








INFLAMMATION

What is 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 cannot always be considered:

- **Lung tissue**  **pneumonia**
- **Breast**  **mastitis**
- **Joint**  **arthritis**

It consists principally of:

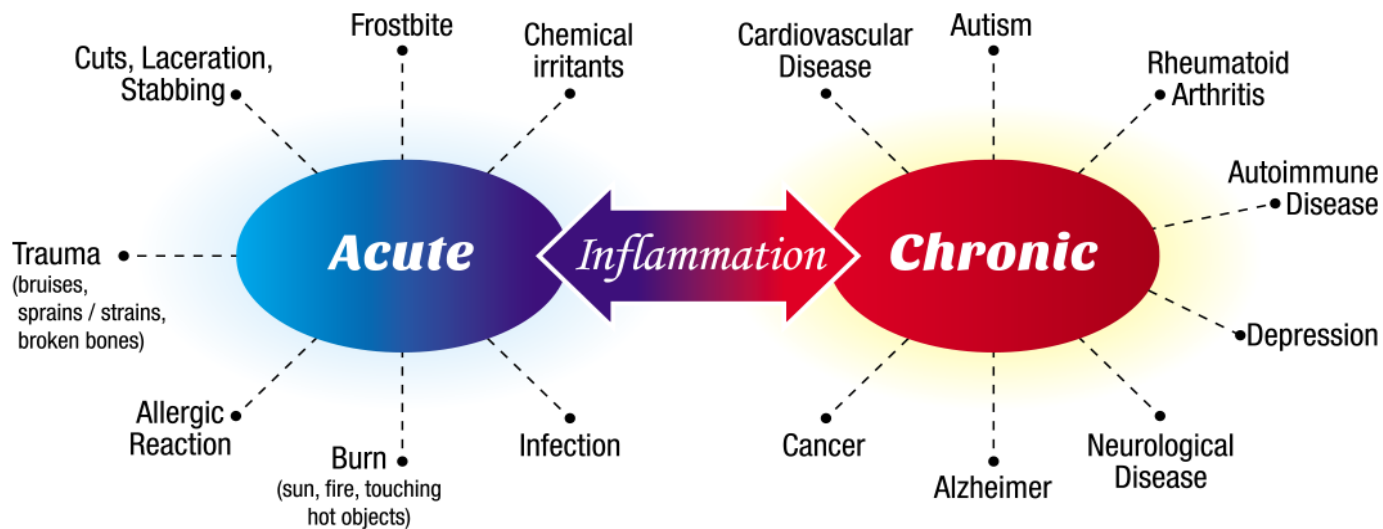
- **Vascular changes**
- **Leukocyte infiltration**
- **Systemic reaction.**

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)



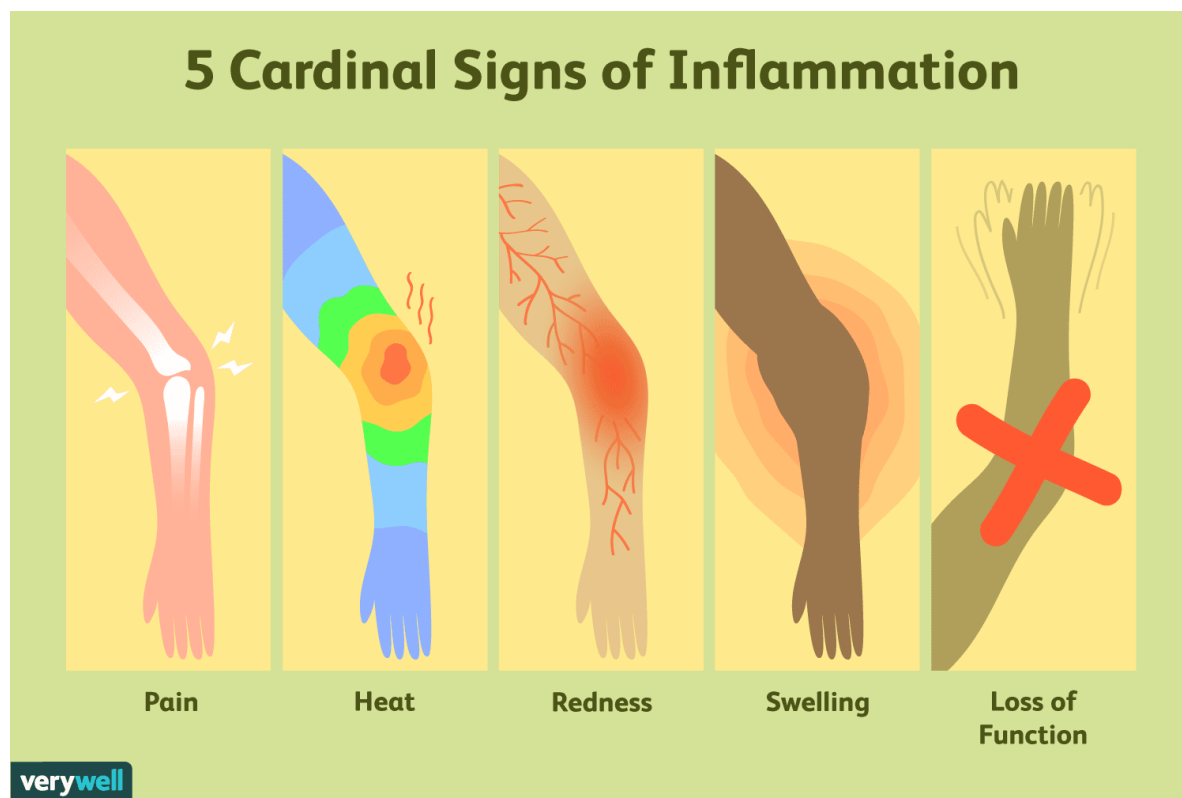
Acute inflammation

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

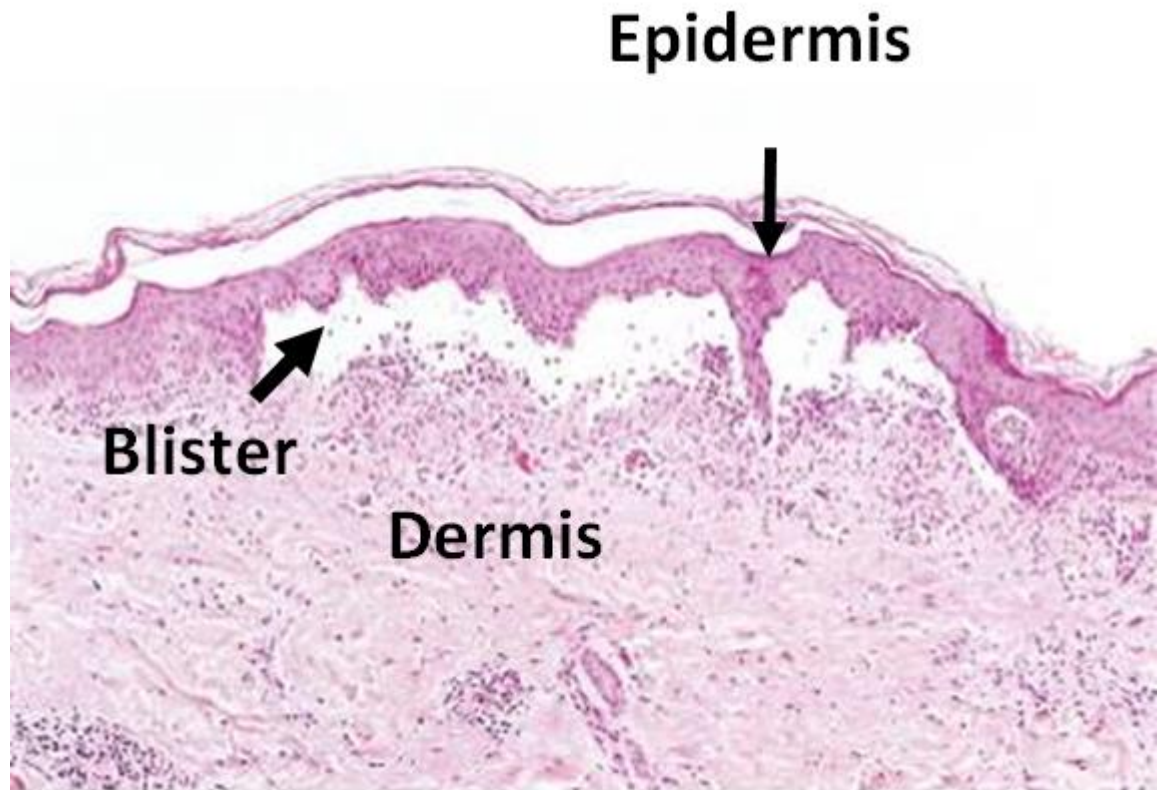
- Heat
- Redness
- Swelling
- Pain
- Loss of function



Morphological types of acute inflammation

1- Serous type:

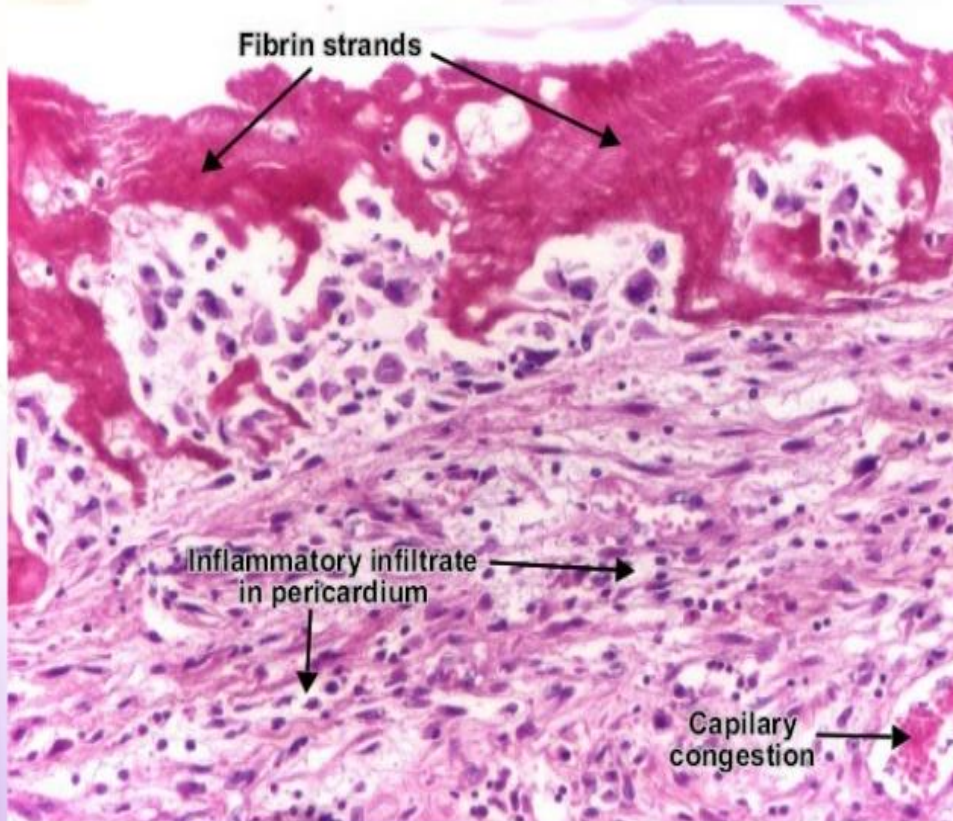
The fluid exudate resembles serum or is watery ex.
Skin blisters from burns or viral infection



2- Fibrinous type:

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

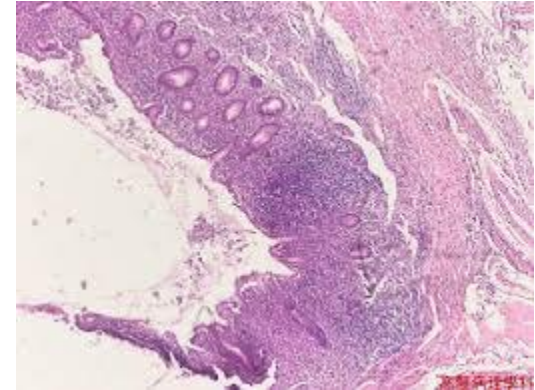
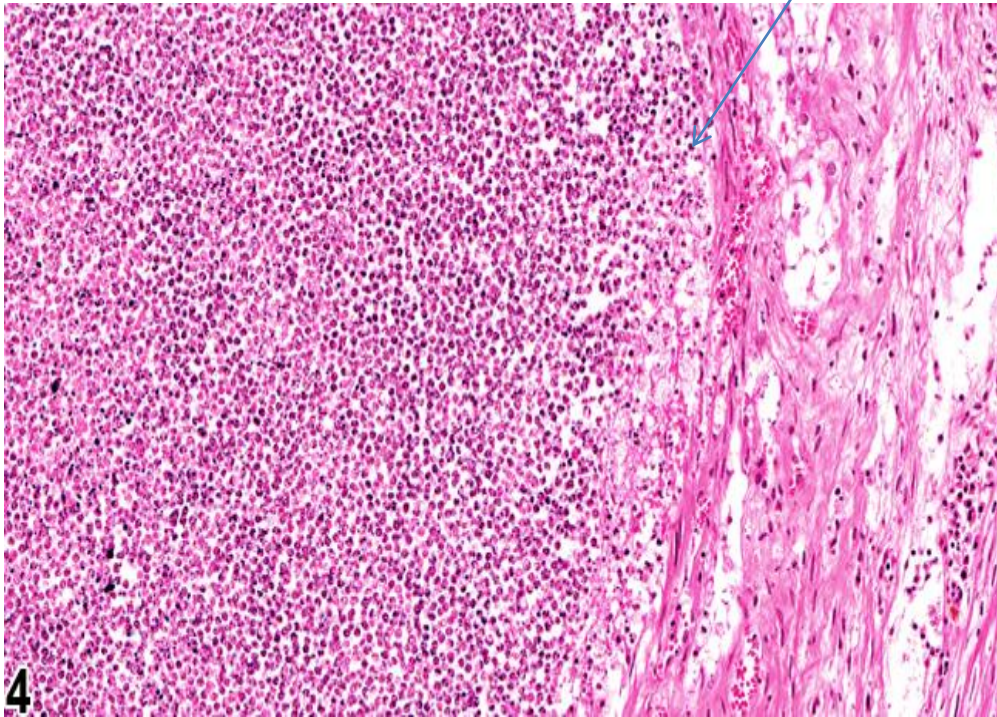
Fibrinous pericarditis – Acute Inflammation



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

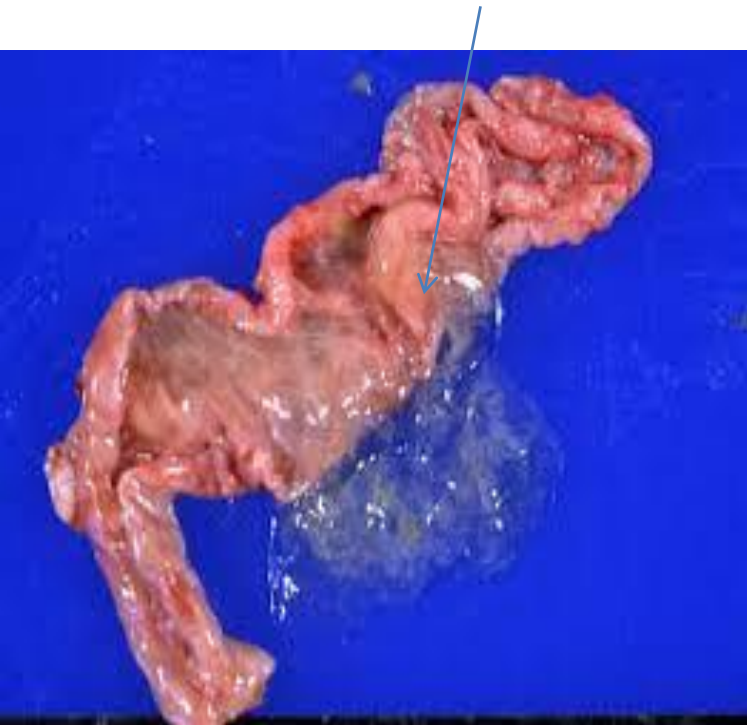
Abscess



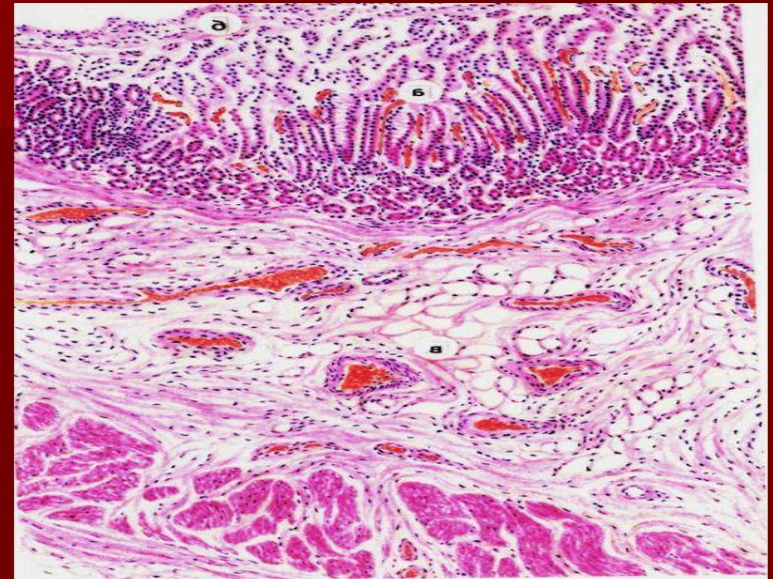
4- Acute catarrhal type:

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

mucin



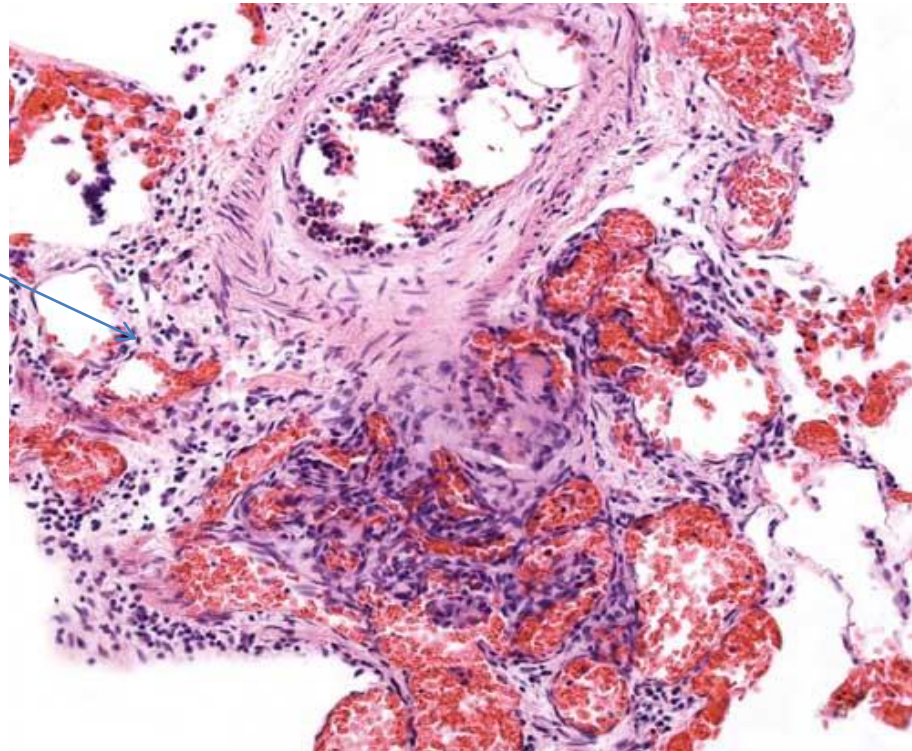
Acute
catarrhal
gastritis



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

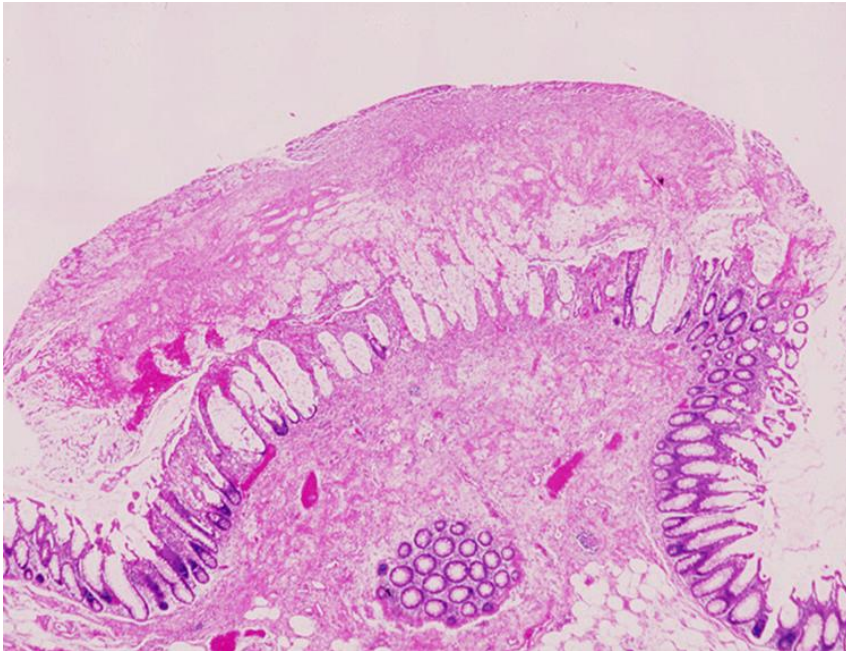


6- Pseudomembranous type:

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

Corynebacterium diphtheriae produce pseudomembrane in the pharynx and trachea

Pseudomembranous colitis

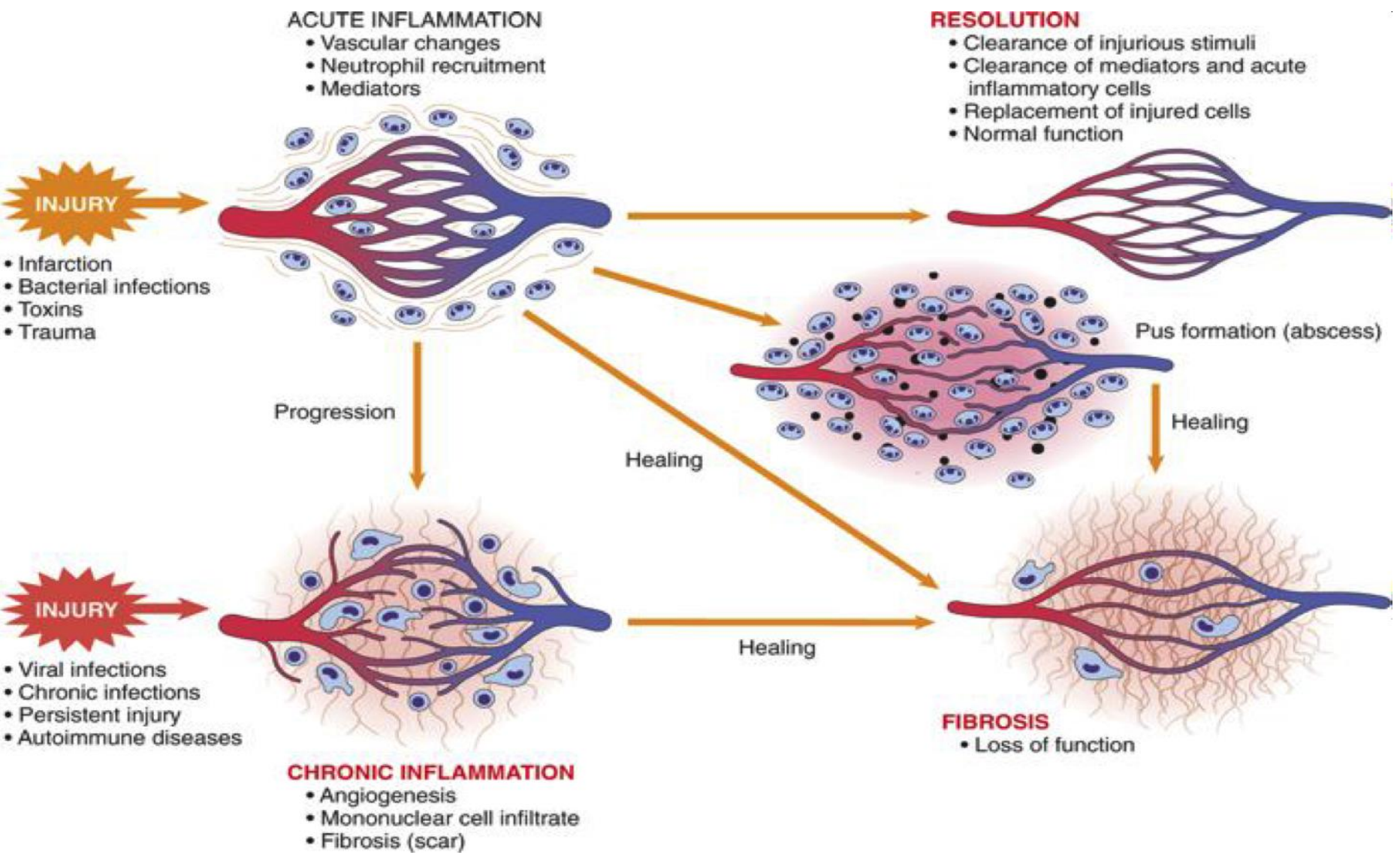


Diphtheria

Pseudomembranous Diphtheria



Out come of acute inflammation



**CHRONIC
INFLAMMATION**

The diagram features a central orange starburst shape with a white outline. Inside the starburst, the words 'CHRONIC' and 'INFLAMMATION' are stacked vertically 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, connected by white lines that form a larger circle.

CANCER

DIABETES

CARDIOVASCULAR

PANCREATITIS

IBD

**AUTOIMMUNE
DISEASES**

**RENAL
DISEASE**

ARTHRITIS

What is chronic inflammation?

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

It 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:

- **Infection:** Tuberculosis. TB. Leprosy, Syphilis
- **Foreign body :** surgical sutures
- **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

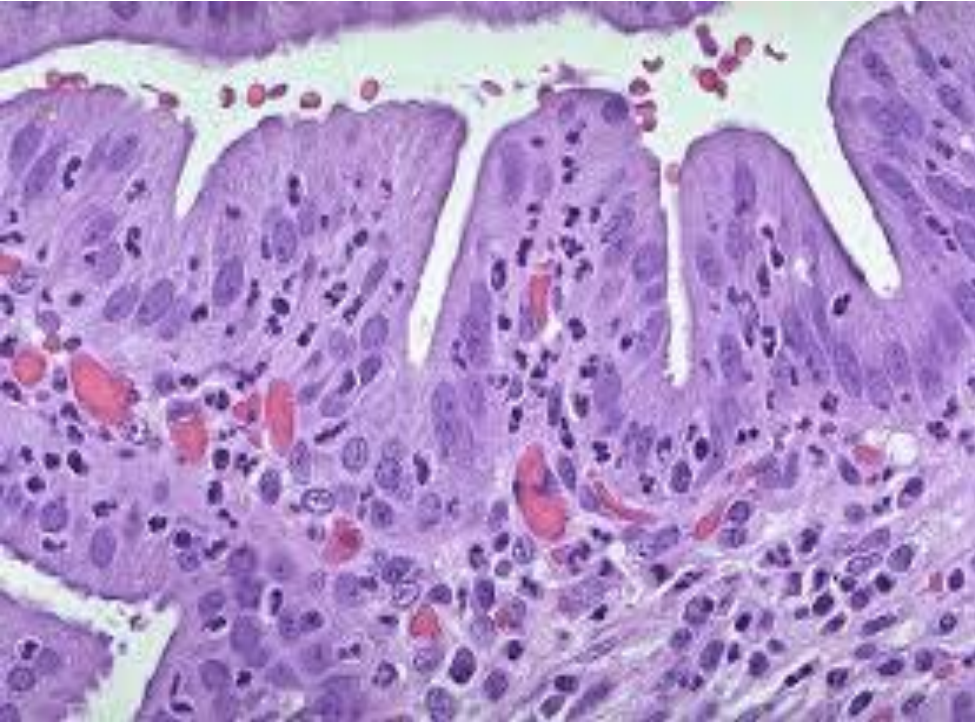
Chronic inflammation is subdivided into 2 types:

- 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)

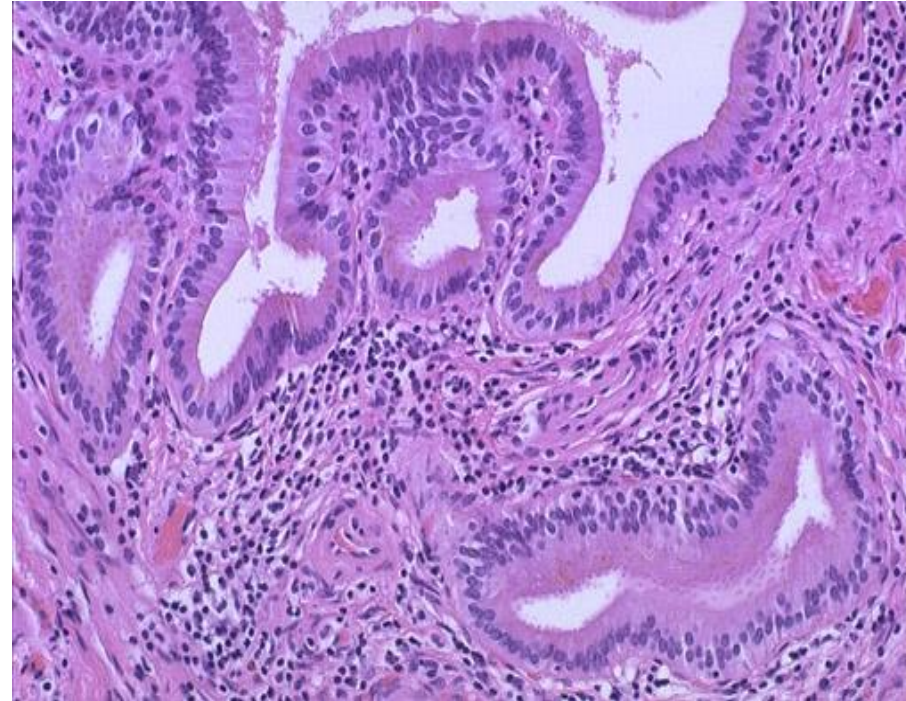
Acute

Neutrophils infiltrating mucosa
and submucosa

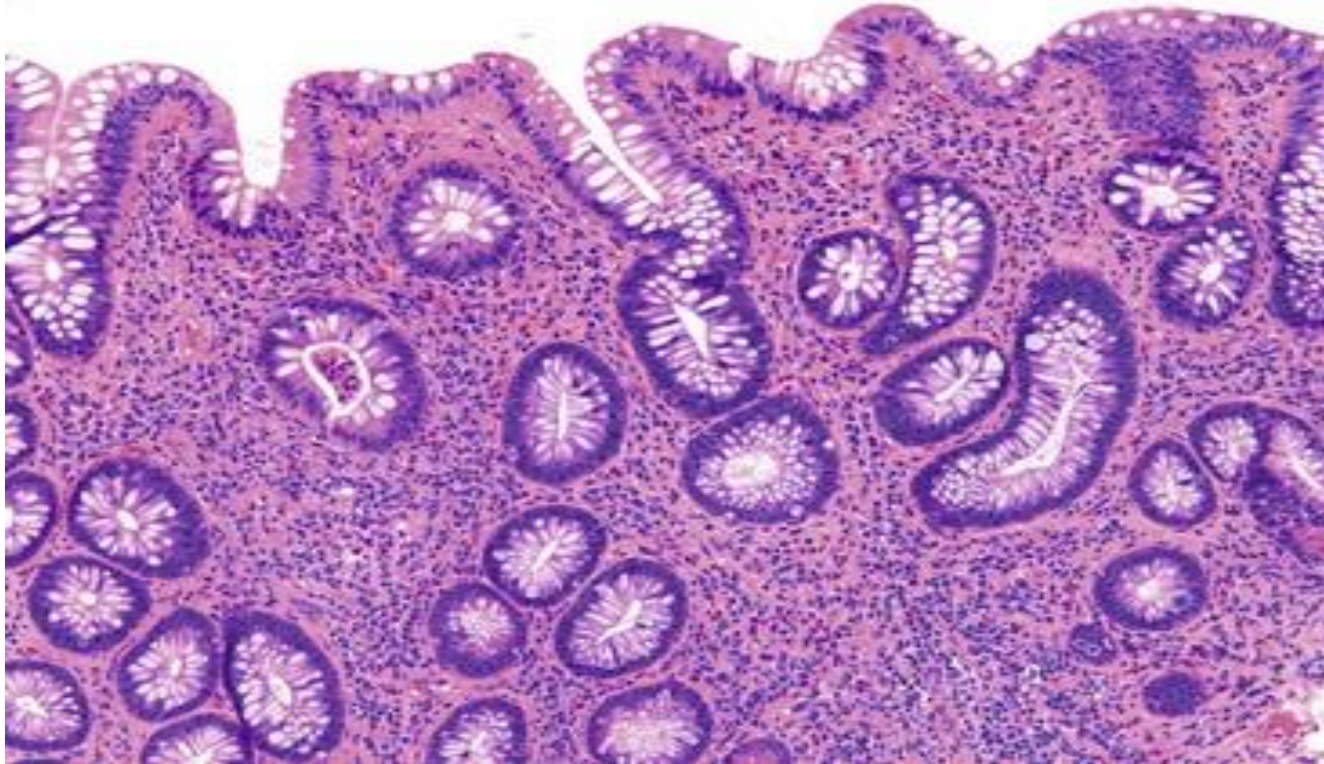


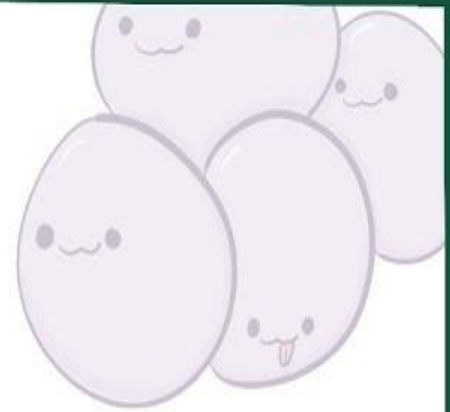
Chronic

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

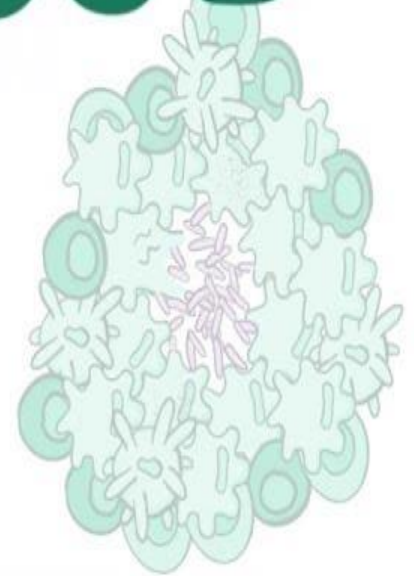
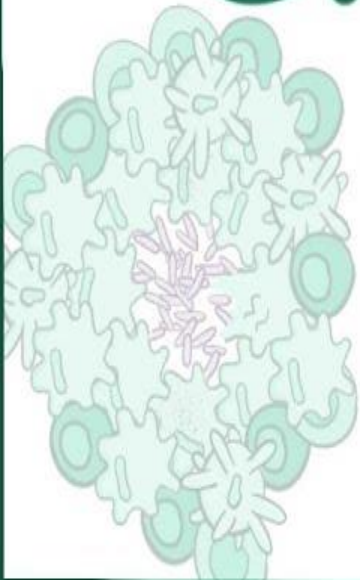


Chronic non specific inflammatory bowel disease

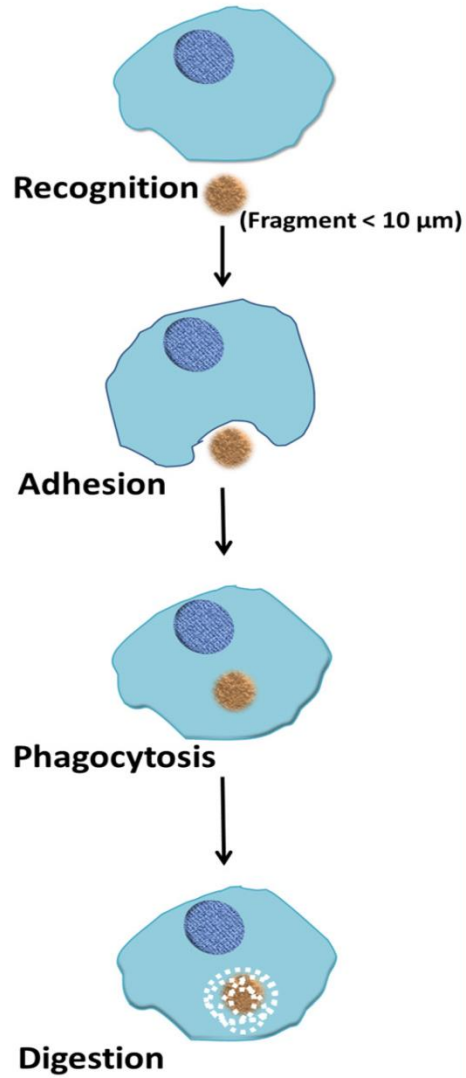




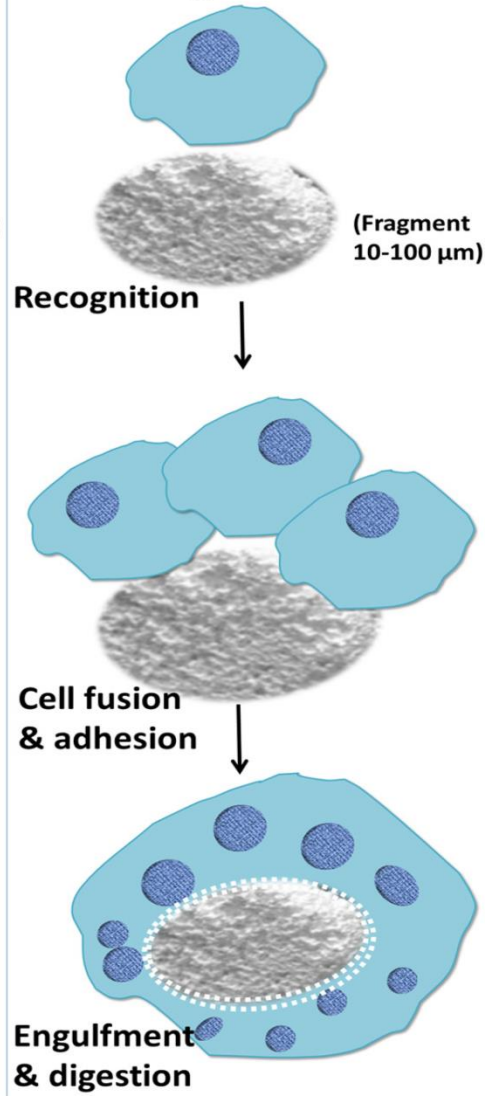
CHRONIC GRANULOMATOUS DISEASE



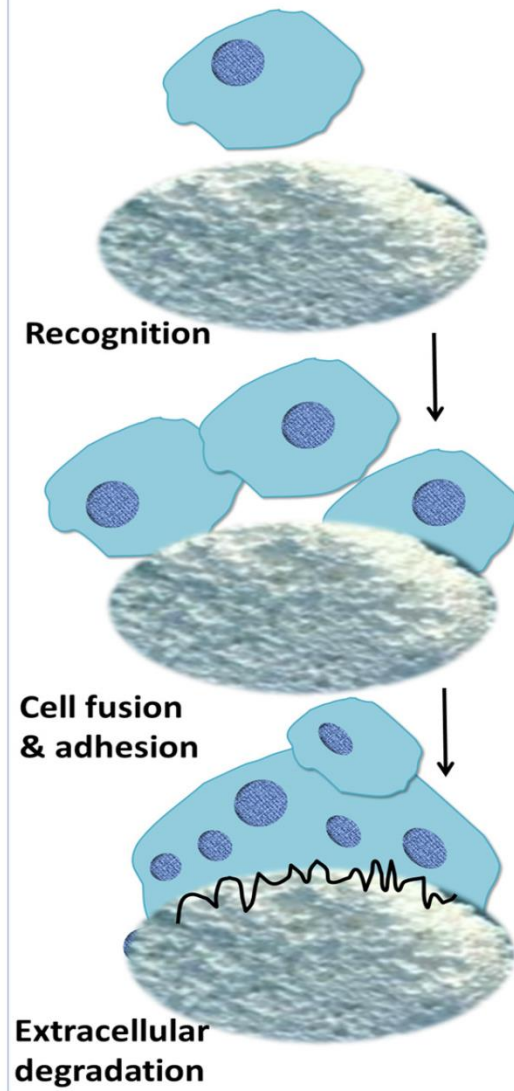
Macrophage Mediated Phagocytosis



Giant Cell Mediated Engulfment



Extracellular Degradation

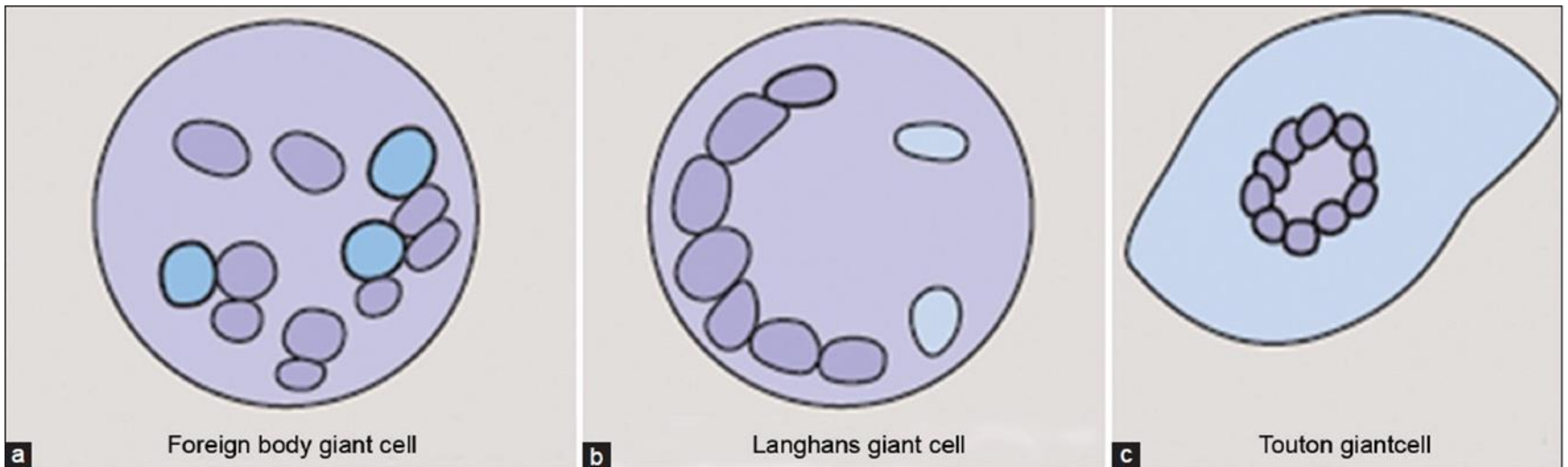


Types of multinucleated giant cells:

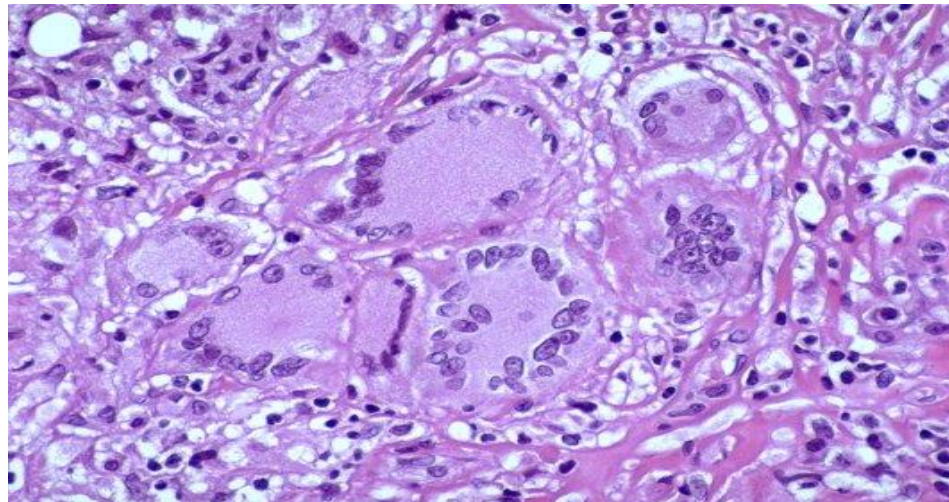
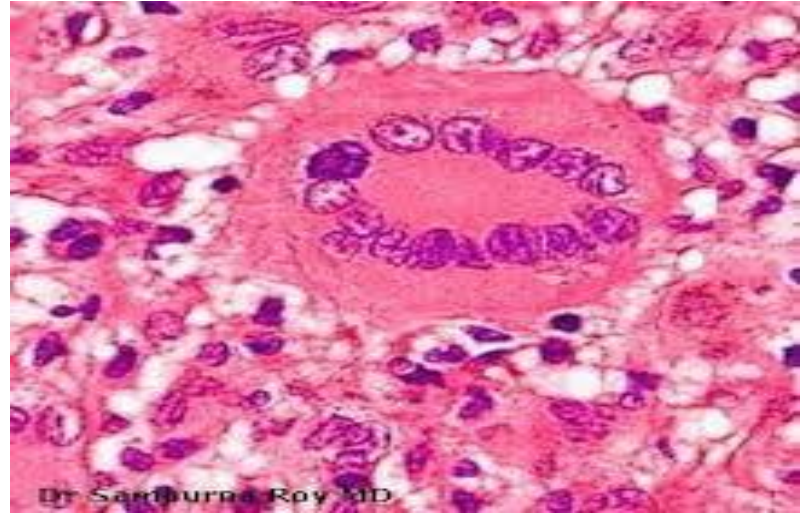
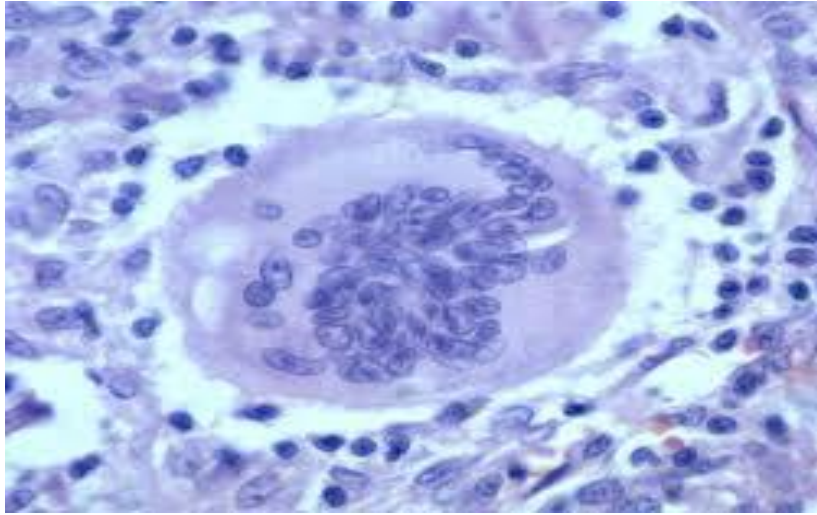
Foreign body multinucleated giant cell/ foreign body

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:** caseation center
- 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.
- 4. Lymphocytes**
- 5. Fibrosis.** Fibrosis is a feature of healing by proliferating fibroblasts at the periphery of granuloma.

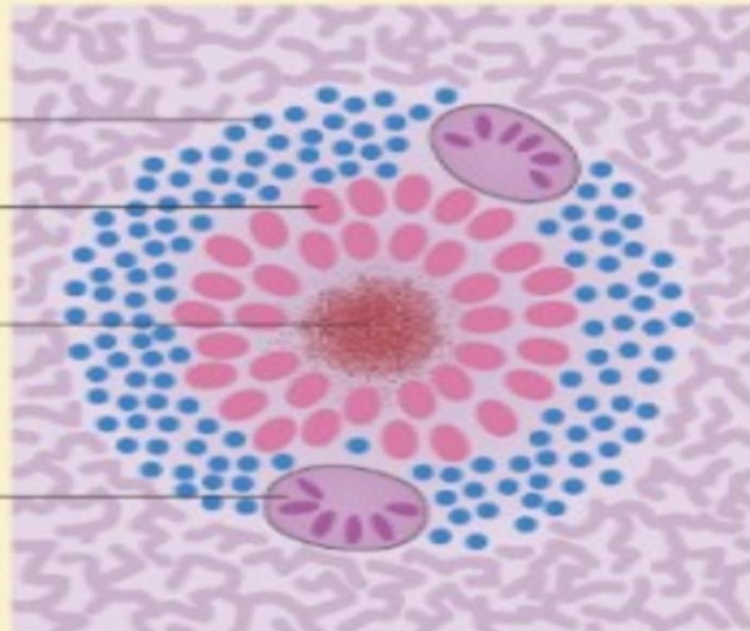
A Tuberculous granuloma

Lymphocyte

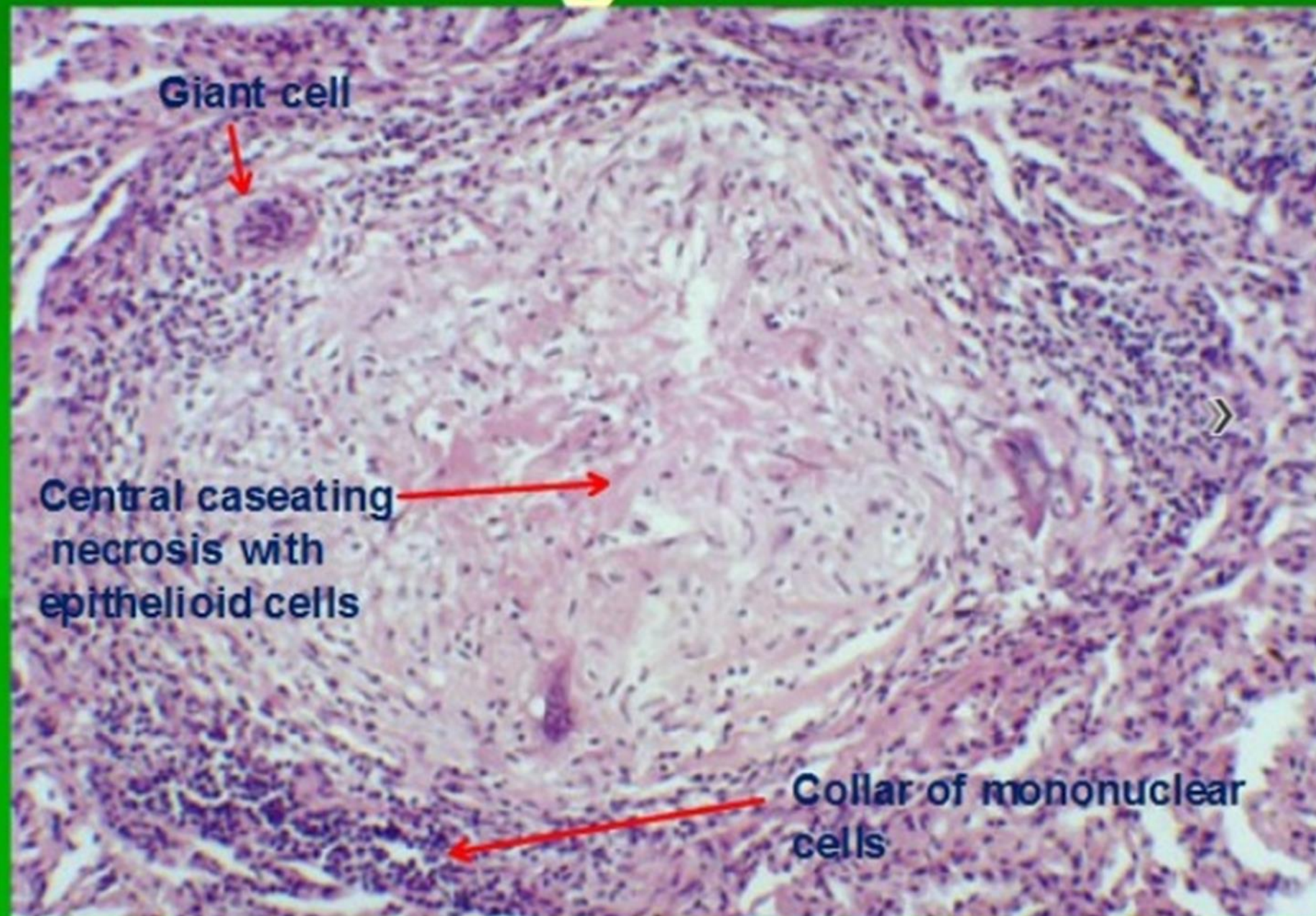
Epithelioid
cell

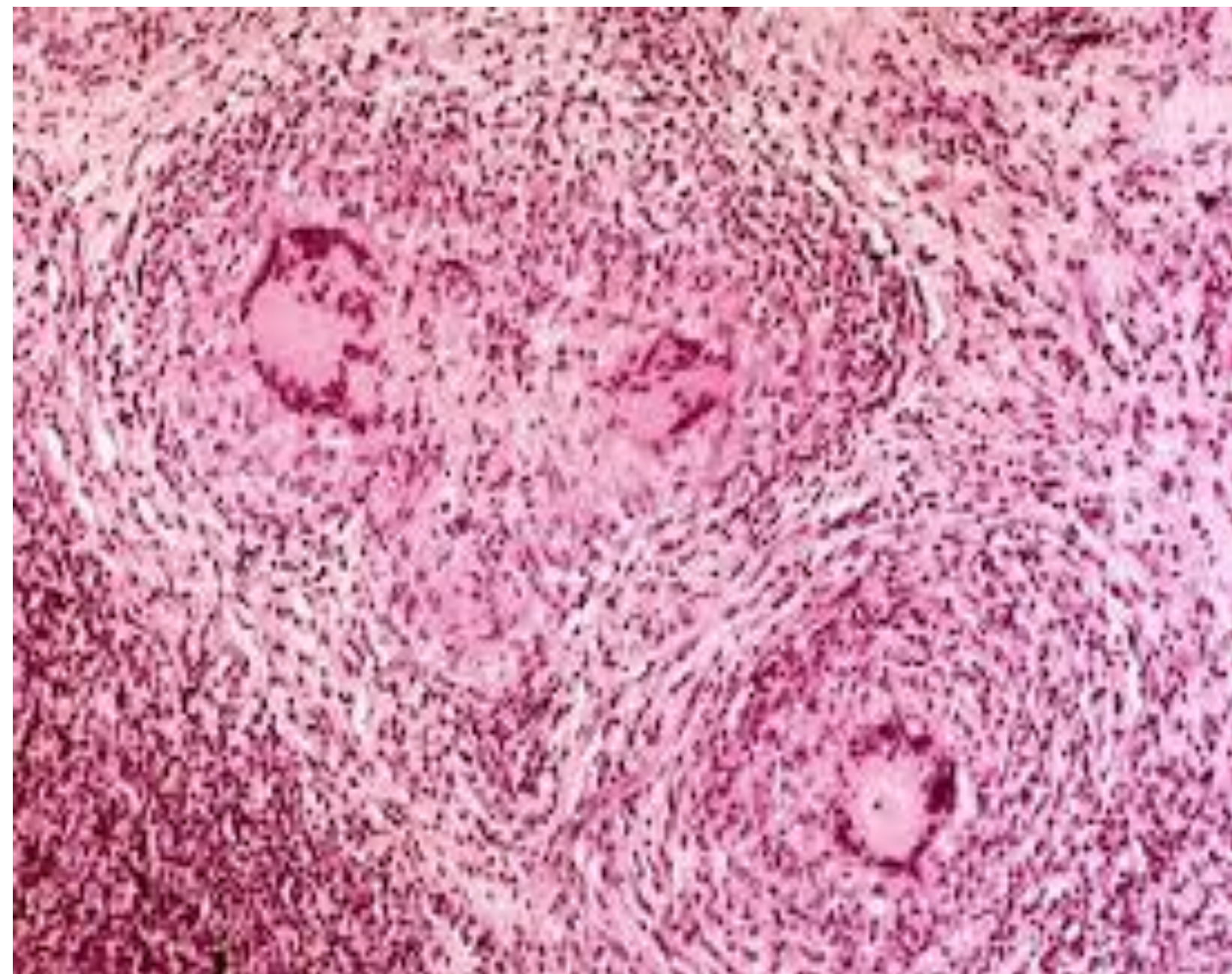
Necrosis

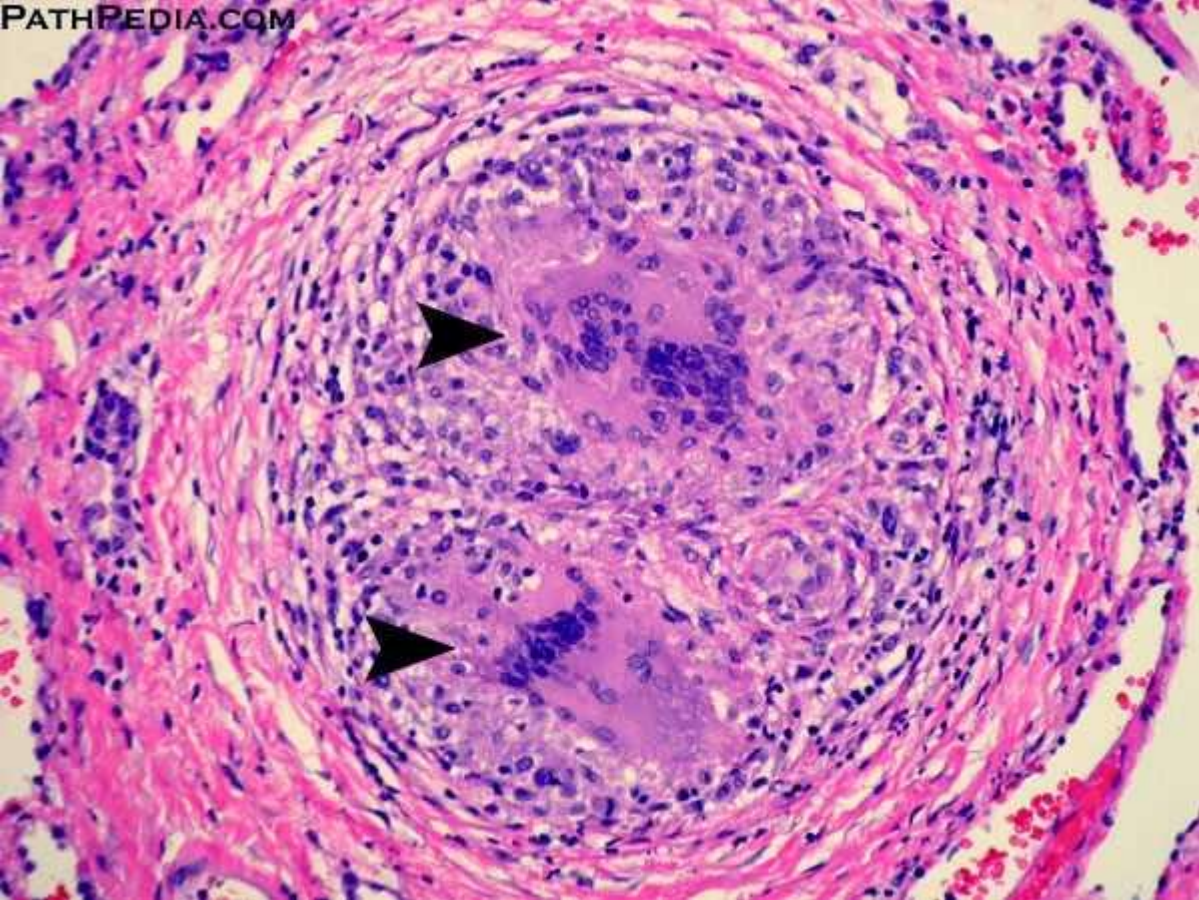
Multinucleated
giant cell



Tubercular granuloma







Thank
you!

