CONDITION

# Agranulocytosis

Learn what agranulocytosis is, why it raises the risk of serious infection, which symptoms need urgent care, and how doctors diagnose and treat it.

**WHAT IT IS**
Severe shortage of neutrophils

**BODY SYSTEM**
Blood and immune system

**MAIN SYMPTOMS**
Fever, sore throat, mouth ulcers, cough

**WHAT CAUSES IT**
Medicines, immune reactions, bone marrow disorders, infections, inherited disorders, unknown

**HOW IT IS DIAGNOSED**
Complete blood count with differential and ANC

**MAIN TREATMENT**
Cause-directed treatment and antimicrobials

**CAN IT BE CURED?**
Sometimes - recovery depends on the cause

**IS IT AN EMERGENCY?**
Sometimes - fever with severe neutropenia

**LONG-TERM OUTLOOK**
Recovery varies with the cause

## Overview

Agranulocytosis is a severe shortage of certain white blood cells, especially neutrophils. Neutrophils are part of the immune system's first response to bacteria and fungi. When very few are present, an infection can develop quickly and may become serious before the usual signs appear.

A complete blood count measures the number of neutrophils in the blood. The result is often reported as the absolute neutrophil count , or ANC. Laboratories may express this as cells per microliter or as cells multiplied by 10<sup>9</sup> per liter.

Doctors generally use the word neutropenia for a low neutrophil count. Agranulocytosis usually refers to an extremely low count, often an ANC below 500 cells per microliter, with the term sometimes reserved for counts below 100. Definitions vary, so the laboratory result and the

person's overall condition matter more than the label alone.

Agranulocytosis can result from a medication, an immune reaction, a bone marrow problem, or another illness. Some cases develop suddenly. Others appear during planned treatments that suppress bone marrow, such as cancer chemotherapy.

The condition matters because the risk of infection rises as the neutrophil count falls. Risk also depends on how long the count remains low and whether other parts of the immune system are affected. Prompt medical assessment can identify infection, remove a possible cause, and support recovery of the neutrophil count.

## Symptoms

A low neutrophil count does not directly cause pain or other specific symptoms. Many people first notice symptoms from an infection. Fever may be the only sign.

Possible symptoms include:

Signs of inflammation may be mild when neutrophils are very low. For example, an infected wound may produce little pus, and pneumonia may not cause dramatic chest symptoms at first. Feeling unwell without an obvious source can still be important.

Seek urgent medical advice the same day for fever or possible infection if you have known severe neutropenia, are taking a medicine associated with agranulocytosis, or have recently received treatment that suppresses bone marrow. Many medical teams use a single oral temperature of 38°C (100.4°F) or higher as a trigger for immediate assessment, but follow the temperature instructions given by your care team.

Call emergency services for trouble breathing, blue or gray lips, severe chest pain, fainting, new confusion, difficulty waking, or signs of shock such as cold or clammy skin with severe weakness. Do not delay emergency care while waiting for a routine appointment or laboratory test.

- Fever, chills, or sweating
- A new sore throat, cough, or shortness of breath
- Painful mouth ulcers, swollen gums, or pain when swallowing
- Burning or pain with urination
- New skin redness, warmth, swelling, or tenderness
- Diarrhea, abdominal pain, or pain around the anus
- Unusual weakness, dizziness, or confusion

## Causes and risk factors

Medicines are an important cause of agranulocytosis. A medication may damage developing neutrophils in the bone marrow or trigger an immune reaction that destroys them. This type of reaction is often unpredictable and can occur even when a medicine has been taken correctly.

Medicines linked to agranulocytosis include some:

This is not a complete list, and the risk differs greatly between medicines. Most people who take these drugs do not develop agranulocytosis. Never stop a prescribed medicine solely because it appears in a general list. If fever, sore throat, mouth ulcers, or other infection symptoms develop, contact the prescribing clinician promptly and ask whether an urgent blood count is needed.

Chemotherapy and some targeted cancer treatments can suppress bone marrow in a more predictable way. The neutrophil count may reach its lowest point several days after treatment. The timing depends on the treatment plan, so oncology teams provide specific instructions about blood tests and fever.

Other possible causes include:

Sometimes no clear cause is found. This may be called idiopathic agranulocytosis.

Risk depends on the underlying cause, medication exposure, dose and duration for some treatments, and individual susceptibility. Previous agranulocytosis from a particular medicine is especially important because exposure to the same or a related medicine may cause another rapid reaction. Make sure this history is documented in your medical and pharmacy records.

- Antithyroid medicines
- Antipsychotic medicines, particularly clozapine
- Antibiotics and other antimicrobial medicines
- Anti-inflammatory and pain medicines
- Anti-seizure medicines
- Immune-suppressing medicines
- An autoimmune disease in which the immune system attacks neutrophils
- A bone marrow disorder, such as aplastic anemia, leukemia, or myelodysplastic syndrome
- Certain viral, bacterial, or parasitic infections
- Severe vitamin or nutritional deficiencies, usually with changes in other blood cells
- An enlarged spleen that removes blood cells from circulation

- Rare inherited disorders that affect neutrophil production

## Diagnosis

Diagnosis begins with a complete blood count with differential . This test measures red blood cells, platelets, and the different types of white blood cells. The ANC is calculated from the percentage of mature neutrophils and closely related cells in the blood.

A clinician may repeat the test to confirm an unexpected result and track whether the count is falling or recovering. A blood smear, in which blood cells are examined under a microscope, can reveal abnormal cells or clues to a bone marrow disorder.

The medical history is essential. Your clinician may ask about:

Testing for infection may include blood cultures, urine tests, imaging, or samples from a painful or inflamed area. Cultures help identify the organism and guide antimicrobial treatment. If infection is suspected in a person with severe neutropenia, treatment may begin before culture results are available.

Further blood tests may look for vitamin deficiencies, viral infections, inflammation, or autoimmune disease. If the cause remains unclear, other blood-cell counts are abnormal, or recovery does not occur as expected, a hematologist may recommend a bone marrow aspiration and biopsy. This procedure removes a small sample of liquid marrow and tissue, usually from the back of the hip bone, to examine how blood cells are being produced.

- All prescription and nonprescription medicines
- Recent medication changes or treatments
- Supplements and recreational drug exposure
- Recent infections, travel, or chemical exposure
- Autoimmune conditions and previous blood-count problems
- Similar blood disorders in close relatives

## Treatment and management

Treatment depends on the neutrophil count, the cause, symptoms, and whether infection is present. Severe agranulocytosis often requires urgent assessment even if the person feels relatively well.

If a medicine is the likely cause, a clinician will usually stop it and select an alternative when

needed. This decision should be made promptly with the prescribing team because abruptly stopping some medicines can also cause harm. The suspected medicine should be recorded in the medical chart, and future exposure may need to be avoided.

Fever with severe neutropenia is treated as a medical urgency. Clinicians generally collect cultures and start broad antibiotic treatment promptly because an infection may progress while test results are pending. Hospital care and intravenous antibiotics may be needed, depending on the person's condition, expected duration of neutropenia, other illnesses, and available support. Antifungal or antiviral treatment may be added when there is evidence of those infections or when fever continues despite initial treatment.

A medicine called granulocyte colony-stimulating factor , or G-CSF, may be used in selected cases. It signals the bone marrow to produce and release more neutrophils. It is not necessary for every person, and the decision depends on the suspected cause, severity, expected recovery, and clinical condition.

Treatment of an underlying autoimmune disease, vitamin deficiency, infection, or bone marrow disorder may also be required. Rare inherited conditions generally need specialist management.

While the count is low, practical precautions can reduce exposure and help detect infection early:

Extreme isolation or highly restrictive diets are not routinely necessary for everyone. Your care team can tailor precautions to the depth and expected duration of neutropenia.

- Wash hands regularly and ask visitors to do the same.
- Avoid close contact with people who have a contagious illness.
- Care for the mouth gently and report ulcers or gum swelling.
- Follow standard food-safety steps, including avoiding undercooked meat and eggs.
- Check your temperature as directed and know whom to contact after hours.
- Avoid rectal thermometers or other rectal procedures unless your medical team says they are safe.

## Complications

The main complication is infection. Common sites include the mouth and throat, lungs, skin, urinary tract, abdomen, and bloodstream. Because inflammation can be muted, infection may be present without obvious swelling, pus, or a clear local symptom.

An infection that spreads into the bloodstream can lead to sepsis, an extreme body-wide response that may affect blood pressure and organ function. Prompt treatment lowers this risk. Severe or long-lasting neutropenia can also lead to deep fungal infections, especially when other parts of the immune system are suppressed.

Mouth ulcers and painful swallowing may make eating and drinking difficult. Diarrhea or intestinal inflammation can lead to dehydration. These problems should be reported because supportive treatment can help and because they may signal infection.

Recovery varies with the cause. Counts often improve after a responsible medicine is stopped, but the timing is not the same for every medicine or person. Bone marrow diseases and inherited conditions may require longer-term care.

## Follow up

Follow-up blood counts show whether neutrophils are recovering. The schedule may range from frequent testing during the acute illness to less frequent monitoring once the count is stable. The clinician will also review symptoms, culture results, medication changes, and any treatment side effects.

Routine follow-up may include a primary care clinician, the original prescriber, or a hematologist, who specializes in blood disorders. People receiving chemotherapy usually follow a monitoring plan from their oncology team.

Ask for written information about the suspected cause. If a medication caused the reaction, confirm how it will appear in your allergy or adverse-reaction record and whether related drugs should be avoided. Tell future clinicians, dentists, and pharmacists about the history.

Keep routine appointments even after the count improves, particularly when the cause is uncertain or other blood-cell counts were abnormal. Between visits, do not wait for routine testing if fever or infection symptoms develop. Use the urgent contact plan provided by your team. Emergency symptoms such as breathing difficulty, confusion, fainting, or severe weakness require emergency care.

## Sources

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