

General Pathology

Inflammation

Th.Lecture 7

2023-2024

Inflammation

- Inflammation is defined as the local response of living mammalian tissues to injury from any agent.
- It is a body defense reaction in order to eliminate or limit the spread of injurious agent, followed by removal of the necrotic cells and tissues.



Cause of inflammation

The injurious agents causing inflammation may be as under:

- Infective agents like bacteria, viruses and their toxins, fungi, and parasites.
- Immunological agents like cell-mediated and antigen-antibody reactions.
- Physical agents like heat, cold, radiation, mechanical trauma.
- Chemical agents like organic and inorganic poisons.
- Inert materials such as foreign bodies.

Nomenclature of inflammation

- The indicator of inflammation in various organs or tissues is by using the suffix (word ending) 'itis' after the Greek word for the organ. So, for instance:
 - Inflammation in the liver is known as hepatitis; kidney, nephritis; small intestine, enteritis; colon, colitis; skin, dermatitis and so on.

Historical highlights

Celsus, a first century A.D. Roman, listed four cardinal signs of acute inflammation:

1. *Rubor* (erythema or redness): vasodilatation and increased blood flow.
2. *Tumor* (swelling): extravascular accumulation of fluid.
3. *Calor* (heat): vasodilatation and increased blood flow.
4. *Dolor* (pain)

Cardinal signs of inflammation



Heat
calor

Redness
rubor

Swelling
tumor

Pain
dolor

Loss of function
Functio laesa

Microscopic morphology of the inflammatory process:

The microscopic changes that indicate the early inflammatory process include;

1. Vascular response
2. Cellular response

Vascular response of the inflammatory process:

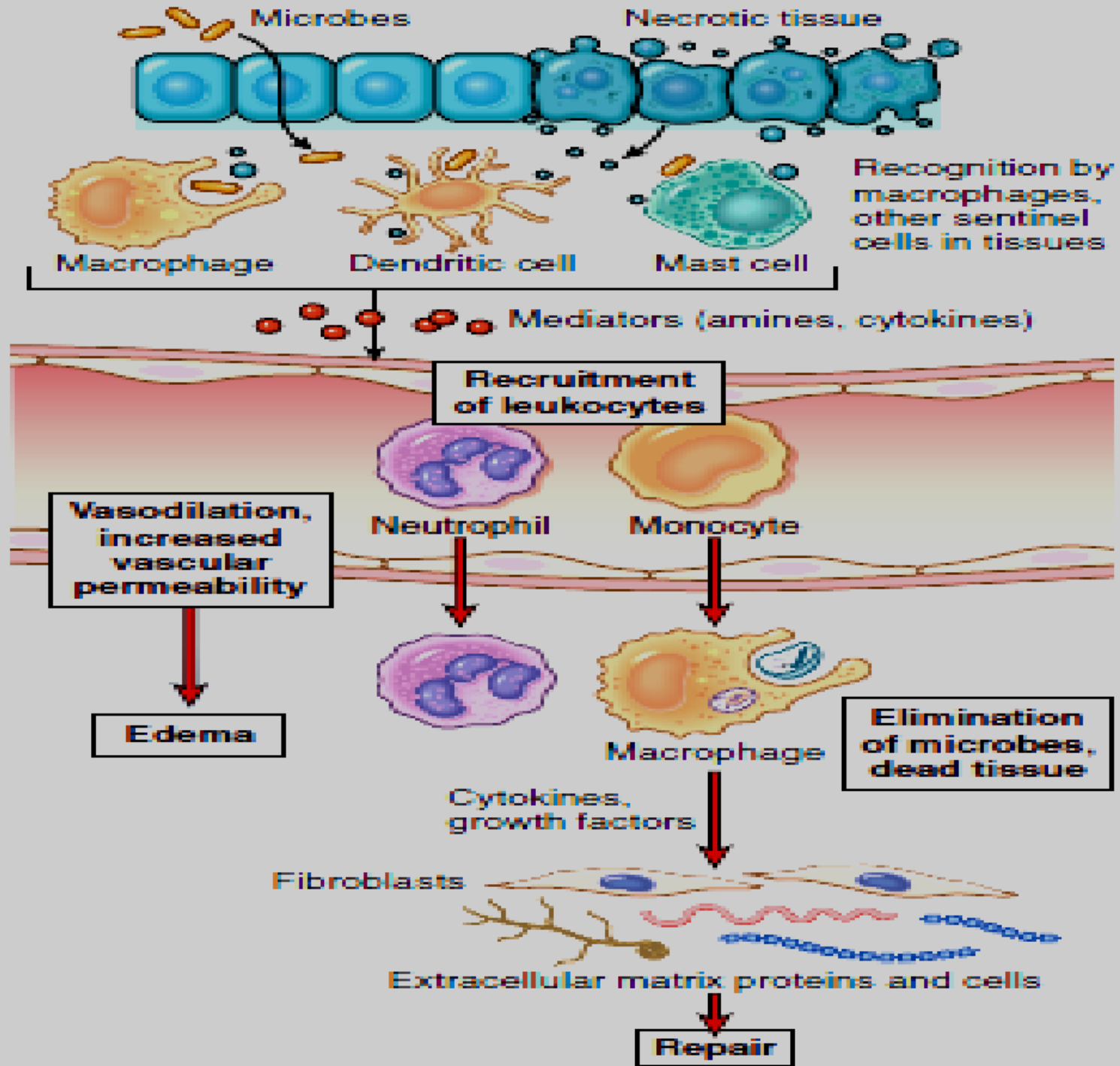
The vascular response of the inflammatory process involves;

1. Changes in blood flow and caliber
2. Increased vascular permeability

STIMULUS

PRODUCTION OF MEDIATORS

INFLUX OF LEUKOCYTES, PLASMA PROTEINS

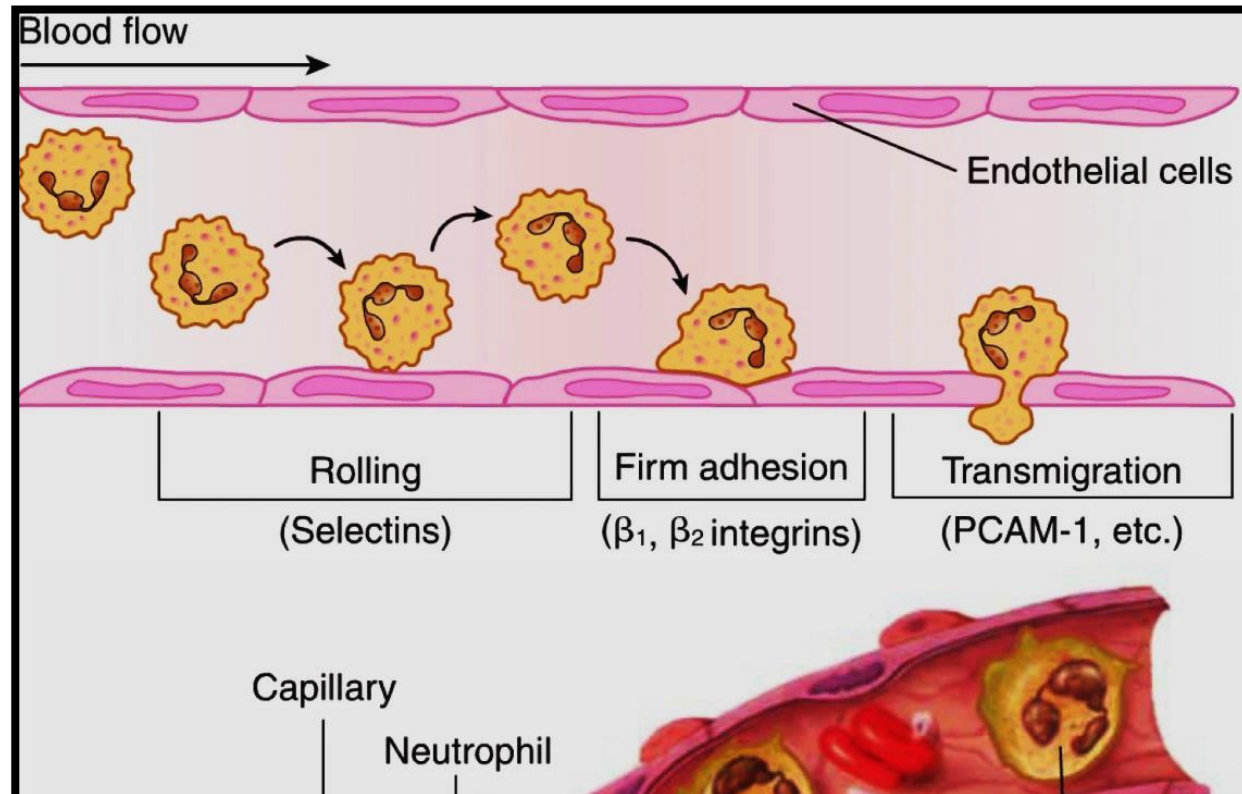


Stages of the cellular response of inflammation:

- Margination
- Emigration
- Chemotaxis
- Phagocytosis
- Killing and degradation of the engulfed particle.

Stages of the cellular response of inflammation:

- A. Margination B. Emigration C. Chemotaxis
D. Phagocytosis E. Killing and degradation of the engulfed particle.



Types of inflammation

Depending upon the **defense capacity** of the host and **duration of response**, inflammation can be classified as;

1. **Acute inflammation**
2. **Chronic inflammation**

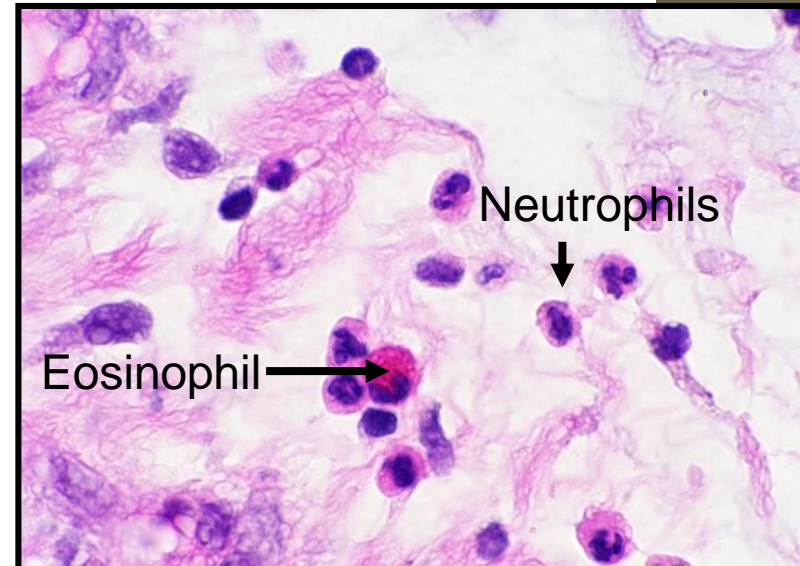
Acute inflammation

- Acute inflammation is the initial response of the body to injurious stimuli and is achieved by the increased movement of plasma and leukocytes (especially neutrophils) from the blood into the injured tissues.
- It usually lasts from minutes to few days and is characterized by the classic cardinal signs of heat, redness, swelling, pain and loss of function.

Acute inflammation

The main features of acute inflammation are:

1. Accumulation of fluid and plasma (exudate) at the affected site.
2. Intravascular activation of platelets, and polymorphonuclear cells as neutrophil, eosinophil (mainly neutrophils) as inflammatory cells.

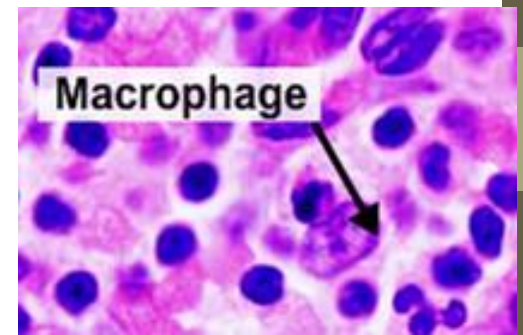


- The type of WBCs seen in the inflammatory response varies with the nature and severity of the injury (cause of inflammation) and the age of the inflammatory lesion.
- In most types of acute inflammation, neutrophils predominate in the first 6-24 hours and then the neutrophils are replaced by macrophages within 24-48 hours.

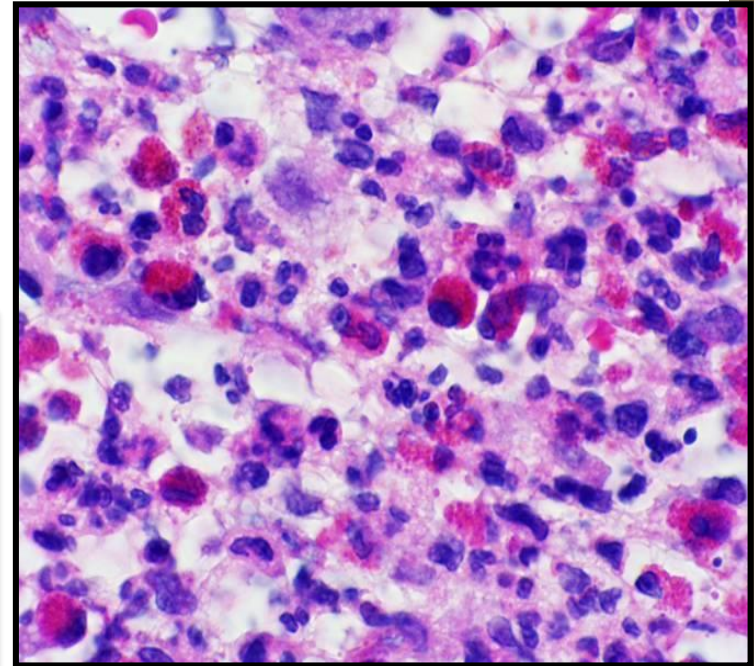
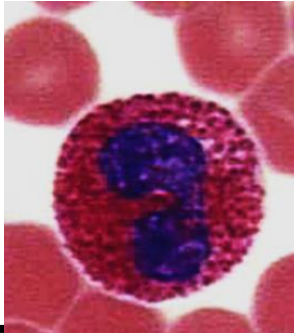
Types of inflammatory cells: Inflammatory cells are divided into 2 main groups.

1) Polymorphonuclear cells (Acute inflammation) Such as neutrophils, eosinophils and Basophils.

2) Mononuclear inflammatory cells (Chronic inflammation) including Macrophages, lymphocytes and plasma cells



In some types of acute inflammation such as those induced by hypersensitivity reactions or parasitic infestations, eosinophils are the main inflammatory cell type.



Eosinophilic leukocyte



Neutrophilic leukocyte



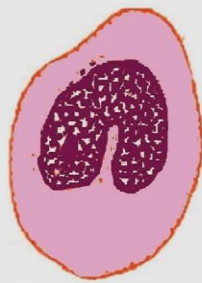
Neutrophilic leukocyte



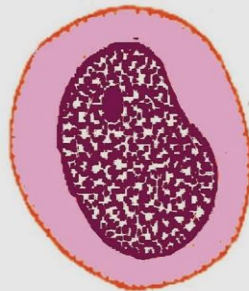
Lymphocyte



Plasma cell



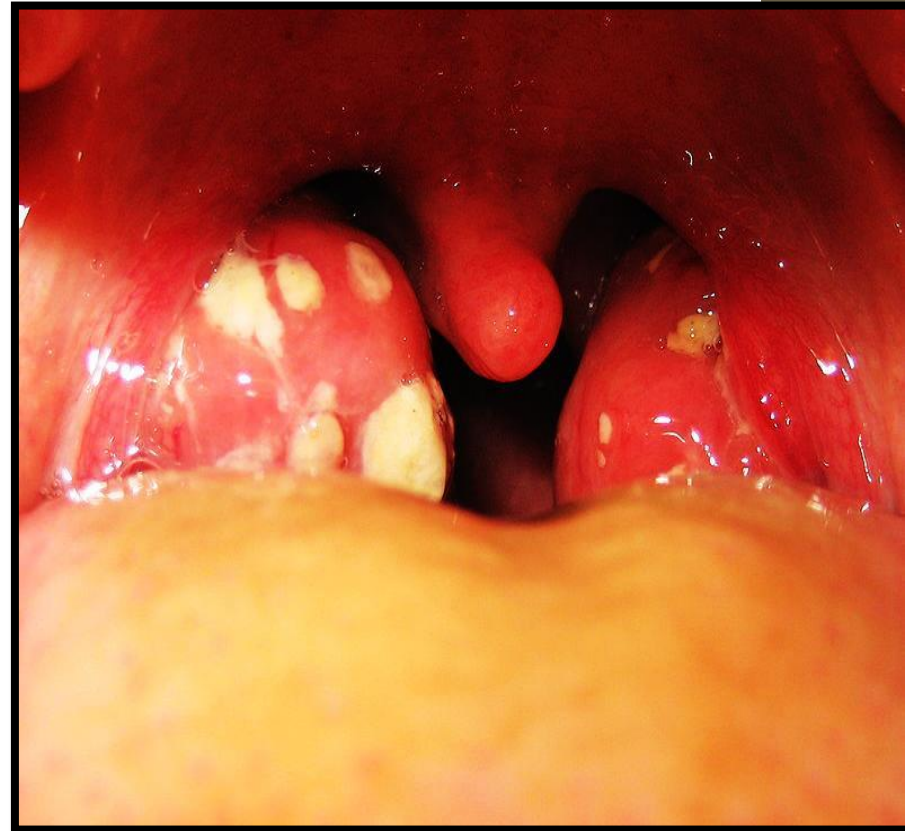
Monocyte

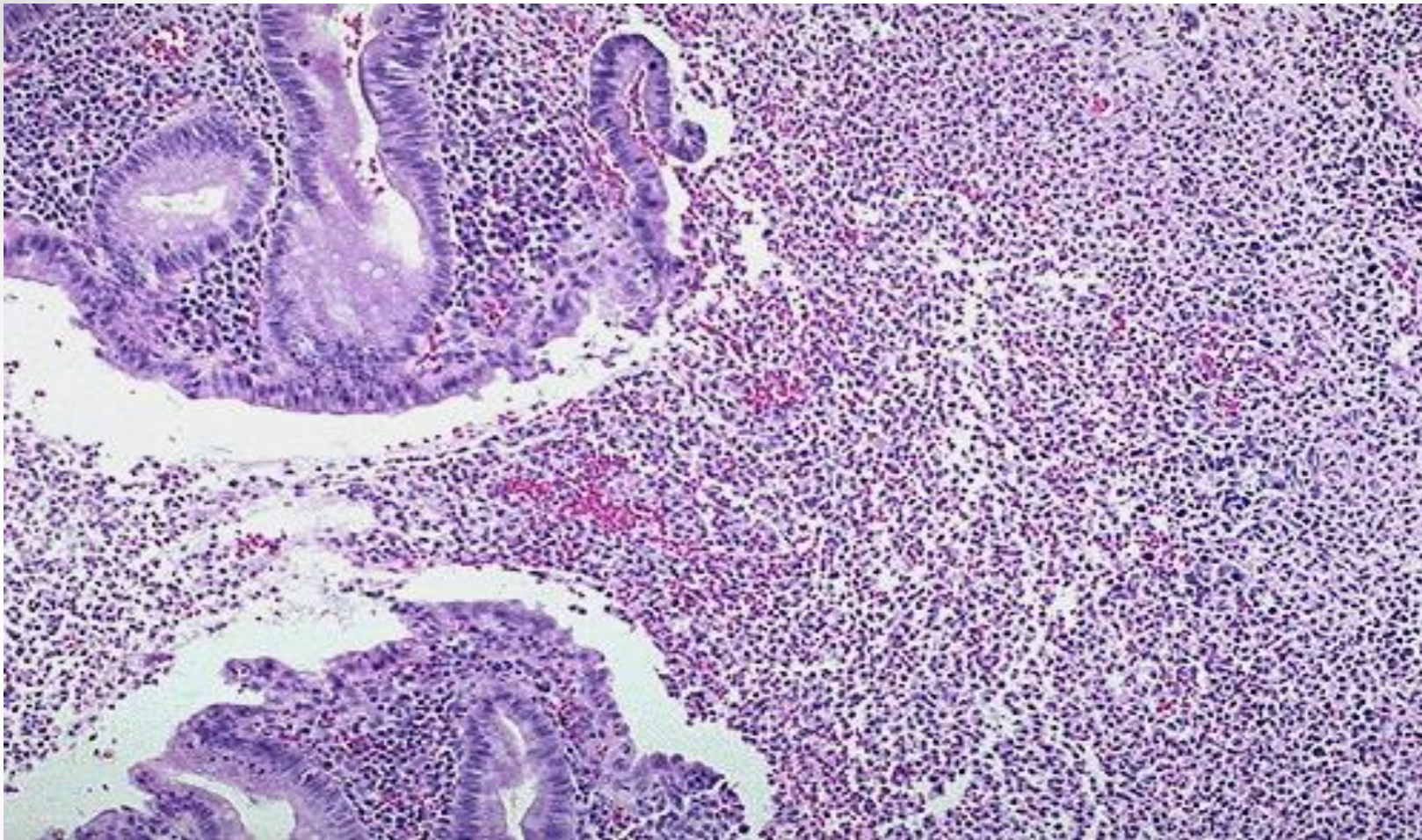


Macrophage

Acute **suppurative tonsillitis** characterizes by Marked enlargement of the pharyngeal tonsils.

- ❑ Multifocal abscess foci are seen on the enlarged tonsils.





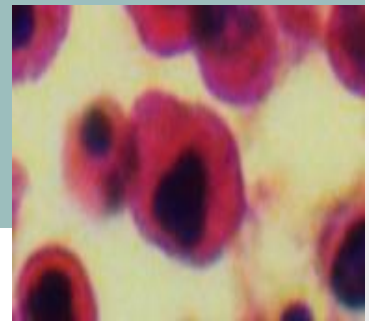
Acute suppurative appendicitis

The lumen is filled with pus (aggregation of dead and viable neutrophils and tissue debris).

Chronic inflammation

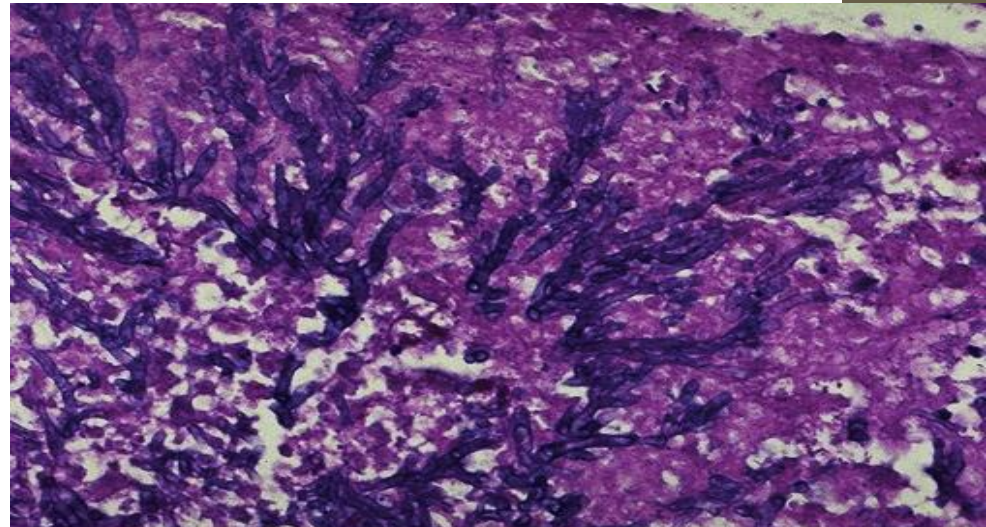
Chronic inflammation is an inflammation of slow progress and long duration (weeks to years) and is characterized by infiltration of mononuclear inflammatory cells i.e., macrophages, lymphocytes and plasma cells associated with simultaneous tissue destruction and repair by fibrosis.

Lymphocytes and plasma cells commonly seen in virus infection and chronic inflammation.

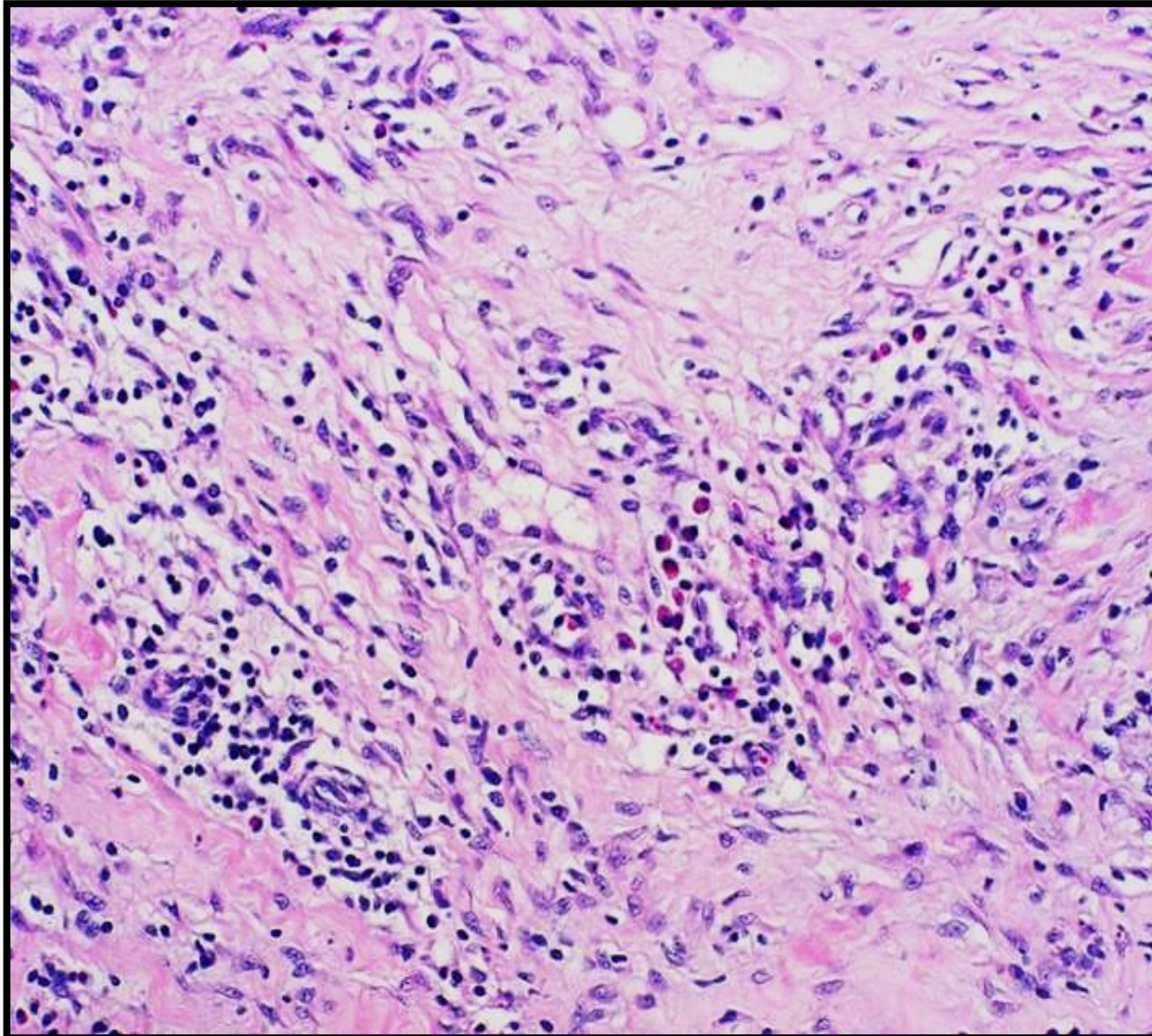


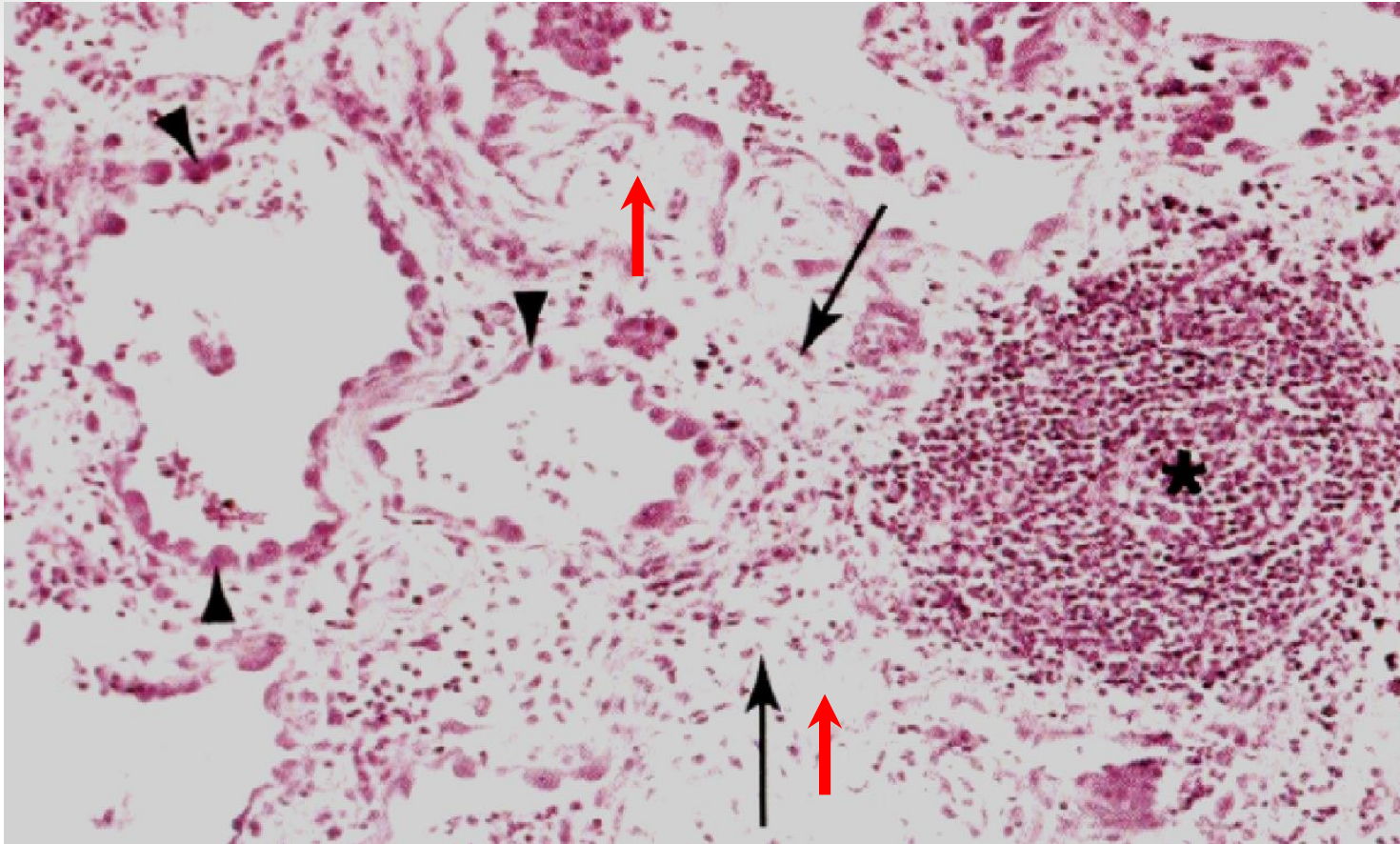
Causes of chronic inflammation:

1) Persistent infections: Microbes that are difficult to eradicate elicit delayed-type of hypersensitivity and produce chronic inflammation, e.g. mycobacteria, and certain viruses, fungi, and parasites. Some agents may cause a distinct pattern of chronic inflammation known as granulomatous reaction.



Chronic Inflammation





Chronic inflammation of the lung (Pneumonia) as indicated by:

- 1. Replacement of the pulmonary tissue by fibrous C. T. (red arrows).**
- 2. Infiltration of the interstitial tissue with chronic inflammatory cells (mainly macrophages and lymphocytes) (black arrows).**