CONDITION

Nephrotic syndrome

Nephrotic syndrome is a pattern of kidney problems that causes large amounts of protein to leak into the urine.

WHAT IT IS
Heavy protein loss in urine from damaged kidney filters

BODY SYSTEM
Kidneys and urinary system

MAIN SYMPTOMS
Swelling, foamy urine, weight gain, tiredness

WHAT CAUSES IT
Kidney disease, immune conditions, infections, medicines, or inherited changes

HOW IT IS DIAGNOSED
Urine protein and blood albumin tests, sometimes kidney biopsy

MAIN TREATMENT
Cause-specific therapy, swelling control, and kidney protection

CAN IT BE CURED?
Sometimes - some causes resolve or remit

IS IT AN EMERGENCY?
Sometimes - with breathing trouble or blood-clot symptoms

LONG-TERM OUTLOOK
Many achieve remission; some develop chronic kidney disease

Overview

Nephrotic syndrome is a group of findings caused by damage to the kidneys' filtering units. These tiny filters, called glomeruli, normally keep protein in your bloodstream while removing waste and extra water.

When the filters become too leaky, large amounts of protein pass into the urine. The level of albumin, an important blood protein, then falls. Fluid can move out of blood vessels and collect in body tissues, causing swelling. Blood cholesterol and other fats also often rise.

Nephrotic syndrome is a condition rather than one specific disease. Several kidney diseases and wider health problems can produce the same pattern. It affects both adults and children, but the common causes and expected course differ by age.

The condition matters because severe protein loss can lead to troublesome swelling and raise the risk of infection, blood clots, and kidney damage. Finding the cause helps guide treatment and gives a clearer idea of what to expect.

Symptoms

Swelling, also called oedema or edema, is the most noticeable symptom. It commonly develops around the eyes, especially in the morning, or in the feet, ankles, and lower legs. More extensive swelling can affect the abdomen or genital area.

Other possible symptoms include:

Swelling may develop gradually or over several days. Mild protein leakage does not always cause obvious symptoms, so the condition is sometimes found during urine testing for another reason.

Children may first be noticed to have puffy eyelids or abdominal swelling. They may appear well despite significant protein loss, although infections and changes in fluid balance can make them unwell quickly.

These symptoms can have many causes. Swelling or foamy urine does not by itself confirm nephrotic syndrome.

- Foamy or frothy urine caused by excess protein
- Rapid weight gain from retained fluid
- Tiredness or reduced appetite
- Clothes, shoes, or rings becoming tight
- Passing less urine than usual
- Shortness of breath if fluid collects around the lungs

Causes and risk factors

Nephrotic syndrome begins with damage to the glomeruli. The damage may arise mainly within the kidneys or as part of another condition.

Primary kidney causes include:

Conditions elsewhere in the body can also damage the filters. These include diabetes, lupus, and amyloidosis, in which abnormal proteins build up in tissues. Certain infections, including hepatitis B, hepatitis C, and HIV, may be associated with nephrotic syndrome.

Some medicines can cause kidney-filter damage. Examples include certain anti-inflammatory medicines and, less commonly, other prescription treatments. Do not stop a prescribed medicine without medical advice; a clinician can assess whether it may be contributing.

Rare inherited forms may appear in infancy, childhood, or later life. Family history can be relevant, particularly when kidney disease began at a young age or affects several relatives.

Having one of these conditions does not mean you will develop nephrotic syndrome. In some people, the underlying cause remains unknown even after testing.

- Minimal change disease: Kidney filters look nearly normal under a standard microscope, but have changes visible with more detailed testing. It is a common cause in children and can also affect adults.
- Focal segmental glomerulosclerosis: Some parts of some glomeruli develop scarring. It may have genetic, immune, viral, or other causes, although no cause is found in some people.
- Membranous nephropathy: Immune proteins collect along the kidney filters and make them leaky.

Diagnosis

Diagnosis starts with urine and blood tests. A urine dipstick can detect protein, but the amount usually needs to be measured more accurately. This may be done using a protein-to-creatinine ratio from one urine sample or, in some cases, a timed urine collection.

Blood tests check albumin and kidney function. Creatinine is a waste product used to estimate how well the kidneys are filtering. Cholesterol and other blood fats are also commonly measured.

Together, heavy urine protein and low blood albumin support the diagnosis. Swelling and raised cholesterol add to the overall pattern but are not enough to confirm it by themselves.

Further tests look for the cause. Depending on your history, these may check blood sugar, immune activity, infections, or abnormal proteins. An ultrasound can show the kidneys' size and structure, although it cannot identify many diseases affecting the microscopic filters.

A kidney biopsy may be needed, especially in adults or when the cause is unclear. During a biopsy, a small piece of kidney tissue is removed with a needle and examined under a microscope. Not every child or adult needs one. The decision is based on age, test results, likely cause, response to initial treatment, and biopsy risks.

Genetic testing may be considered when an inherited condition is suspected.

Treatment and management

Treatment has two aims: address the cause and reduce the effects of protein loss. The plan differs between children and adults and among the diseases that cause the syndrome.

Corticosteroids and other medicines that reduce immune activity may be used for immune-related kidney disease. Minimal change disease often responds to corticosteroids like prednisone or hydrocortisone , while other causes may need different treatment. These medicines require monitoring because they can increase infection risk and cause other side effects.

If nephrotic syndrome is linked to diabetes, lupus, an infection, or another condition, treating that problem is an important part of kidney care. A medicine suspected of causing the syndrome may be changed under clinical supervision.

Other management may include:

Reducing sodium, which is mainly found in salt, can help control swelling and blood pressure. Severe fluid restriction is not suitable for everyone. A kidney dietitian can help if you need advice about salt, fluids, protein, or nutrition.

Eating very large amounts of protein does not replace what is lost in urine and may place extra strain on the kidneys. Dietary needs should be based on kidney function, nutrition, and the severity of protein loss.

Regular monitoring usually includes blood pressure, weight, urine protein, albumin, and kidney function. Children may have home urine testing during treatment or after remission.

- Diuretics like furosemide or hydrochlorothiazide , sometimes called water tablets, to reduce fluid build-up
- Medicines that lower blood pressure and reduce protein leakage
- Treatment for high cholesterol when appropriate
- Blood-thinning medicine for selected people at high risk of clots
- Vaccination and infection-risk planning, particularly with immune-suppressing treatment

Complications

Nephrotic syndrome can increase the risk of blood clots. Protein loss changes the balance between substances that cause and prevent clotting. A clot may form in a leg, lung, or, less often, a blood vessel near the kidney.

Infections may occur more easily because protective antibodies can be lost in urine. Corticosteroids and other immune-suppressing treatments can add to this risk.

Other possible complications include:

Not everyone develops these problems. Risk is influenced by the cause, severity, duration, kidney function, and response to treatment.

- Acute kidney injury, meaning a sudden decline in kidney function
- Chronic kidney disease from lasting filter damage
- Severe or persistent fluid build-up
- High blood pressure
- Poor nutrition or loss of muscle, despite fluid-related weight gain
- High cholesterol and a possible increase in long-term cardiovascular risk
- Treatment side effects, including infection, bone problems, or altered blood sugar

Prevention

Nephrotic syndrome cannot always be prevented. This is especially true for inherited conditions and immune-related kidney diseases whose triggers are not known.

Managing diabetes, lupus, infections, and high blood pressure may reduce kidney damage when these conditions are present. Take medicines as directed and attend recommended monitoring if a treatment can affect kidney function.

Avoid starting supplements or frequent anti-inflammatory pain medicines without checking whether they are suitable for your kidneys. This is particularly important if you already have kidney disease.

Prevention after diagnosis mainly focuses on reducing relapses and complications. This may include taking treatment consistently, monitoring urine when advised, limiting sodium, and reporting infections or increasing swelling promptly.

Living with it and what to expect

The course of nephrotic syndrome is closely tied to its cause. Some people have one episode that resolves with treatment. Others enter remission, meaning protein loss becomes very low or disappears, but later have relapses. Some continue to lose protein despite treatment and develop chronic kidney disease over time.

Many children with steroid-sensitive nephrotic syndrome respond well, although relapses can occur over several years. Some eventually stop relapsing. Children with inherited or treatment-resistant forms may have a more difficult course.

In adults, recovery is influenced by the underlying kidney disease and any wider health condition. Improvement may take weeks or months, and swelling can change faster than the kidney disease itself. Even when swelling settles, urine and blood tests are needed to show whether the syndrome is in remission.

Most people can continue school, work, exercise, and family activities when the condition is stable. Plans may need adjustment during severe swelling, infection, treatment changes, or hospital care.

Long-term follow-up is important even after remission. Monitoring can detect renewed protein loss, high blood pressure, medicine side effects, or declining kidney function before they cause clear symptoms.

When to get medical help

Arrange a routine medical appointment if you develop persistent foamy urine, swelling around the eyes or ankles, or unexplained fluid-related weight gain. These symptoms need assessment but are not automatically an emergency.

If you already have nephrotic syndrome, contact your care team promptly about increasing swelling, reduced urine, a sudden rise in weight, signs of infection, or problems taking treatment. A child with nephrotic syndrome who develops a fever should receive prompt medical advice.

Seek urgent medical care for:

Call emergency services for sudden shortness of breath, chest pain, coughing up blood, fainting, or new weakness or difficulty speaking. These can be signs of a blood clot or another serious problem requiring immediate assessment.

- A painful, swollen, warm, or discoloured leg
- Fever with severe abdominal pain
- Very little urine with rapidly worsening swelling
- Vomiting or diarrhoea that makes it difficult to keep fluids down

Common questions

Is nephrotic syndrome the same as kidney failure?

No. Nephrotic syndrome describes heavy protein loss through damaged kidney filters. Kidney filtering ability may initially remain normal. Some causes can eventually lead to kidney failure, but this does not happen to everyone.

Can nephrotic syndrome go away completely?

Sometimes. Some causes respond well to treatment or resolve after a trigger is removed. This is called remission. Relapses can still occur, while other causes lead to ongoing protein loss.

Why does nephrotic syndrome make urine foamy?

Excess protein changes the way urine behaves when it mixes with air and water, producing persistent foam. Occasional bubbles are common and do not necessarily mean there is protein in the urine.

Is nephrotic syndrome contagious?

No. You cannot catch nephrotic syndrome from another person. An infection may occasionally be the underlying trigger, but the kidney condition itself does not spread.

What should I eat with nephrotic syndrome?

Limiting salty foods often helps with swelling and blood pressure. You should not automatically start a high-protein diet. Your needs may change with kidney function, treatment, and nutritional status, so individual dietetic advice can be useful.

Can I work, attend school, or exercise?

Many people can continue their usual activities when symptoms are controlled. Severe swelling, fatigue, infection, or a blood-clot risk may temporarily limit activity. Your care team can advise when it is safe to return after an acute episode.

Sources

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