Assistant Lecturer
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INFLAMMATION

WHAT IS INFLAMMATION?

- **Inflammation:** is part of the process by which the immune system defends the body from harmful agents, such as bacteria and viruses.

The function of inflammation is to eliminate the initial cause of cell injury, clear out necrotic cells and tissues damaged from the original insult and the inflammatory process, and initiate tissue repair.

- **Terms ending in the suffix "-itis" denote inflammation**

EXAMPLES

*Appendix	appendicitis
* Larynx	laryngitis
*Bronchi	bronchitis
*Gastric mucosa	gastritis
*Hair follicle	folliculitis
*Lung tissue	pneumonia
*Joint	arthritis

But it cannot always be considered:

INFLAMMATION CONSISTS OF :

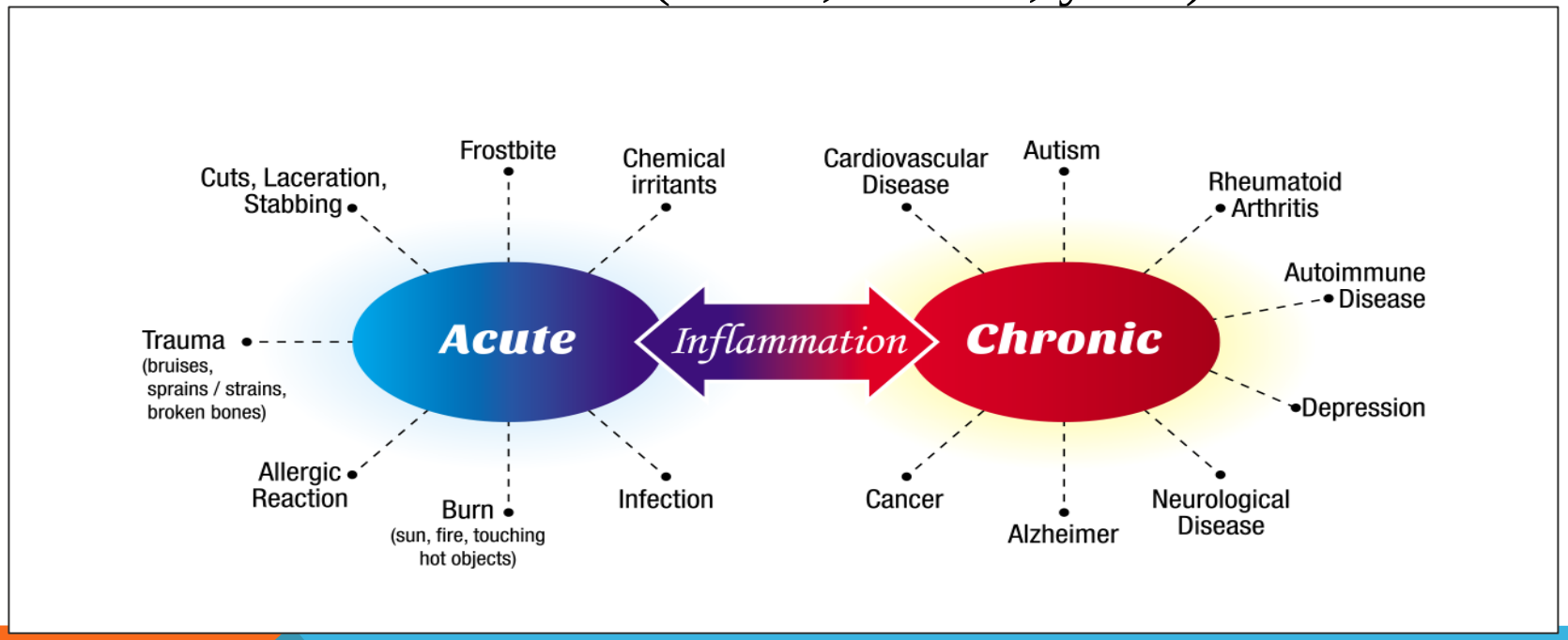
- Vascular changes :changes in blood flow, an increase in permeability of blood vessels.
- Leukocyte infiltration :the migration of fluid, proteins, and white blood cells (leukocytes) from the circulation to the site of tissue damage.
- Systemic reaction. An inflammatory response

CAUSES OF INFLAMMATION

1) Infection: Bacterial ,Viral, Parasitic and microbial toxins
2) Immunological: hypersensitivity 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

I. Lasts only for short period.

II. Characterized by the exudation of fluid and plasma proteins

III. Emigration of leukocytes predominantly neutrophiles.

THE FIVE CARDINAL SIGNS OF ACUTE INFLAMMATION

- Redness :caused by the dilation of small blood vessels
- heat: results from increased blood flow through the area and is experienced only in peripheral parts of the body
- swelling :caused primarily by the accumulation of fluid outside the blood vessels.
- Pain: results in part from the distortion of tissues caused by edema, and it also is induced by certain chemical mediators of inflammation, such as bradykinin& serotonin.
- Loss of function :result from pain that inhibits mobility or from severe swelling that prevents movement in the area.

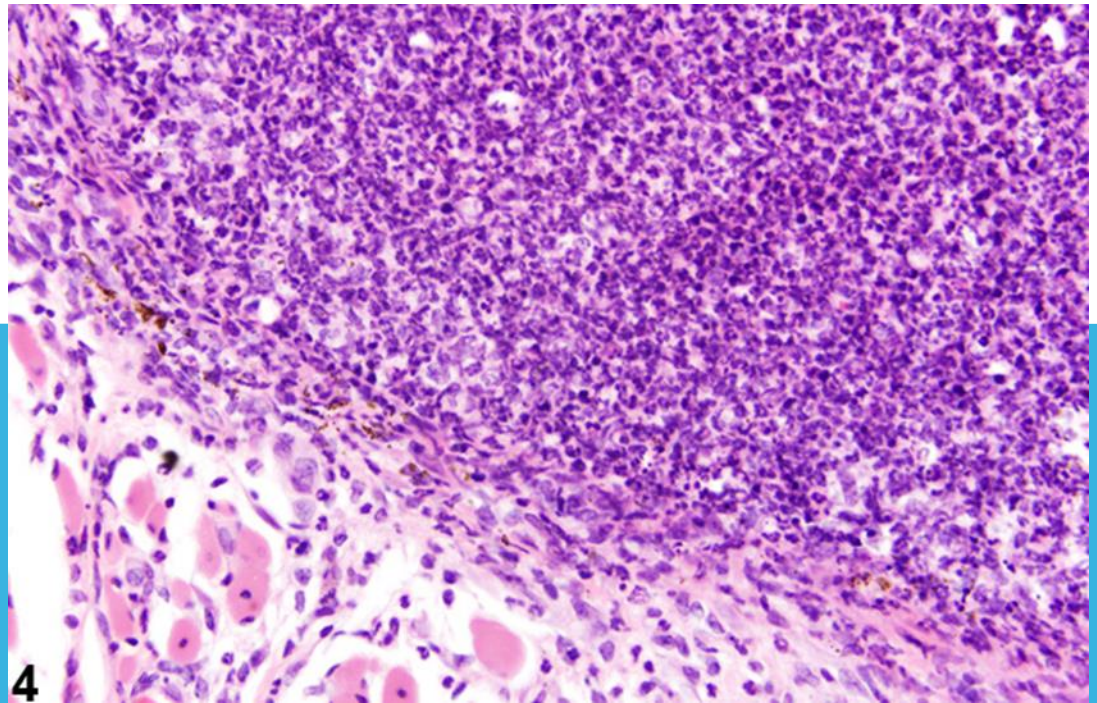

5 cardinal signs of inflamation
Pain
Heat
Redness
Swelling
Loss of Function

MORPHOLOGICAL TYPES OF ACUTE INFLAMMATION

1- Serous type: The fluid exudate resumble serum(serous) or is watery ex. Skin blisters from burns or viral infection

HISTOLOGICAL EXAM

Acute inflammation in the skin is characterized by infiltration of neutrophils, which may be accompanied by eosinophils and macrophages as well as occasional lymphocytes, and plasma cells. Suppurative inflammation is characterized by discrete pockets of degenerate neutrophils and cellular debris

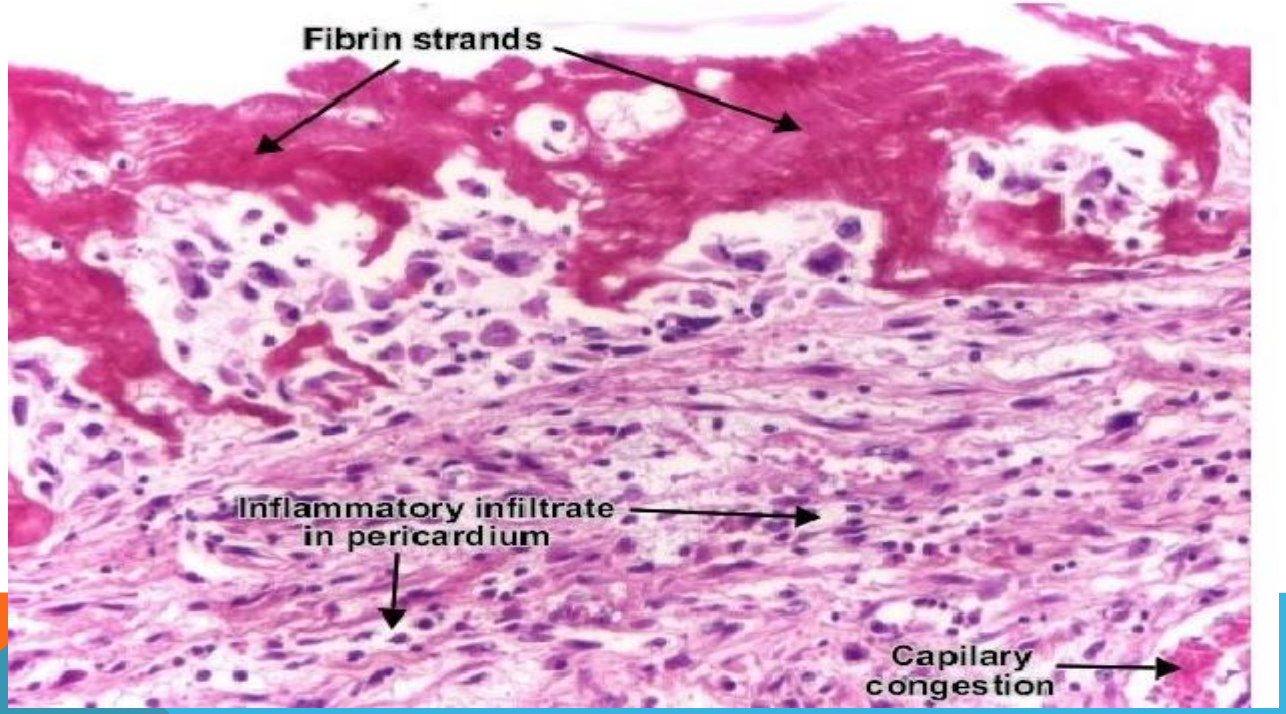


2. FIBRINOUS INFLAMMATION

In severe injuries resulting in great vascular permeability, larger molecules such as fibrinogen (fibrous) pass the vascular barrier, and fibrin is formed and depositedin the lining of body cavities, such as the meninges (fibrinous meningitis), pericardium (fibrinous pericarditis)

HISTOLOGICALLY

fibrin appears as an eosinophilic meshwork of threads or sometimes as an amorphous coagulum

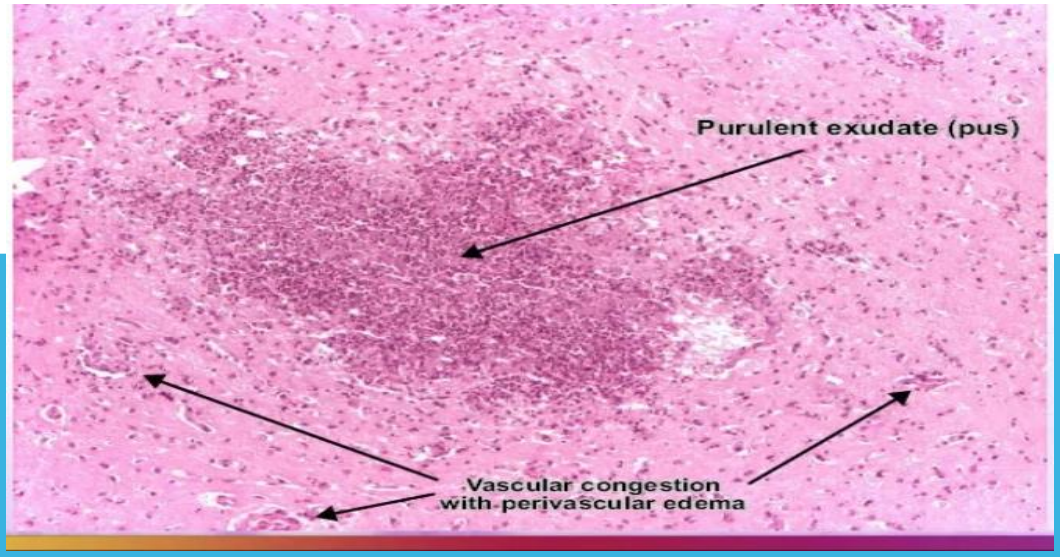


3. . PURULENT INFLAMMATION(SUPPURATIVE)

Inflammation with exudate consisting primarily of died neutrophils and cellular debris

Pyogenic bacterial infection. It may lead to abscess formation

The predominant feature of the exudate is the formation of pus, a creamy liquid.

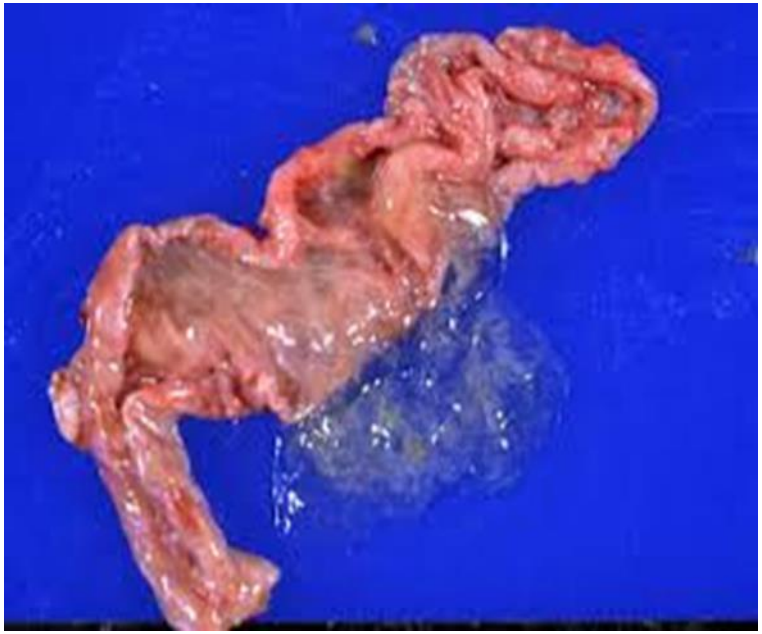


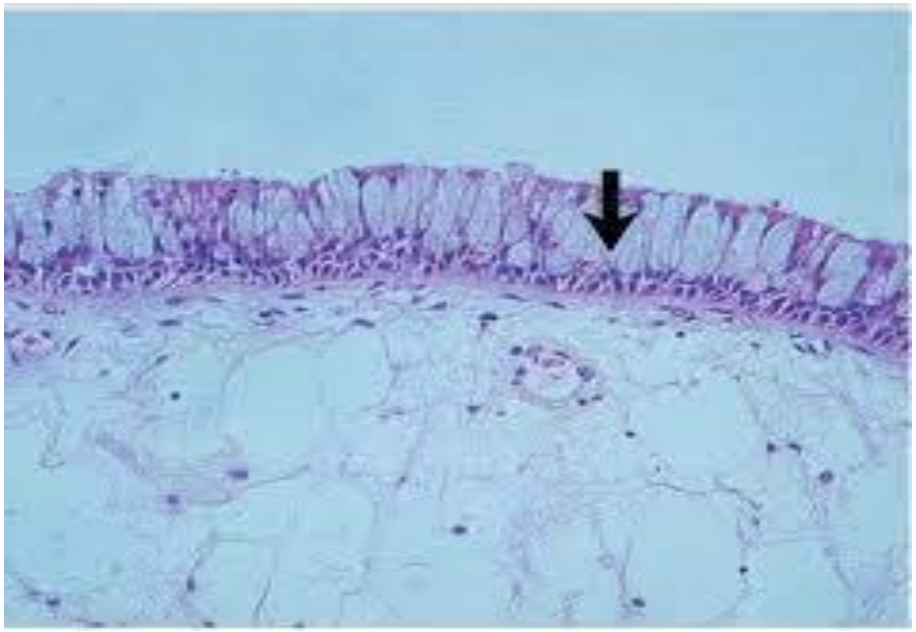
4. CATARRHAL INFLAMMATION

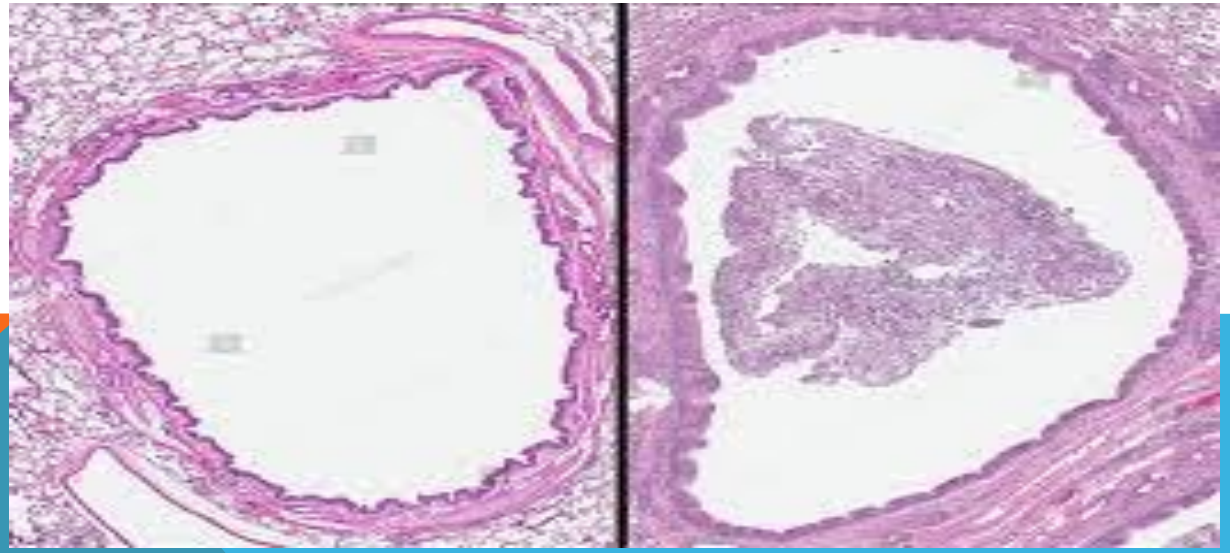
Exudative inflammation occurring on the mucous membranes of the respiratory and gastrointestinal tracts and producing a watery exudate of serum and mucus

Grossly the surface appears reddened and swollen and may be covered with or contain, a clear to slightly opaque, thick fluid

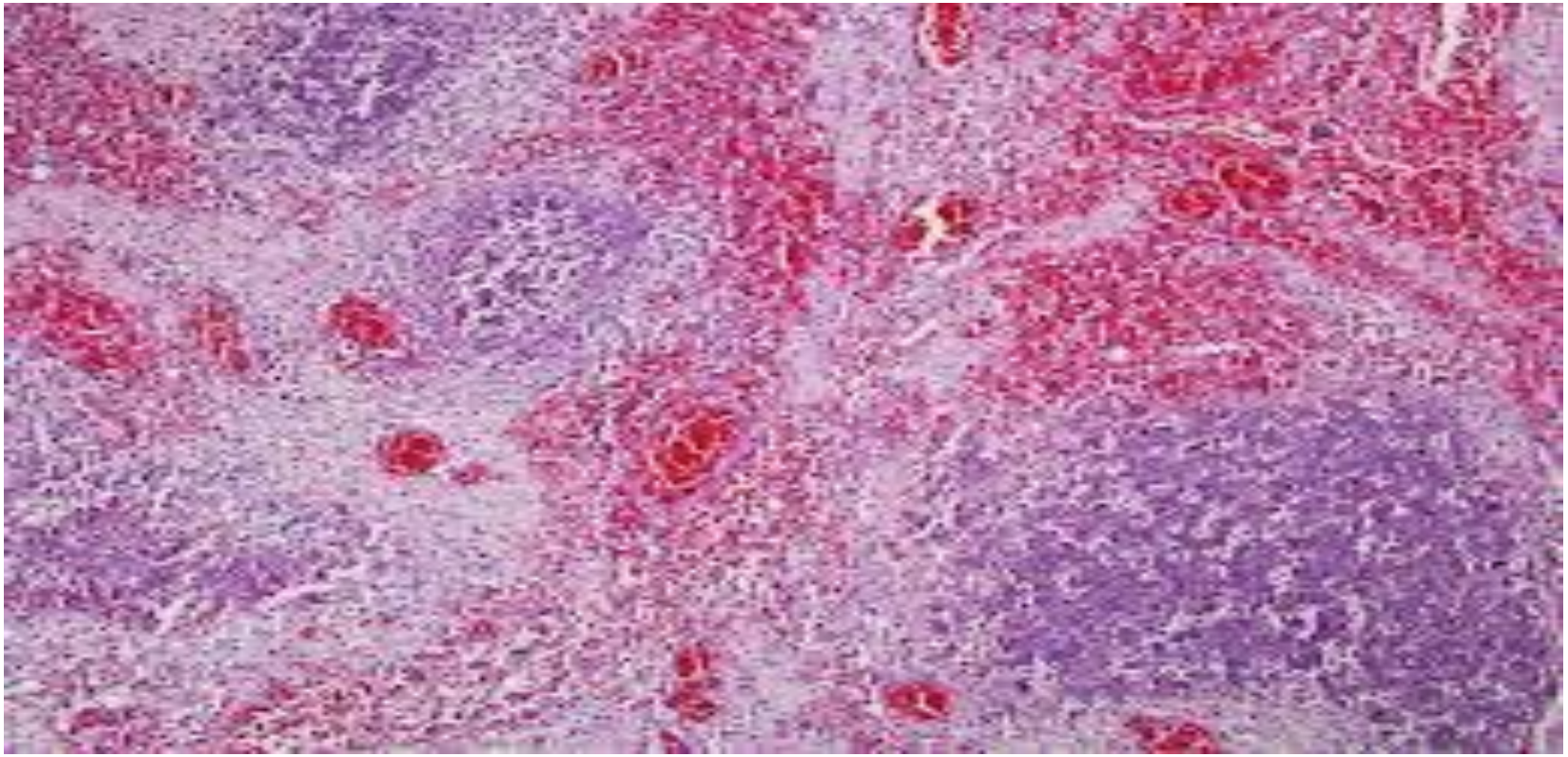
Microscopically, mucosa are swelling and sub mucosa hyperemic and edema and infiltration of lymphocytes



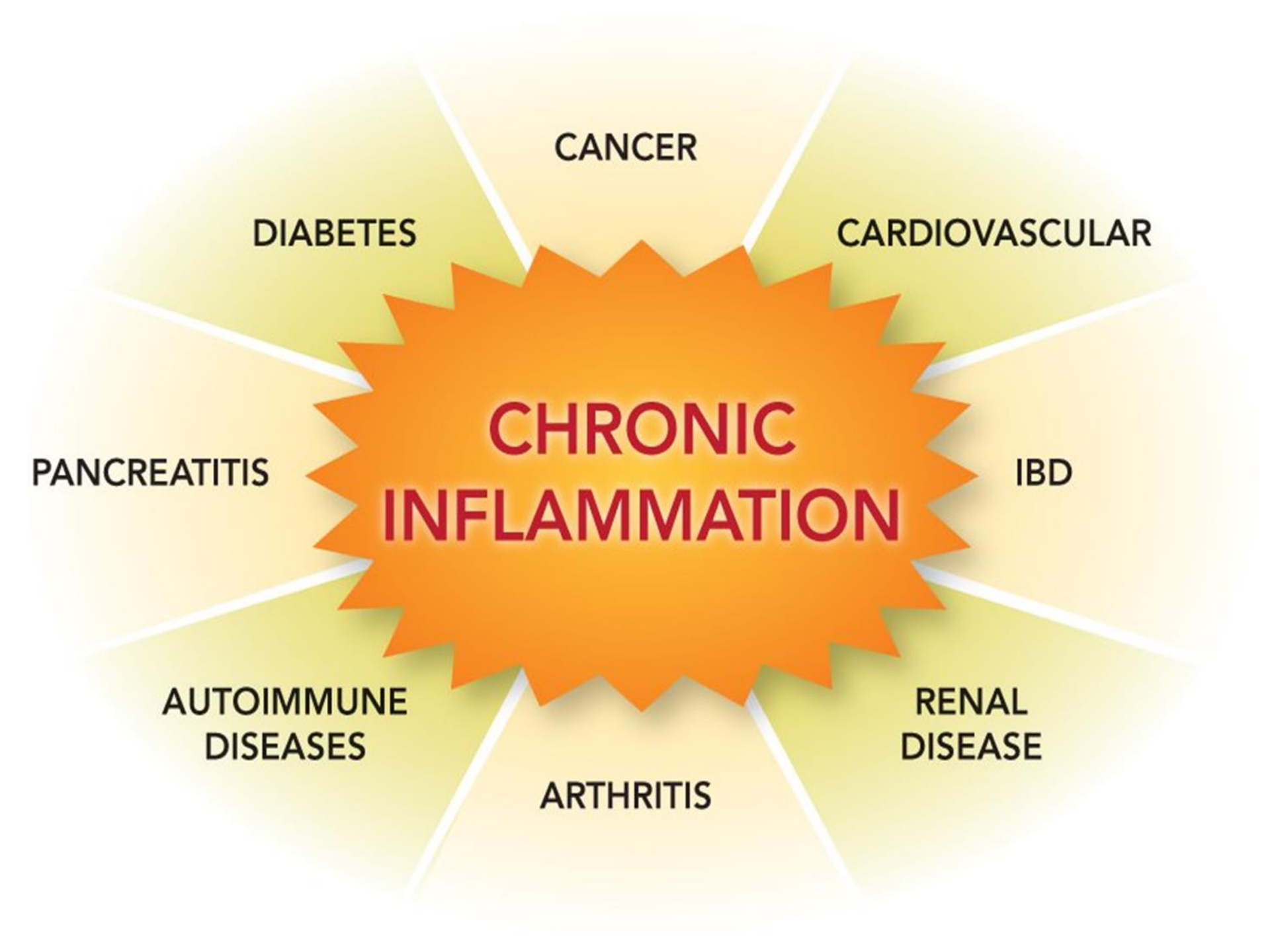




5. HAEMORRHAGIC INFLAMMATION



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


CANCER
DIABETES
CARDIOVASCULAR
CHRONIC INFLAMMATION
PANCREATITIS
IBD
AUTOIMMUNE DISEASES
RENAL DISEASE
ARTHRITIS

Inflammation of prolonged duration, usually weeks to months and even years. The response is characterized predominantly by lymphocytes and macrophages, tissue necrosis, and accompanied by tissue repair, such as healing, fibrosis, and granulation tissue formation, all of which may occur simultaneously

CAUSES OF CHRONIC INFLAMMATION

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., Syphilis
* Foreign body : surgical sutures
* Hypersensitivity reactions (HSR): Rheumatoid Arthritis (RA)

TYPES OF CHRONIC INFLAMMATION

1. Nonspecific proliferative: Characterized by the presence of non-specific granulation tissue formed by infiltration of mononuclear cells (lymphocytes, macrophages, plasma cells) and proliferation of fibroblasts, connective tissue, vessels, and epithelial cells, for example, an inflammatory polyp-like nasal and lung abscess.

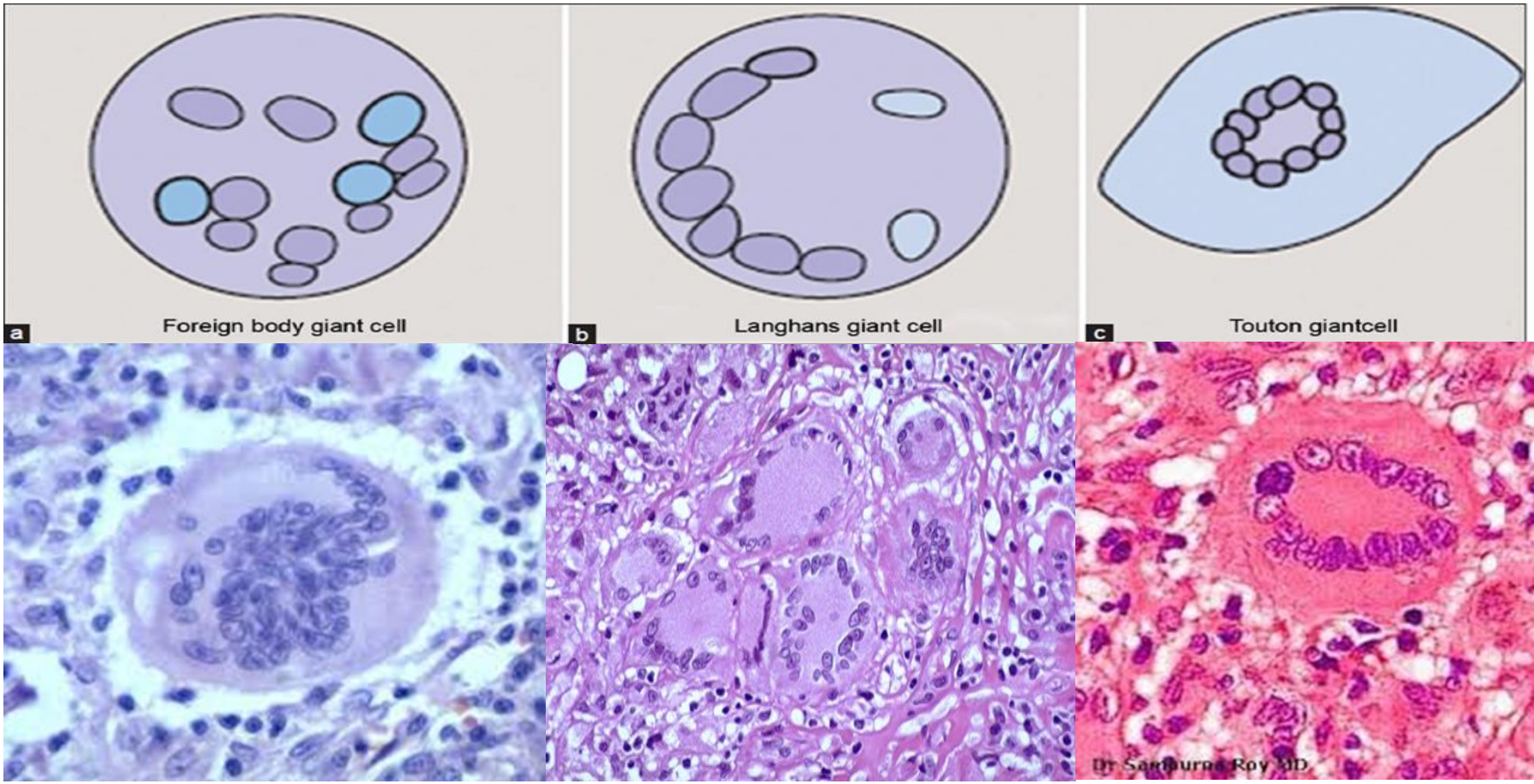
2. *Granulomatous inflammation:* A specific type of chronic inflammation characterized by the presence of distinct nodular lesions or granulomas formed with an aggregation of activated macrophages or its derived cell called epithelioid cells usually surrounded by lymphocytes. The macrophages or epithelioid cells inside the granulomas often coalesc to form Langhans or giant cells such as foreign body and Tumor giant cells.

There are two types:

A. Granuloma formed due to foreign body or T-cell mediated immune response is termed as foreign body granuloma, for example, silicosis.

B. Granuloma formed due to chronic infection is termed as infectious granuloma(Langhans) for example, tuberculosis.

C. touton : Tumor giant cells.


a
Foreign body giant cell
b
Langhans giant cell
c
Touton giantcell
Dr Sanjoorna Roy MD

COMPOSITION OF GRANULOMA

A granuloma has the following structural composition:

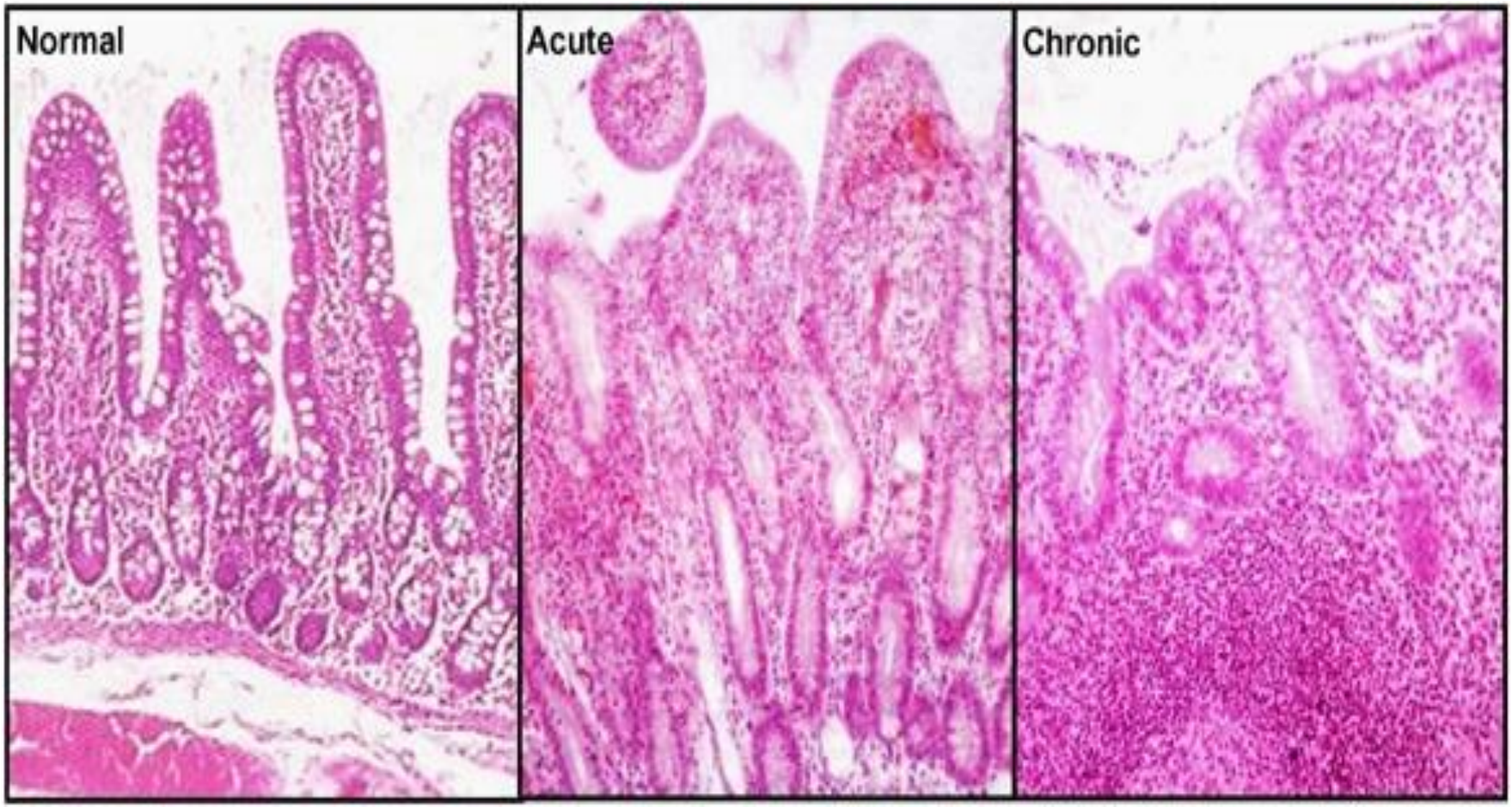
1. Necrosis: caseation center

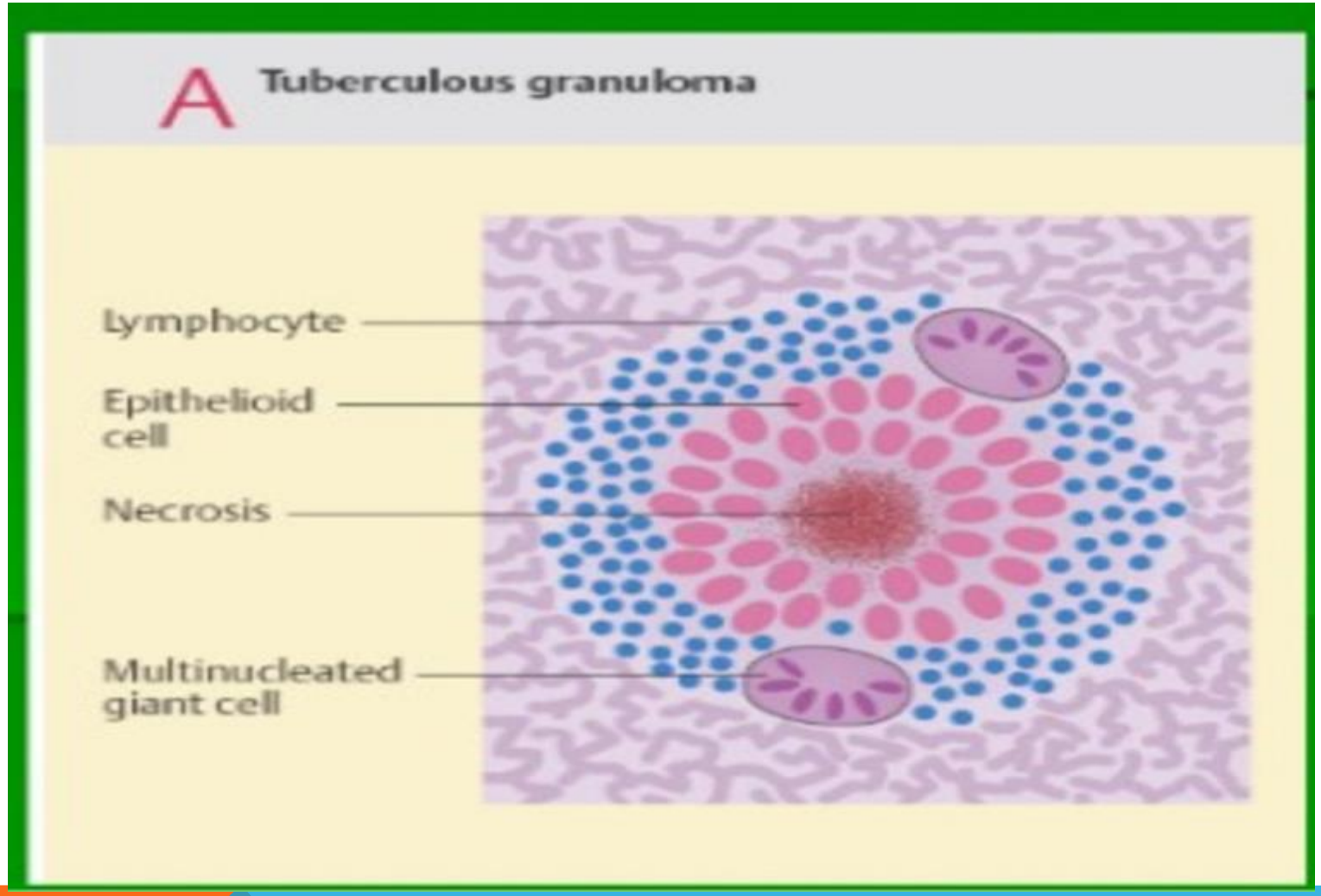
2. Epithelioid cells which are modified macrophages

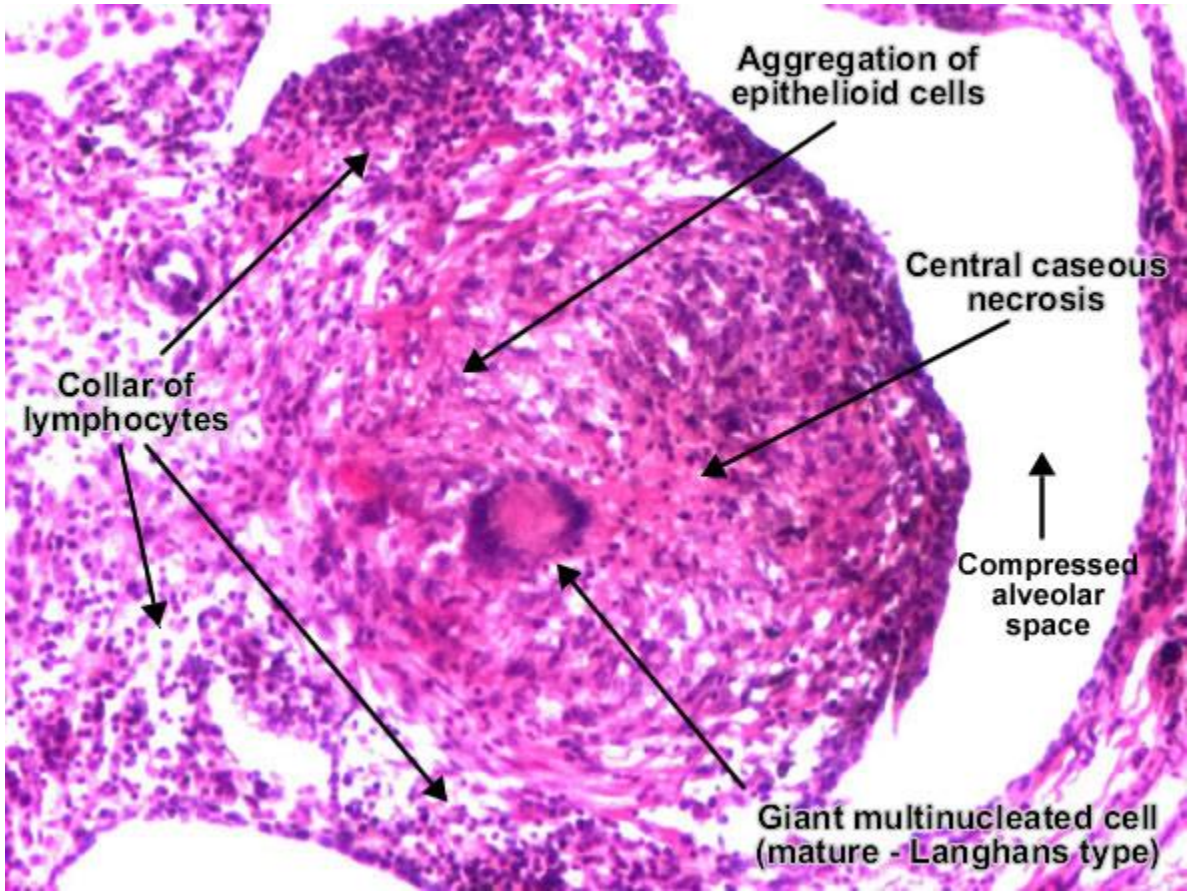
3. Multinucleate giant cells. Multinucleate giant cells are formed by fusion of adjacent epithelioid cells and may have 20 or more nuclei.

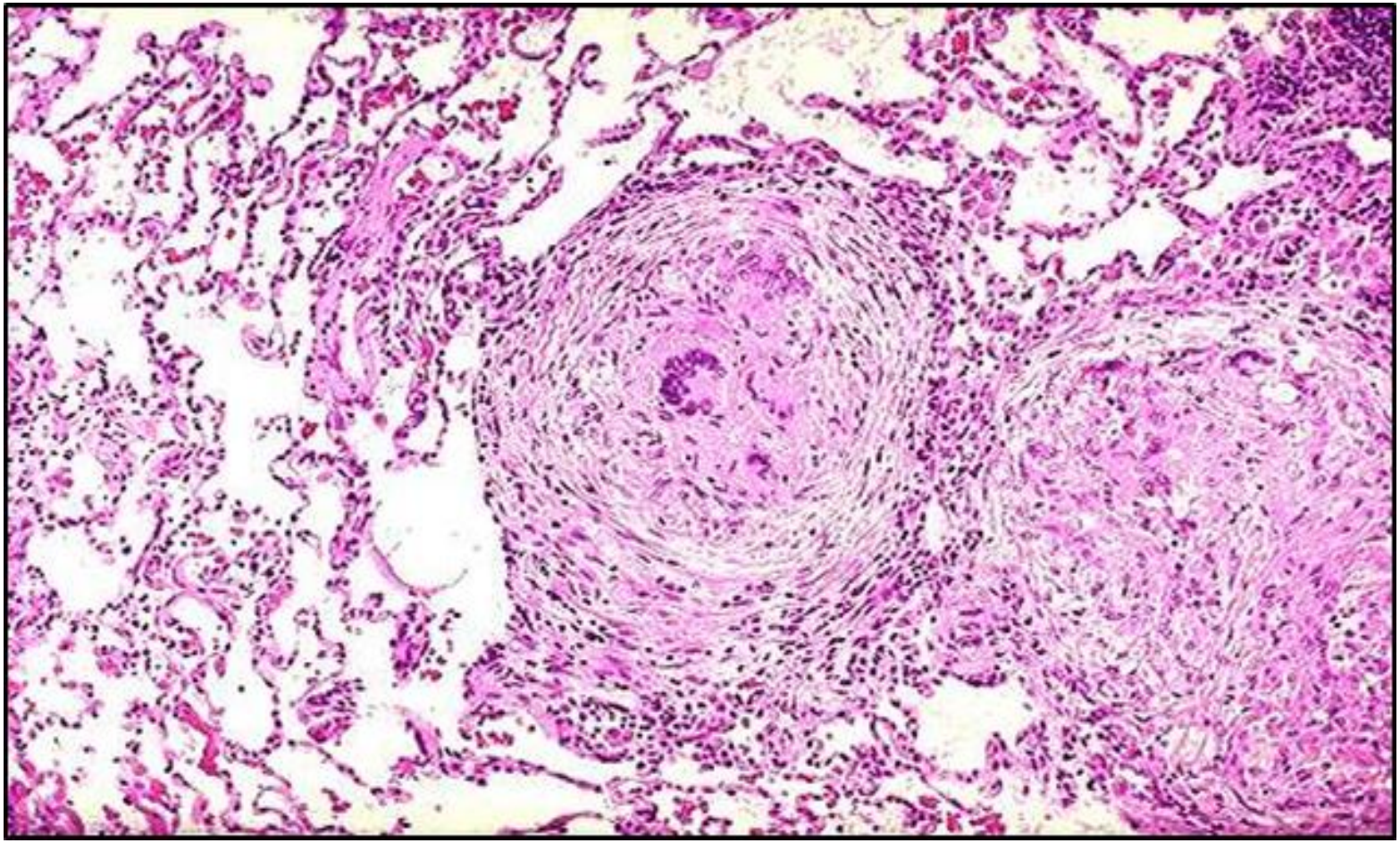
4. Lymphocytes

5. Fibrosis. Fibrosis is a feature of healing by proliferating fibroblasts at the periphery of granuloma


Normal
Acute
Chronic


A Tuberculous granuloma
Lymphocyte
Epithelioid cell
Necrosis
Multinucleated giant cell


Aggregation of epithelioid cells
Central caseous necrosis
Collar of lymphocytes
Compressed alveolar space
Giant multinucleated cell (mature - Langhans type)

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For Your
Attention