CONDITION

Nephrocalcinosis

Nephrocalcinosis is a buildup of calcium deposits within the tissue of one or both kidneys.

WHAT IT IS
Calcium deposits within the kidney tissue

BODY SYSTEM
Kidneys and urinary system

MAIN SYMPTOMS
Often none, flank pain, blood in urine, frequent urination

WHAT CAUSES IT
Excess urine calcium, metabolic disorders, inherited conditions

HOW IT IS DIAGNOSED
Kidney ultrasound or CT, supported by blood and urine tests

MAIN TREATMENT
Treating the cause and reducing urine mineral buildup

CAN IT BE CURED?
Sometimes - causes are treatable, but deposits may remain

IS IT AN EMERGENCY?
Sometimes - fever with severe flank pain may signal infection

LONG-TERM OUTLOOK
Often stable when the underlying cause is controlled

Overview

Nephrocalcinosis means calcium has collected within the tissue of the kidneys. It may affect one or both kidneys. The deposits are usually found in the inner part of the kidney, called the medulla, but they can sometimes develop in the outer layer, called the cortex.

Nephrocalcinosis is not the same as having a kidney stone. A kidney stone is a solid piece of material within the kidney's drainage system. Nephrocalcinosis is a more spread-out pattern of calcium within the kidney tissue. However, the two conditions can occur together.

Many people have no symptoms when nephrocalcinosis is found. It may appear unexpectedly on an ultrasound or CT scan performed for another reason.

The condition matters because it can be a sign that the body is handling calcium, phosphate, or oxalate abnormally. These are natural minerals and chemicals that can form crystals. Finding

and treating the underlying cause may reduce further deposits, kidney stones, and long-term kidney damage.

Symptoms

Nephrocalcinosis itself often causes no symptoms. When symptoms occur, they may come from kidney stones, a urinary infection, reduced kidney function, or the condition responsible for the calcium buildup.

Possible symptoms include:

Some underlying causes can also produce muscle weakness, tiredness, constipation, bone pain, poor growth in children, or dehydration. These symptoms are not specific to nephrocalcinosis and can have many other explanations.

The amount of calcium seen on a scan does not always match the symptoms. Some people with widespread deposits feel well and have normal kidney function. Others develop problems because the underlying condition continues to affect their kidneys.

- Pain in the side, back, lower abdomen, or groin
- Blood in the urine, which may look pink, red, or brown
- Needing to urinate often or passing unusually large amounts of urine
- Increased thirst
- Nausea or vomiting during an episode of severe stone pain
- Repeated urinary tract infections

Causes and risk factors

Nephrocalcinosis usually develops when urine contains high levels of calcium, phosphate, or oxalate. Crystals may then collect within kidney tissue.

High urine calcium is called hypercalciuria . It can occur even when the calcium level in the blood is normal. High blood calcium, called hypercalcaemia , can also increase the amount reaching the kidneys.

Possible causes include:

Premature babies may develop nephrocalcinosis because their kidneys are still developing and because of factors related to intensive medical care. In some people, no single cause is identified.

Nephrocalcinosis is not usually caused by eating an ordinary amount of calcium. Restricting calcium without medical advice may not help and can sometimes increase stone risk or affect bone health.

- Primary hyperparathyroidism: one or more parathyroid glands release too much hormone, raising blood and urine calcium
- Distal renal tubular acidosis: the kidneys do not remove acid from the blood properly, changing urine chemistry
- Medullary sponge kidney: an inborn difference in the small collecting tubes inside the kidneys
- Primary hyperoxaluria: a rare inherited condition that causes the liver to make too much oxalate
- Dent disease and other inherited kidney conditions: disorders that change how kidney tubules handle minerals
- Excess vitamin D activity: this may come from certain medical conditions or excessive supplement use
- Sarcoidosis: an inflammatory condition that can increase calcium absorption
- Prolonged high calcium levels: including those caused by some cancers or long periods of immobility
- Certain medicines: loop diuretics can contribute in some settings, particularly in premature infants

Diagnosis

Nephrocalcinosis is confirmed with imaging. A kidney ultrasound can show bright areas caused by calcium and does not expose you to radiation. A CT scan provides more detail and can also detect small kidney stones, but it uses radiation.

Imaging can help show whether deposits are in the kidney medulla or cortex and whether there are stones or a blocked urinary tract. Calcium deposits may occasionally be seen on an abdominal X-ray, but this is less sensitive.

After nephrocalcinosis is found, the next step is usually to look for its cause. Testing may include:

A kidney biopsy, in which a small tissue sample is removed, is rarely needed just to diagnose nephrocalcinosis. It may be considered if imaging and blood or urine tests suggest another kidney problem.

Your personal and family history also matters. A history of kidney stones, fractures, bowel surgery, premature birth, medicine or supplement use, or relatives with kidney problems may guide testing.

- Blood tests for kidney function, calcium, phosphate, bicarbonate, and other salts
- Parathyroid hormone and vitamin D tests when appropriate
- Urine testing for infection, blood, acidity, calcium, citrate, oxalate, and protein
- One or more 24-hour urine collections to measure minerals and urine volume
- Genetic testing when an inherited condition is suspected

Treatment and management

Treatment focuses on the underlying cause and on reducing further crystal buildup. Existing deposits do not always disappear, even when treatment works.

The management plan is based on blood and urine results, kidney function, symptoms, and whether stones are also present. It may include:

Do not stop prescribed medicines or sharply change calcium, vitamin D, or fluid intake on your own. Fluid advice may need to be different if you have heart failure, advanced kidney impairment, or another condition that limits fluid intake.

Kidney stones may need separate treatment. Small stones can sometimes pass without a procedure. A stone that causes ongoing pain, obstruction, infection, or kidney damage may need removal or fragmentation.

Severe inherited conditions require specialist care. In advanced primary hyperoxaluria or kidney failure, dialysis or organ transplantation may be considered. These treatments are not needed for most people with nephrocalcinosis.

Follow-up commonly includes blood and urine tests, blood pressure checks, and occasional imaging. The timing is based on the cause and whether the findings are stable.

- Increasing fluid intake when this is safe, so the urine is less concentrated
- Adjusting dietary sodium, because a high salt intake can increase urine calcium
- Keeping a normal, appropriate amount of calcium in the diet rather than severely restricting it
- Treating an overactive parathyroid gland
- Replacing alkali, such as citrate or bicarbonate, in some acid-balance disorders

- Using medicines that reduce urine calcium in selected people
- Treating high oxalate levels or a specific inherited condition
- Reviewing supplements and medicines that may be contributing

Complications

Many people do not develop serious complications. Risk is greater when the underlying cause remains active or when calcium deposits are extensive.

Possible complications include:

Nephrocalcinosis on a scan does not by itself mean that kidney failure will occur. Kidney function, the specific cause, and changes over time provide more useful information about long-term risk.

- Kidney stones
- Blockage of urine flow
- Repeated urinary tract infections
- Persistent blood in the urine
- Reduced ability to concentrate urine, causing thirst and frequent urination
- Chronic kidney disease, meaning a lasting reduction in kidney function
- Kidney failure in some severe inherited or metabolic conditions

Prevention

Not every case can be prevented. Inherited conditions, medullary sponge kidney, and kidney differences linked to premature birth are not caused by lifestyle choices.

When the cause is acquired, early treatment may reduce new deposits. This can include controlling abnormal calcium levels, treating acid-balance problems, and reviewing medicines or supplements.

If you are advised to reduce stone risk, useful measures may include drinking enough fluid to keep urine dilute and limiting excessive salt. The right fluid and dietary plan should reflect your urine results and other health conditions.

Avoid taking high-dose calcium or vitamin D supplements unless there is a clear medical reason. However, do not remove normal calcium-containing foods from your diet without

advice. Very low dietary calcium can have unwanted effects and may increase oxalate absorption in some people.

Living with it and what to expect

Nephrocalcinosis may remain unchanged for years, especially when kidney function is normal and the cause has been controlled. The calcium already present may stay visible on scans even when no new deposits are forming.

Some people continue to have kidney stones or urinary infections. Others need only periodic monitoring and have few limits on daily life. Whether the condition progresses is mainly influenced by its cause, the degree of mineral imbalance, and how well kidney function is preserved.

Routine follow-up may involve checking:

If you have an inherited cause, monitoring may continue throughout life. Family members may sometimes be offered testing. Genetic counselling can help explain how a condition may be passed through a family.

Regular activity, work, school, travel, and pregnancy may still be possible. Planning may be needed if you have reduced kidney function, frequent stones, or a condition that requires regular medicine and laboratory testing.

- Kidney function and blood mineral levels
- Blood pressure
- Urine calcium, oxalate, citrate, acidity, or protein
- New stones, infections, or urinary symptoms
- Growth and bone health in children

When to get medical help

Arrange a routine appointment if you have ongoing urinary symptoms, repeated kidney stones, visible blood in your urine, increased thirst and urination, or questions about medicines and supplements. If nephrocalcinosis was found incidentally, follow-up is still important even when you feel well.

Seek urgent medical care for:

Fever with severe flank pain can mean a kidney infection combined with urinary blockage. This

needs urgent assessment because urine may not be able to drain normally.

Call emergency services if you become confused, faint, are difficult to wake, have severe weakness, or cannot pass urine while in significant pain.

- Severe or persistent pain in your side, back, or abdomen
- Fever, chills, or feeling unwell with urinary symptoms
- Repeated vomiting or an inability to keep fluids down
- Passing much less urine than usual
- Blood clots in the urine or heavy visible bleeding

Common questions

Is nephrocalcinosis the same as kidney stones?

No. Nephrocalcinosis is calcium deposited within kidney tissue, while stones form in the urine-collecting system. You can have either condition alone or both together.

Can nephrocalcinosis go away?

Sometimes the appearance improves, particularly when the cause is treated early. In many people, existing deposits remain visible even after the mineral imbalance has been corrected. Treatment may still prevent progression and protect kidney function.

Does nephrocalcinosis mean my kidneys are failing?

No. Many people have normal kidney function when the condition is diagnosed. The risk of kidney damage is linked more closely to the underlying cause and whether it continues over time.

What foods should I avoid?

There is no single nephrocalcinosis diet. Advice depends on whether your urine contains too much calcium, oxalate, sodium, or another substance. Avoiding excessive salt may help some people, but severe calcium restriction is not usually recommended without a specific reason.

Can drinking more water remove the deposits?

Water does not usually dissolve deposits already in kidney tissue. Adequate fluid can make urine less concentrated and may reduce further crystal or stone formation. Ask about a safe daily amount if you have heart or kidney impairment.

Is nephrocalcinosis inherited?

Some causes are inherited, including primary hyperoxaluria and Dent disease. Many other

causes are not. Genetic testing may be considered when nephrocalcinosis starts in childhood, runs in the family, or occurs with unusual blood or urine findings.

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