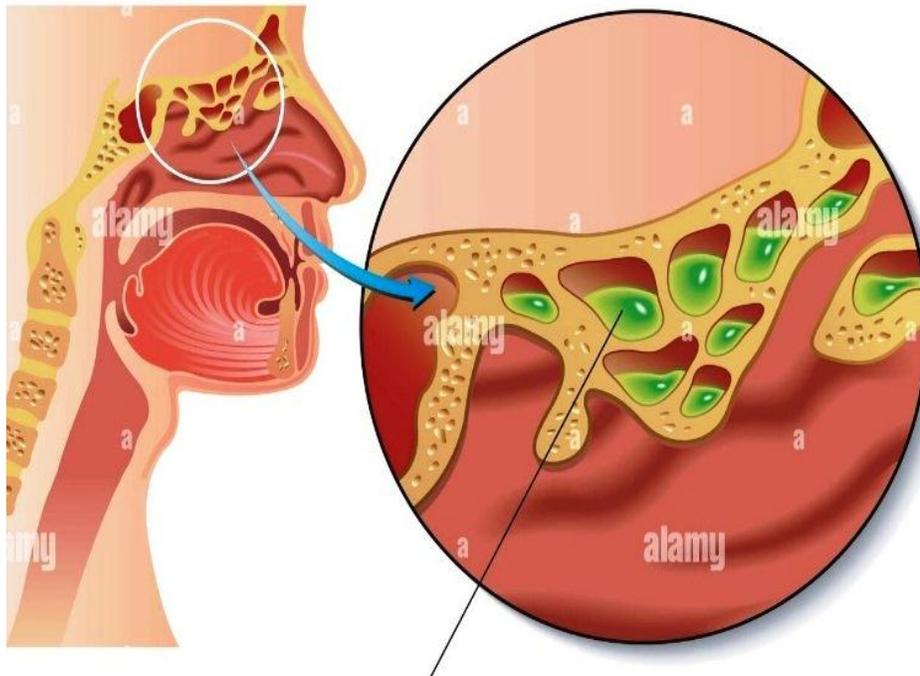


# Inflammation and repair-3



Paranasal sinuses with mucus and pus

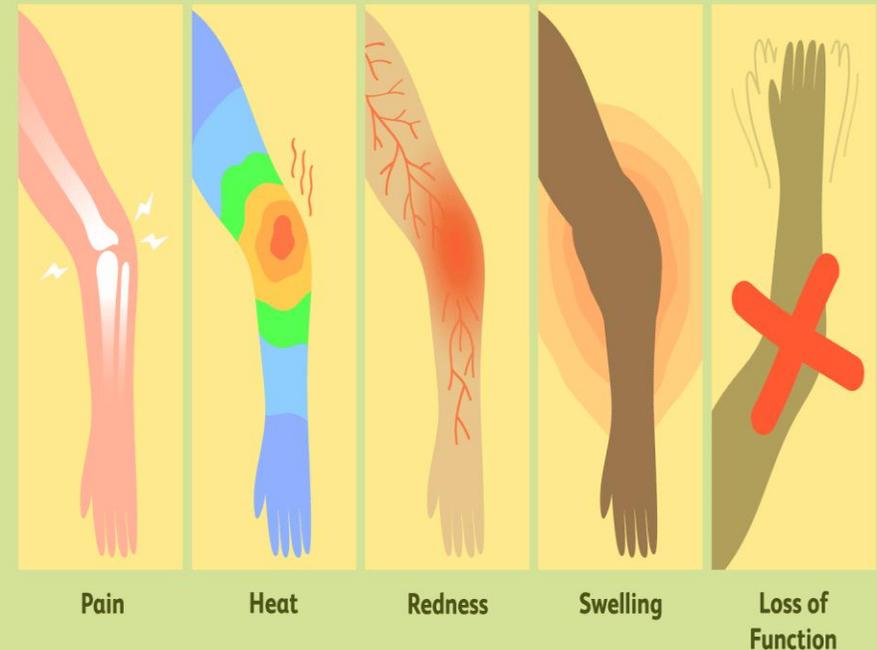


# Acute inflammation

## Cardinal signs of acute inflammation

- 1- Redness:** Due to vascular dilatation.
- 2- Hotness:** Due to increased blood flow.
- 3- Pain: Due to:**
  - Direct action of the chemical mediators on the sensory nerve endings
  - Pressure on the sensory nerve endings by inflammatory edema
- 4- Swelling:** Due to accumulation of inflammatory edema.
- 5- Loss of function:** Due to the swelling and pain.

## 5 Cardinal Signs of Inflammation



# TYPES OF ACUTE INFLAMMATION

## 1- Non-suppurative inflammations:

1. Serous inflammation
2. Fibrinous inflammation
3. Serofibrinous inflammation
4. Catarrhal inflammation
5. Membranous inflammation
6. Allergic inflammation
7. Hemorrhagic inflammation
8. Necrotizing inflammation.

## 2-Suppurative inflammations:

- a- **Localized** (abscess, carbuncle, furuncle)
- b- **Diffuse** (cellulitis)

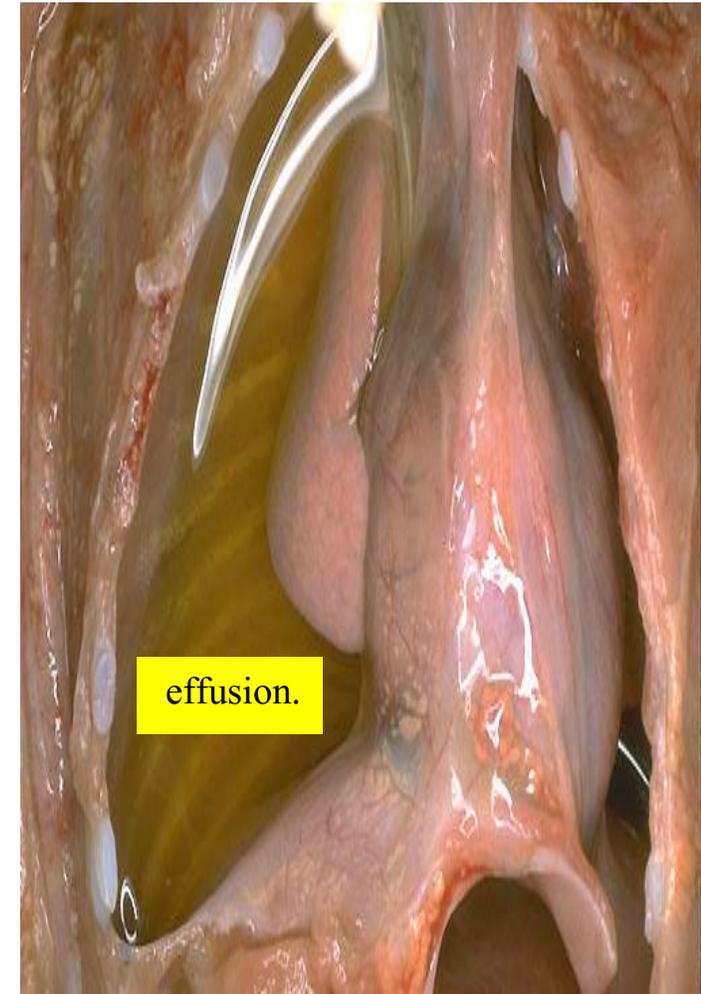
# Serous inflammation

- **Definition:**

Acute non suppurative inflammation characterized by **serous exudate formation**.

- **Examples:**

- Fluid** secreted by mesothelial cells and collects in *the serous cavities* (**pleura, peritoneum**, and pericardium or joint spaces(**effusion**)) between the visceral and parietal layers.
- Bullae** of mild burn or viral blisters.



# Fibrinous inflammation

- **Definition:**

Acute non suppurative inflammation characterized by increased vascular permeability with **formation of fibrin-rich inflammatory exudate.**

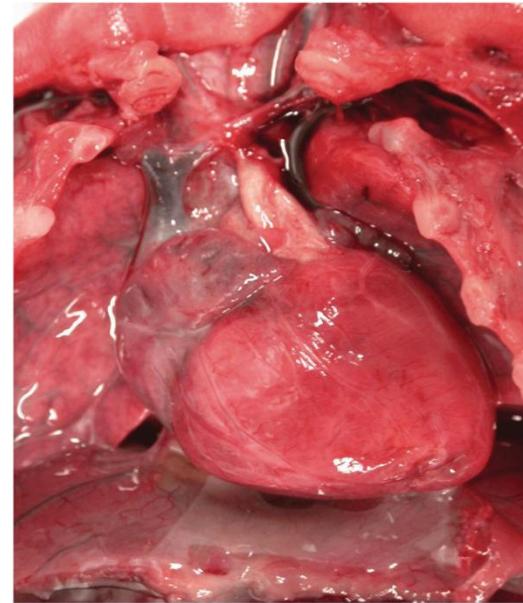
- **Sites:**

- Serous membranes as pericardium, pleura & peritoneum.
- Lung alveoli in **lobar pneumonia.**

**Fate:**

**1- Resolution:** fibrinous exudate may be degraded by fibrinolysis and removed by macrophages with restoration of normal tissue structure.

**2- Organization:** when fibrin isn't removed, it stimulates the growth of fibroblasts and blood vessels that leads to **scarring.**



**Normally, pericardium is translucent**



The **pericardial surface** is dry with a **coarse granular appearance** caused by **fibrinous exudate**

# Serofibrinous inflammation

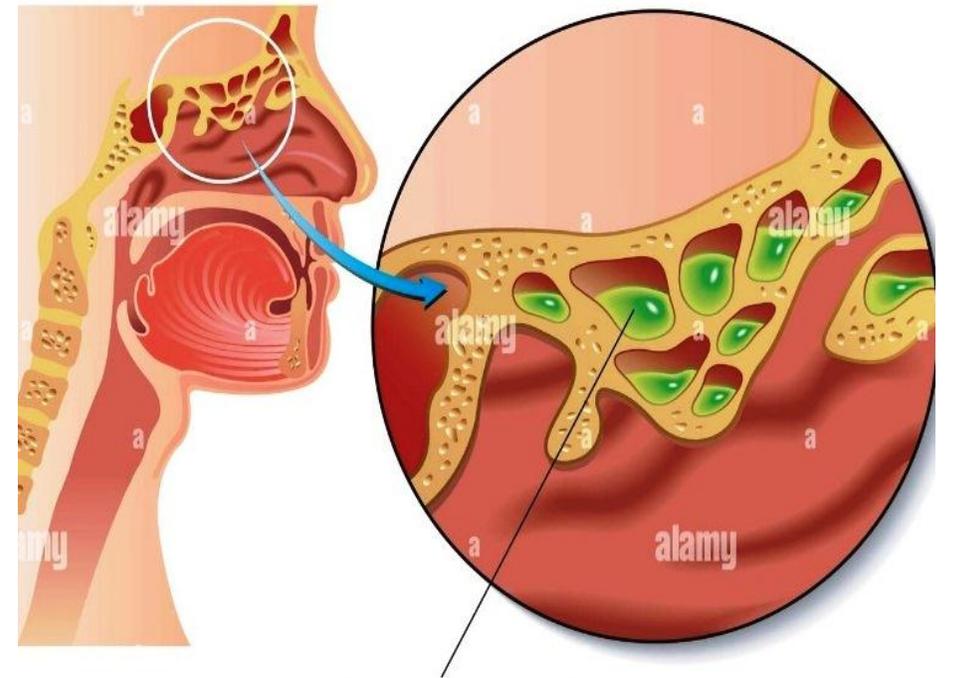
- Excessive amounts of inflammatory **fluid rich in fibrin**.
- The affected membrane becomes opaque

**Examples:** Pleurisy with effusion

# Catarrhal inflammation

## Definition:

- A acute non-suppurative inflammation affecting the **mucous membranes** .
- characterized by **excess mucous secretion**.
- Examples:
  - Catarrhal rhinitis, **Sinusitis**
  - Appendicitis.



Paranasal sinuses with mucus and pus

# Membranous inflammation

- **Definition:**

Acute non-suppurative inflammation of mucus surfaces characterized by formation of pseudomembranes.

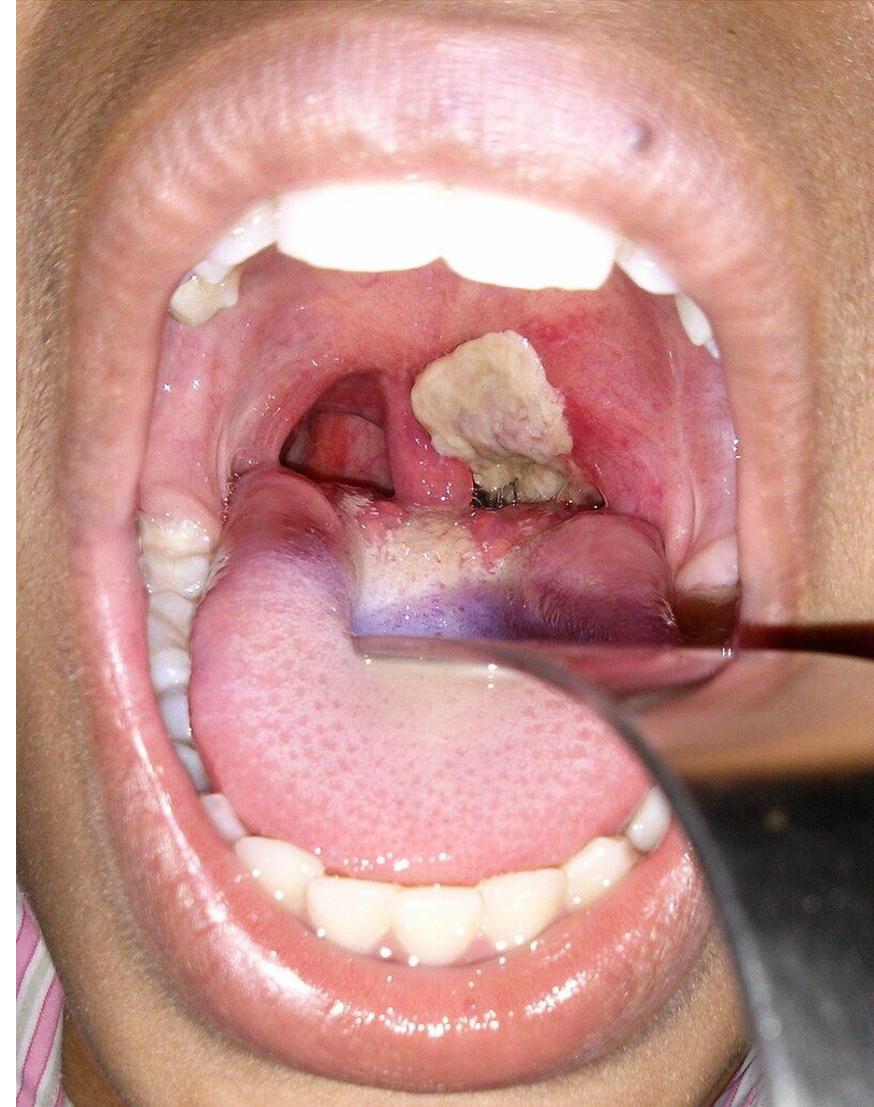
- **Sites:** intestine in bacillary dysentery and **throat in diphtheria infections**.

**Pathogenesis:** bacteria remains on the mucosal surface and produce **powerful toxins** which cause **patchy tissue necrosis**.

Exotoxins diffuse through necrotic membrane and diffuse to submucosa and absorbed by the blood causing **toxemia**.

**Gross:** the **membrane is grayish white**, loosely attached to the underlying mucous membrane. it can be easily detached leaving **superficial bleeding ulcer**.

**MIC:** The pseudomembrane is formed of **fibrin network** entangle **necrotic mucosal cells, bacteria and PNLs**.



# Allergic inflammation

*Antigen-antibody reaction characterized by:*

- increase histamine release.
- **Outpouring** of excess amount of inflammatory exudate.
- Increased number of **eosinophils** (contain histaminase )in tissues and in the blood.

# Hemorrhagic inflammation

Destruction of capillaries with **escape of large numbers of RBC's** to the area of inflammation.

***Examples:***

smallpox and hemolytic streptococcal infections.

# Necrotizing inflammation

- Acute inflammation associated with **wide spread necrosis**.
- Resulting from superimposed **thrombosis** and vascular obstruction.

# Acute suppurative inflammation

- **Definition:**

Acute inflammation characterized by **presence of pus.**

- **Types of suppurative inflammation:**

**1- Localized:**

- Abscess
- Carbuncle (affect thick skin as back skin)
- Furuncle (small abscess related to hair follicles or sebaceous gland)

**2- Diffuse:**

Cellulitis

# ABSCESS

- Localized area of suppurative inflammation resulting in formation of **cavity containing pus**
- Caused by pathogenic bacteria mainly **staphylococci**
- site: usually** subcutaneous tissue-may occur in organs as lung, liver, brain



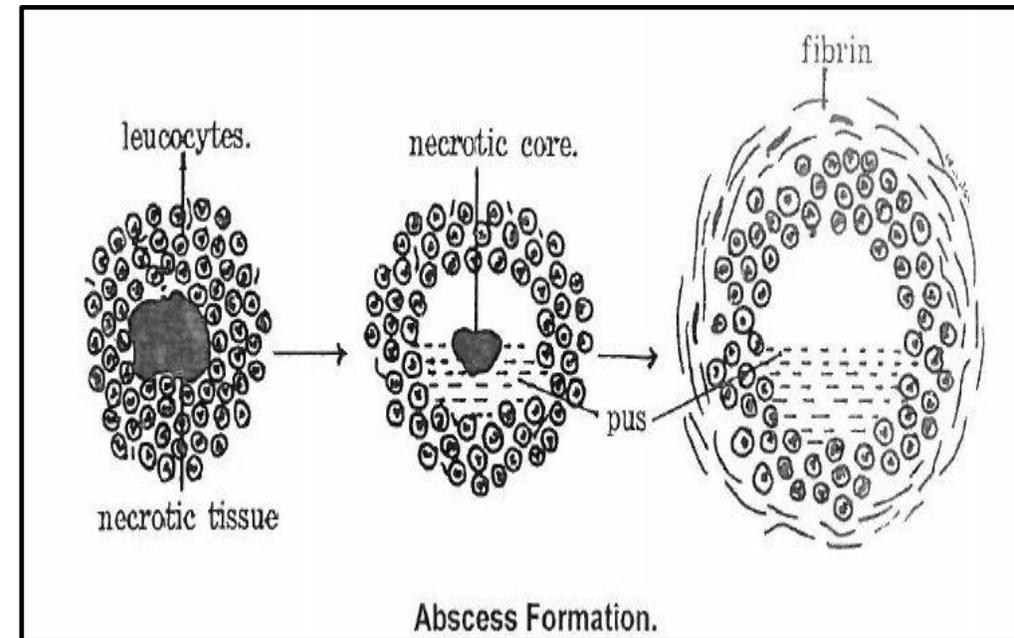
## Pathogenesis: 3 stages:

**1- Early stage:** central zone of necrosis surrounded by peripheral zone of inflammation contain PNLs .

- dead neutrophils release proteolytic enzymes which liquefy the margins of the central zone with formation of pus.

## **2- Intermediate stage:**

- central necrotic zone **diminish by liquefaction of its margins,**
- mid-zone of pus
- peripheral zone of inflammation.



*Staph.* produces **coagulase enzyme** which help fibrin formation and localize the Abscess.

**3- Late stage:** pus evacuates, cavity collapses and healing occurs by granulation tissue.

# Complications:

1- **Chronicity.**

2- **Spread** to Regional lymph nodes.

3- **Ulcer:** Deficient epithelization.

4- **Sinus:** Blind tract lined by epithelium connecting abscess cavity to external surfaces.

5- **Fistula:** Tract lined by epithelium connecting two hollow organs  
e.g. vesico-vaginal fistula.

6- **Keloid:** excessive fibrosis.

7- **Malignant transformation**



# Chronic inflammation

## Chronic inflammation develops in one of 3 ways:

- 1- **On top of** acute inflammation.
- 2- **Repeated bouts** of acute inflammation.
- 3- **Starts** as chronic e.g. T.B.

## Causes of chronic inflammation:

- 1- Persistent acute inflammation.
- 2- Infection by certain pathogens as T.B. bacilli.
- 3- Continuous exposure to irritant
- 4- Impaction of foreign materials.
- 5- Autoimmune diseases.
- 6- Diseases of unknown cause as inflammatory bowel disease.

# Types of chronic inflammation

## 1- Chronic non specific inflammation:

With *no characteristic* histopathological appearance.

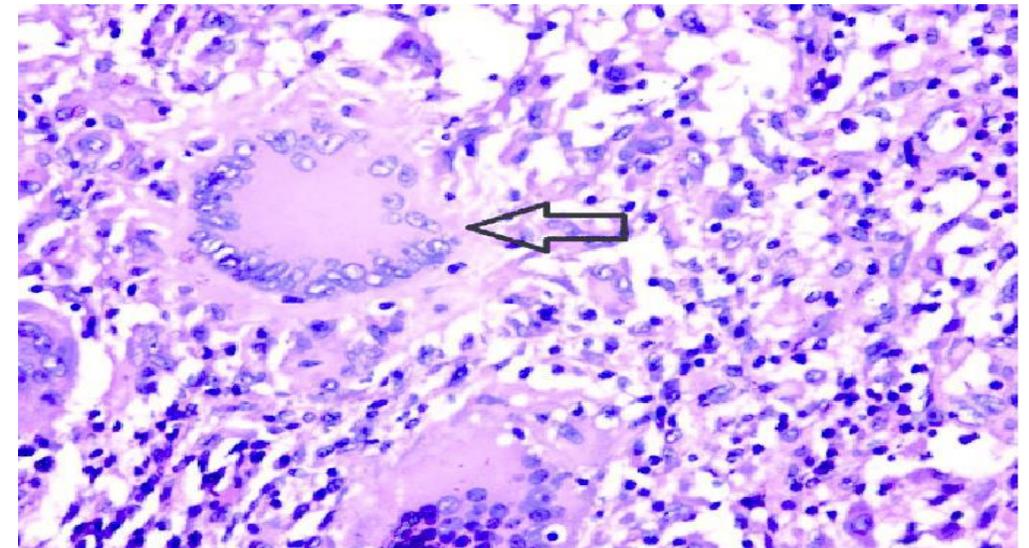
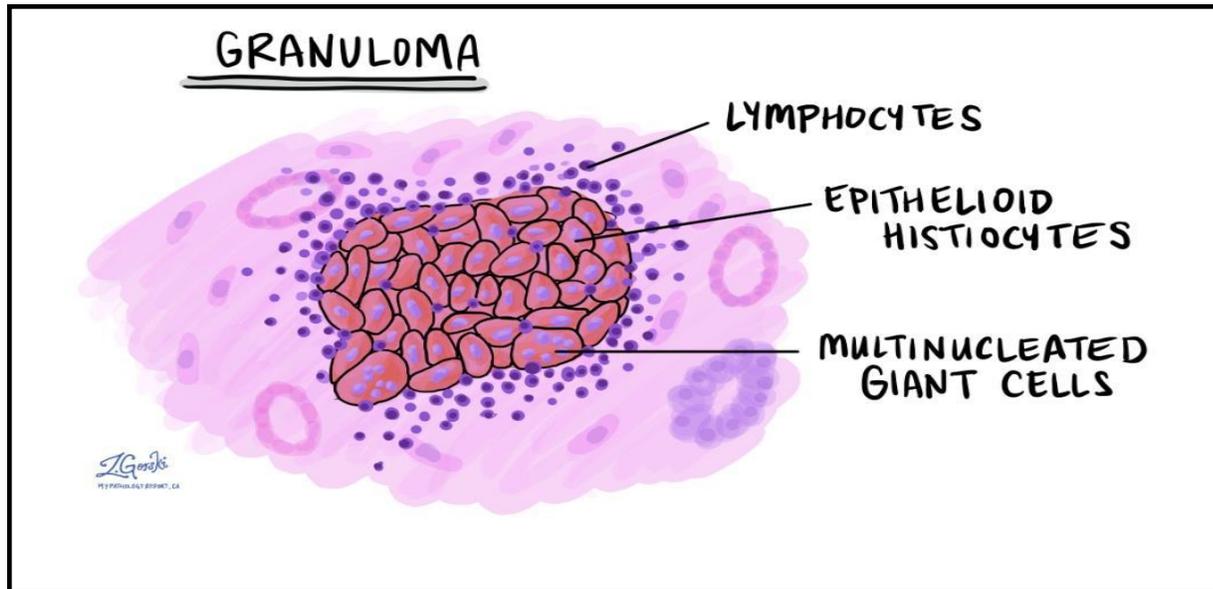
## 2- Chronic specific inflammation:

with *characteristic histopathological pattern* (granulomatous inflammation).

# Granulomatous inflammation (Granuloma)

## Definition:

it is a type of chronic inflammation characterized by **focal accumulation of large number of macrophages** (epithelioid cells) together with lymphocytes, plasma cells, multinucleated giant cells (fusion of macrophages) and fibroblasts.



# Types of granuloma:

## 1-Infective granuloma:

- **Bacterial:** T.B. Leprosy.
- **Parasitic:** bilharziasis and toxoplasma c-
- **Fungal:** histoplasmosis.

## 2-Non infective granuloma:

- Silicosis, asbestosis.
- **Foreign body granuloma:** around foreign bodies as piece of wood and suture material.

**Fate:** heal by fibrosis with scar formation.

# Difference between acute and chronic inflammation

	<b>ACUTE</b>	<b>CHRONIC</b>
<b>Causative agent</b>	Pathogens, irritants, damage	Persistent acute inflammation due to non-degradable pathogens, persistent foreign bodies, or autoimmune reactions
<b>Major cells</b>	neutrophils, basophils, eosinophils, monocytes, macrophages	Monocytes, macrophages, lymphocytes, plasma cells, fibroblasts
<b>Onset</b>	Immediate	Delayed
<b>Duration</b>	Few days	Up to many months, or years
<b>Outcomes</b>	Resolution, abscess formation, chronic inflammation	Tissue destruction, fibrosis

Thank

you

