








INFLAMMATION

Inflammation: is a response of living tissues to a harmful insult or agents. Its purpose is to **localize**, **eliminate** the injurious agent, **remove** damaged tissue and **replace** it with healthy new tissue (**repair**).

- Terms ending in the suffix “**-itis**” denote inflammation

Examples:

- **Appendix**  **appendicitis**
- **Larynx**  **laryngitis**
- **Bronchi**  **bronchitis**
- **Gastric mucosa**  **gastritis**
- **Hair follicle**  **folliculitis**

But it not always Can be considered:

• **Lung tissue**  **pneumonia**

• **Breast**  **mastitis**

• **Joint**  **arthritis**

It consists principally of:

1-Vascular changes :



2-Leukocyte infiltration and:



3-Systemic reaction.

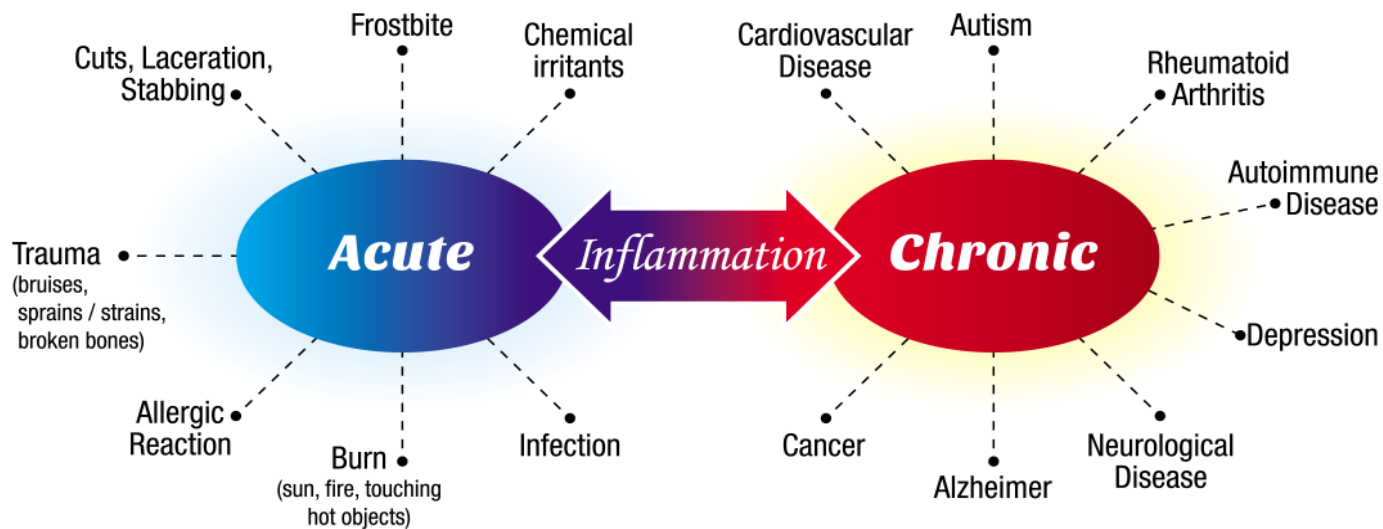


Causes of inflammation

- 1) **Infection:** Bacterial ,Viral, Parasitic and microbial toxins
- 2) **Immunological:** hypersensetivity reactions and autoimmune diseases
- 3) **Physical agents:** trauma, radiation, burn
- 4) **Chemical agents:** strong acids and alkalines, toxins
- 5) **Foreign bodies:** splinters, sutures and dirts
- 6) **Circulation disorders:** thrombosis, hemorrhage

■ Types of inflammation:

- Acute inflammation (sec, mins, hrs or days)
- Chronic inflammation (weeks, months, years)



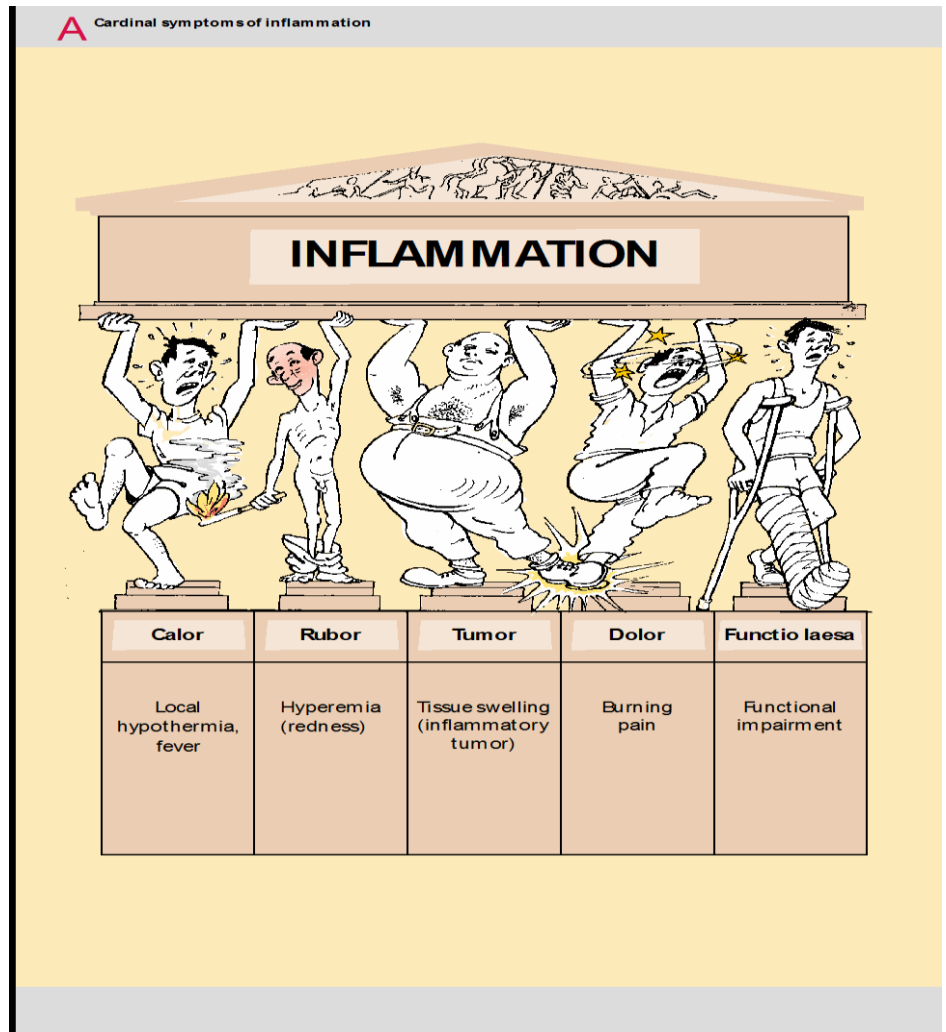
Acute inflammation

An inflammatory response that :

- I. Lasts only for **short period**.**
- II. Characterized by the **exudation of fluid and plasma proteins****
- III. Emigration of leukocytes predominantly **neutrophils**.**

The five Cardinal Signs of Acute Inflammation

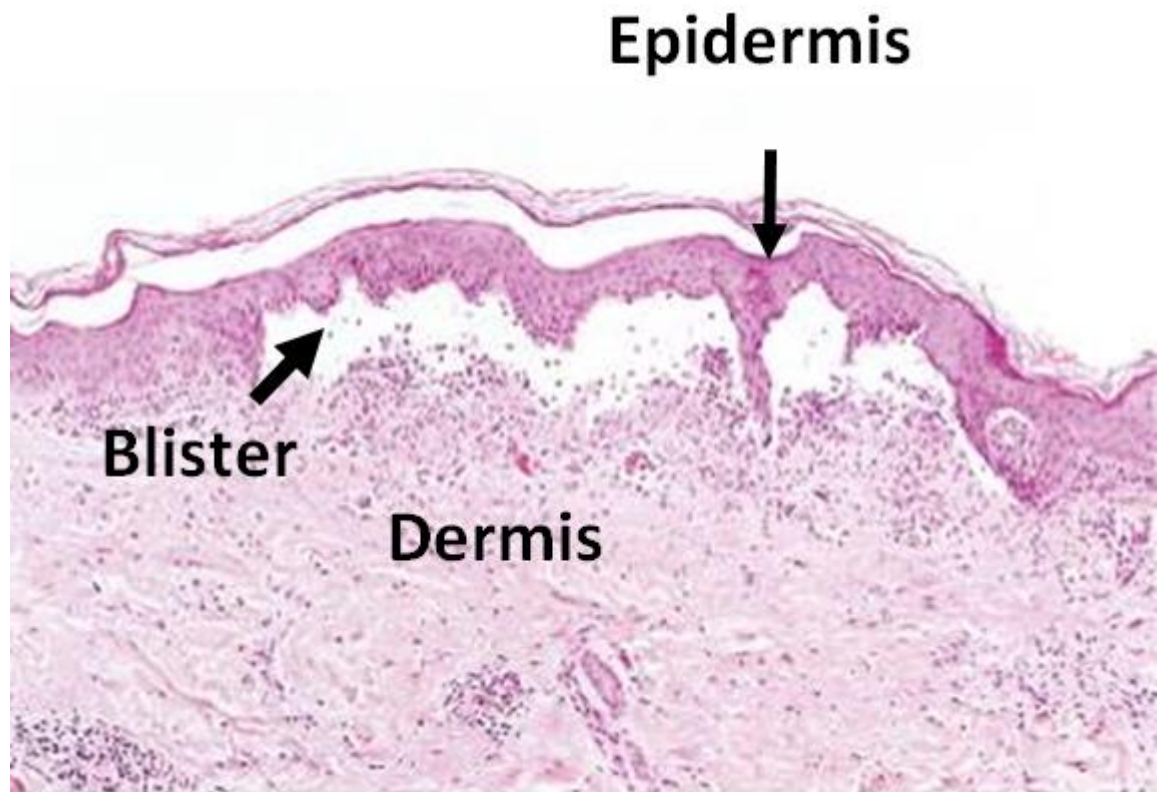
- ❑ Heat (CALOR)
- ❑ Redness (RUBOR)
- ❑ Swelling (TUMOR)
- ❑ Pain (dolor)
- ❑ Loss of function (FUNCTIO LAESA)



Morphological types of acute inflammation

1- Serous type:

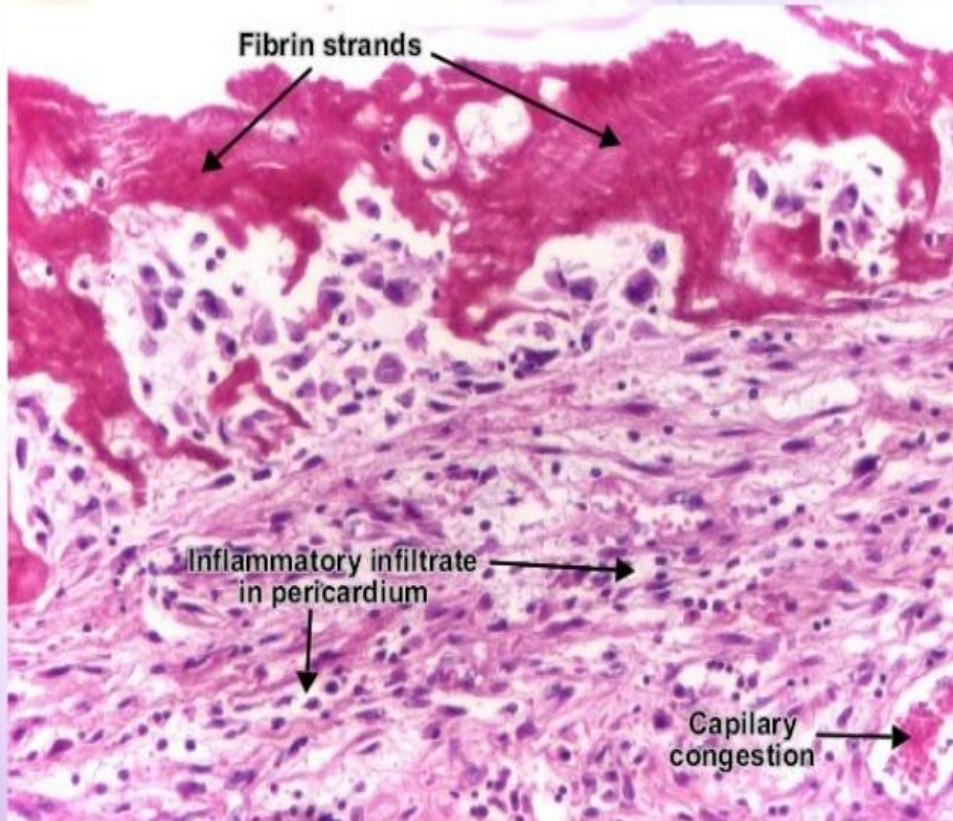
The fluid exudate resembles serum or is watery ex.
Skin blisters from burns or viral infection



2- Fibrinous type:

It is characterized by a thick exudate containing fibrin usually found in serous cavities as pericardium

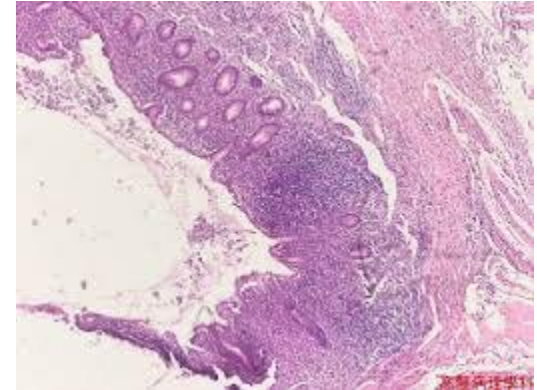
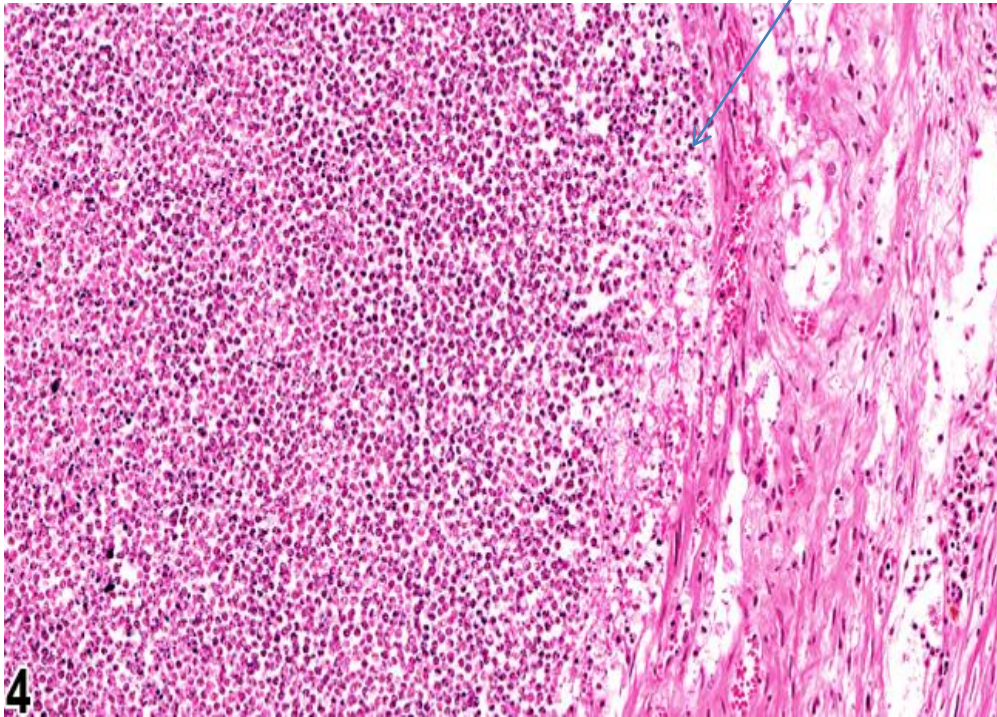
Fibrinous pericarditis – Acute Inflammation



3- Suppurative type:

It is characterized by production of pus containing neutrophils, liquified cellular debris and edema fluid ex. Pyogenic bacterial infection. It may lead to abscess formation

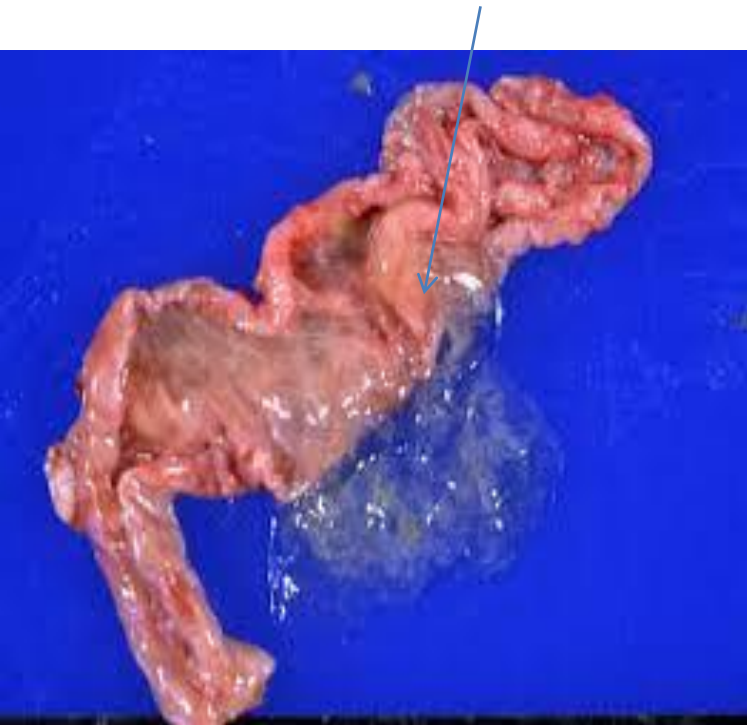
Abscess



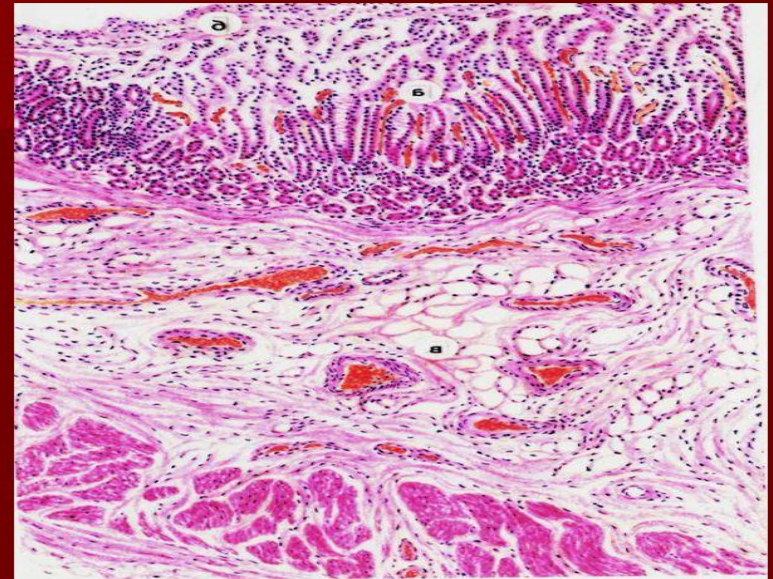
4- Acute catarrhal type:

It is inflammation of mucous membranes, characterized by mucus secretion, as in infections ex. Runny nose in common cold, gastritis, colitis

mucin



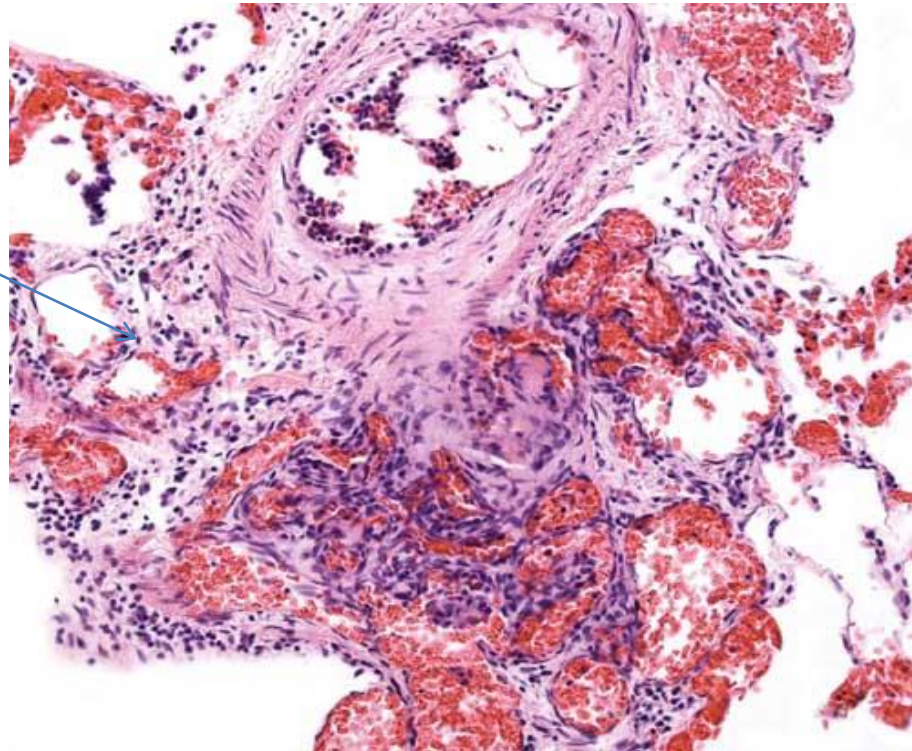
Acute
catarrhal
gastritis



5- Acute hemorrhagic:

It is characterized by microvascular injury with massive microvascular bleeding producing an exudate with a high erythrocyte content

The inflamed area is necrotic and filled with blood

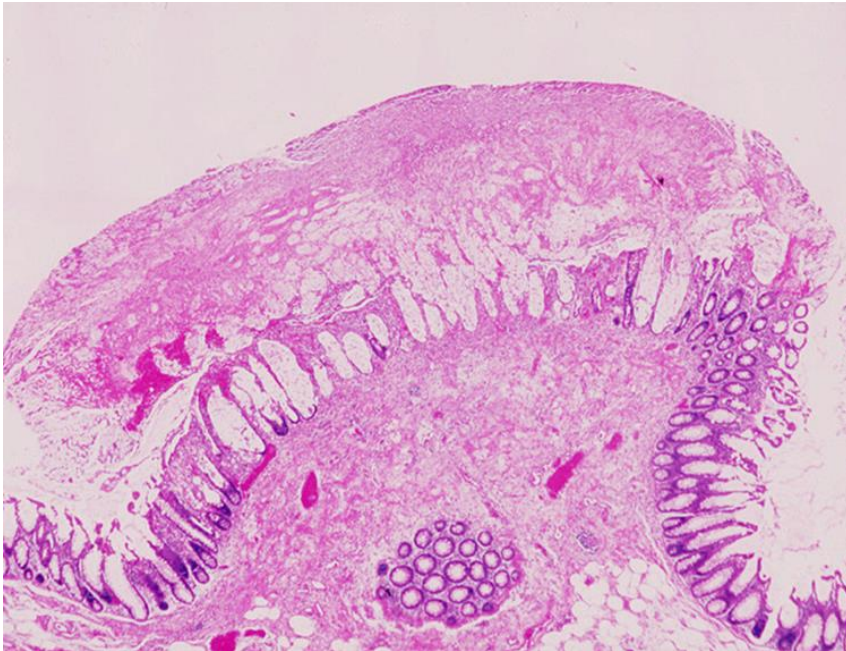


6- Pseudomembranous type:

Bacterial toxins damage mucosal lining producing a membrane composed of necrotic tissue ex.

Corynebacterium diphtheriae produce pseudomembrane in the pharynx and trachea

Pseudomembranous colitis

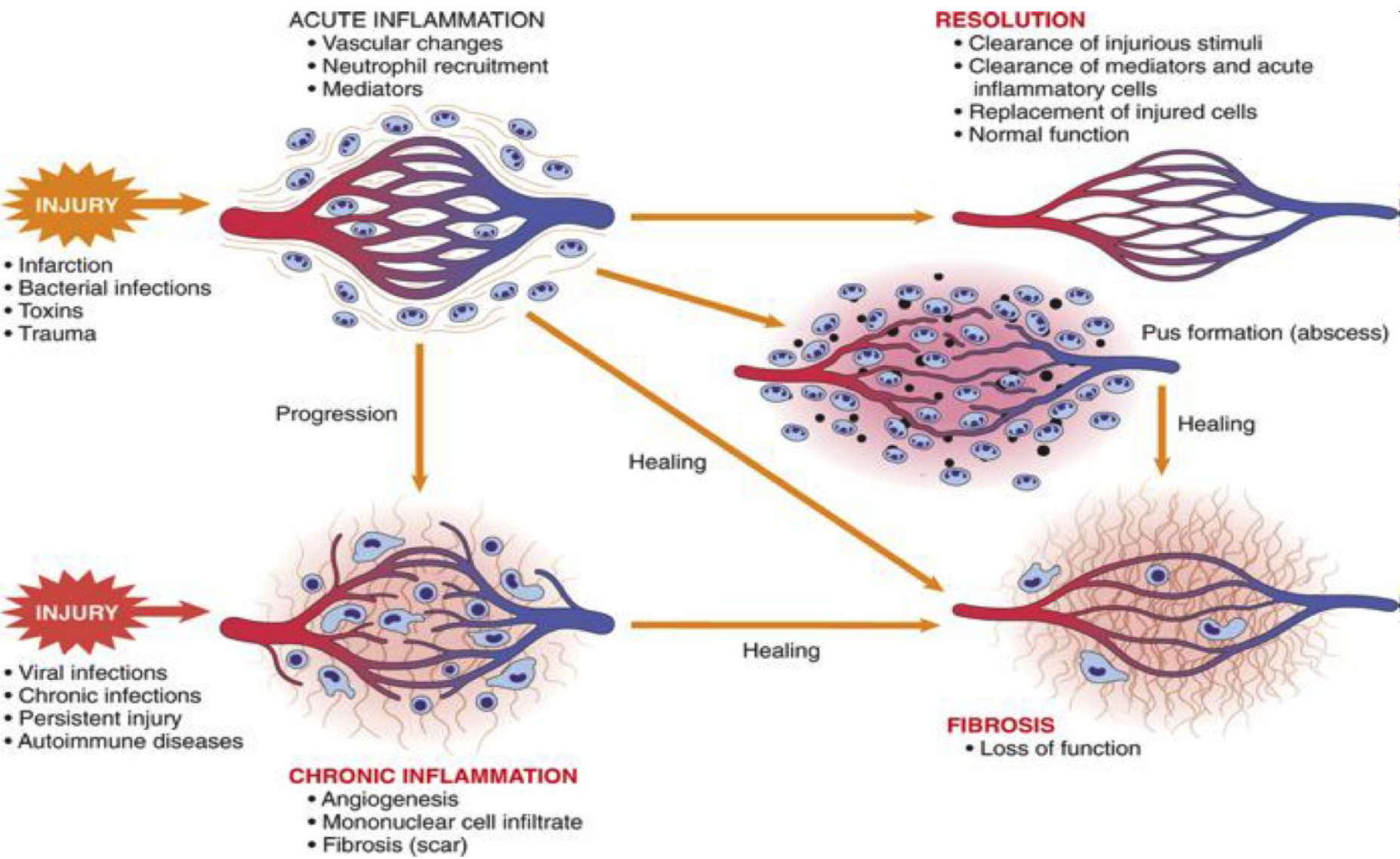


Diphtheria

Pseudomembranous Diphtheria



Out come of acute inflammation



The diagram features a central orange starburst shape with a jagged, sunburst-like border. Inside this starburst, the words 'CHRONIC INFLAMMATION' are written in a bold, red, sans-serif font. Surrounding the starburst are eight light green, wedge-shaped segments, each containing the name of a disease in a bold, black, sans-serif font. The segments are arranged in a circle around the central starburst, with white lines separating them. The diseases listed are: CANCER (top), CARDIOVASCULAR (top-right), IBD (right), RENAL DISEASE (bottom-right), ARTHRITIS (bottom), AUTOIMMUNE DISEASES (bottom-left), PANCREATITIS (left), and DIABETES (top-left).

**CHRONIC
INFLAMMATION**

CANCER

CARDIOVASCULAR

IBD

**RENAL
DISEASE**

ARTHRITIS

**AUTOIMMUNE
DISEASES**

PANCREATITIS

DIABETES

Chronic inflammation is defined as prolonged process in which tissue destruction, inflammation and attempt to repair occur at the same time.

Chronic inflammation can be caused by one of the following 3 ways:

- 1. Progression of acute inflammation e.g. osteomyelitis**
- 2. Recurrent attacks of acute inflammation lead to chronicity e.g. in recurrent urinary tract infection leading to chronic pyelonephritis, repeated acute infection of gallbladder leading to chronic cholecystitis.**
- 3. Chronic inflammation starting de novo:**
 - i. Infection: Tuberculosis. TB. Leprosy, Syphilis**
 - ii. Foreign body : surgical sutures**
 - iii. Hypersensitivity reactions (HSR): Systemic Lupus Erythematosus (SLE), Rheumatoid Arthritis (RA)**

Systemic Effect of Chronic Inflammation

- **Mild Fever, loss of weight and weakness**
- **Anemia**
- **Leukocytosis**
- **Elevated ESR**

TYPES OF CHRONIC INFLAMMATION

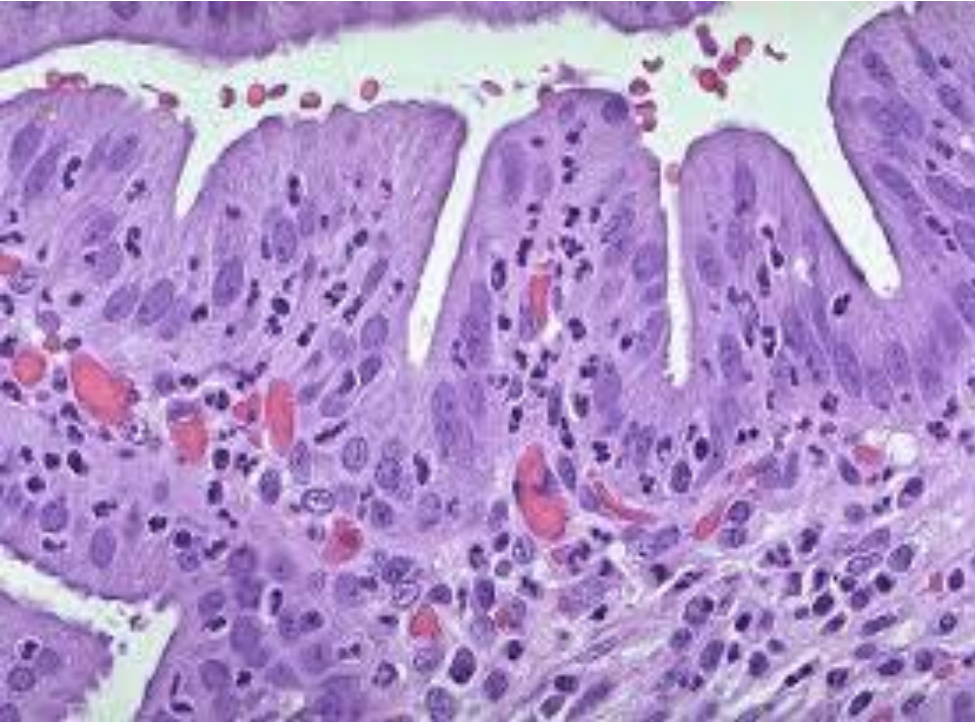
Chronic inflammation is subdivided into 2 types:

- 1. Chronic non-specific inflammation.** It is characterized by chronic inflammatory cell infiltration e.g. chronic osteomyelitis, lung abscess.
- 2. Chronic granulomatous inflammation.** It is characterized by formation of granulomas e.g. tuberculosis, foreign body

Acute vs chronic cholecystitis (chronic non specific)

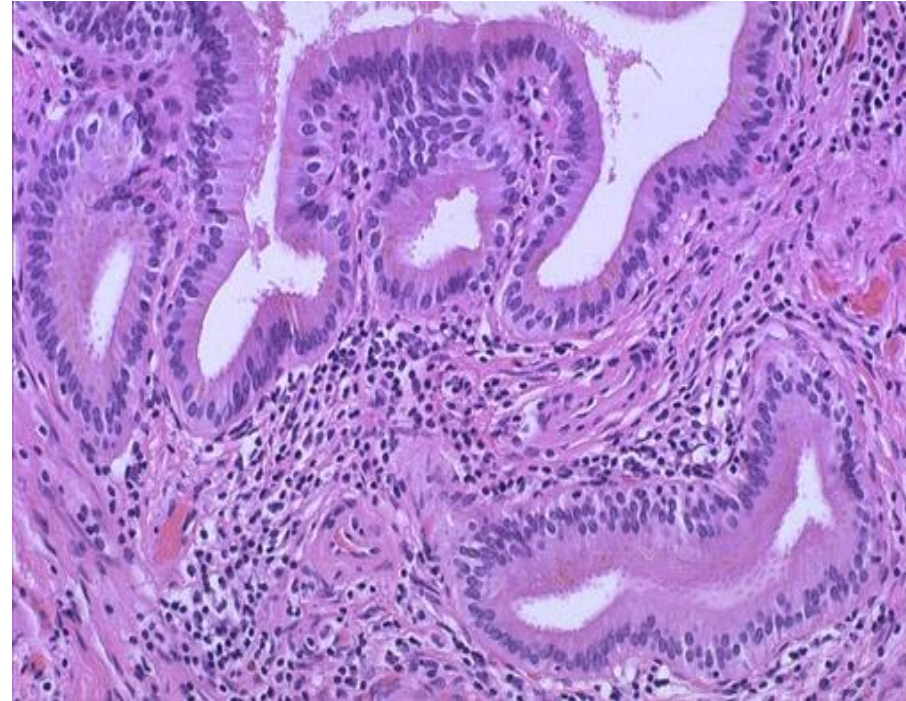
Acute

Neutrophils infiltrating mucosa
and submucosa

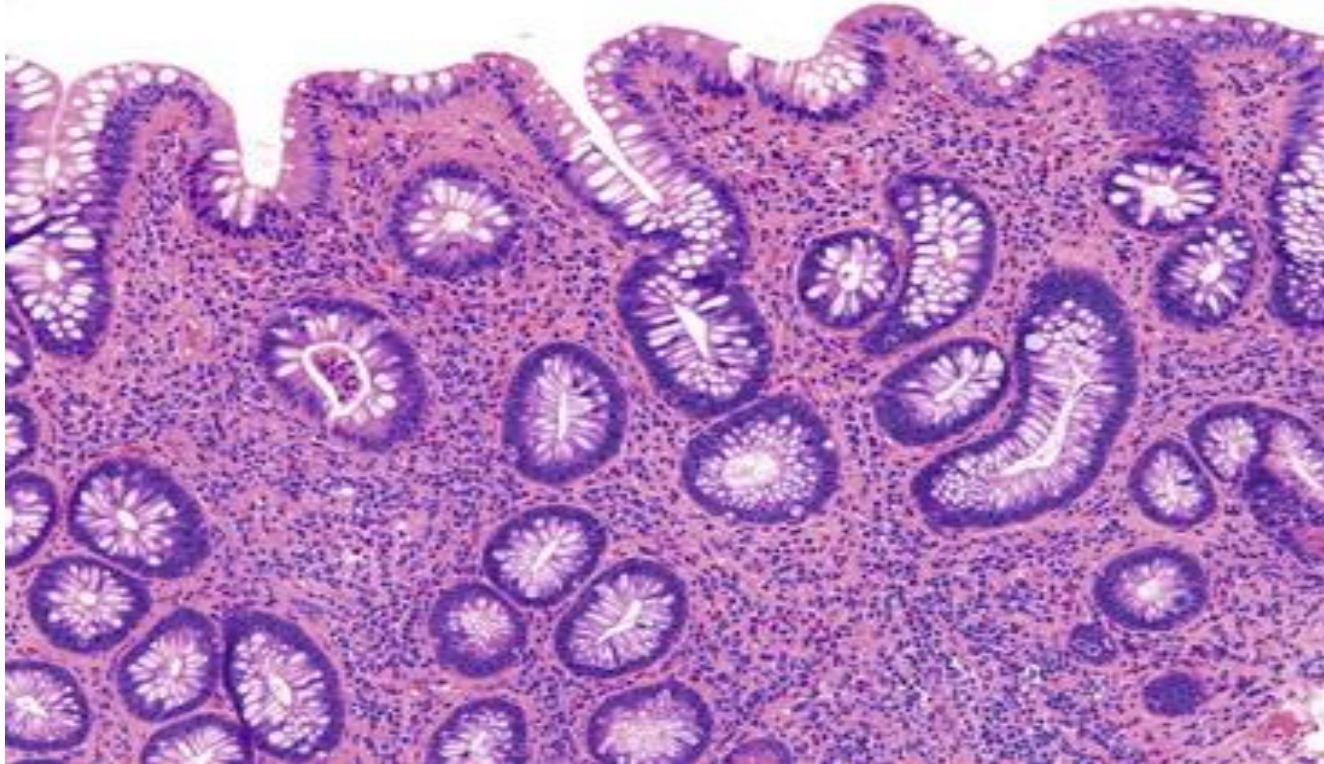


Chronic

Wall is penetrated by mucosal
glands with inflammatory cells
infiltration and fibrosis

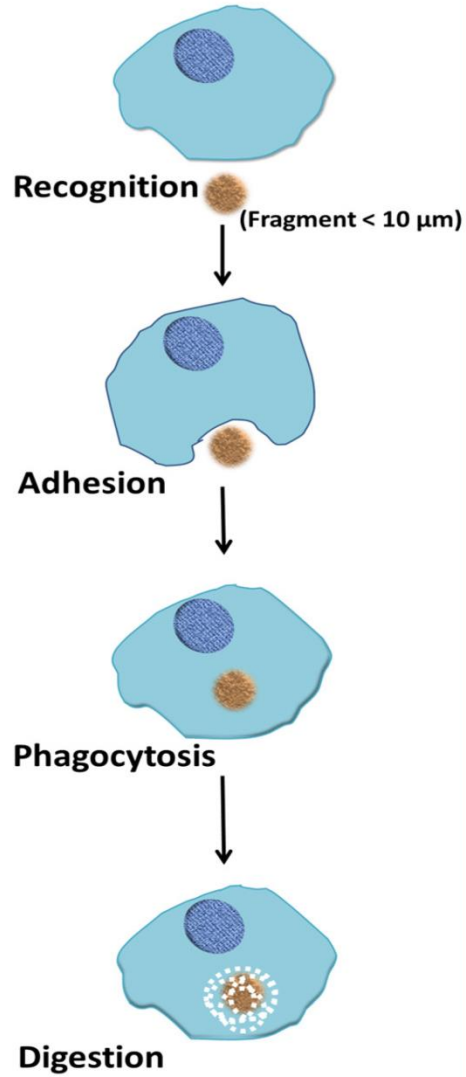


Chronic non specific inflammatory bowel disease

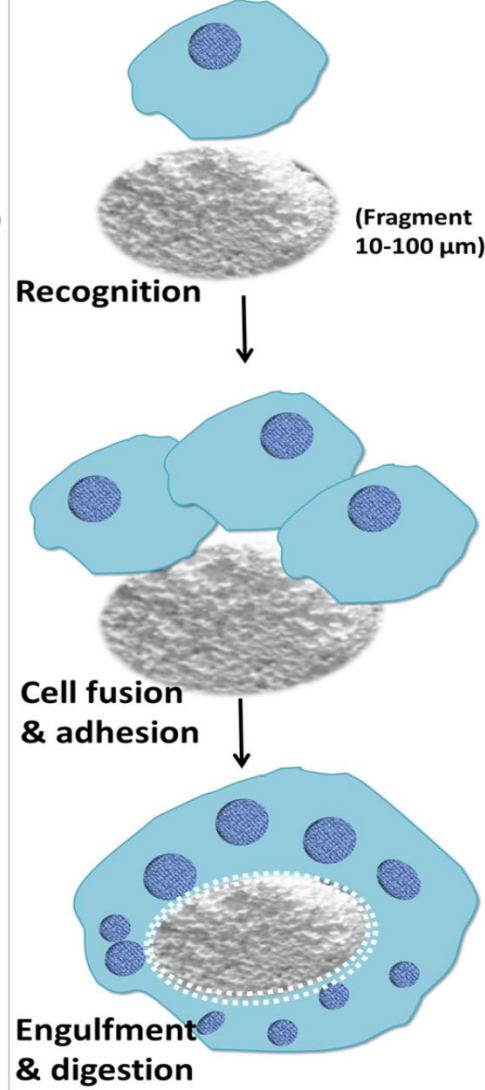


Chronic Granulomatous

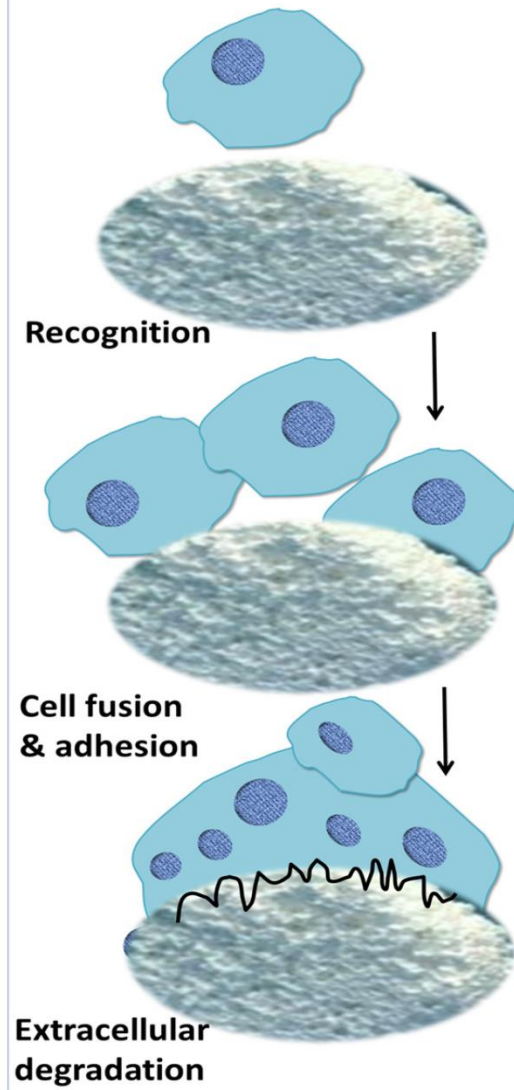
Macrophage Mediated Phagocytosis



Giant Cell Mediated Engulfment



Extracellular Degradation

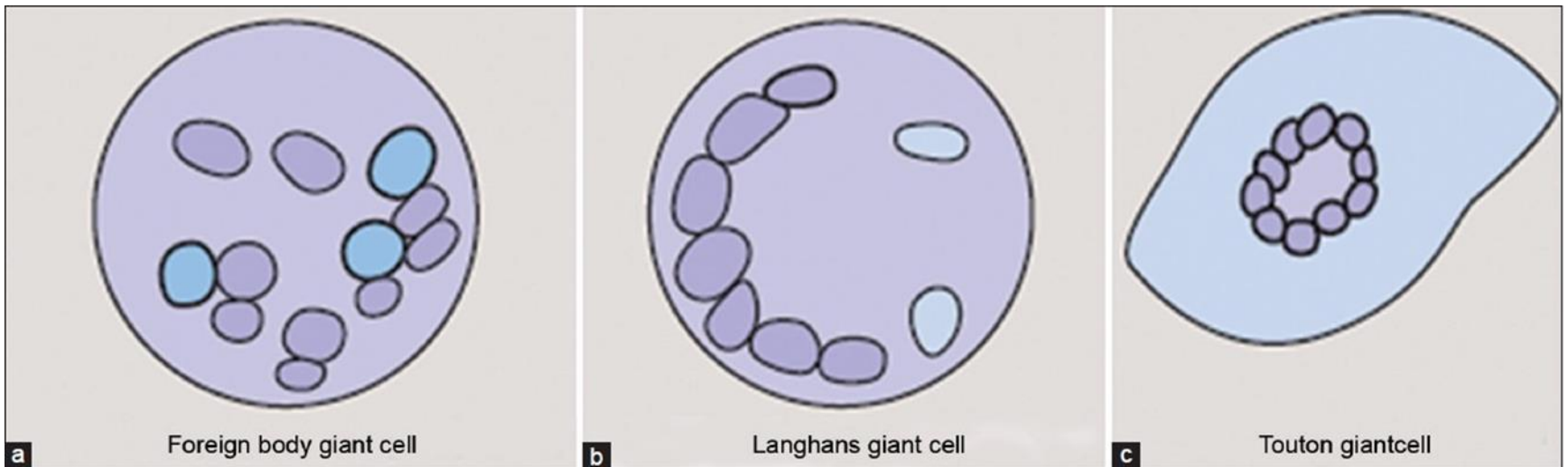


Types of multinucleated giant cells:

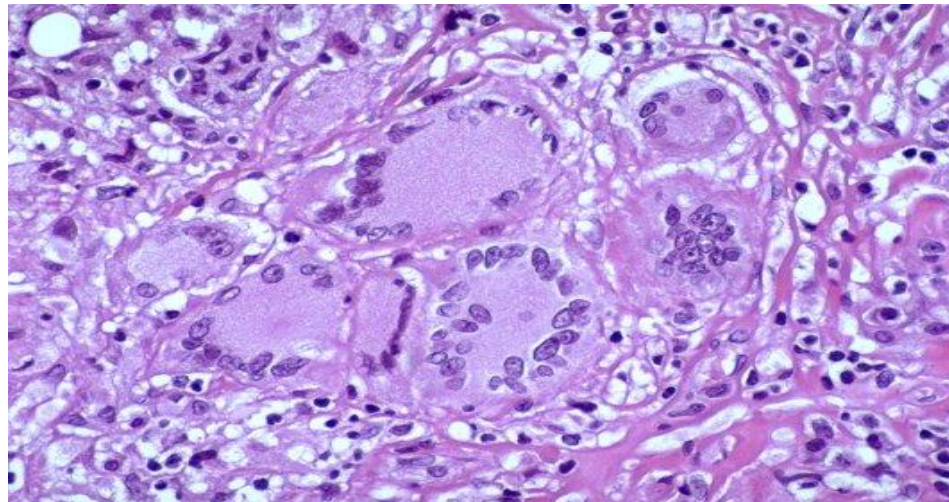
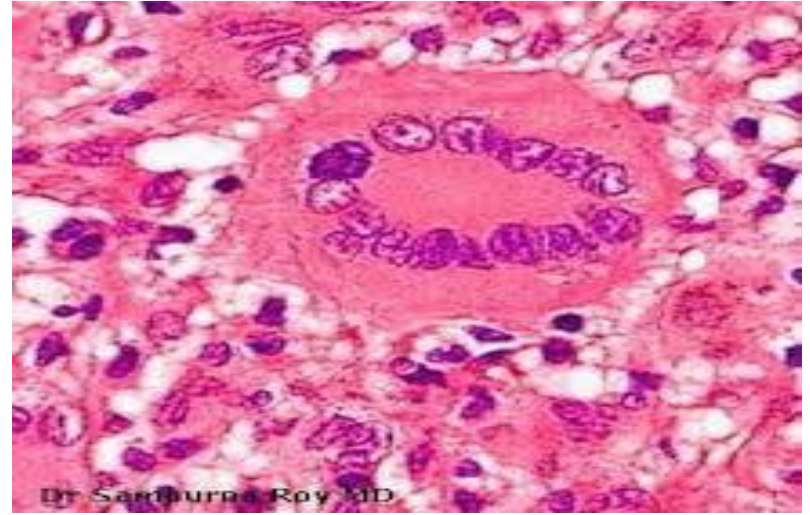
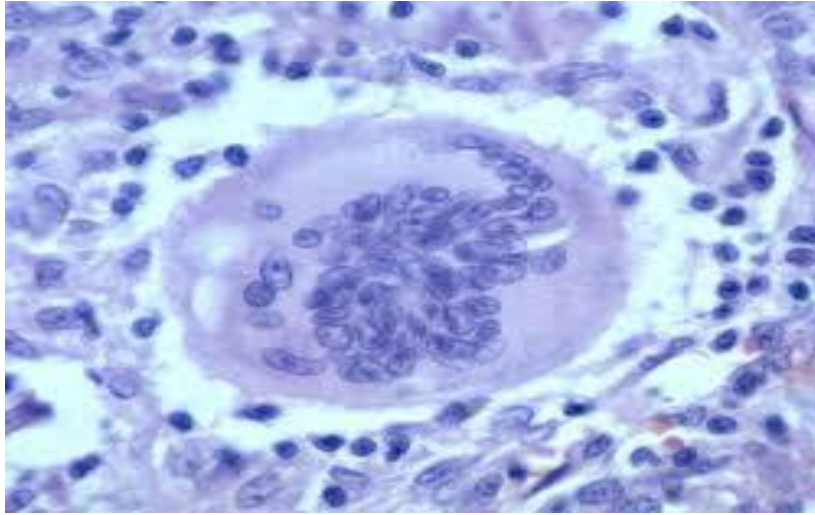
Foreign body multinucleated giant cell/ foreign body

Langhans multinucleated giant cell/ TB

Touton multinucleated giant cell/ tumour



Q/ Identify the type of giant cell?



Composition of Granuloma

A granuloma has the following structural composition:

- 1. Necrosis.** Necrosis may be a feature of some granulomatous conditions e.g. central caseation necrosis of tuberculosis
- 2. Epithelioid** cells which are modified macrophages
- 3. Multinucleate giant cells.** Multinucleate giant cells are formed by fusion of adjacent epithelioid cells and may have 20 or more nuclei. These nuclei may be arranged at the periphery like horseshoe or ring, or are clustered at the two poles (Langhans' giant cells), or they may be present centrally (foreign body giant cells). The former are commonly seen in tuberculosis while the latter are common in foreign body tissue reactions.
- 4. Lymphocytes**
- 5. Fibrosis.** Fibrosis is a feature of healing by proliferating fibroblasts at the periphery of granuloma.

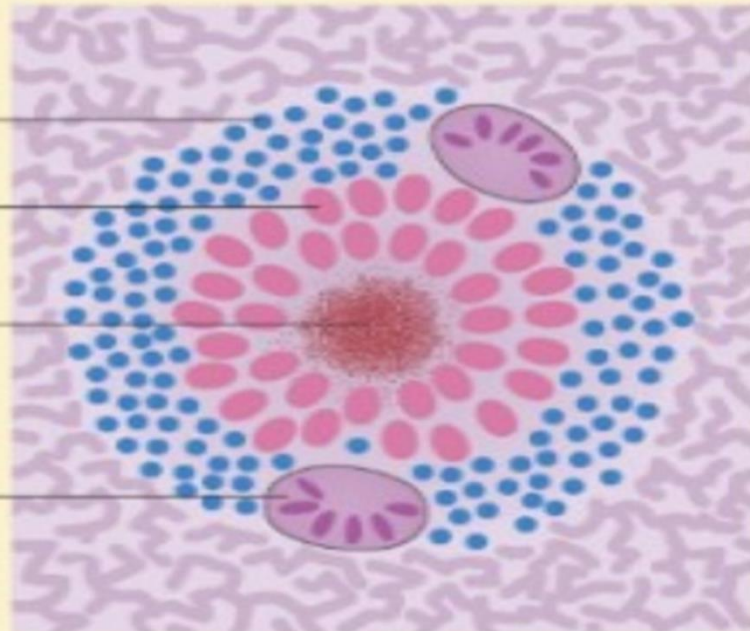
A Tuberculous granuloma

Lymphocyte

Epithelioid
cell

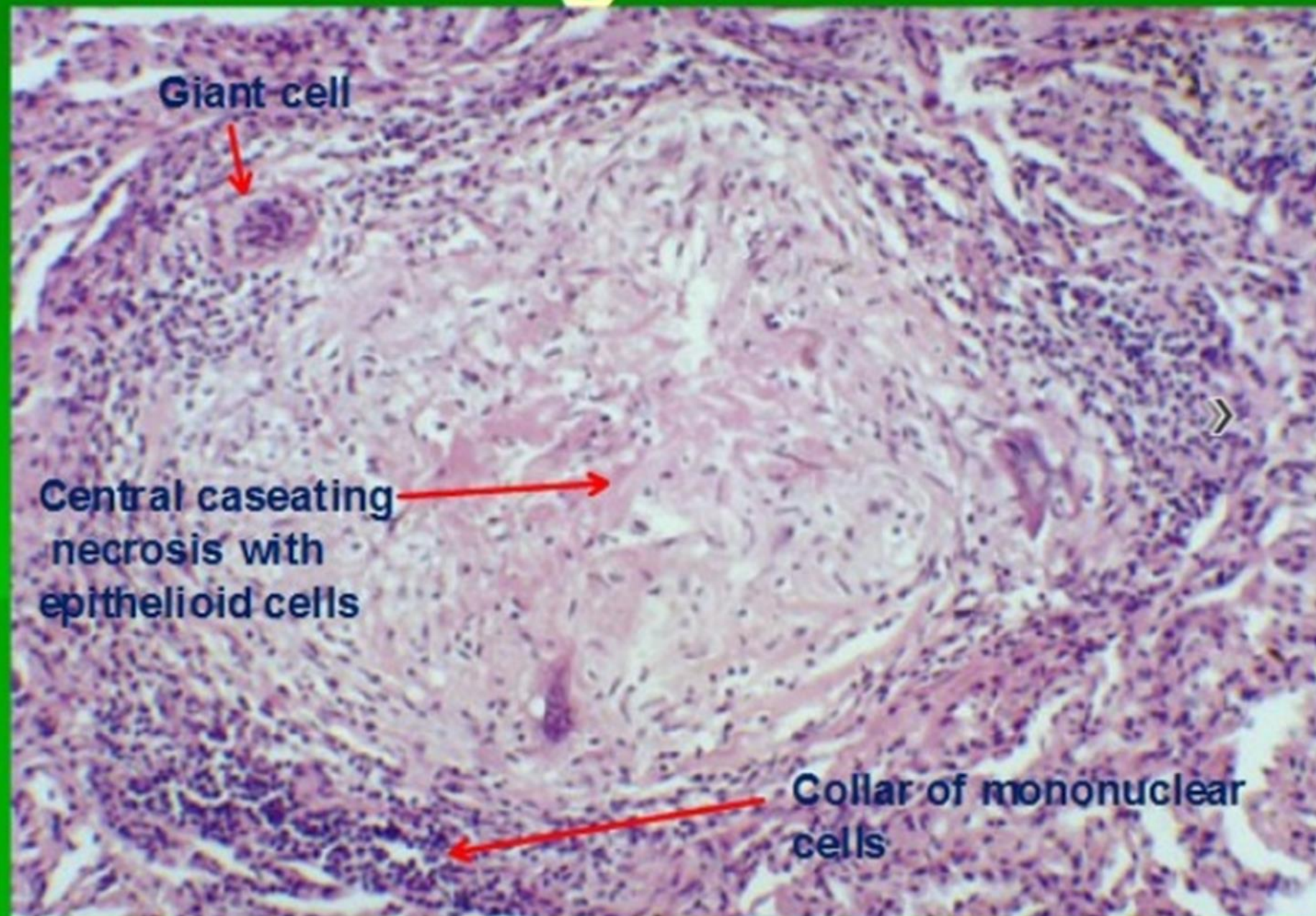
Necrosis

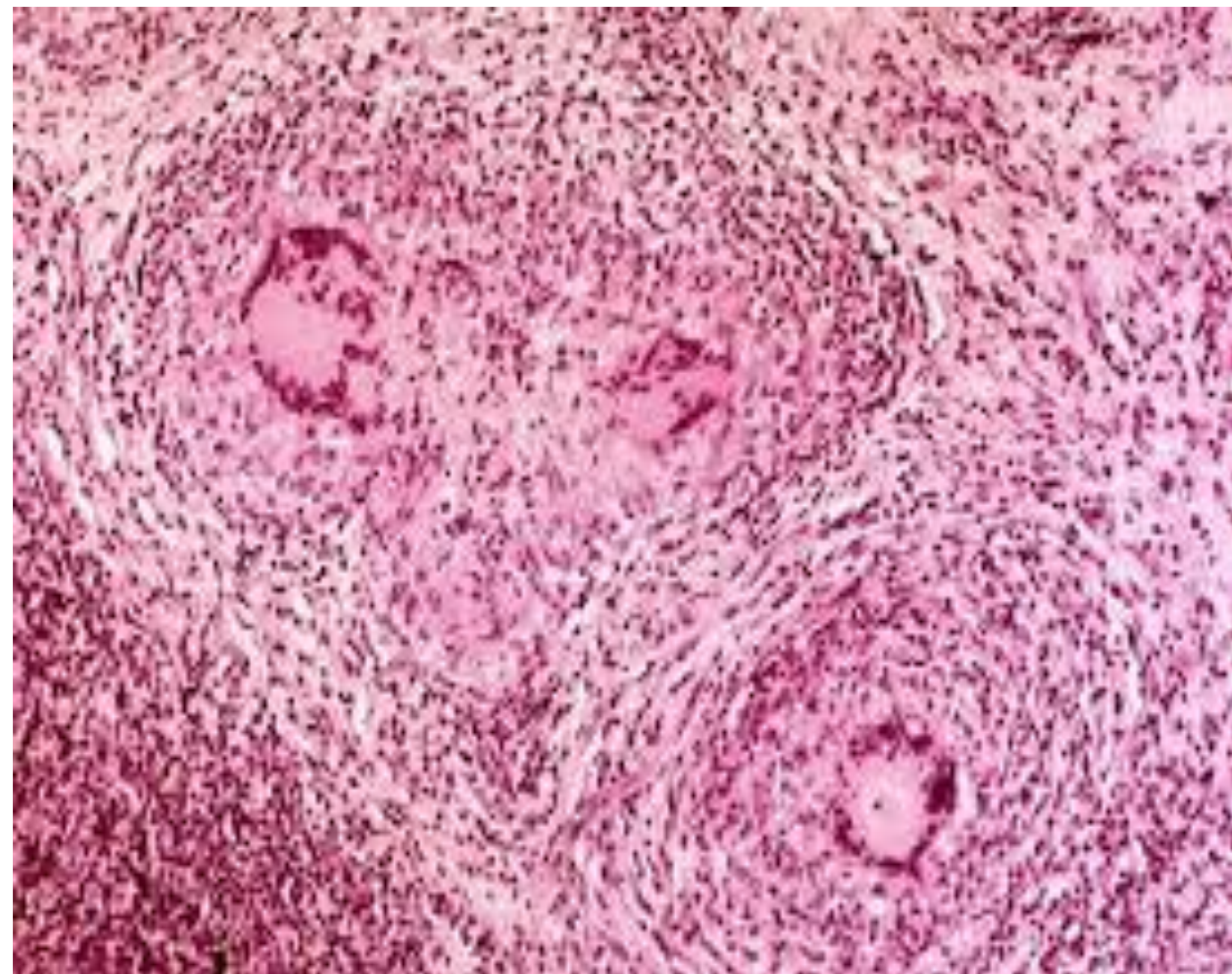
Multinucleated
giant cell

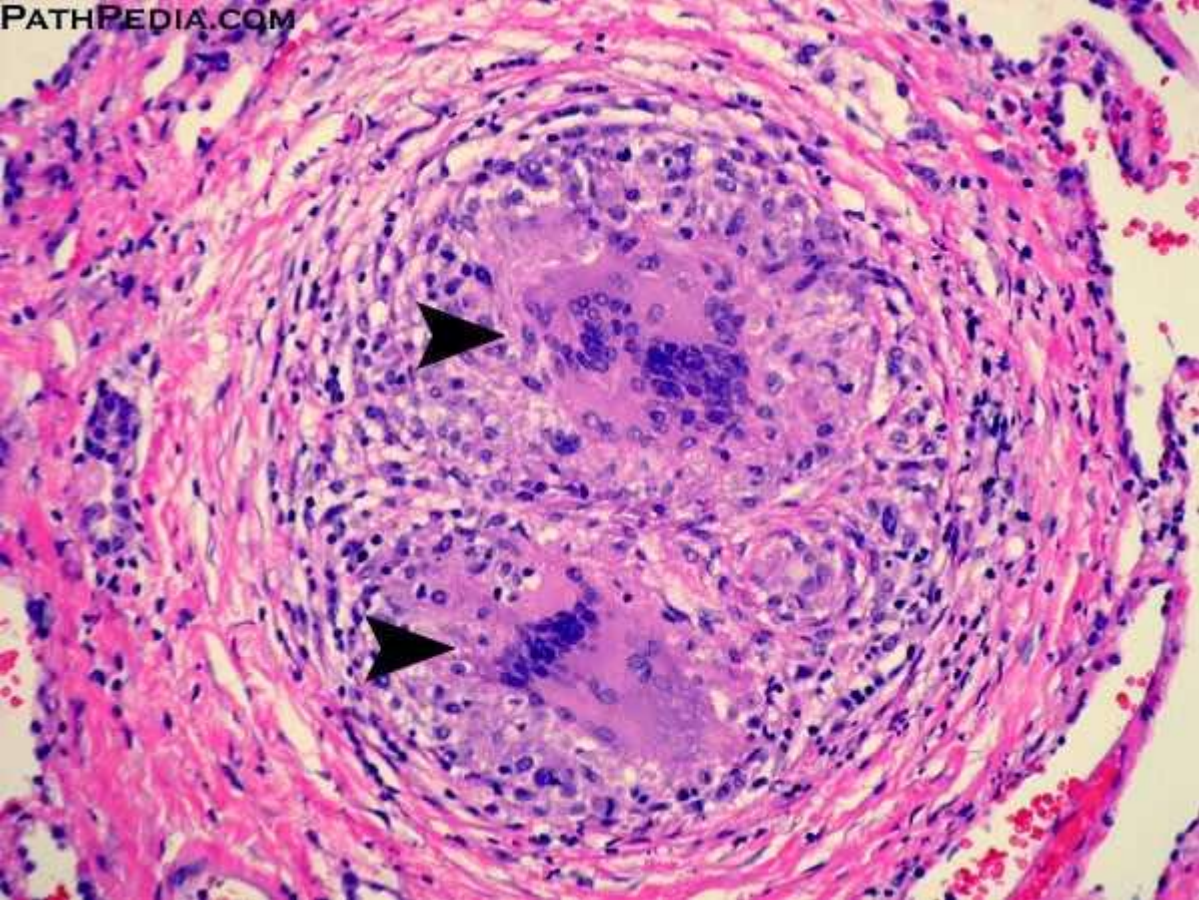


- **The classical example of granulomatous inflammation is the tissue response to tubercle bacilli which is called tubercle seen in tuberculosis. A fully-developed granuloma is about 1 mm in diameter with central area of caseous necrosis, surrounded by epithelioid cells and one to several multinucleated giant cells (commonly Langhans type), surrounded at the periphery by lymphocytes and bounded by fibroblasts and fibrous tissue**

Tubercular granuloma







Thank
you!

