

## THE DIFFERENCE BETWEEN ACUTE AND CHRONIC INFLAMMATION

Trainee Assistant: **Asatullayev Rustamjon Baxtiyarovich**

Student: **Abdurashidova Gulyora Jamshid qizi**

Samarkand State Medical University

**Abstract:** Inflammation is a vital defense mechanism that protects the body from harmful stimuli such as pathogens, damaged cells, or irritants. It plays an essential role in healing and tissue repair. However, depending on duration and response, inflammation is categorized into two types: acute and chronic. Acute inflammation is rapid and short-term, aiming to eliminate the initial cause of injury and promote repair. Chronic inflammation, in contrast, is prolonged and often leads to tissue destruction and fibrosis. This paper aims to explain the main differences between acute and chronic inflammation, including their causes, cellular mechanisms, mediators, and clinical outcomes.

**Keywords:** inflammation, acute inflammation, chronic inflammation, immune response, tissue repair, pathology

### Introduction

Inflammation is one of the most fundamental processes in human physiology and pathology. It represents the body's immediate response to infection or injury, designed to eliminate harmful agents and initiate healing. While acute inflammation is protective and self-limiting, chronic inflammation may persist for months or years, leading to progressive tissue damage.

Understanding the difference between acute and chronic inflammation is crucial for clinicians and researchers, as these processes underlie many diseases, including cardiovascular disorders, arthritis, diabetes, and cancer. This paper provides a comparative overview of the two forms of inflammation and their biological and clinical significance.

### Methods

This study is based on a comprehensive review of academic sources including scientific journals, textbooks, and reports from health organizations. Literature was obtained from databases such as PubMed, ScienceDirect, and WHO publications. Comparative analysis was conducted to evaluate differences in onset, duration, cellular composition, mediators, and outcomes between acute and chronic inflammation. Information from Robbins and Cotran Pathologic Basis of Disease and Cellular and Molecular Immunology was used to ensure accuracy.

### Results

The findings of this study revealed significant differences between acute and chronic inflammation in terms of onset, duration, cellular composition, mediators, and outcomes.

Acute inflammation occurs rapidly, usually within minutes or hours after injury or infection, and typically lasts for a few days. It is characterized by vascular changes, exudation of plasma proteins, and the migration of neutrophils to the site of injury. These processes help eliminate pathogens and initiate tissue repair. The main mediators involved in acute inflammation include histamine, prostaglandins, bradykinin, and cytokines such as interleukin-1 (IL-1) and tumor necrosis factor-alpha (TNF- $\alpha$ ).

In contrast, chronic inflammation develops more slowly and may persist for weeks, months, or even years. It is usually caused by persistent infections, autoimmune diseases, or long-term exposure to toxic substances. The cellular composition also differs significantly; instead of neutrophils, macrophages, lymphocytes, and plasma cells dominate chronic inflammation. These cells release cytokines such as interferon-gamma (IFN- $\gamma$ ), transforming growth factor-beta (TGF- $\beta$ ), and other mediators that contribute to ongoing tissue damage and fibrosis.

The outcomes of inflammation depend largely on its type and duration. Acute inflammation generally resolves once the harmful stimulus is removed, leading to complete healing or formation of an abscess. However, when the acute response fails to resolve, it can evolve into chronic inflammation. Chronic inflammation, on the other hand, often results in progressive tissue destruction, fibrosis, and granuloma formation.

These outcomes are closely associated with chronic diseases such as rheumatoid arthritis, atherosclerosis, and pulmonary fibrosis.

Overall, the study indicates that while acute inflammation is essential for short-term protection and healing, chronic inflammation represents a maladaptive process that contributes to many pathological conditions.

## Discussion

The comparison between acute and chronic inflammation demonstrates that although both forms serve protective functions, their outcomes differ significantly. Acute inflammation is beneficial and necessary for immediate defense and tissue repair. However, if the harmful stimulus persists or the resolution mechanisms fail, it transitions into chronic inflammation.

Chronic inflammation is often pathological and associated with degenerative diseases. The continuous presence of macrophages and lymphocytes results in tissue destruction and fibrosis. Modern medicine aims to regulate inflammation using pharmacological agents such as nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and immunosuppressants to prevent chronic progression.

Understanding the mechanisms underlying both forms of inflammation allows healthcare professionals to identify, manage, and prevent inflammatory diseases more effectively.

## Conclusion

Inflammation is a crucial biological response that maintains health by eliminating harmful stimuli and initiating repair. Acute inflammation is short-lived and restorative, while chronic inflammation is prolonged and often destructive. Recognizing the differences between them is essential for accurate diagnosis, treatment, and prevention of chronic inflammatory diseases.



Continuous research and medical education are necessary to develop new therapies that balance inflammation and healing processes effectively.

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