Inflammation 6

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FRCPath

Outcome of acute inflammation

- 1. resolution: regeneration and repair.
- 2. chronic inflammation.
- 3. scarring

Resolution - definition

- Restoration of normal structure and function.

resolution

Happens when:

1. Injury is limited and short lived.
2. No or minimal tissue damage.
3. Injured tissue can regenerate.

Chronic inflammation

Happens if:

- Offending agent not removed.

scarring

- If there is extensive tissue destruction
- Or in tissues that cannot regenerate.

Serous inflammation

- Occurs if injury is mild.
- Watery protein-poor fluid.
- Happens in skin blisters due to burns or viral infections
- Occurs also in body cavities: serous effusions.

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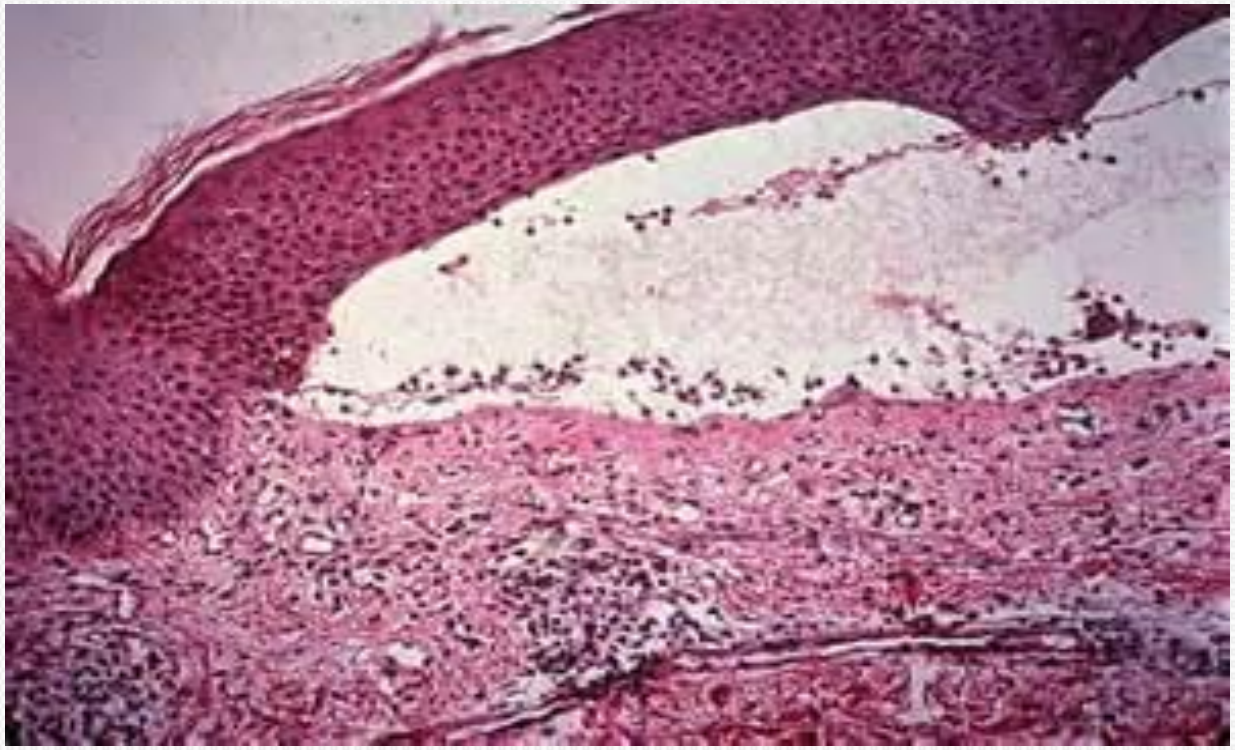
Serous inflammation



Fibrinous inflammation

- More severe injury.
- Greater vascular permeability.
- So: edema fluid contains fibrin.
- In body cavity lining… pericarditis.

fibrin

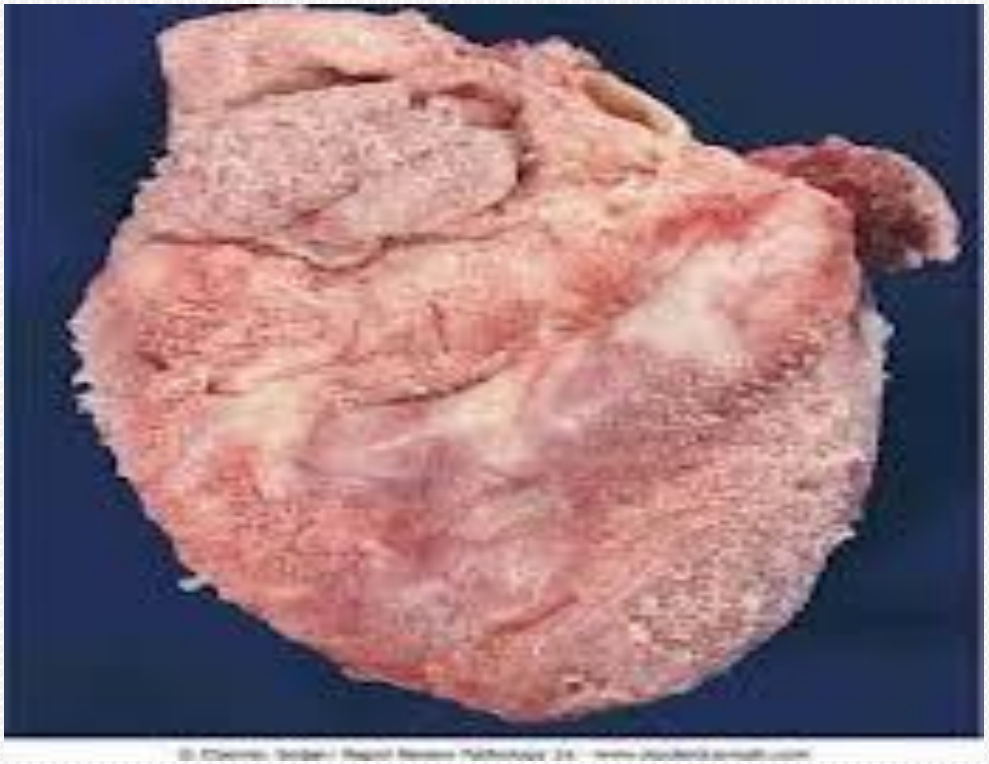
- Protein.
- Eosinophilic meshwork of threads.

Fibrinous inflammation

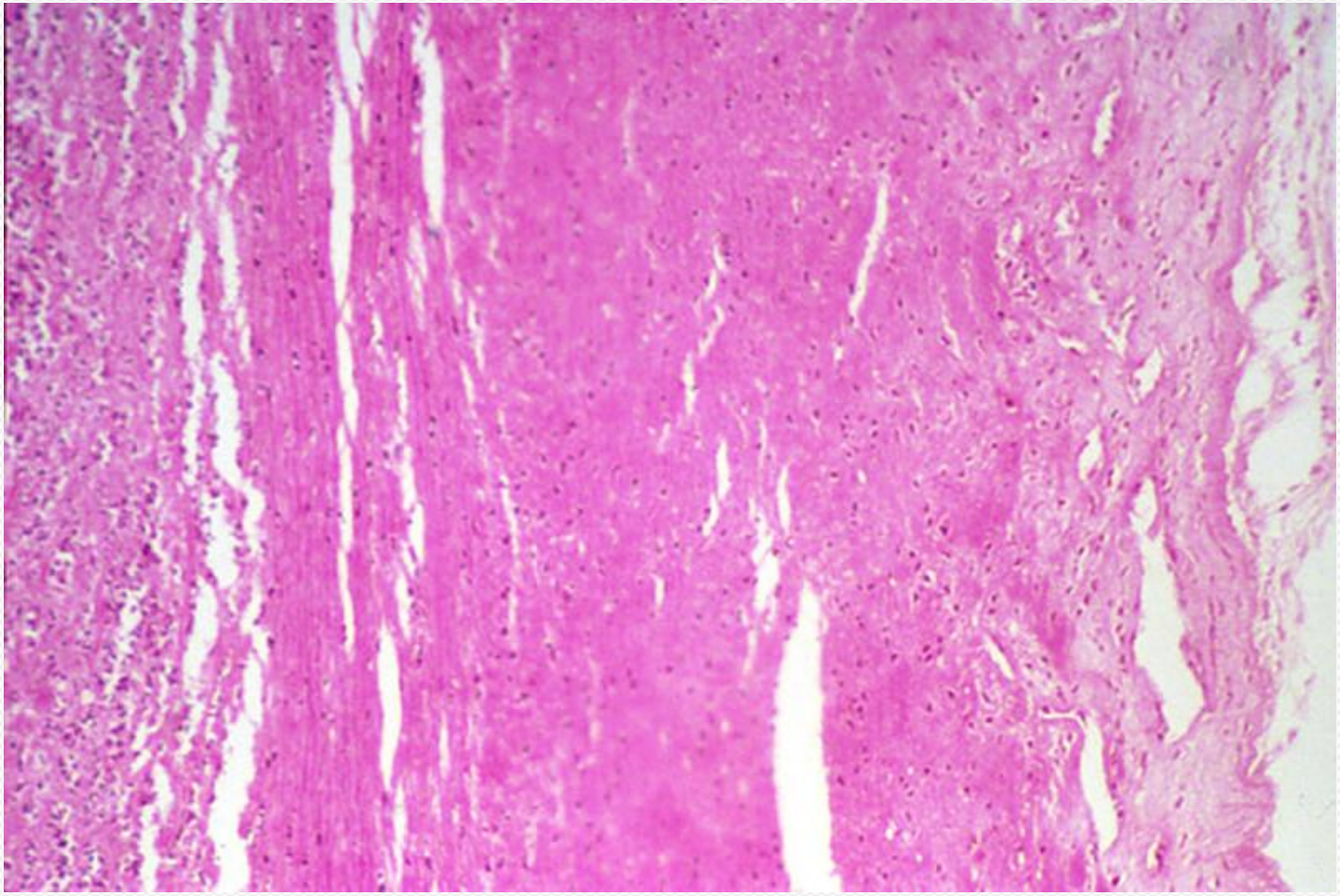
Outcome:

- Resolution if mild
- Scarring if more severe.

Fibrinous pericarditis



Fibrinous pericarditis



Suppurative inflammation

- In bacterial infections.
- Pus formation… composed of neutrophils.

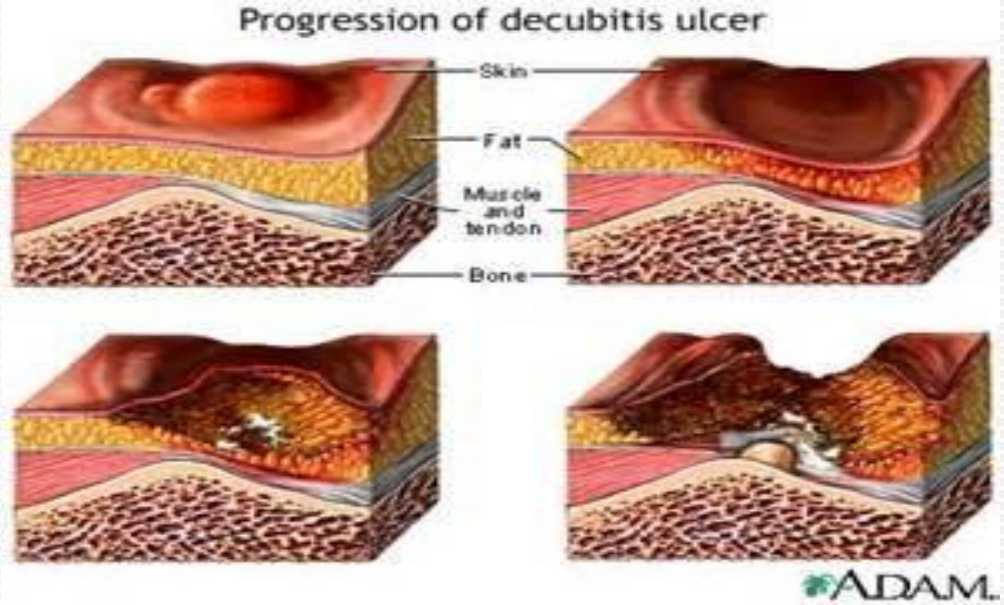
- Abscess: focal collections of pus.

- Usual outcome: scarring

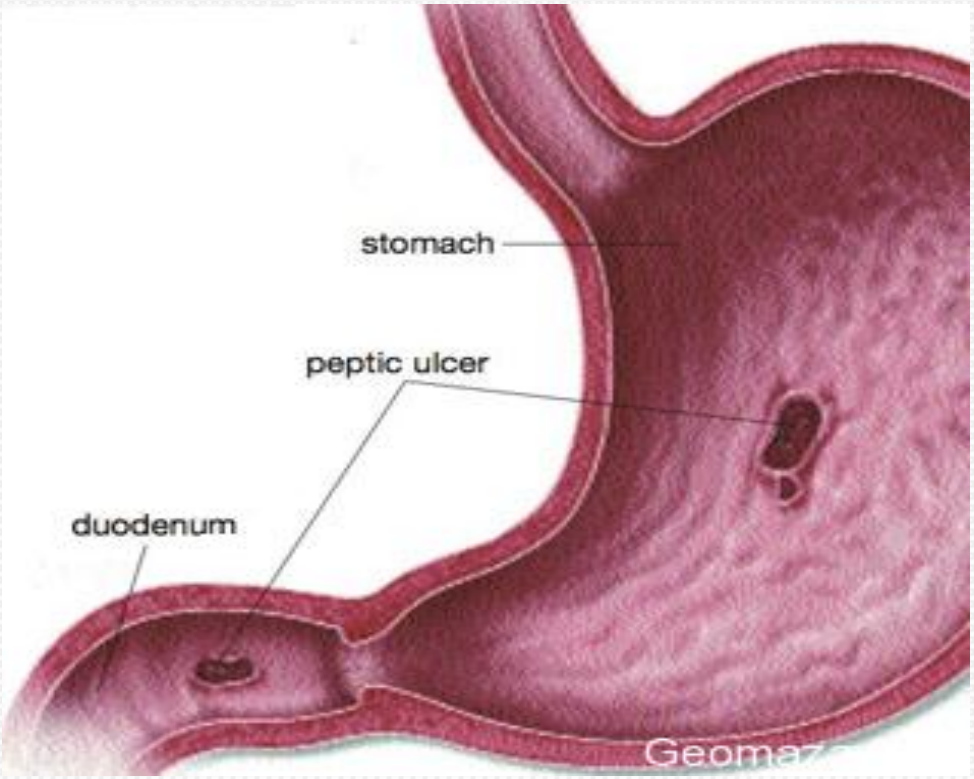
ulcer

- Local defect of the surface of an organ or tissue produced by cellular necrosis and shedding of necrotic and inflammatory tissue.

ulcer


Progression of decubitis ulcer
Skin
Fat
Muscle and tendon
Bone
ADAM.

ulcer



ulcer

Chronic inflammation

Chronic Inflammation

Characterized by:

1. Inflitration with mononuclear cells.
2. Tissue destruction
3. Repair (new angiogenesis & Fibrosis)

Causes of chronic inflammation

1- **Unresolving acute inflammation**

2- **Persistent infections:** (TB, Syphilis, Fungi, viruses)

3- **Prolonged exposure to toxic agents**. (Silica, plasma lipids like in atherosclerosis)

4- **Autoimmune disease** (Rheumatoid arthritis, Inflammatory bowel disease)

Cells of chronic inflammation

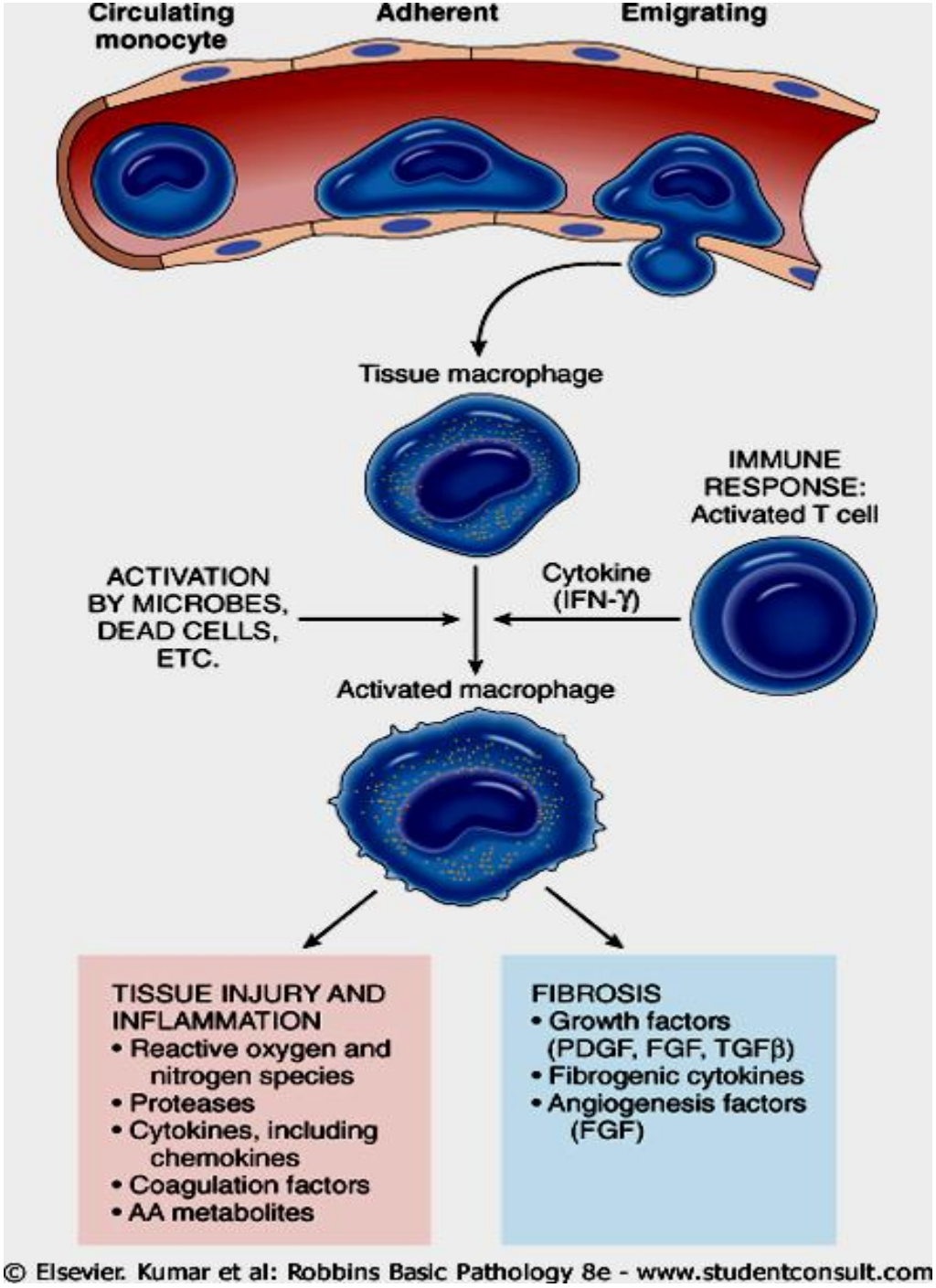
- Macrophages.
- Lymphocytes
- Plasma cells
- Eosinophils
- Mast cells

Macrophages

- Are the dominant cells of chronic inflammation
- derived from blood ***monocytes***
- normally diffusely scattered in most connective tissues, and also in organs such as the liver (*Kupffer cells*), spleen and lymph nodes (called *sinus histiocytes*), central nervous system (*microglial cells*), and lungs (*alveolar macrophages*).

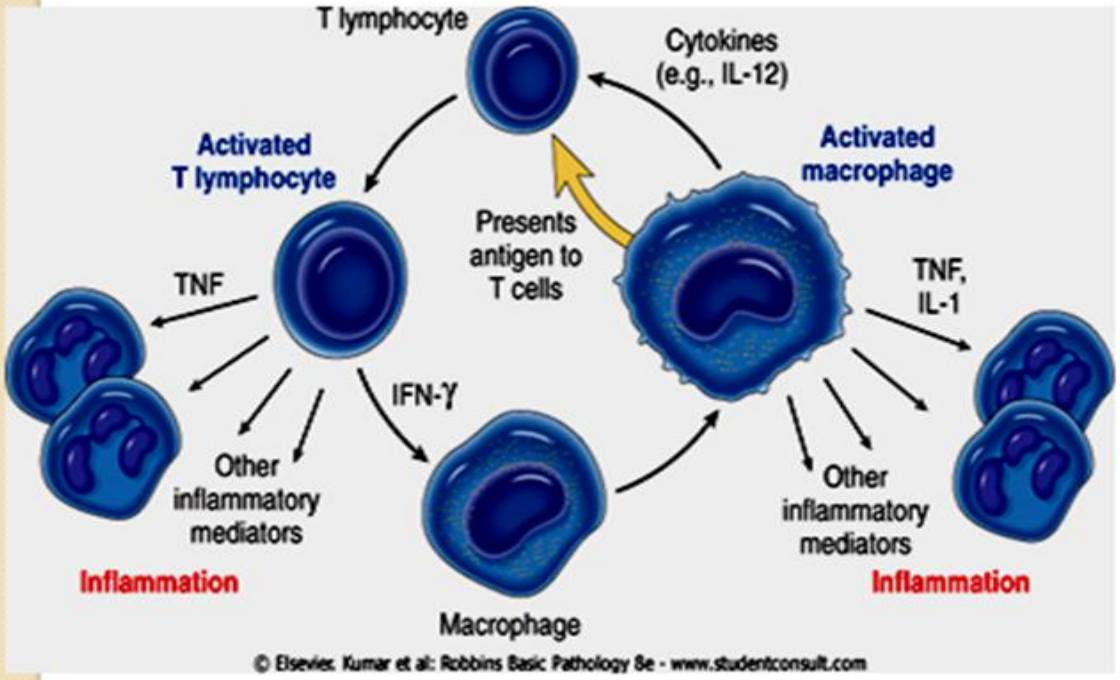
M1 and M2 macrophages

- M1 .. Classical pathway… inflammation
- M2… alternative pathway… anti-inflammation and tissue repair and necrosis.



Lymphocytes and Plasma Cells

- Lymphocytes and macrophages interact in a bidirectional way, and these interactions play an important role in chronic inflammation
- **Activated T lymphocytes** produce cytokines, including **IFN-γ**, a powerful activator of macrophages,


T lymphocyte
Cytokines
(e.g., IL-12)
Activated
T lymphocyte
Activated
macrophage
Presents
antigen to
T cells
TNF
TNF,
IL-1
IFN-γ
Other
inflammatory
mediators
Other
inflammatory
mediators
Inflammation
Inflammation
Macrophage
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Plasma cells

- develop from **activated B lymphocytes.**
- produce antibodies against persistent antigens or against altered tissue components.

Eosinophils

- characteristically found in inflammatory sites around:

1. **parasitic infections** or
2. **as part of immune reactions mediated by IgE, typically associated with *allergies.***

eosinophils

Granulomatous Inflammtion

-Aggregates of epithelioid histiocytes

-Mechanism:

1. Persistent T-cell response to certain microbes as M. tuberculosis,
2. Foreign bodies. E.g. suture, splinter.

Diseases associated with granulomatous inflammation include:

1. Tuberculosis
2. Leprosy
3. sarcoidosis

Granuloma morphology

- **Macrophages in granulomas have pink, granular cytoplasm with indistinct cell boundaries (epitheloid macrophages)**
- **These are surrounded by a collar of lymphocytes**
- **Older granulomas may have a rim of fibroblasts and connective tissue, and frequently, multinucleated giant cells**

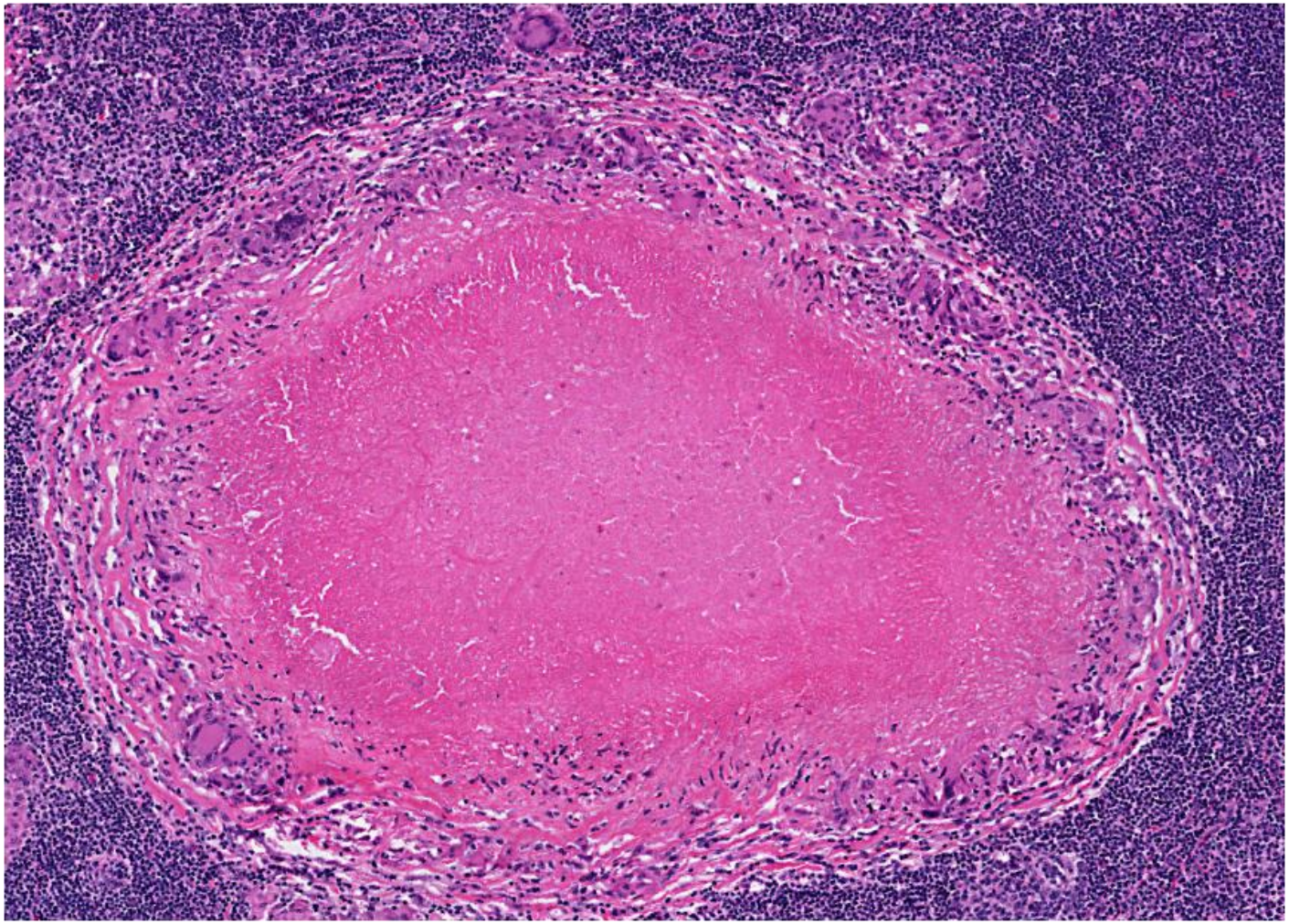
Caseating granulomas

- hypoxia and free-radical injury leads to a central zone of necrosis.
- Grossly, this has a granular, cheesy appearance (**caseous necrosis**)
- Microscopically, amorphous, structure-less, granular debris, with complete loss of cellular details.
- Seen mainly in TB.

Caseating granulomas

- a combination of hypoxia and free-radical injury leads to a central zone of necrosis. Grossly, this has a granular, cheesy appearance and is therefore called **caseous necrosis**. Microscopically, this necrotic material appears as amorphous, structureless, granular debris, with complete loss of cellular details.
- Healing of granulomas is accompanied by fibrosis that may be quite extensive.

Granuloma: microscopic morphology




KEEP
CALM
This is it
YOUR LAST
LESSON!