Acute Inflammation

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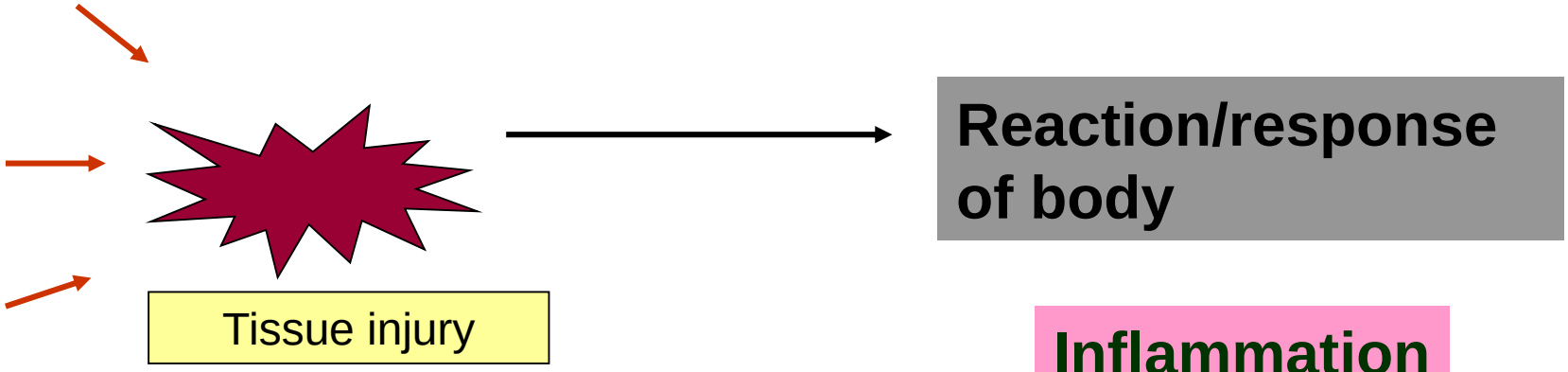
Inflammation

- Inflammation is a physiological response to tissue injury.



- Inflammation is not a disease by itself.
- It is the manifestation of tissue injury.
- Inflammation is a beneficial event.
- But it can be harmful and may produce a disease.

Inflammation

Depending on the time duration of inflammatory process

1. Acute Inflammation
2. Chronic inflammation

Acute inflammation

- Initial response of tissues to a wide range of injurious agents
- Last from few hours to few days; "**Acute**"
- Whatever the cause of tissue injury is , the acute inflammatory response is the same.
- The process is usually described by the suffix '**itis'**
- However, some conditions such as asthma and pneumonia do not follow this convention

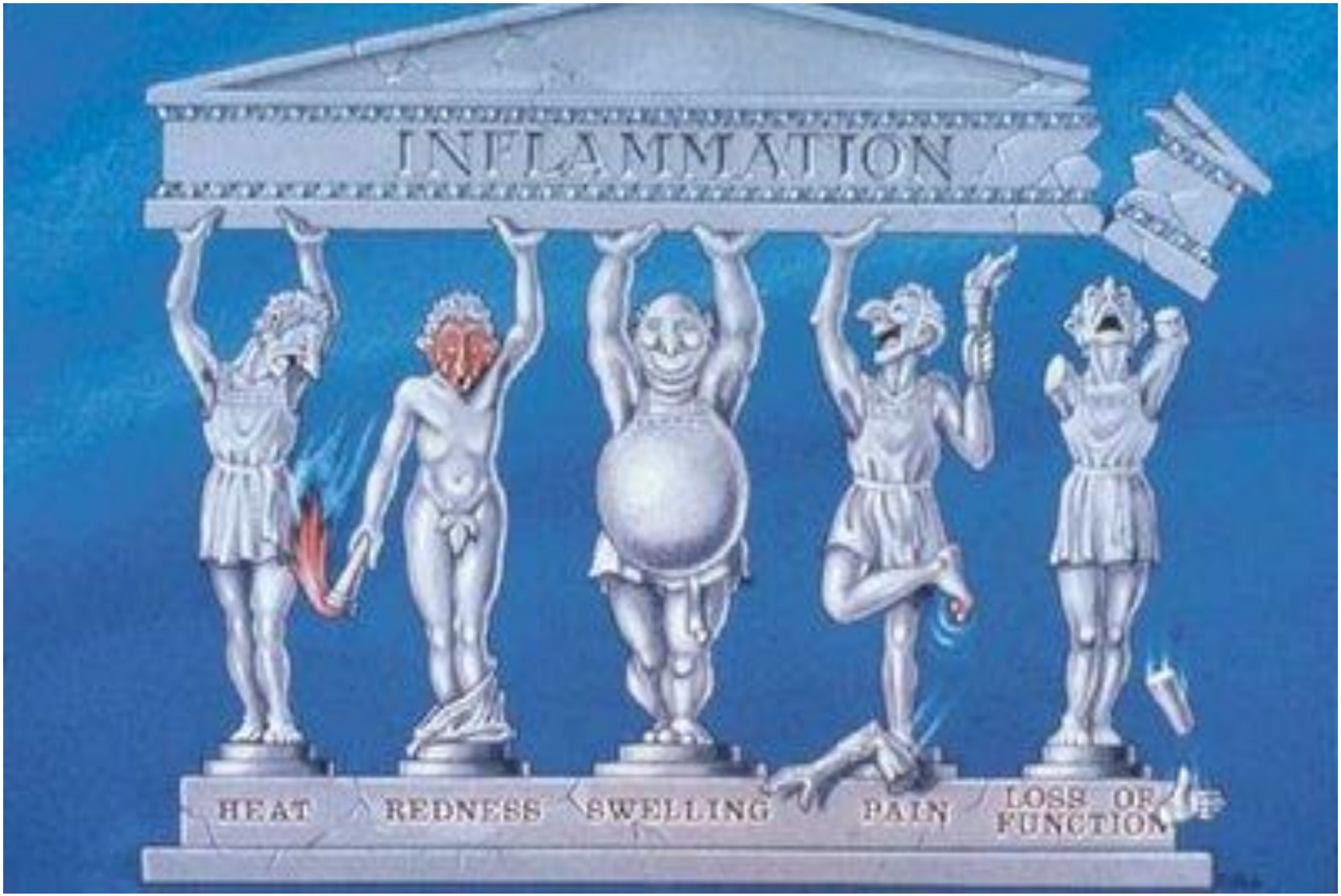
Different causes of acute inflammation

- Microbial infections
- Physical agents -trauma, radiation, burns,
- Chemical agents
- Tissue necrosis
- Hypersensitivity reactions

Features of acute inflammation

- Redness
- Warmth
- Swelling
- Pain
- Loss of function

Features of acute inflammation



Features of acute inflammation

Note the **redness and swelling** of the hand in cellulitis

Features of acute inflammation

Note the redness, swelling and blister formation of this finger.

Features of acute inflammation

A blister, accumulation of fluid

Underlying pathogenetic mechanism for these features

- **Redness** -dilatation of blood vessels
- **Warmth** -increased blood flow
- **Swelling** -accumulation of fluid “Exudate”
- **Pain** -stretching, oedema
  chemical mediators
- **Loss of function** due to pain , swelling

What happens inside the tissue?

3 main processes are involved;

1.Increase in diameter of blood vessels and increase in local blood flow.

2. increased vascular permeability

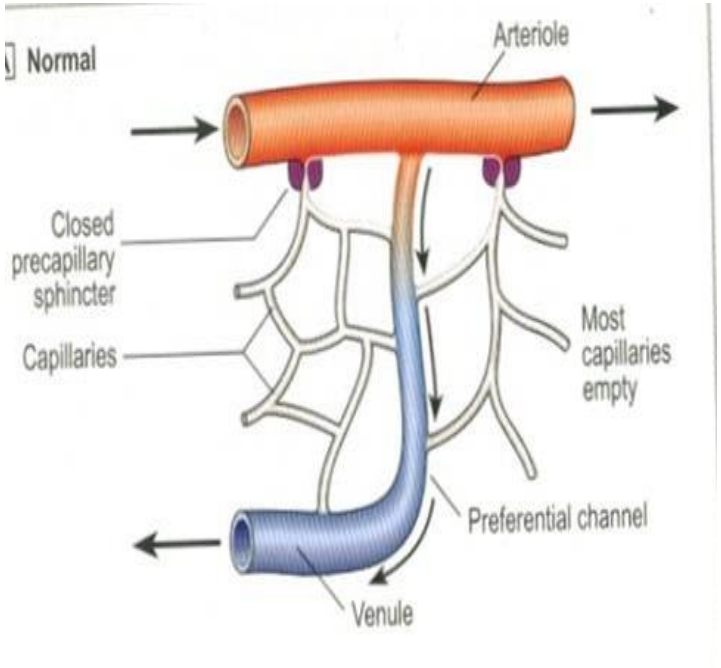
3. formation of ‘exudate’ with migration of neutrophils -‘cellular exudate’

1. Change in calibre of vessels

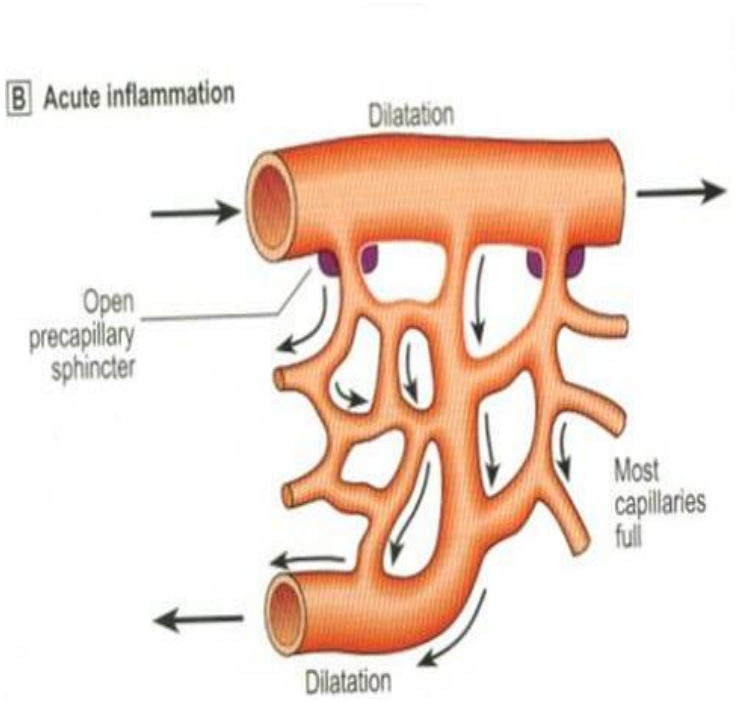
- Under physiological conditions blood travels through only a few number of capillary channels.

- In acute inflammation blood starts to flow through all vascular channels

Change in calibre of vessels

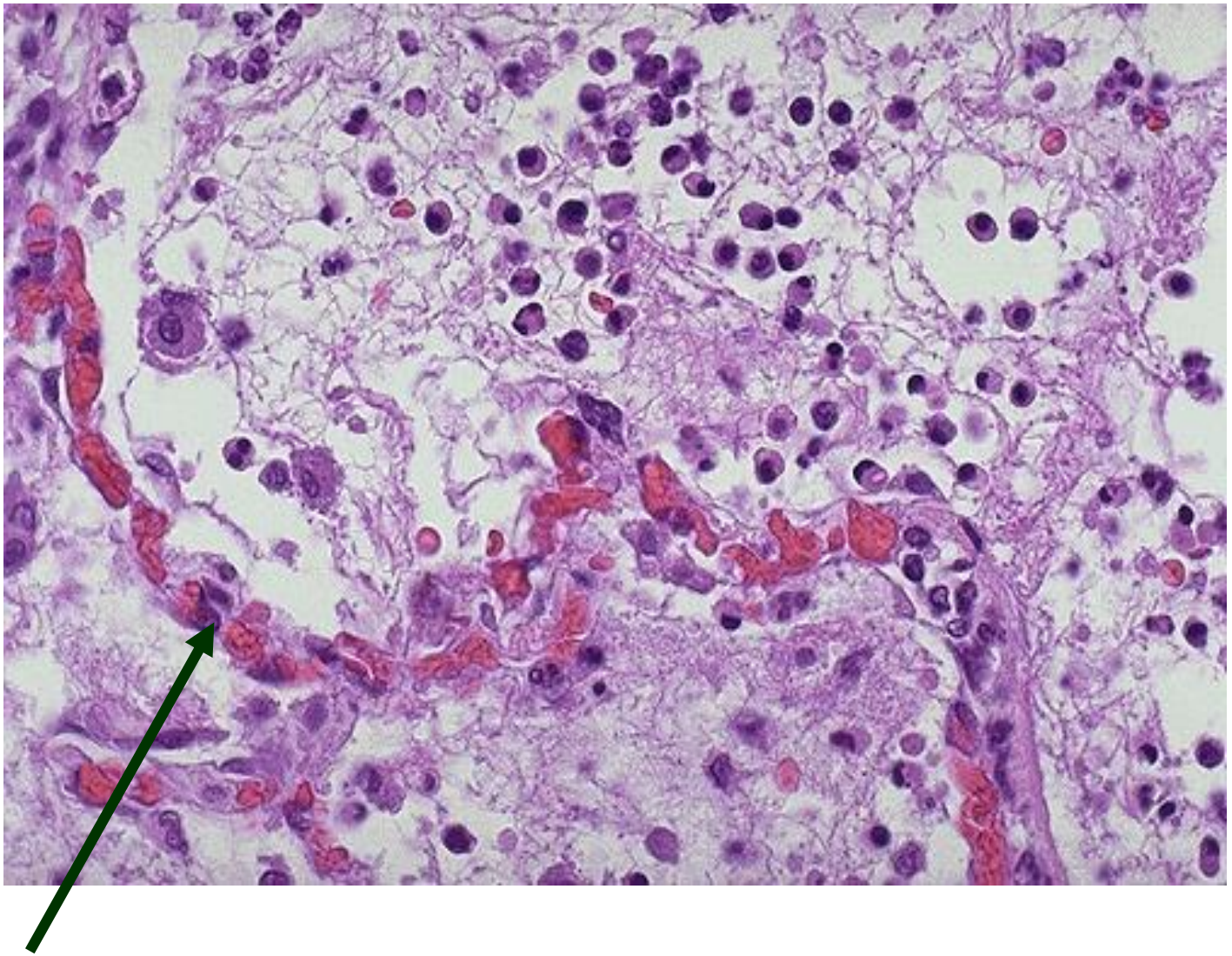


Normal circulation



Acute inflammation

Change in calibre of vessels



Note the dilated pulmonary capillaries in acute pneumonia

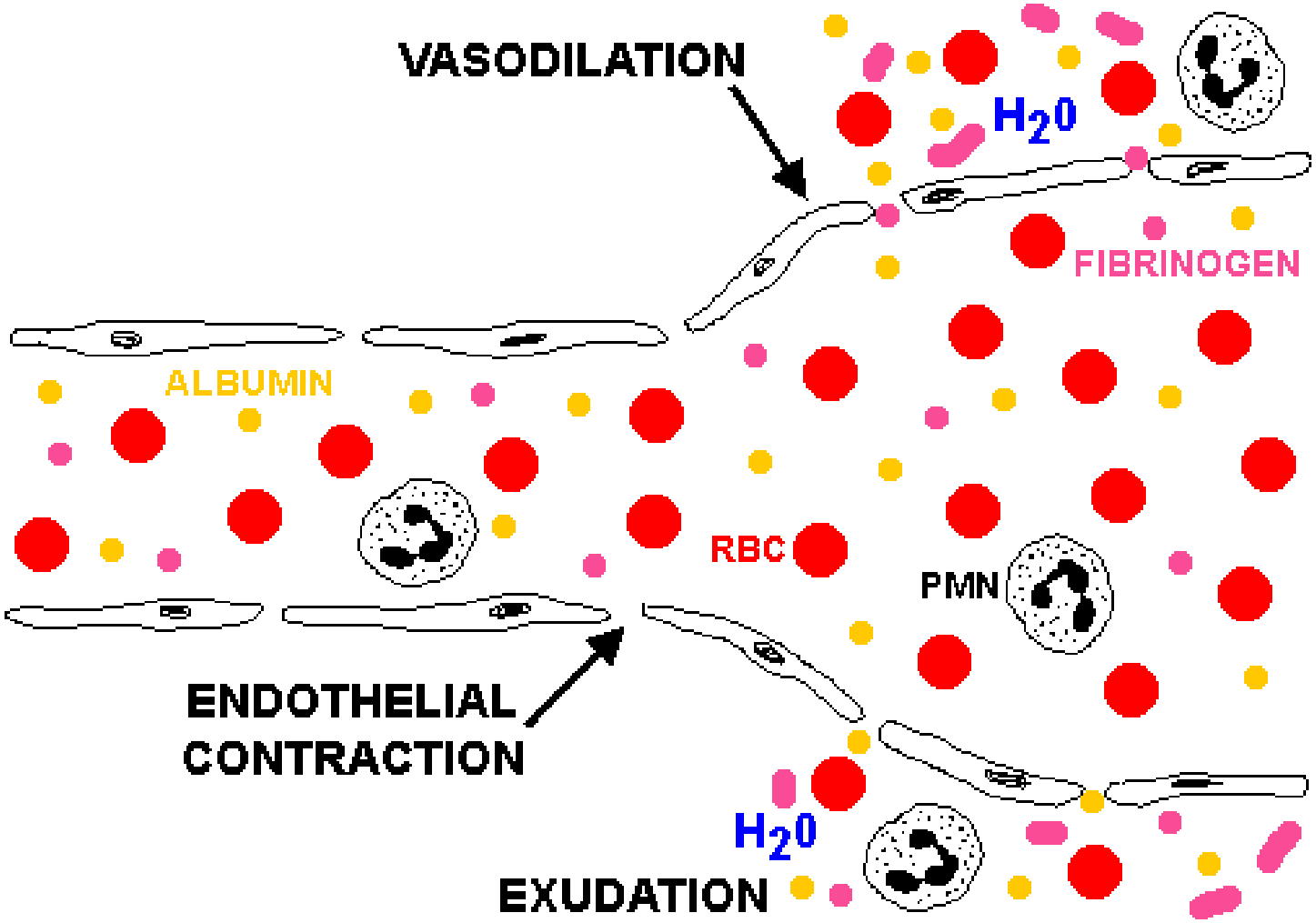
2. Increased permeability

- Under physiological conditioned only water and solutes can pass across the vessel wall.

- In acute inflammation , excess fluid together with plasma proteins leak into the extravascular space.

  “**Exudate**” ; protein rich fluid

Increased permeability



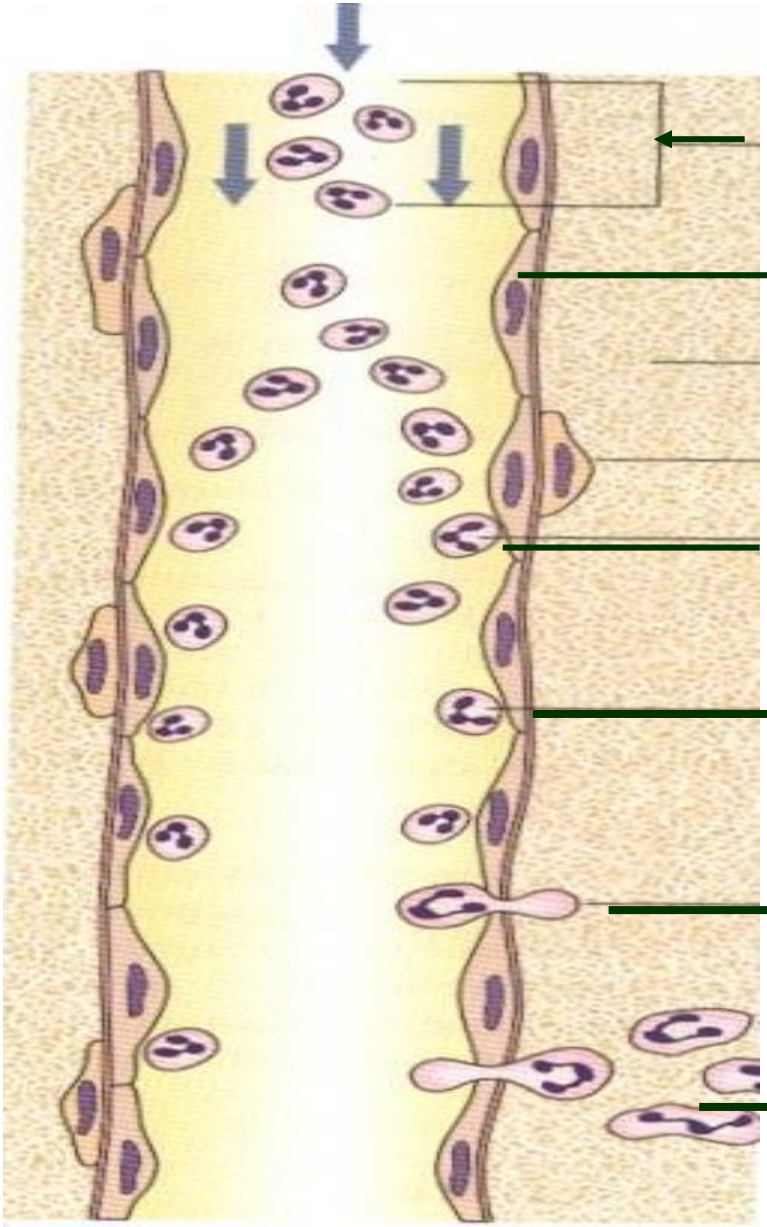
Why does the vessel permeability increase?

- Chemical mediators Eg; Histamine
- Direct vascular injury eg; trauma of vessels
- Endothelial cell injury eg; radiation

3.Formation of cellular exudate

- Presence of neutrophils in fluid exudate is the classic feature of acute inflammation.

Steps in neutrophil migration



Normal blood flow "Axial Stream"

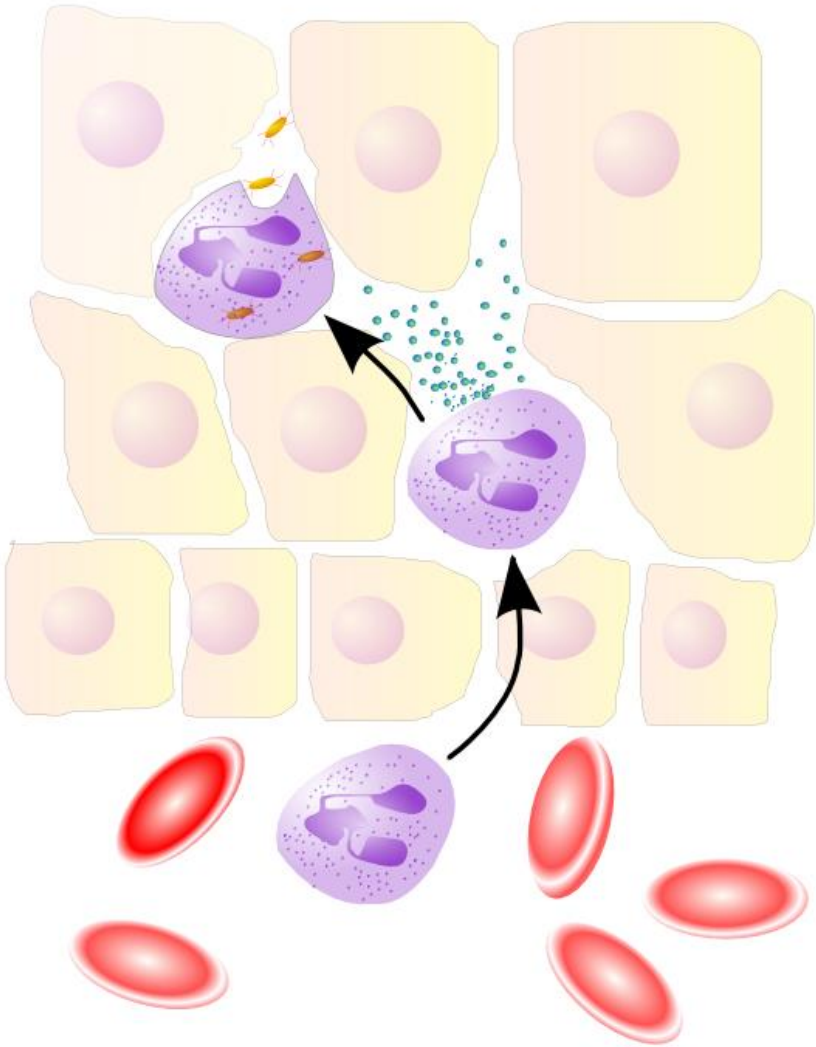
Endothelial cell

Neutrophil margination

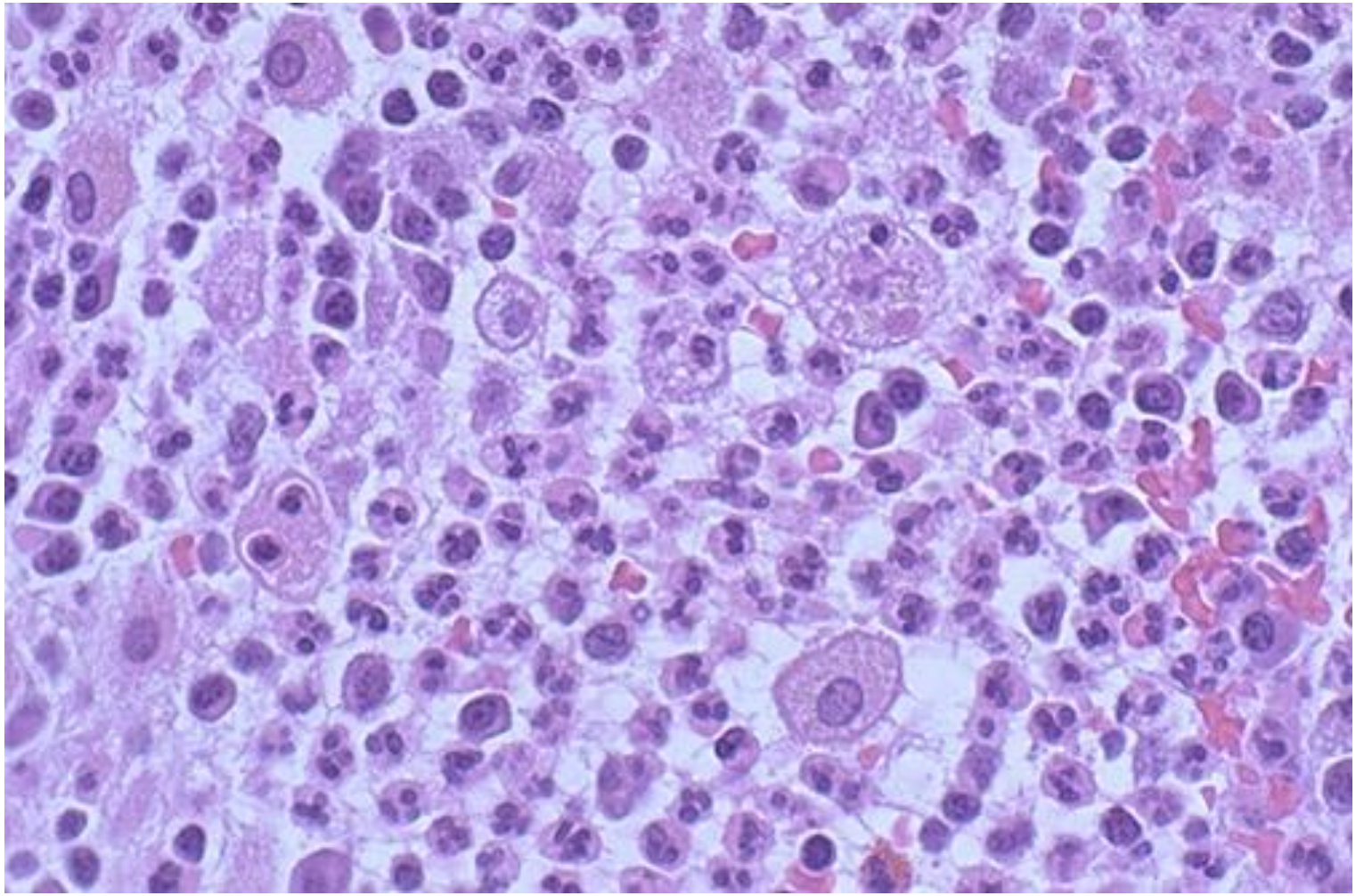
Pavementing

Pass between endothelial cells

Pass through basal lamina into adventia

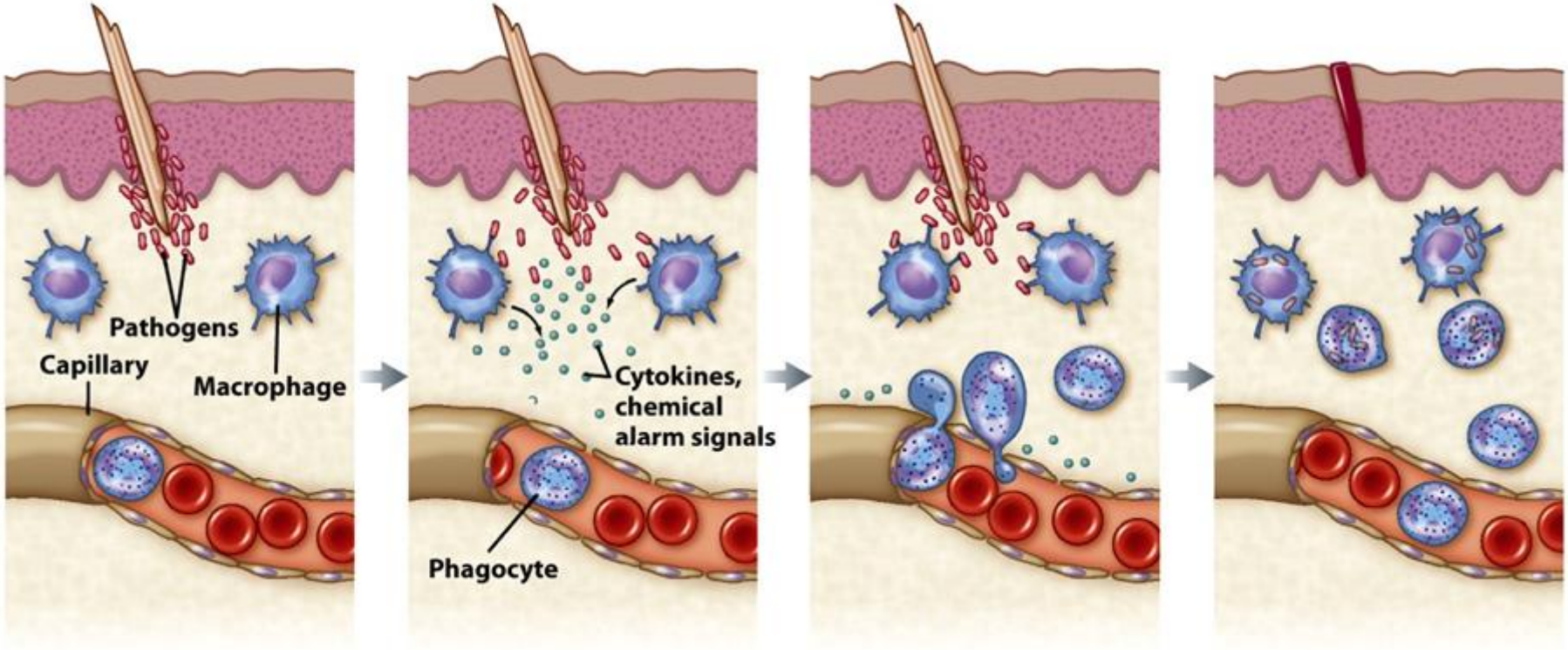


Cellular exudate



Note the large number of neutrophils in the exudate

Acute inflammation of hair follicles



How is acute inflammation brought about?

- Through **chemical mediators,** released from

Cells

Histamine

Prostaglandin

leucotrienes

lysosomal compounds

Plasma

complement system

coagulation system

fibrinolytic system

Effects of acute inflammation

local effects

systemic effects

Systemic effects of acute inflammation

- Fever
- Malaise, anorexia,
- Lymphadenopathy,hepatomegaly, splenomegaly
- High ESR
- Neutrophil leucocytosis in WBC/DC
- Anaemia

Local effects of acute inflammation

- Most local effects are beneficial
- But there are harmful effects .
- Sometimes these could be life threatening

Beneficial effects of acute inflammation

- Dilution of toxins released by microorganisms
- Entry of protective antibodies into the site of inflammation
- Transport of drugs
- Delivery of oxygen and nutrients
- Killing of microorganisms

Harmful effects of acute inflammation

- Destruction of normal tissue
- Swelling acute epiglottitis
  acute meningitis

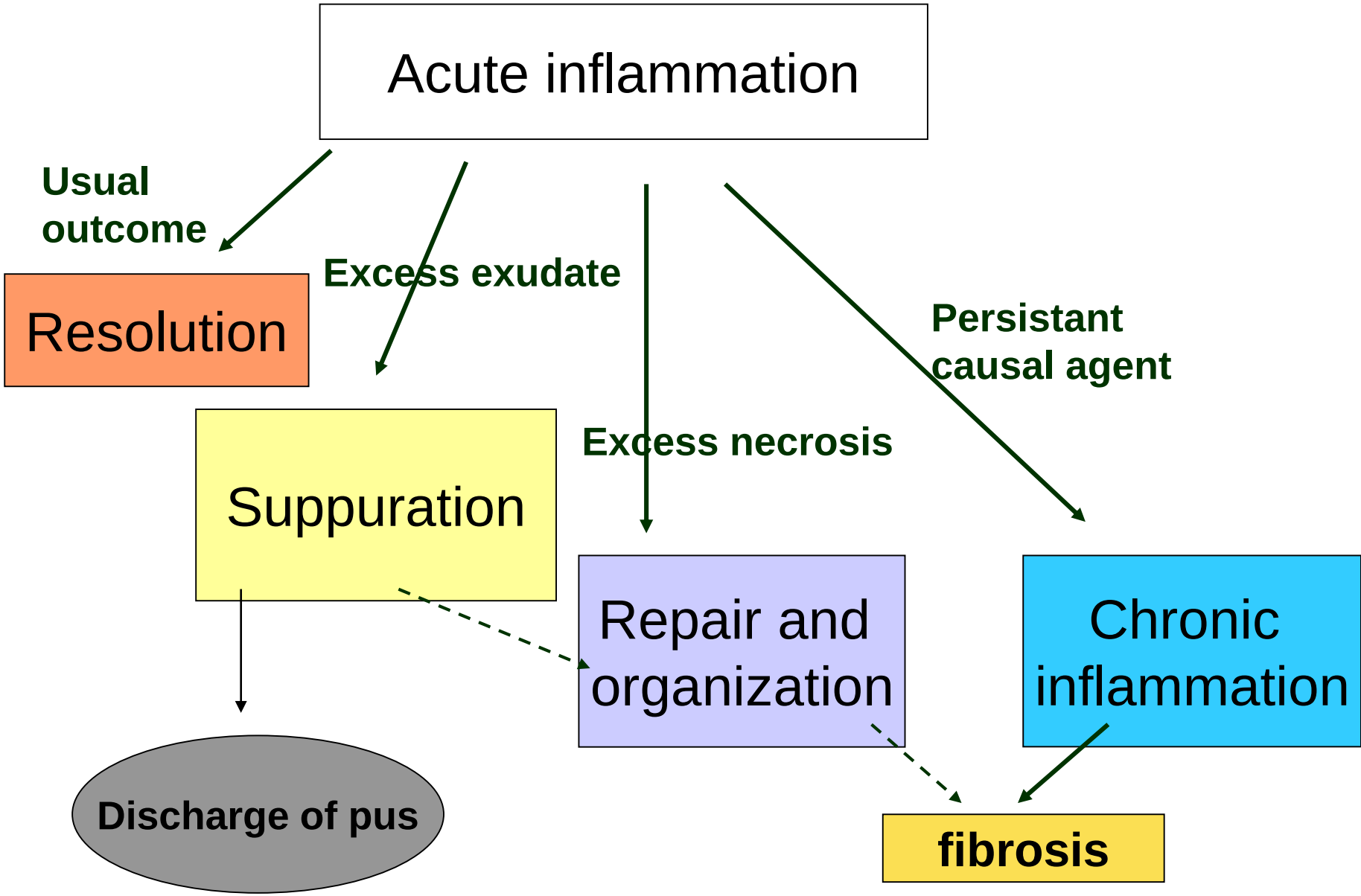
Laryngeal oedema obstructing the airway

Cerebral oedema in acute meningitis, note the heavy exudate over the brain surface

Outcome of acute inflammation

- Depends on
  - type of injury
  - type of tissue involved

Outcome of acute inflammation



Resolution

complete restoration of tissue to normal

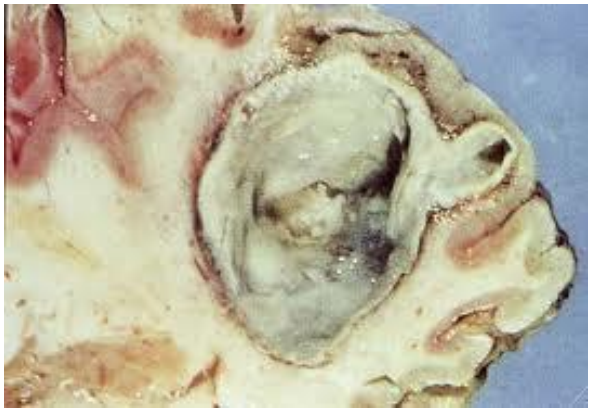
eg; lobar pneumonia

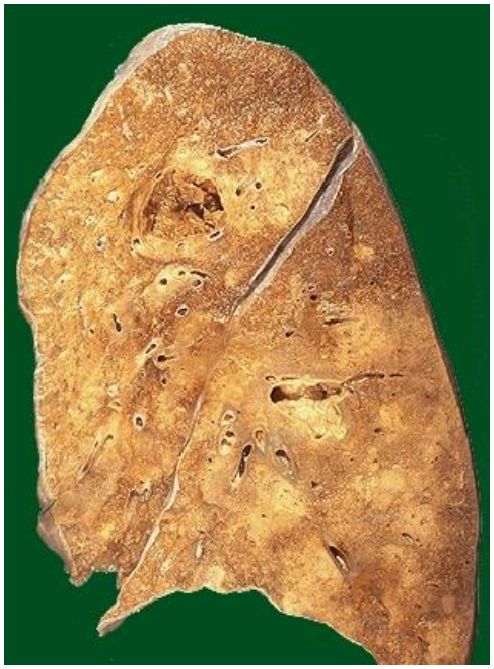
Suppuration

formation of pus- living and dead neutrophils, bacteria and cellular debris.

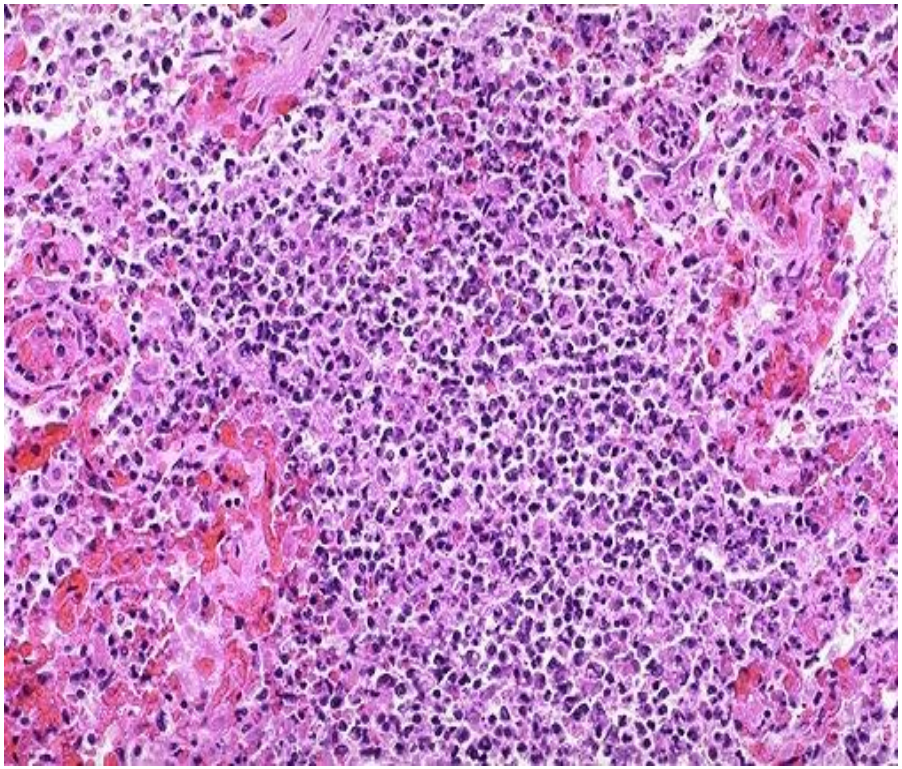
when pus gets encapsulated by a membrane an **abscess** is formed.

Abscess formation





Abscess



There are many dead and living neutrophils

Give a name……

Summary