HEALTH BASICS

Complement component 3 (C3)

Complement component 3 is an immune-system protein measured to help assess inflammation and complement activity.

WHAT IT IS
A blood protein in the immune complement system

WHERE IT COMES UP
Blood tests for immune, kidney, liver, or inflammatory conditions

WHY IT MATTERS
Helps interpret complement activity and inflammation

WHAT IT IS NOT
Not a disease or diagnosis

WHO TO ASK
Clinician who ordered the test, sometimes immunology or kidney specialist

HOW IT IS CHECKED
C3 blood test, sometimes with C4 and complement activity tests

Overview

Complement component 3, usually called C3, is a protein in the complement system. This system is part of your immune defenses. It helps identify and remove microbes, damaged cells, and other material from the body.

C3 is made mainly by the liver and circulates in the blood. It is involved in all three major routes that activate the complement system. For this reason, measuring C3 can provide useful information about how the system is behaving.

A C3 blood test may be ordered when a clinician is assessing an autoimmune condition, inflammation, repeated infections, or certain kidney problems. It is often measured with complement component 4, or C4. Other tests may measure how well the complement system functions rather than how much of one protein is present.

C3 is not a disease or a diagnosis. A result outside the laboratory's reference range does not show, by itself, what caused the change. It needs to be interpreted with your symptoms, medical history, other test results, and sometimes earlier C3 measurements.

How it works

The complement system includes many proteins that normally circulate in an inactive form. When the system detects a possible threat, these proteins activate one another in a controlled sequence called a cascade.

There are three main activation routes:

All three routes lead to the activation of C3. An enzyme complex splits C3 into smaller parts called C3a and C3b.

C3a helps promote inflammation and attracts immune activity to the area. C3b attaches to a target, making it easier for immune cells to recognize and remove. C3b also helps continue the complement cascade. Later steps may form a structure that can damage the outer membrane of certain bacteria.

The body controls this response using regulatory proteins. These controls help direct complement activity toward microbes or damaged material while limiting injury to healthy cells.

A standard C3 blood test measures the amount of C3 protein. It does not fully measure whether the complement system works normally. Functional tests may also be used. CH50 mainly assesses the classical complement pathway, while AH50 assesses the alternative pathway.

Reference ranges differ between laboratories because testing methods and units are not identical. Your result should be compared with the range printed on your own report.

- The classical pathway can be triggered by antibodies attached to a target
- The lectin pathway recognizes certain patterns on microbes
- The alternative pathway can become active directly on some surfaces

Why it matters for your health

A low C3 level can mean that C3 is being used faster than the body replaces it. Clinicians sometimes call this complement consumption. This can happen during active immune or inflammatory processes.

Low C3 may also occur if the body is not producing enough protein, if protein is being lost, or because of an inherited problem affecting complement. The pattern of C3, C4, and functional complement results can help narrow down which part of the system may be involved.

A high C3 level is less specific. C3 is an acute-phase protein, meaning its production may

increase during inflammation. A raised result usually cannot identify the source or cause of inflammation.

For some people with a known condition, C3 is checked over time. Trends may be more informative than one result. For example, C3 and C4 may form part of follow-up for systemic lupus erythematosus, commonly called lupus. However, complement levels do not always match symptoms or disease activity, so they are not used alone.

C3 testing may also support the assessment of kidney inflammation. This is usually done alongside kidney function blood tests, a urine test for blood and protein, blood pressure measurements, and sometimes antibody tests or a kidney biopsy.

A normal C3 level does not rule out every immune, complement, or kidney condition. Some complement disorders can be present even when the amount of C3 in the blood is within the reference range.

What can go wrong

Several different conditions or situations can affect C3. The test result alone cannot distinguish among them.

Autoimmune conditions may activate complement. Lupus is a common reason for measuring C3 and C4. Some forms of blood-vessel inflammation, called vasculitis, can also involve complement, although patterns differ between conditions.

Kidney disorders linked to low C3 include infection-related glomerulonephritis and C3 glomerulopathy. Glomerulonephritis means inflammation of the kidney's filtering units. C3 glomerulopathy is a group of rare kidney disorders caused by poorly controlled activity of the alternative complement pathway.

Atypical hemolytic uremic syndrome is another uncommon condition involving abnormal complement regulation in some people. It affects blood cells, platelets, and the kidneys. A normal C3 result does not exclude it.

Severe liver disease can reduce the production of complement proteins. Protein loss, including loss through damaged kidneys, may also contribute to a low level. Clinicians interpret these possibilities using liver tests, urine results, and other protein measurements.

Inherited C3 deficiency is rare. It can reduce the body's ability to clear certain bacteria and may be considered in someone with a history of serious or repeated bacterial infections. Diagnosis requires more than a single low result and may involve functional complement tests, repeat measurements, and specialist assessment.

C3 can rise with inflammation, infection, or tissue injury. Because many situations can cause this response, a high level is usually a general finding rather than a marker of one specific illness.

The C3 result itself does not create an emergency. Arrange routine follow-up to discuss an unexpected result, especially if it was ordered as part of ongoing monitoring.

Seek prompt medical advice if you develop reduced urine output, new swelling, blood in the urine, or shortness of breath. These symptoms can have many causes but may need assessment, particularly when kidney tests are abnormal.

Call emergency services for severe breathing difficulty, collapse, confusion, a stiff neck with fever, or a rapidly spreading rash that does not fade when pressed. These are emergency warning signs regardless of your C3 level.

What you can do

Ask why C3 was tested and whether the clinician is looking at a single result or a change over time. Keep a copy of the report, including the value, units, reference range, and test date.

Useful questions include:

Do not try to raise or lower C3 through supplements or a special diet. There is no general home treatment for an abnormal C3 result. Management, when needed, targets the condition affecting the complement system rather than the number itself.

If a complement deficiency is confirmed, ask an immunology specialist about an infection plan and appropriate vaccinations. This advice should be tailored to the specific deficiency and your health history.

If C3 is only slightly outside the reference range and your other results are reassuring, there may be nothing you need to do before routine follow-up. Do not stop prescribed medicines based on a C3 result unless the clinician responsible for that medicine advises you to do so.

- Was C4 measured, and what does the combined pattern suggest?
- Would repeating C3 help confirm whether the change persists?
- Are CH50 or AH50 functional complement tests relevant?
- Were kidney function, urine protein, urine blood, or liver tests checked?
- Does the result fit with my current symptoms and medical history?

Common questions

Does a low C3 result mean I have lupus?

No. Lupus can lower C3, but so can kidney inflammation, infection-related immune activity, liver disease, protein loss, and rare complement disorders. Lupus is diagnosed using the wider clinical picture and additional tests.

Does high C3 mean there is too much immunity?

Not necessarily. C3 may increase as part of a broad inflammatory response. A high value does not measure overall immune strength and usually does not identify the cause.

Why were C3 and C4 ordered together?

Different complement pathways use these proteins in different patterns. Comparing C3 with C4 can provide more information than either measurement alone, although further tests may still be needed.

Can C3 change over time?

Yes. Levels can change as inflammation, protein production, protein loss, or complement activity changes. Laboratory methods can also differ, so results are best compared using the same laboratory when practical.

Is fasting required for a C3 test?

C3 testing itself usually does not require fasting. You may receive fasting instructions if other blood tests are being collected at the same time. Follow the instructions provided with your appointment.

Can a normal C3 result rule out a complement disorder?

No. A concentration test measures how much C3 is present, not every part of its function. Functional tests and specialist testing may be needed when the medical history suggests a complement problem.

Sources

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