TUBERCULOSIS

Chronic, transmissible, inflammatory, granulomatous disease, widespread all around the world

Epidemiology:

- 1,7 billion persons are infected by TB worldwide
- 8-10 million of new cases/year
- 1,7 million deaths/year.

TBC is the 2nd most common cause of death for infectious diseases in the world, following AIDS

TUBERCULOSIS

Etiology: Mycobacterium tuberculosis or Koch Bacillus (KB)
KB characteristics: obligate aerobic, rod-shaped, alcohol-acid resistant (Mycolic acids in the bacterial cell wall), appears in red color after Ziehl-Neelsen staining

INFECTION ≠ DISEASE

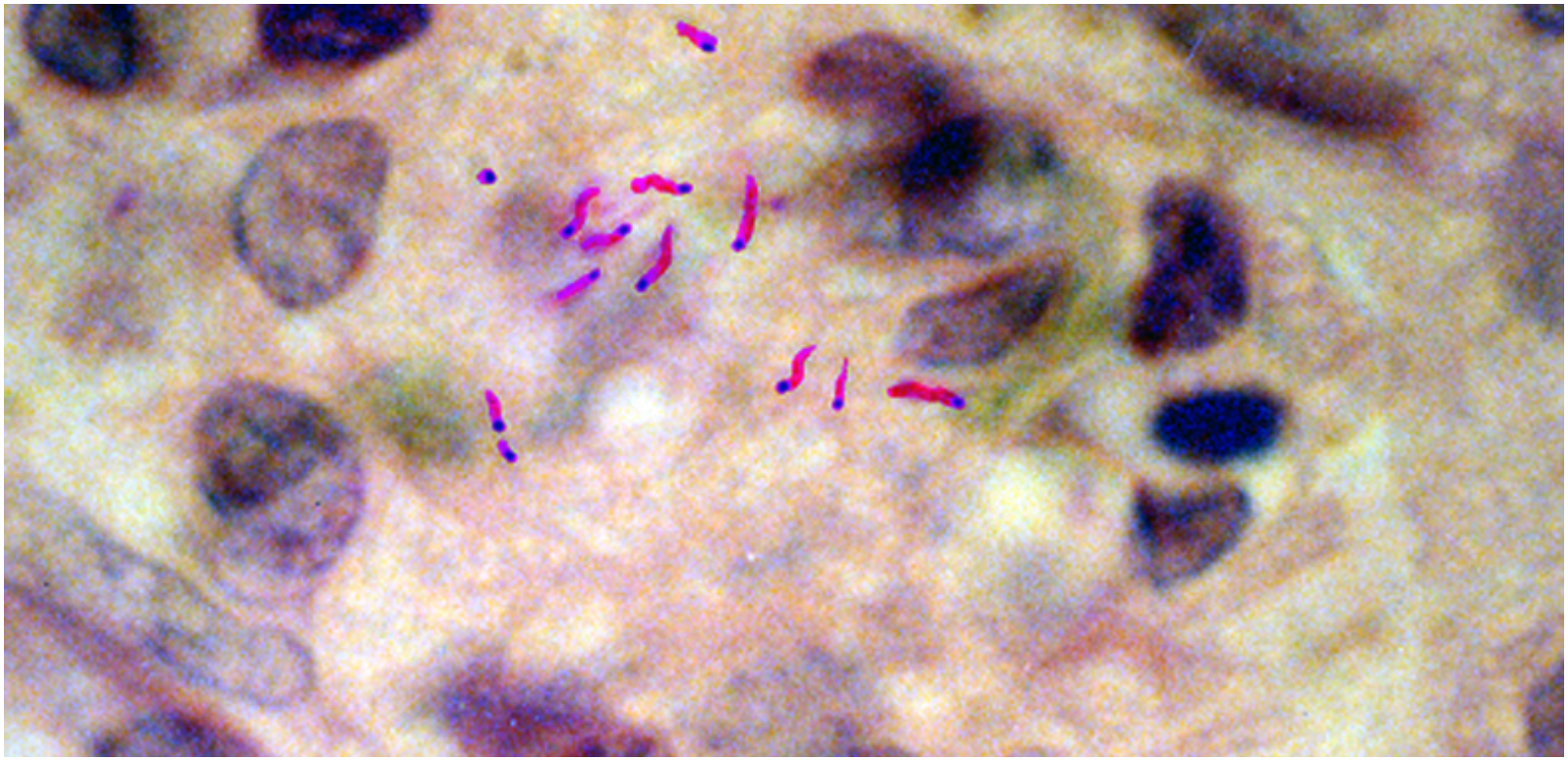
INFECTION:

Bacterium contact

Bacterium penetration in the organism (primarily transmitted through the air)

Development of immune response (positive cutaneous tests:Mantoux Test)

Ziehl-Neelsen staining



TUBERCULOSIS

Tuberculin test (Mantoux)

- intradermal-reaction with purified protein derivatives (PPD) of the Mb. Tubercolosis -- palpable nodule after 48-72 h = cellular hypersensitivity-mediated by tubercular antigens

- non-differentiating infection / overt-apparent disease

False negative reactions:

- Viral infections, sarcoidosis, malnutrition, Hodgkin's disease, immunosuppression and hyperacute tyberculosis

False positive reactions:

- Atypical Mycobacterial infections

TUBERCULOSIS

Routes of penetration

- Aerogenic
- Digestive tract
- Skin and Mucous membranes
- Placenta

Favoring conditions

- Poverty, overcrowding, immunedeficiency states, chronic debilitating diseases

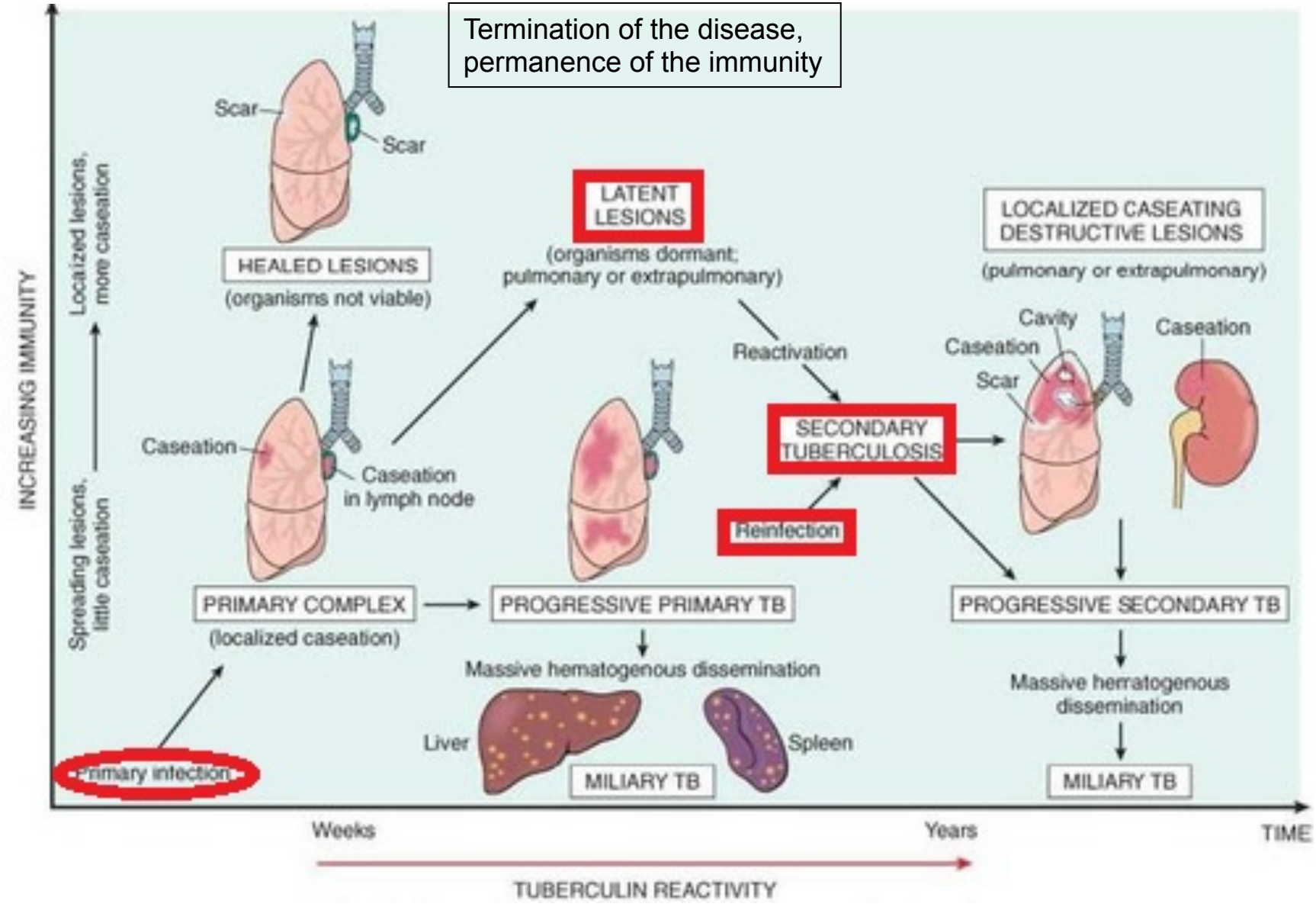
DISEASE → Development of chronic tissue lesions, progressive

Routes of diffusion

- Lymphatic (primaryTB)
- Haematogenous (secondary or post-primary TB)
- Intracanalar

TUBERCULOSIS

Termination of the disease,
permanence of the immunity



TUBERCULOSIS

Phases of the disease

1 - **Primary period**
(primary TB)

→ Ghon's primary complex

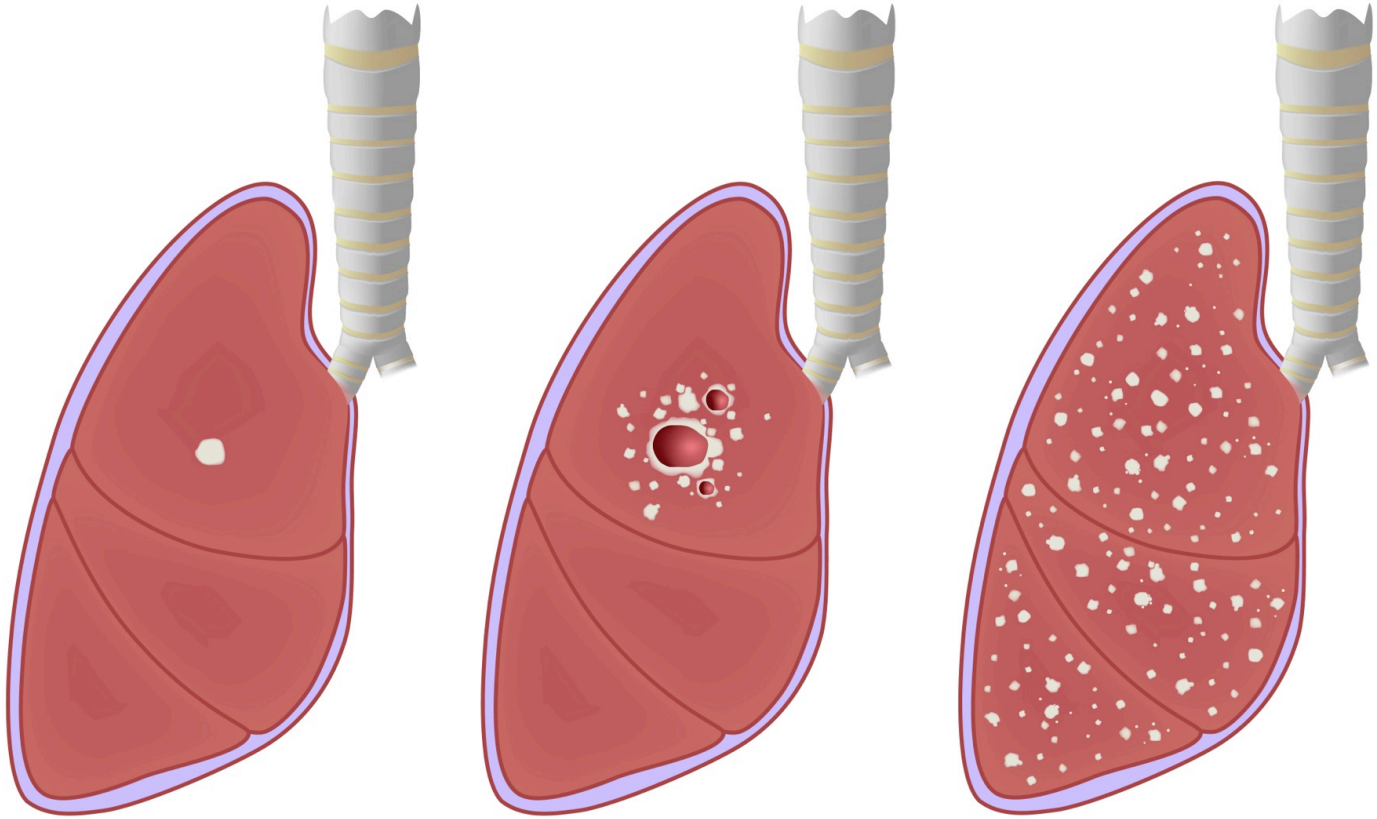
— Primary outbreak
Lymphagitis
Satellite Lymphadenitis

2 - **Secondary period**
or post-primary
(secondary TB)

→ Re-infection
Reactivation

— Lungs
Lymph nodes
Bowel
Fallopian tubes & uterus
Liver

Tuberculosis



Latent infection

Cavitary tuberculosis

Miliary tuberculosis

TB lesions: morphology

- Exudative TB
- Passage forms
- Productive TB

Exudative form ← High receptivity (uneffective immune reaction)
Bacterial overload

↓

Exudate: serum-fibrin-haemorrhagic + granulocytes, lymphocytes, macrophages, etc.

colliquation

Caseous necrosis: demarcation and encapsulation (fibrosis, calcification)

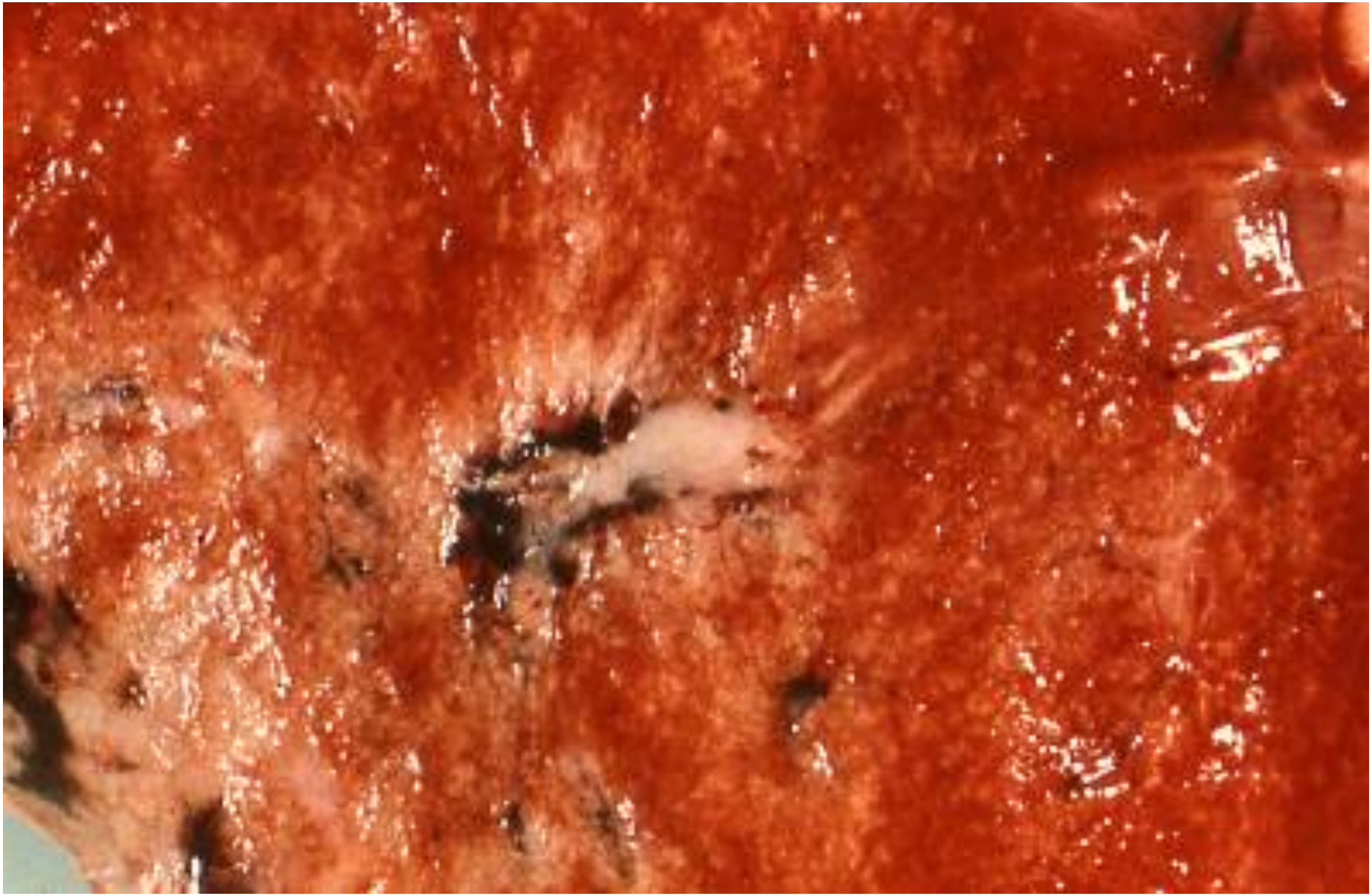
Productive form ← Mildly effective immunity
Moderate bacterial load

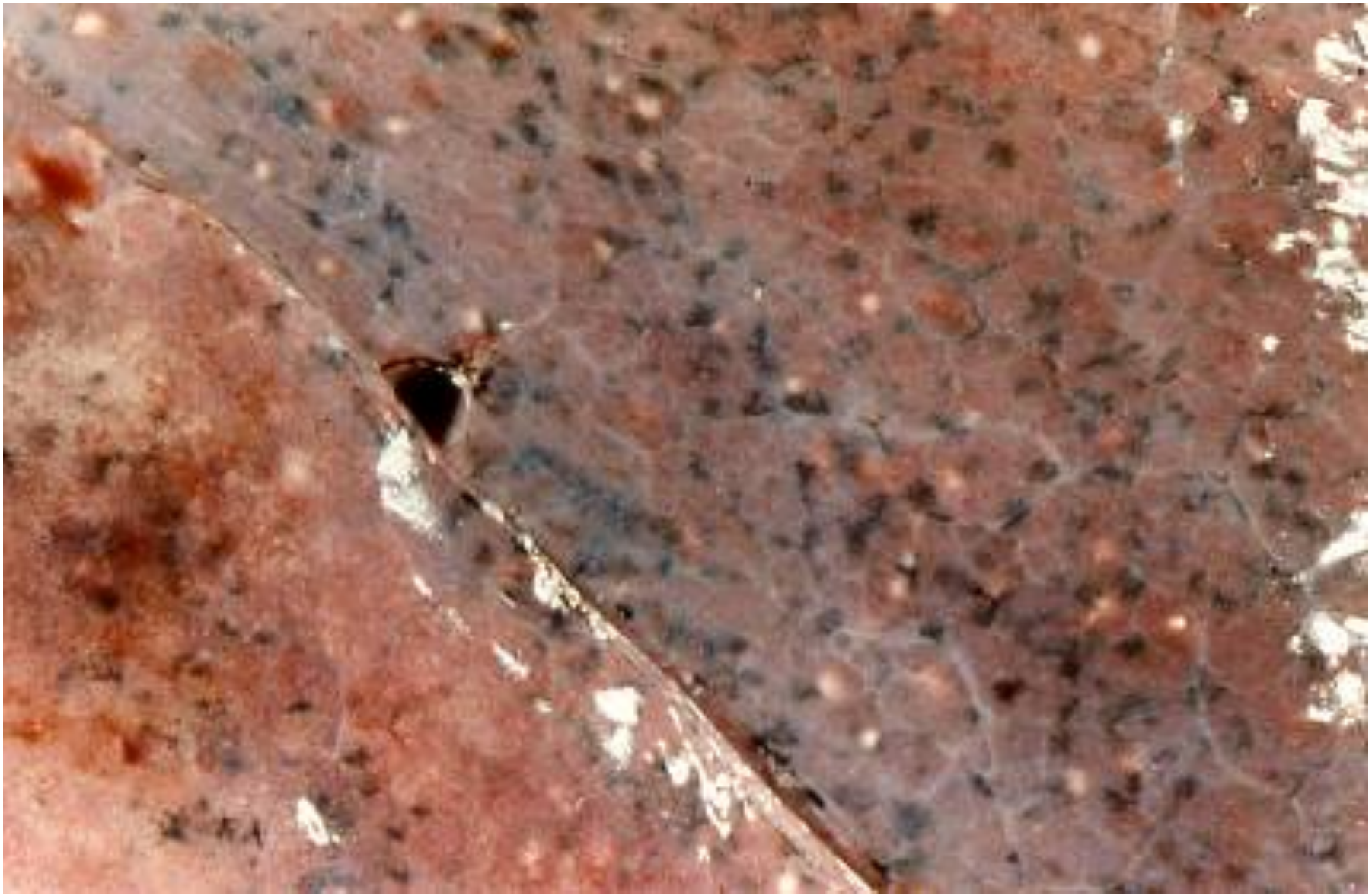
↓

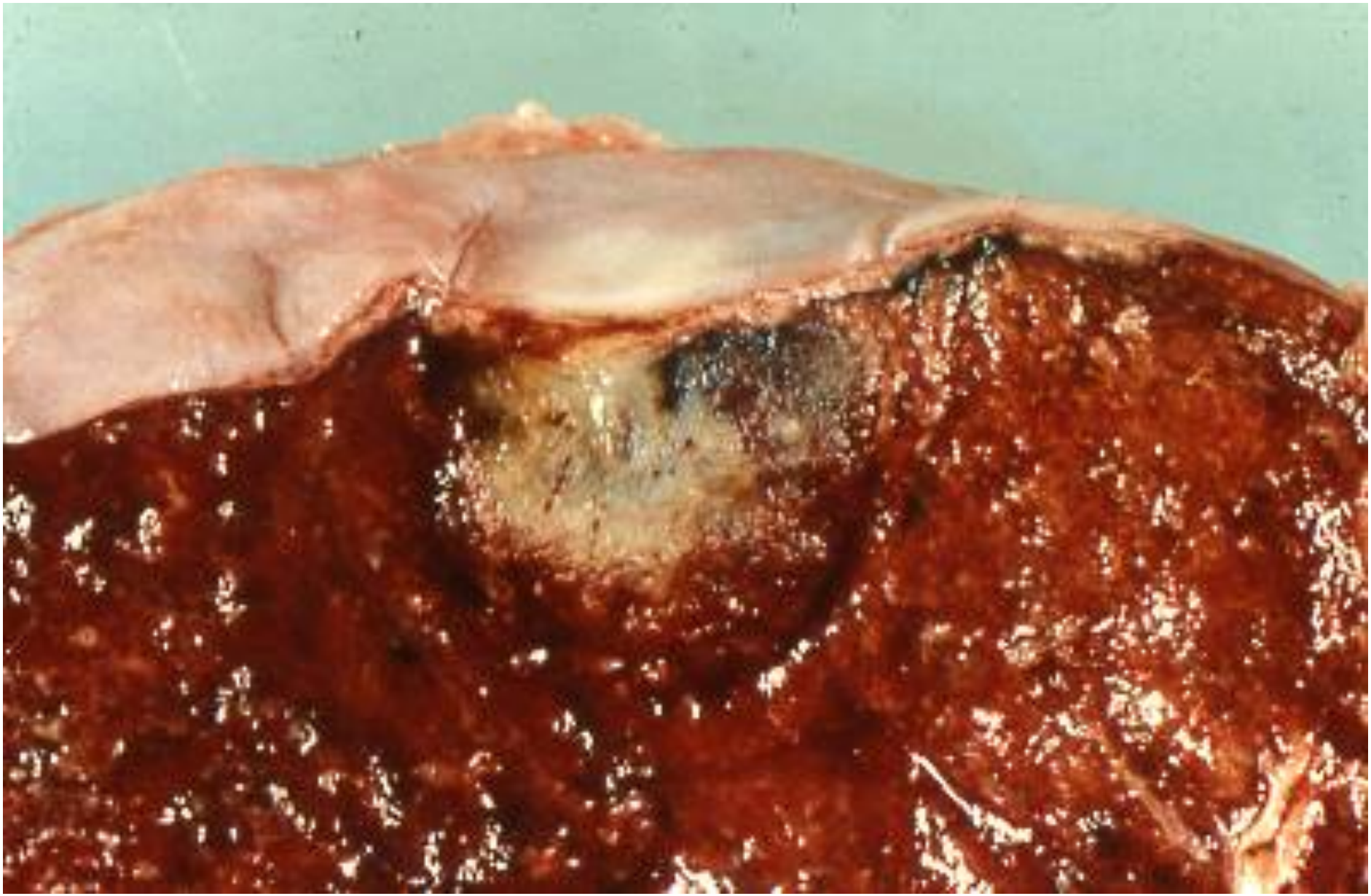
Tuberculin

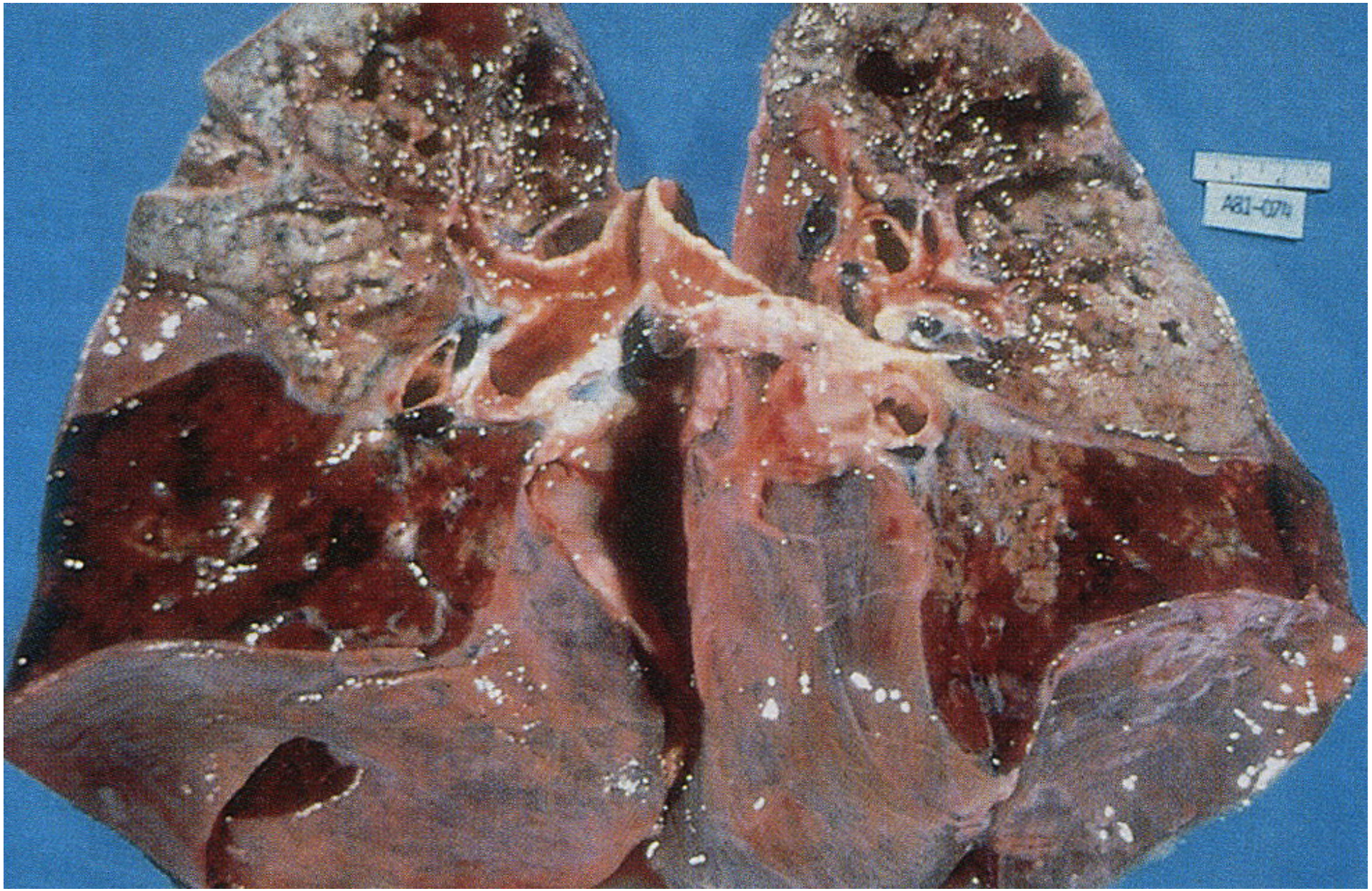
Specific histogenic reaction against KB
Nodule formation, initially submicroscopic

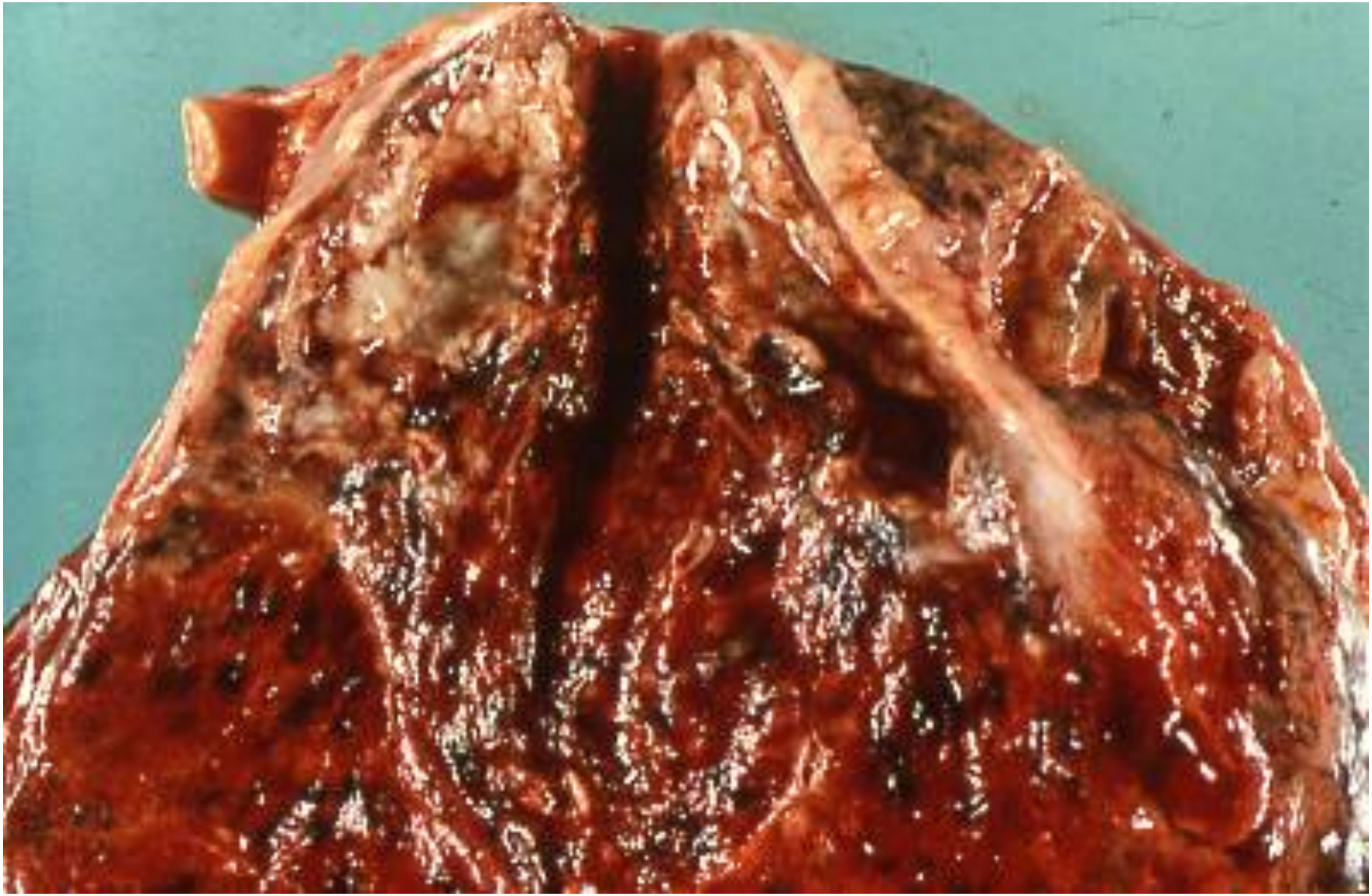
- Crude tubercle
- Primary Laennec tubercle (cooked)
- Miliary tubercle
- Conglomerate tubercle
- Tuberculoma











TB GRANULOMA

Dimensions: from less than 1mm until few cm.

Histology: epitheliod cells
multinucleated giant cells (Langhans cells)
lymphocytes, histiocytes, plasma cells, fibroblasts.

CASEOUS NECROSIS — In the center of granuloma

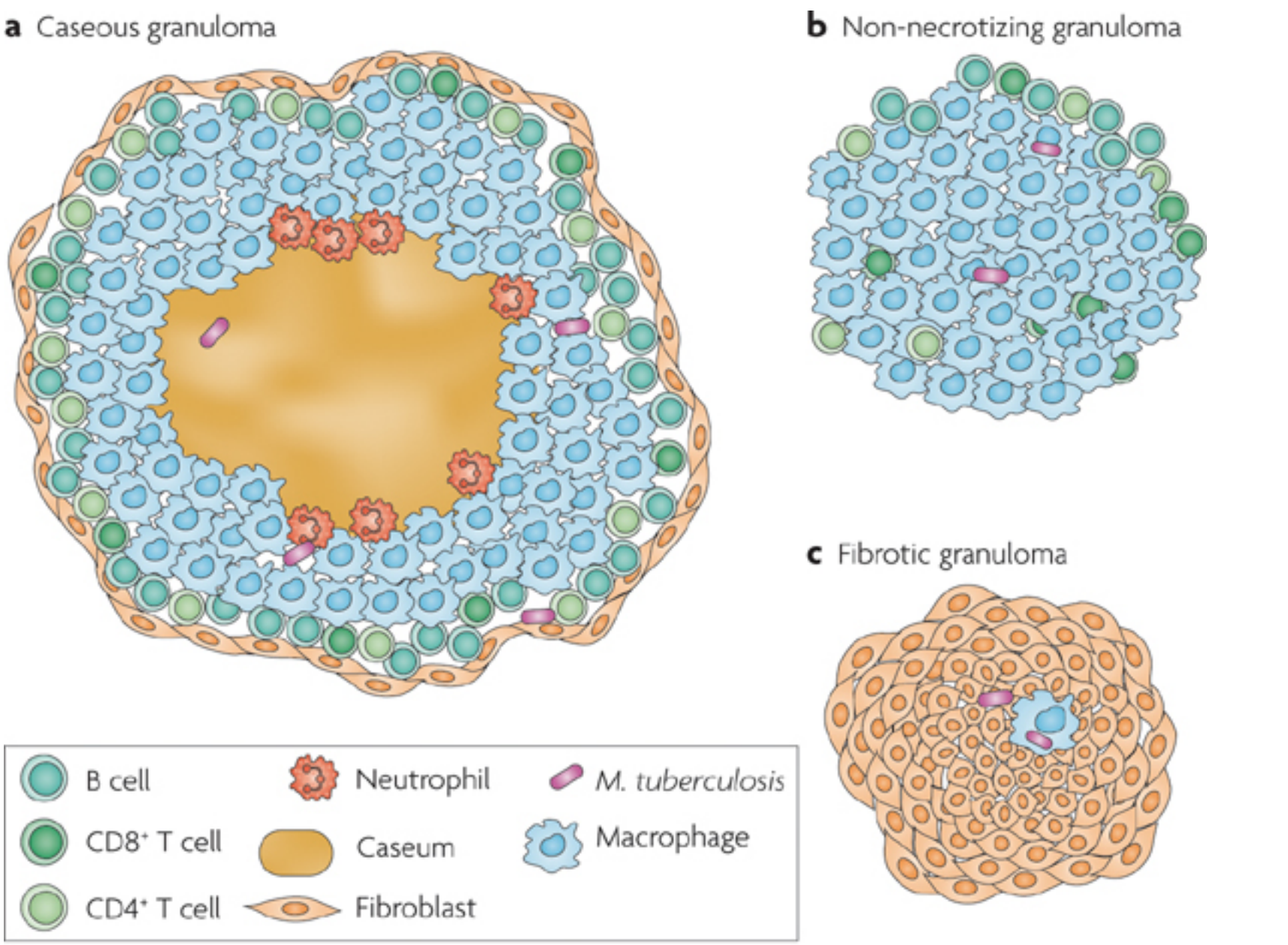
Amorphous, acidophilic material, constituted by minor proteic and lipidic granulations
Cancellation of pre-existing structures
Persistence of elastic fibers and vessel walls
Absence of bacilli (relative anoxia, decreased pH)

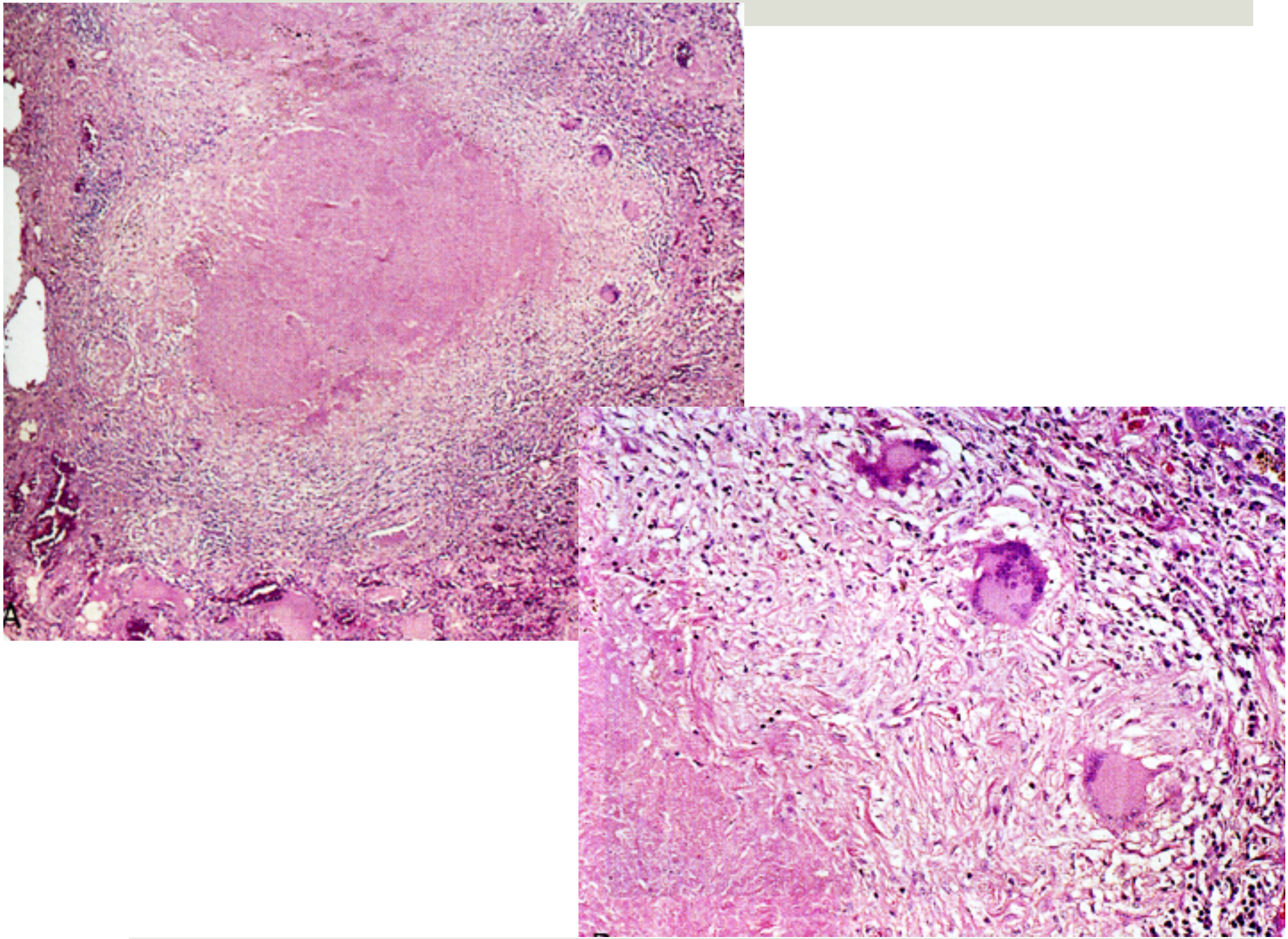
Evolution of the tubercle

Fibrosis

Calcification

Fluidification — Cold abscess
Evacuation towards the outside or in a natural body cavity (cavern, ulcer, fistula)


a Caseous granuloma
b Non-necrotizing granuloma
c Fibrotic granuloma
B cell
CD8⁺ T cell
CD4⁺ T cell
Neutrophil
Caseum
Fibroblast
M. tuberculosis
Macrophage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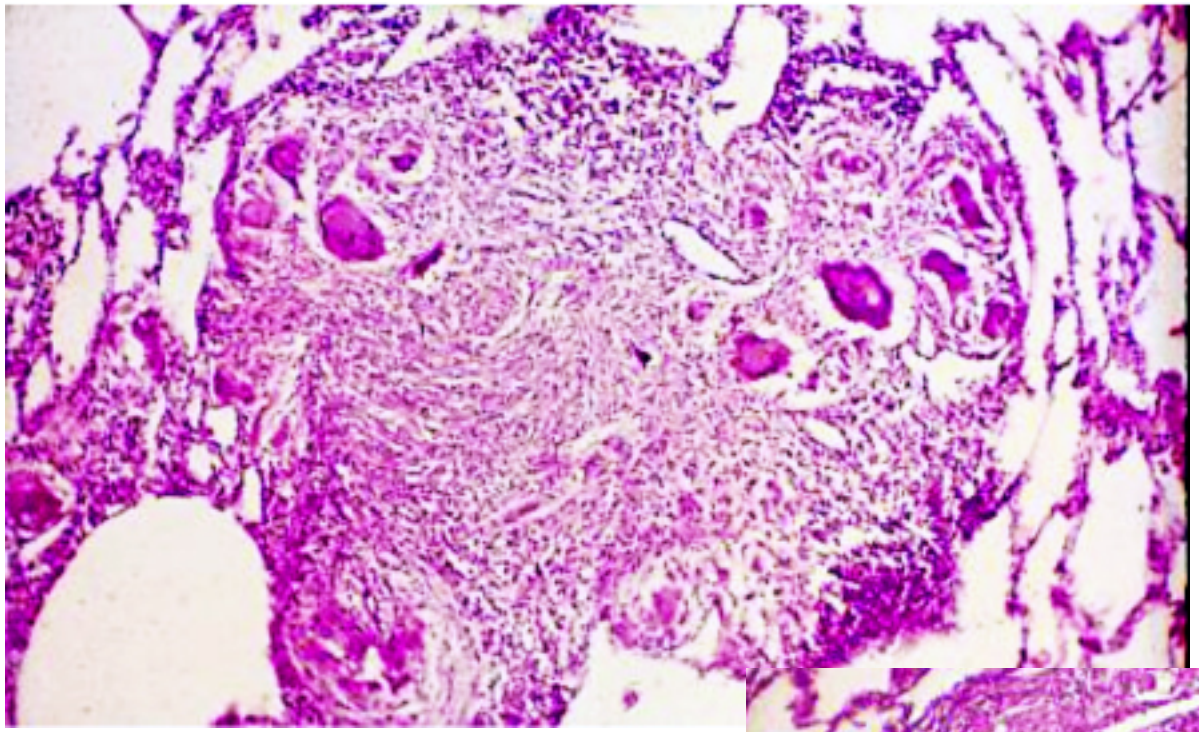
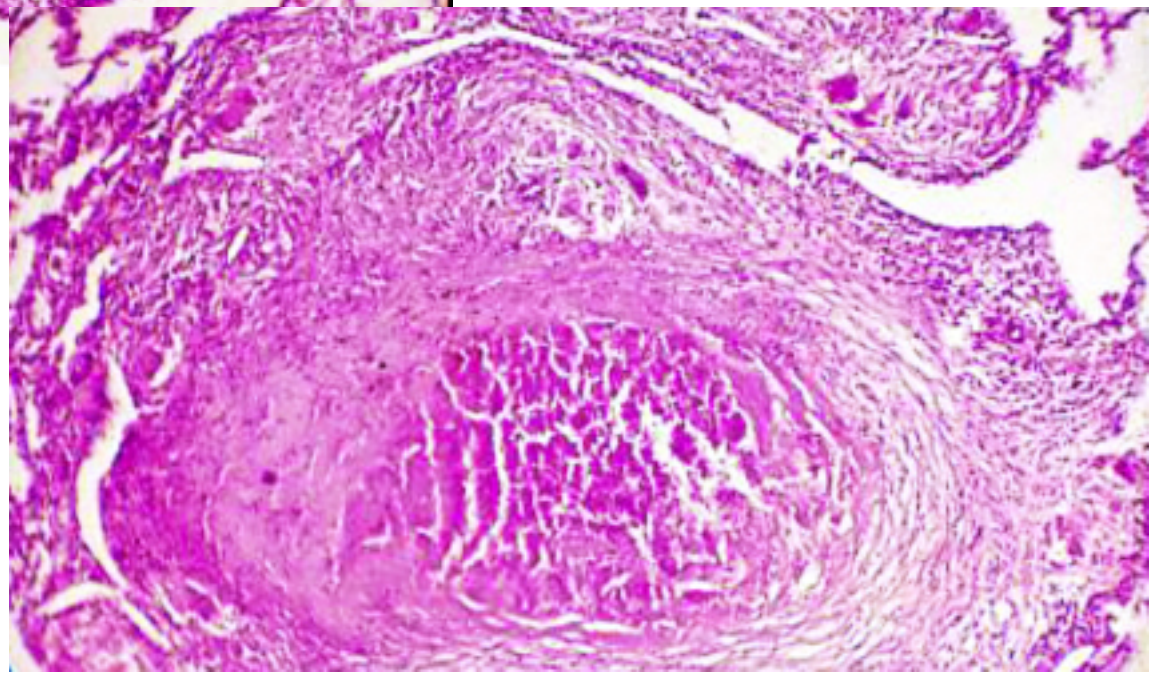


Non-caseating tubercle



Caseating tubercle

Langhans Cells