. A small urine sample is usually enough. A raised result is often repeated because exercise, fever, menstruation, infection, very high blood glucose, and other temporary factors can affect it.

A blood creatinine test is used to estimate the glomerular filtration rate, or eGFR. This estimates how much blood the kidneys filter each minute. A lower eGFR generally means reduced kidney function, although age and other factors influence the result.

Chronic kidney disease is usually confirmed when abnormal kidney function or evidence of kidney damage persists for at least three months. One abnormal result does not always mean you have a long-term condition.

Your healthcare team may also check blood pressure, blood glucose, cholesterol, blood count, and mineral levels. An ultrasound can examine the kidneys' size and structure.

Further investigation may be needed if the pattern is unusual. Examples include blood in the urine, a very rapid change in kidney function, sudden heavy protein loss, or kidney problems that do not fit the history of diabetes. Occasionally, a kidney biopsy is used to look at a small tissue sample under a microscope.

Treatment and management

Treatment aims to protect remaining kidney function and reduce the risk of heart attack, stroke, and kidney failure. Your plan will be based on your type of diabetes, kidney test results, blood pressure, other conditions, and the medicines you already take.

Keeping blood glucose within a safe, agreed range reduces ongoing stress on the kidneys. Targets may need adjustment as kidney function changes because the kidneys help clear insulin and some diabetes medicines from the body. This can increase the risk of low blood glucose.

Blood-pressure control is also important. ACE inhibitors and angiotensin receptor blockers, known as ARBs, can lower blood pressure and reduce albumin leakage in appropriate people. They are especially useful when high blood pressure and albumin in the urine occur together. Blood tests are used to monitor kidney function and potassium after treatment starts or changes.

For many people with type 2 diabetes and chronic kidney disease, an SGLT2 inhibitor may help protect the kidneys and heart. Its kidney benefits can extend beyond its effect on blood glucose. Suitability depends partly on kidney function and other medical factors.

Other treatments may include a GLP-1 receptor agonist to help manage type 2 diabetes and cardiovascular risk, or finerenone for selected people with type 2 diabetes and continuing albumin leakage. These medicines are not suitable for everyone and require appropriate monitoring.

Daily management may also involve:

Some medicines need a lower dose or should be avoided when kidney function falls. Non-steroidal anti-inflammatory drugs like ibuprofen or naproxen , or NSAIDs, such as ibuprofen can contribute to kidney injury, particularly during dehydration or alongside certain medicines. Ask a pharmacist or healthcare professional before using them, and do not stop prescribed treatment without advice.

If kidney function becomes severely reduced, options may include dialysis or a kidney transplant. Dialysis filters waste and fluid from the blood when the kidneys can no longer do enough of this work.

- Reducing salt to support blood-pressure and fluid control
- Avoiding smoking
- Staying physically active within your abilities
- Eating a balanced diet without excessive protein

- Taking cholesterol-lowering treatment when recommended
- Reviewing all prescription, over-the-counter, and herbal products

Complications

Kidney damage can affect much more than waste removal. Possible complications include:

Diabetes and chronic kidney disease together also increase the risk of heart attack, heart failure, stroke, and circulation problems. Managing cardiovascular risk is therefore a central part of treatment, even when kidney symptoms are absent.

- Fluid retention, leading to swelling or breathlessness
- High potassium, which can affect heart rhythm
- Anaemia, meaning too few oxygen-carrying red blood cells
- Changes in calcium, phosphate, and bone health
- Acid build-up in the blood
- Poor nutrition and muscle loss in advanced stages
- Kidney failure requiring dialysis or transplantation

Prevention

Diabetes-related kidney damage cannot always be prevented. Some risk factors, including age, family history, and how your body responds to diabetes, cannot be changed.

You can lower the risk or help delay progression by attending regular kidney checks, managing blood glucose and blood pressure, avoiding smoking, and taking recommended medicines consistently.

Staying hydrated is sensible, but drinking unusually large amounts of water does not repair kidney damage. If you have advanced kidney problems or swelling, you may instead be advised to limit fluid.

During vomiting, diarrhoea, fever, or another illness that causes dehydration, some medicines may need temporary adjustment. Follow the illness plan provided by your healthcare team rather than changing medicines on your own.

Living with it and what to expect

Many people have mild, stable kidney changes for years and continue their usual work, family life, travel, and activities. Others experience a gradual decline, while a smaller group develops more rapid loss of kidney function. Test trends over time are more informative than a single result.

Follow-up usually includes blood pressure checks, urine albumin testing, and blood tests for eGFR and electrolytes such as potassium. Checks may become more frequent if kidney function is falling, albumin levels are high, or treatment has changed.

You may be referred to a kidney specialist if the cause is uncertain, results worsen quickly, complications develop, or kidney function becomes severely reduced. Referral does not necessarily mean that dialysis is expected.

Diet advice should be tailored to your test results. Not everyone needs to restrict potassium, phosphate, protein, or fluid. Unnecessary restrictions can make meals difficult and may reduce nutrition. A renal dietitian can help if specific changes are needed.

It can be stressful to watch kidney test results change. Ask what your results mean as a trend, what stage of chronic kidney disease they suggest, and what monitoring is planned. Early changes do not mean that kidney failure is inevitable.

When to get medical help

Arrange routine medical follow-up if you have diabetes and have missed your kidney screening, or if you notice persistent ankle swelling, repeated foamy urine, increasing tiredness, or changes in urination. These symptoms usually need assessment but are not automatically an emergency.

Seek urgent same-day help if you:

Call emergency services for severe difficulty breathing, chest pain, a seizure, loss of consciousness, or new severe confusion. These signs may reflect dangerous fluid, heart, glucose, or mineral disturbances and need immediate care.

- Pass much less urine than usual
- Develop rapidly increasing swelling
- Have repeated vomiting or cannot keep fluids down
- Become unusually drowsy or weak
- Have very high or low blood glucose that is not responding to your usual plan

Common questions

Can damaged kidneys recover?

Some sudden kidney problems can improve, but established long-term scarring may not reverse. Treatment can still reduce albumin leakage, stabilise test results, and slow further loss of function.

Does foamy urine mean my kidneys are failing?

No. Foamy urine has several causes and does not show how well the kidneys are filtering. A urine albumin test can check whether protein leakage is present.

How quickly does diabetes-related kidney damage progress?

There is no single timeline. Some people's results remain stable for many years, while others decline more quickly. Blood pressure, glucose management, albumin leakage, heart health, smoking, and response to treatment all influence the course.

Can I still take metformin or insulin?

Many people with kidney problems can continue diabetes treatment, but some medicines require dose changes as eGFR falls. Insulin may remain active for longer when kidney function is reduced, increasing the chance of low blood glucose. Medicine reviews and monitoring are important.

Do I need a special kidney diet?

Not everyone does. Reducing excess salt is commonly helpful, but restrictions on potassium, phosphate, protein, or fluid should be based on your kidney function, blood tests, nutrition, and symptoms.

Will I eventually need dialysis?

Many people do not. Dialysis is considered only when kidney function becomes very low and causes problems that cannot be managed in other ways. Your pattern of test results over time gives more useful information than the diagnosis alone.

Sources

- National Institute of Diabetes and Digestive and Kidney Diseases: Diabetic Kidney Disease
- Kidney Disease: Improving Global Outcomes: KDIGO 2024 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease

- Kidney Disease: Improving Global Outcomes: KDIGO 2022 Clinical Practice Guideline for Diabetes Management in Chronic Kidney Disease
- American Diabetes Association: Chronic Kidney Disease and Risk Management, Standards of Care in Diabetes-2024
- American Diabetes Association and KDIGO: Diabetes Management in Chronic Kidney Disease Consensus Report, 2022
- National Institute for Health and Care Excellence: Chronic kidney disease-assessment and management, NG203