CONDITION

# Glomerulonephritis

Glomerulonephritis is inflammation that damages the tiny blood-filtering units inside the kidneys.

**WHAT IT IS**
Inflammation damaging the kidneys' blood-filtering units

**BODY SYSTEM**
Kidneys and urinary system

**MAIN SYMPTOMS**
Dark urine, swelling, foamy urine, reduced urination

**WHAT CAUSES IT**
Immune conditions, infections, inherited changes, or unknown causes

**HOW IT IS DIAGNOSED**
Urine and blood tests, often a kidney biopsy

**MAIN TREATMENT**
Kidney protection and treatment of the underlying cause

**CAN IT BE CURED?**
Sometimes - some causes resolve, while damage may persist

**IS IT AN EMERGENCY?**
Sometimes - breathing trouble, confusion, or very little urine

**LONG-TERM OUTLOOK**
Many recover; some develop chronic kidney failure

## Overview

Glomerulonephritis means inflammation of the glomeruli. Glomeruli are clusters of tiny blood vessels in the kidneys that filter waste and extra water from your blood.

When these filters become inflamed, blood and protein can leak into the urine. The kidneys may also have trouble removing waste, balancing salts, and controlling the amount of fluid in the body.

Glomerulonephritis is not one single disease. It is a group of kidney conditions with different causes. Some begin suddenly and improve after treatment. Others develop slowly over months or years. A rapidly progressing form can reduce kidney function within days or weeks.

The condition may affect both kidneys even when you do not feel pain. Mild cases are

sometimes found through a routine urine or blood test. More serious inflammation can cause swelling, high blood pressure, or acute kidney injury, which is a sudden loss of kidney function.

Finding the specific type matters because treatment for an infection-related condition is different from treatment for an immune system condition or an inherited kidney disorder.

## Symptoms

Symptoms can appear suddenly or develop so gradually that they are easy to miss.

Possible symptoms include:

Blood in the urine is not always visible. A laboratory test may be the only way to detect it. Likewise, early loss of kidney function may cause no obvious symptoms.

These symptoms can have causes other than glomerulonephritis. Testing is needed to find out what is happening.

- Pink, red, brown, or cola-coloured urine from blood
- Foamy or frothy urine caused by excess protein
- Swelling around the eyes, ankles, feet, legs, or abdomen
- Urinating less often or passing less urine
- High blood pressure
- Tiredness, nausea, poor appetite, or trouble concentrating
- Shortness of breath if fluid collects in the lungs

## Causes and risk factors

Many forms of glomerulonephritis happen when the immune system mistakenly damages the glomeruli. Sometimes the trigger is known, but it is often unclear why one person develops kidney inflammation and another does not.

Immune-related causes include IgA nephropathy, lupus, anti-glomerular basement membrane disease, and some forms of vasculitis. Vasculitis is inflammation of blood vessels. These conditions may affect only the kidneys or several parts of the body.

Glomerulonephritis can occur during or after an infection. Examples include certain streptococcal infections, infection of a heart valve, hepatitis B or C, and HIV. The kidney problem may be caused by the immune response to the infection rather than germs directly entering the kidneys.

Inherited conditions can also damage the glomeruli. Alport syndrome, for example, affects a structural protein in the kidneys and may also affect hearing and eyesight.

Some medicines or other exposures can trigger immune-related kidney inflammation. In other cases, no cause is found even after detailed testing.

Factors that may increase the likelihood of a particular form include:

Diabetes and long-term high blood pressure can damage the glomeruli, but that damage is not usually described as inflammatory glomerulonephritis.

- A recent or long-lasting infection
- An autoimmune condition such as lupus
- A family history of inherited kidney disease
- A condition that causes inflammation of blood vessels
- Exposure to a medicine linked to kidney inflammation

## Diagnosis

Diagnosis begins with your symptoms, health history, medicines, recent infections, and family history. A physical examination may identify swelling, high blood pressure, a rash, or signs that another organ is involved.

A urine test checks for blood and protein. Looking at the urine under a microscope can reveal misshapen red blood cells or red blood cell casts. Casts are tiny tube-shaped collections that form inside the kidney and can point to glomerular inflammation.

Blood tests measure creatinine, a waste product used to estimate how well the kidneys are filtering. Other tests may check blood counts, salt levels, immune proteins, antibodies, or evidence of infection.

An ultrasound can show the kidneys' size and structure and help rule out a blockage. It does not usually identify the exact type of glomerulonephritis.

A kidney biopsy is often needed when the cause or severity is uncertain. During a biopsy, a small piece of kidney tissue is removed with a needle, usually using ultrasound guidance. A laboratory examines the tissue for patterns of inflammation, immune deposits, and scarring. These findings can confirm the subtype and guide treatment.

Not everyone needs a biopsy. The decision takes account of the test results, suspected cause, rate of kidney function loss, and whether the result would change treatment.

## Treatment and management

Treatment is based on the cause, how quickly kidney function is changing, and the amount of inflammation or permanent scarring.

Supportive care protects the kidneys while the cause is investigated or treated. This may include limiting salt, managing blood pressure, and using medicines that reduce swelling or protein loss. Fluid advice must be individual because drinking extra fluid can worsen swelling in some people.

If an active infection is present, treatment may include an appropriate antimicrobial medicine. Treating an infection does not always immediately stop the kidney inflammation, which may be driven by the immune response.

Immune-suppressing medicines may be used for conditions such as lupus nephritis, vasculitis, anti-glomerular basement membrane disease, or certain severe forms of glomerulonephritis. These medicines reduce immune activity but can increase infection risk, so the exact diagnosis and close monitoring are important.

Plasma exchange may be considered for selected severe immune conditions. This procedure removes plasma, the liquid part of blood, and replaces it to reduce harmful antibodies.

Dialysis can temporarily do some of the kidneys' work if waste, potassium, acid, or fluid reaches an unsafe level. Some people recover enough kidney function to stop dialysis. Others with extensive permanent damage may need long-term dialysis or a kidney transplant.

Regular management commonly includes blood pressure checks and repeat urine and blood tests. Do not stop prescribed medicines or start anti-inflammatory painkillers like ibuprofen or naproxen , supplements, or herbal products without checking whether they are safe for your kidneys.

## Complications

Glomerulonephritis can lead to acute kidney injury. This may improve, but severe or repeated injury can leave lasting damage.

Other possible complications include:

Some immune causes can also affect the lungs, skin, joints, nerves, or other organs. Complications are more likely when inflammation is severe, treatment is delayed, or substantial scarring is already present.

- High blood pressure

- Fluid overload, including fluid in the lungs
- High potassium or excess acid in the blood
- Heavy protein loss and low blood protein levels
- Increased risk of blood clots with some protein-losing conditions
- Chronic kidney disease
- Kidney failure requiring dialysis or transplantation

## Prevention

Many forms of glomerulonephritis cannot be prevented. This is especially true when the cause is inherited, autoimmune, or unknown.

Reducing the chance of certain infections may lower some risks, but it cannot prevent every infection-related case. Measures include recommended vaccination, safer practices that reduce exposure to blood-borne infections, and appropriate care for suspected infections.

If you already have glomerulonephritis, preventing further kidney damage is a separate goal. Controlling blood pressure, avoiding smoking, attending monitoring appointments, and checking the kidney safety of medicines can help protect remaining function.

Inherited forms cannot be prevented by lifestyle changes. Genetic counselling may help families understand inheritance and testing options, but it does not change the genes a person has inherited.

## Living with it and what to expect

The course depends mainly on the subtype, the speed of kidney function loss, and how much inflammation or scarring is present.

Some acute forms settle over weeks or months, although urine abnormalities can take longer to disappear. Other forms remain active, return after a quiet period, or slowly reduce kidney function over years. Chronic glomerulonephritis may require lifelong monitoring even when you feel well.

Follow-up usually involves blood pressure measurements, urine protein checks, and blood tests for kidney function. These results can show change before symptoms appear. A stable result does not necessarily mean monitoring is no longer needed.

Most daily activities can continue when symptoms and blood pressure are controlled. During

periods of significant swelling, anaemia, active inflammation, or treatment with immune-suppressing medicine, tiredness may limit work, school, or exercise. Your activity plan may need to change during a flare or recovery.

Food and fluid advice is not the same for everyone. Some people need to limit salt, potassium, protein, or fluid, while others do not. A kidney dietitian can help avoid restrictions that are unnecessary or nutritionally unbalanced.

If kidney function continues to decline, the kidney team can discuss future options early. Planning does not mean dialysis is certain; it allows time to understand dialysis, transplantation, and supportive care if they become relevant.

## When to get medical help

Arrange a prompt medical assessment if you notice persistent dark or bloody urine, new foamy urine, swelling around your eyes or legs, reduced urination, or repeated high blood pressure readings. These symptoms need testing even if you otherwise feel well.

If you have diagnosed glomerulonephritis, contact your care team promptly about increasing swelling, rapid weight gain from fluid, worsening nausea, much less urine, or possible infection while taking immune-suppressing treatment.

Seek emergency help for:

Routine follow-up is for monitoring stable kidney function and adjusting long-term care. The symptoms above can signal severe fluid overload, rapidly worsening kidney function, or another urgent complication.

- Severe or sudden difficulty breathing
- Chest pain
- Confusion, fainting, or a seizure
- Almost no urine, especially with swelling or illness
- Coughing up blood
- Severe headache or vision changes with very high blood pressure

## Common questions

Is glomerulonephritis the same as a kidney infection?

No. A kidney infection usually involves bacteria in the urinary tract and kidney tissue.

Glomerulonephritis affects the filtering units and is often caused by an immune response. An infection elsewhere in the body can sometimes trigger it.

Can glomerulonephritis go away?

Sometimes. Certain acute forms improve completely or nearly completely. Other forms recur or become chronic. Permanent scarring is less likely to recover, even after the inflammation has been controlled.

Why does glomerulonephritis make urine brown?

Damaged filters can allow red blood cells to enter the urine. As the blood pigments change, the urine may look tea-coloured, brown, or cola-coloured rather than bright red.

Will I need dialysis?

Many people do not. Dialysis is used when the kidneys cannot safely remove enough fluid, waste, potassium, or acid. It may be temporary during an acute illness or long term if kidney failure is permanent.

Is glomerulonephritis contagious?

Glomerulonephritis itself is not contagious. However, an infection that triggers some forms may spread between people. Most people who catch that infection will not develop glomerulonephritis.

Can I exercise with glomerulonephritis?

Gentle or moderate activity may be possible when your condition is stable. Significant swelling, uncontrolled blood pressure, severe tiredness, or active inflammation may require temporary limits. Exercise plans should reflect your kidney function and current symptoms.

## Sources

- KDIGO 2021 Clinical Practice Guideline for the Management of Glomerular Diseases , Kidney Disease: Improving Global Outcomes, Kidney International , 2021
- Glomerular Diseases , National Institute of Diabetes and Digestive and Kidney Diseases
- Glomerulonephritis , MedlinePlus, U.S. National Library of Medicine
- Glomerulonephritis , NHS
- Glomerulonephritis , Merck Manual Consumer Version