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## Kidneys - nephrotic syndrome

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### Summary

- Nephrotic syndrome is characterised by the kidneys removing too much protein from the blood.
  - 'Minimal change' disease (lipoid nephrosis) is the most common form of nephrotic syndrome in children.
  - Treatment includes medications and dietary changes.
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Nephrotic syndrome is a condition of the kidneys. It is usually caused by one of the diseases that damage the kidneys' filtering system. This allows a protein called albumin to be filtered out into the urine (albuminuria).

When the protein level in the blood drops, liquid seeps out of the smallest blood vessels (capillaries) all over the body and settles into the surrounding tissue, causing fluid swelling (oedema). Treatment includes medications and dietary changes.

### How your kidneys work

Blood is 'cleaned' in the kidneys as it passes through tiny filters called nephrons. Each kidney contains about one million nephrons. The kidneys remove waste products from the blood (such as products of food metabolism), while maintaining a balance of nutrients, salts and water.

Protein is not usually removed when the kidneys filter waste from the blood. However, when the kidneys are damaged, protein leaks through the damaged filters and is removed from the body in the urine, along with the waste products.

The two proteins that are most likely to be present in the urine when this happens are albumin (which controls blood volume) and globulin (largely made up of antibody proteins).

Usually, a person loses less than 150 mg of protein in the urine in a 24-hour period. A person with nephrotic syndrome can lose more than 3.5 g of protein in the urine during a 24-hour period (or 25 times the normal amount).

### Symptoms of nephrotic syndrome

The symptoms of nephrotic syndrome include:

- foamy and frothy urine
- unexplained weight loss
- general malaise (feeling unwell)
- oedema (fluid retention or swelling), particularly around the abdomen (belly area), legs and eyes
- muscle wasting
- stomach pain
- dizziness when standing up from a lying or sitting position (orthostatic hypotension).
- loss of appetite
- fatigue

### Causes of nephrotic syndrome

Some of the causes of nephrotic syndrome include:

- **changes to the immune system (minimal change disease or lipoid nephrosis)** – nephrotic syndrome due to changes to the immune system is most common in children. It is called 'minimal change disease' because the kidney filters appear normal under a microscope. The cause is thought to be changes in certain cells of

the immune system. The function of the kidneys is normal and the outlook for recovery is usually excellent

- **inflammation** – local inflammation or swelling damages and scars the kidney filters. Examples of this are **focal segmental glomerulosclerosis** and **membranous nephropathy**. Treatment may not resolve the condition, and the kidneys may gradually lose their ability to filter wastes and excess water from the blood
- **other health conditions, which can lead to ‘secondary nephrotic syndrome’** – this can be caused by certain conditions including diabetes, drugs, cancer and systemic lupus erythematosus (SLE).

### Complications of nephrotic syndrome

Complications of nephrotic syndrome can include:

- **dehydration** – low protein levels may lead to a reduction in blood volume. In severe cases, intravenous fluids may be given to boost the body’s water content
- **blood clots** – these occur in the leg veins and occasionally in the kidney veins. Blood clots can also go into the lungs and cause chest pain, breathlessness or coughing up of blood
- **infection** – infection and inflammation (peritonitis) of the peritoneal cavity. This is the thin elastic lining that contains the pancreas, stomach, intestines, liver, gallbladder and other organs. A fever may indicate infection
- **kidney failure** – without treatment, the kidneys may fail in extreme cases
- **high blood pressure**
- **anaemia.**

### Diagnosis of nephrotic syndrome

Diagnosing nephrotic syndrome involves a number of tests, including:

- **urine tests** – excessive protein makes the urine appear frothy and foamy. A test for albumin/creatinine ratio may be done to measure the amount of albumin in the urine in relation to the amount of creatinine
- **blood tests** – these estimate the glomerular filtration rate (eGFR), which shows how well the kidneys are working
- **biopsy** – a small sample of kidney tissue is taken and examined in a laboratory.

### Further tests for nephrotic syndrome

Sometimes, further tests may be required. These may include:

- **ultrasound** – an examination of the kidneys using sound waves to outline the structure of the organs
- **computed tomography (CT) scan** – uses x-rays and digital computer technology to create detailed two- or three-dimensional images of the internal organs and tissues
- **magnetic resonance imaging (MRI)** – uses a strong magnetic field and radio waves to provide clear and detailed pictures of internal organs and tissues.

### Treatment for nephrotic syndrome

‘Minimal change’ nephrotic syndrome fixes itself in around 40 per cent of cases. Other causes of nephrotic syndrome are also often treatable. It is essential to consult a kidney specialist (nephrologist) who can develop a management plan for your condition.

Treatment depends on the severity of the condition, but may include:

- **specific medication for some causes** (for example: steroids for minimal change; immunosuppression for membranous nephropathy or focal sclerosis; angiotensin active agents [ACE inhibitors or angiotensin blockers] to reduce the amount of albuminuria and to reduce blood pressure for people with persisting nephrotic syndrome) – this may lead to complete or partial remission of the nephrotic syndrome
- **diuretics to control swelling**
- **medication to control high blood pressure**
- **dietary changes** – a diet low in salt, saturated fat and cholesterol may be helpful to reduce swelling and keep cholesterol levels under control. Advice from a renal dietitian may be required to develop an individualised dietary plan.

## Where to get help

- Your doctor
- Kidney specialist (nephrologist)
- **Kidney Health Australia** helpline Tel. **1800 454 363**
- **Renal dietitian**

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Kidney Health Australia

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