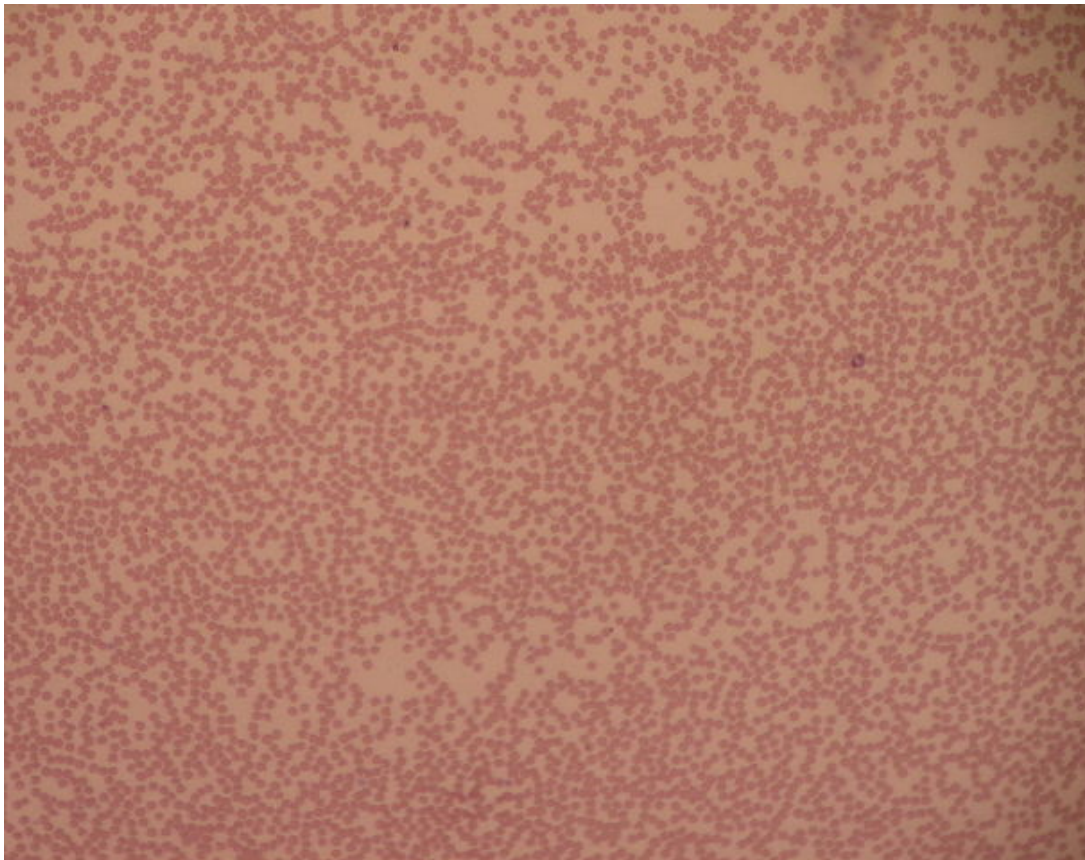


Neutropenia in Children — Symptoms and Treatment

[See online here](#)

Neutropenia refers to a decreased neutrophil count. When Neutropenia occurs, the body becomes incapable of defending itself from the invasion of organisms like viruses, bacteria or fungi. This leads to the manifestation of signs and symptoms of infectious processes going on inside the body. There are many types of Neutropenias; broadly divided into the inherited and acquired forms. Many laboratory investigations and treatment options are available. They are selected on the basis of etiology and the duration of illness.



Definition of Neutropenia

Neutropenia is a condition in which the **count of neutrophils is reduced**. The role of white blood cells is to fight against the infections caused by the microorganisms. The human blood consists of many types of white blood cells, lymphocytes, monocytes, Basophils, Eosinophils, and Neutrophils.

Neutrophils are **present in most abundance, making about 40 - 75% of the white**

blood cells. They are the first cells to move in response to the inflammatory chemicals released from the damaged or invaded cells.

Neutropenia can occur as a result of the following conditions:

- A child not making enough Neutrophils
- Excessive Neutrophils are getting destroyed in the circulation
- Neutrophils are defective; they get accumulated in improper places instead of migrating through proper channels

Neutropenia is **defined differently in infants** (up until one year of age) **and older children.** In infants, less than 1000/ul count is defined as Neutropenia. In children older than one year of age, the definition is the same as that of adults, that is less than 1,500/ul.

Classification of Neutropenia

- In mild Neutropenia, the ANC (absolute neutrophil count) is 1000—1500/ul.
- In moderate cases, the ANC ranges from 500—1000/ul
- In severe Neutropenia, it is < 500/ul

ANC = White Blood Cells/microlitre x percent (Polymorphonuclear cells + bands)/100

An Example:

Take total WBC count, multiply times both bands and segs

5.6	12	250
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80 % lymphs
10 % monos
5 % neutrophils
2 % eosinophils
2 % bands

$5,600 \times 7\% = 392$

Types of Neutropenia

There are three types of Neutropenias - the hereditary type, acquired and the mixed forms. The important types in each category are discussed as below.

Hereditary Neutropenia

Congenital Neutropenia

It is the inherited and **severe type** of Neutropenia. Inheritance is **autosomal dominant.** It is more common in infants and young children. The symptoms include mouth sores, frequent fever, pneumonia, ear infections, and rectal sores. If treatment is not immediately started, a child may start to lose teeth due to severe gum infections.

Chronic Neutropenia

Kostmann's Syndrome is a **chronic sub-type of hereditary Neutropenia.** It is

transmitted in an **autosomal recessive** pattern and is an aggressive condition.

Cyclic Neutropenia

It is present in many members of the family. It occurs every 3 weeks (the range can be from 12–35 days) and continues for 3–6 days in a single cycle. The symptoms include **infections, fever, and ulcers**. Most children improve after puberty.

Acquired Neutropenia

Acquired types are more common than hereditary types.

Immune-mediated Neutropenias

Drug-induced: A drug can act as a hapten and induce antibody formation. The drugs that can cause Neutropenia are Quinidine, Aminopyrine, Penicillin, Cephalosporin, Phenothiazines, Sulfonamides, and Hydralazine.

Autoimmune: The Neutropenia can be **primary or secondary autoimmune Neutropenia**. In the primary form, there is no other abnormality except the antibodies (Antineutrophil antibodies) that attach to neutrophils causing their peripheral destruction; infections that occur as a result of Neutropenia are mild and limited.

The secondary Neutropenia occurs due to some other primary pathology, like any other autoimmune disease, infections, and malignancy. In infants, the **secondary Neutropenia is very rare**. Above one year of age, the incidence of secondary Neutropenia increases; therefore, rigorous research to find the underlying autoimmune diseases is done.

Infections

The following are the infections that can result in the acquired form of Neutropenia:

- Viral infections (Measles, influenza, EBV, CMV, Viral hepatitis, HIV)
- Bacterial sepsis
- Typhoid
- Toxoplasmosis
- Brucellosis
- Rickettsial infection
- Malaria
- Dengue Fever

Mixed type of Neutropenia

Chronic Benign Neutropenia

It is a **rare form that can lead to life-threatening infections**. It is more common in children less than four years of age. The infections tend to decrease with age.

Causes of Neutropenia

1. **Hereditary**
2. **Acquired**

- Autoimmune
- Aplastic anemia
- Tumor infiltration

- Ionizing radiation
- Drugs
- Bacterial infections
- Viral infections

Signs and Symptoms of Neutropenia

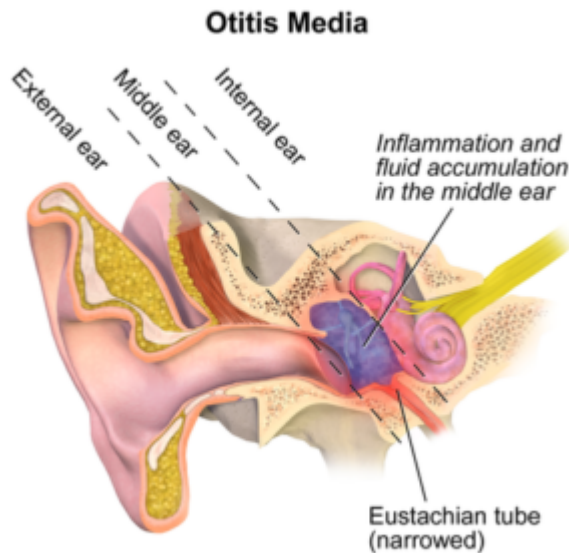


Image: "Otitis Media" by BruceBlaus. License: [CC BY-SA 4.0](https://creativecommons.org/licenses/by-sa/4.0/)

The signs and symptoms are **those of the infections that have occurred due to Neutropenia:**

- Fever
- Otitis media
- Headache
- Cough
- Pneumonia
- Bladder infection
- Diarrhea
- Sore throat
- Ulcers
- Gum infections

Diagnosis of Neutropenia

The diagnosis is based on history, physical examination, and laboratory investigations. Imaging studies are also performed in certain cases.

History

The child often has complaints of pneumonia, ear infection, tonsillitis, gastroenteritis, skin infection, and pharyngitis. **Family history is important**, especially in cases of inherited Neutropenia.

Physical examination

It **shows the signs of infections**, fever, ulcers, gingivitis, abscesses, pneumonia, skin infections, sepsis, cervical lymphadenopathy, and growth retardation. Many times, there is a fever without any focal signs of the disease.

Laboratory investigations

- Complete blood count
- Differential Leukocyte Count (DLC)
- Peripheral blood smears
- Liver function tests
- Antineutrophil antibody tests
- Rheumatoid factor (RF)
- Quantification of serum immunoglobulin
- Peripheral blood flow cytometry
- Others may include testing for infections (mentioned in types) like Typhoid, TB, Hepatitis, and AIDS

For Infections

Urine culture, blood cultures, wound cultures, sputum cultures, and Gram-staining, skin biopsy and stool cultures for Clostridium Difficile. The list can vary **depending upon the type of infection**.

Imaging studies

- Radiographs of long bones for cases of congenital neutropenias
- Chest X-rays and CT scans for signs of pneumonia
- Abdominal radiographs for the liver and spleen
- Ultrasounds

Management of Neutropenia

There is a general approach and specific treatment for Neutropenia.

General Approach

- Remove offending drugs
- Oral hygiene
- Stool softeners
- Skincare
- Correction of folic acid deficiency
- Dietary measures to include properly cooked meat, clean water and the avoidance of acidic food

Specific Therapy

- Antibiotics
- Colony-stimulating factors
- Granulocyte transfusion
- Immunoglobulin
- Corticosteroids

References

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