CONDITION

Anti-glomerular basement membrane disease

Learn how anti-glomerular basement membrane disease affects the kidneys and lungs, how it is diagnosed, and why prompt treatment and follow-up matter.

WHAT IT IS
Rare autoimmune kidney and lung disease

BODY SYSTEM
Kidneys and lungs

MAIN SYMPTOMS
Blood in urine, swelling, reduced urination, coughing up blood

WHAT CAUSES IT
Autoimmune, trigger often unknown

HOW IT IS DIAGNOSED
Anti-GBM antibody blood test, kidney biopsy

MAIN TREATMENT
Plasma exchange and immune-suppressing treatment

CAN IT BE CURED?
Sometimes - inflammation controlled, damage may remain

IS IT AN EMERGENCY?
Sometimes - coughing up blood or severe breathlessness

LONG-TERM OUTLOOK
Variable recovery with possible permanent kidney failure

Overview

Anti-glomerular basement membrane disease, often shortened to anti-GBM disease, is a rare autoimmune condition. In autoimmune disease, the immune system mistakenly attacks part of the body.

In anti-GBM disease, the immune system makes proteins called antibodies that target the glomerular basement membrane. This is a thin layer of tissue within the kidneys' filtering units, called glomeruli. Damage to these filters can allow blood and protein to leak into the urine. It can also cause kidney function to decline quickly.

The same target is present in the tiny air sacs of the lungs. As a result, some people develop bleeding in the lungs as well as kidney inflammation. Disease affecting both the kidneys and lungs has historically been called Goodpasture syndrome. However, medical professionals

increasingly use the more specific term anti-GBM disease.

Anti-GBM disease matters because kidney damage may progress over days or weeks. Lung bleeding can also interfere with oxygen levels. Prompt evaluation and treatment may limit further injury, although recovery depends partly on how much damage has already occurred.

Symptoms

Symptoms vary depending on whether the disease affects the kidneys, lungs, or both. Early kidney inflammation may cause few noticeable symptoms, so urine and blood tests are important.

Possible signs of kidney involvement include:

Lung involvement may cause a dry cough, shortness of breath, chest discomfort, or coughing up blood. Bleeding into the lungs may lead to anemia, meaning there are too few healthy red blood cells. Anemia can cause weakness, pale skin, dizziness, or breathlessness.

Some people first notice general symptoms such as tiredness, fever, joint discomfort, or unintentional weight loss. These symptoms can occur with many illnesses and do not by themselves show that someone has anti-GBM disease.

Coughing up blood, severe or rapidly worsening shortness of breath, blue or gray lips, fainting, confusion, or severe chest discomfort requires emergency medical care. Very little or no urine, especially with increasing swelling, vomiting, or breathing difficulty, also needs urgent assessment.

Visible blood in the urine, new swelling, persistent shortness of breath, or a major decrease in urination should be discussed promptly with a healthcare professional, even when symptoms are not severe.

- Pink, red, brown, or tea-colored urine caused by blood in the urine
- Foamy urine, which may result from excess protein
- Swelling in the feet, ankles, legs, hands, or face
- Reduced urination
- High blood pressure
- Fatigue, nausea, poor appetite, or itching as kidney function worsens

Causes and risk factors

Anti-GBM antibodies most often target a specific part of type IV collagen. Collagen is a structural protein. Type IV collagen helps form the supporting membranes in the kidney filters and lung air sacs.

It is not always clear why the immune system begins making these antibodies. The disease does not usually follow a simple pattern of inheritance. Certain genetic features can affect susceptibility, but having one of these features does not mean a person will develop the disease.

Cigarette smoking may expose the target tissue in the lungs and is associated with lung bleeding in people who have anti-GBM antibodies. Exposure to hydrocarbon fumes, such as some fuels or industrial solvents, has also been reported as a possible trigger. Infections or other forms of lung injury may sometimes occur before the illness, although a clear trigger is often not found.

Anti-GBM disease can occur at different ages. It may affect people who previously appeared healthy, as well as people with other medical conditions.

Some patients have both anti-GBM antibodies and antineutrophil cytoplasmic antibodies, known as ANCA. ANCA are associated with another group of autoimmune blood-vessel disorders called ANCA-associated vasculitis. This overlap can affect long-term follow-up because ANCA-associated disease may relapse even after anti-GBM antibodies disappear.

Anti-GBM disease is not contagious. It cannot be spread by coughing, touching, or sharing household items.

Diagnosis

Doctors consider the symptoms, examination findings, blood tests, urine tests, imaging, and sometimes a kidney biopsy. Because kidney function may decline quickly, testing is often arranged urgently.

Urinalysis can detect blood and protein that may not be visible. A laboratory may also examine the urine under a microscope for abnormal red blood cells or structures called red blood cell casts. These findings suggest that bleeding is coming from inflamed kidney filters.

Blood tests measure creatinine, a waste product used to estimate kidney function. Other tests may assess potassium, blood counts, inflammation, and oxygen levels. A low red blood cell count may reflect lung bleeding, kidney disease, or both.

A specific blood test looks for anti-GBM antibodies. A positive result in the right clinical setting strongly supports the diagnosis. However, no single test is perfect. If doctors remain concerned despite a negative blood test, they may continue the evaluation.

Testing for ANCA helps identify people who may have overlapping vasculitis. Doctors may also order tests for other autoimmune conditions or infections when alternative explanations are possible.

A chest X-ray or computed tomography scan may show bleeding in the lungs. Bronchoscopy, in which a clinician passes a small camera into the airways, is sometimes used when the cause of lung changes is uncertain. It is not required for every patient.

A kidney biopsy often confirms the diagnosis and shows how much inflammation and scarring are present. During a biopsy, a small sample of kidney tissue is removed with a needle after local numbing medicine is given. Under a microscope, anti-GBM disease typically causes severe inflammation with crescent-shaped areas of injury. A special test called immunofluorescence usually shows a smooth, linear pattern of antibodies along the basement membrane.

Biopsy findings help the care team estimate whether kidney function may recover and guide treatment decisions. The procedure has bleeding risks, so clinicians first consider blood pressure, blood clotting, and other safety factors.

Treatment and management

Anti-GBM disease is generally treated in a hospital or through urgent specialist care. A nephrologist, who specializes in kidney disease, usually directs treatment. Pulmonary, critical care, rheumatology, or transplant specialists may also be involved.

Treatment has three main goals:

Plasma exchange, also called plasmapheresis, removes plasma-the liquid part of the blood-and replaces it with another fluid. Because antibodies circulate in plasma, repeated exchanges can lower anti-GBM antibody levels. Blood tests help the team follow the response.

Immune-suppressing medicines reduce antibody production and inflammation. Treatment commonly includes a corticosteroid and cyclophosphamide. Corticosteroids like prednisone or hydrocortisone act quickly against inflammation. Cyclophosphamide suppresses immune cells involved in producing antibodies. Other treatments, such as rituximab, may be considered in selected situations, including disease that does not respond as expected or when standard treatment cannot be used.

These medicines can increase the risk of infection and cause other important side effects. Cyclophosphamide can affect blood cell counts, the bladder, and fertility. Corticosteroids can affect blood sugar, mood, sleep, bones, and infection risk. Before and during treatment, the care team may discuss blood monitoring, infection prevention, vaccinations, fertility

preservation, and other measures based on the person's health and treatment plan.

Dialysis may be needed if the kidneys cannot adequately remove waste or fluid, or if blood chemistry becomes unsafe. Dialysis can be temporary if kidney function recovers, but some people need long-term treatment.

Severe lung bleeding may require oxygen, blood transfusion, or breathing support. These treatments stabilize the person while plasma exchange and immune-suppressing therapy address the underlying disease.

The expected benefit of intensive immune treatment depends on the clinical situation. When kidney biopsy shows extensive irreversible scarring and a person already requires dialysis, kidney recovery may be unlikely. Treatment decisions then take into account whether there is active lung bleeding, ongoing inflammation, antibody results, possible ANCA overlap, and the risks of therapy. These decisions should be made with the specialist team rather than by stopping or changing medicines independently.

Avoiding cigarette smoke and inhaled recreational or occupational substances that can injure the lungs is especially important. People with possible workplace exposure should discuss protective measures with their care team and occupational health service.

- Remove harmful antibodies from the blood
- Stop the immune system from making more antibodies
- Support kidney and lung function while inflammation settles

Complications

Kidney inflammation can lead to acute kidney injury, chronic kidney disease, or permanent kidney failure. People with kidney failure may need ongoing dialysis or a kidney transplant.

Bleeding in the lungs can cause anemia and low oxygen levels. Severe bleeding can require intensive care, although prompt treatment may control the inflammation.

Anti-GBM disease itself and its treatments can both increase health risks. Possible treatment complications include infections, low blood cell counts, bleeding, blood clots related to vascular access, and medicine-specific side effects. Monitoring is intended to identify these problems early.

Relapse of anti-GBM disease is generally uncommon once antibodies have disappeared, but it can occur. People who also have ANCA may have a greater long-term risk of recurrent autoimmune inflammation and may need a different monitoring plan.

Follow up

Follow-up usually includes kidney function tests, urine testing, blood counts, and measurement of anti-GBM antibodies. The care team may also monitor ANCA when it was present at diagnosis. The schedule depends on disease severity, treatment, and whether kidney function has recovered.

Routine visits are used to review blood pressure, swelling, urine output, breathing, medicine side effects, infection risk, and dialysis needs. People taking immune-suppressing medicines need planned laboratory monitoring and should not adjust treatment without medical advice.

If kidney function does not recover, follow-up focuses on dialysis care, anemia, bone and mineral health, nutrition, blood pressure, and transplant planning when appropriate. Kidney transplantation may be possible after the disease becomes inactive. Specialists generally wait until anti-GBM antibodies have remained undetectable for a period of time before transplantation to reduce the risk of disease affecting the new kidney.

Between planned visits, contact the care team promptly for new blood in the urine, increasing swelling, falling urine output, fever during immune-suppressing treatment, or a return of cough or breathlessness.

Seek emergency care for coughing up blood, severe breathing difficulty, fainting, confusion, blue or gray lips, or little to no urine with rapidly worsening illness.

Sources

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