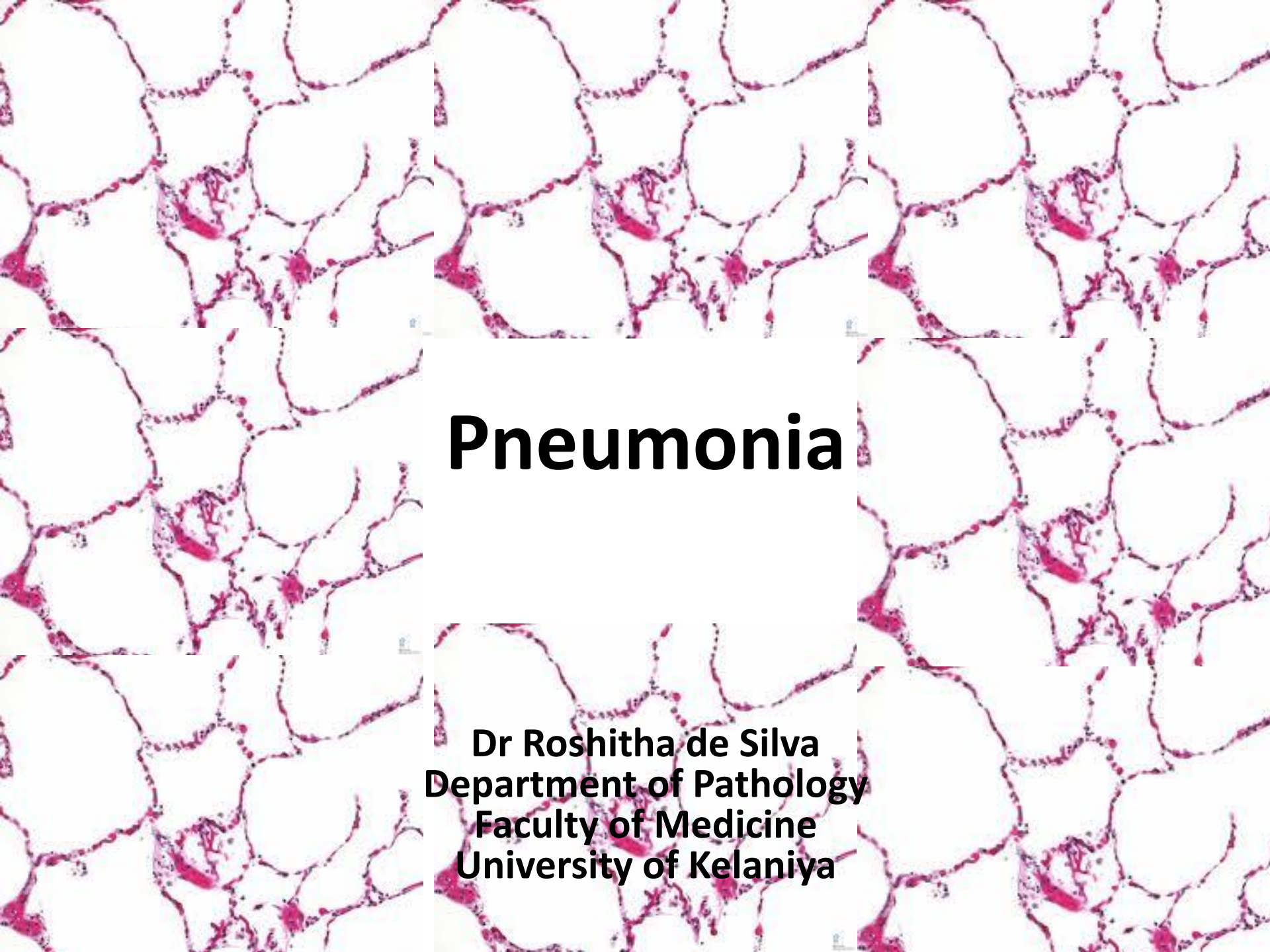

Pneumonia

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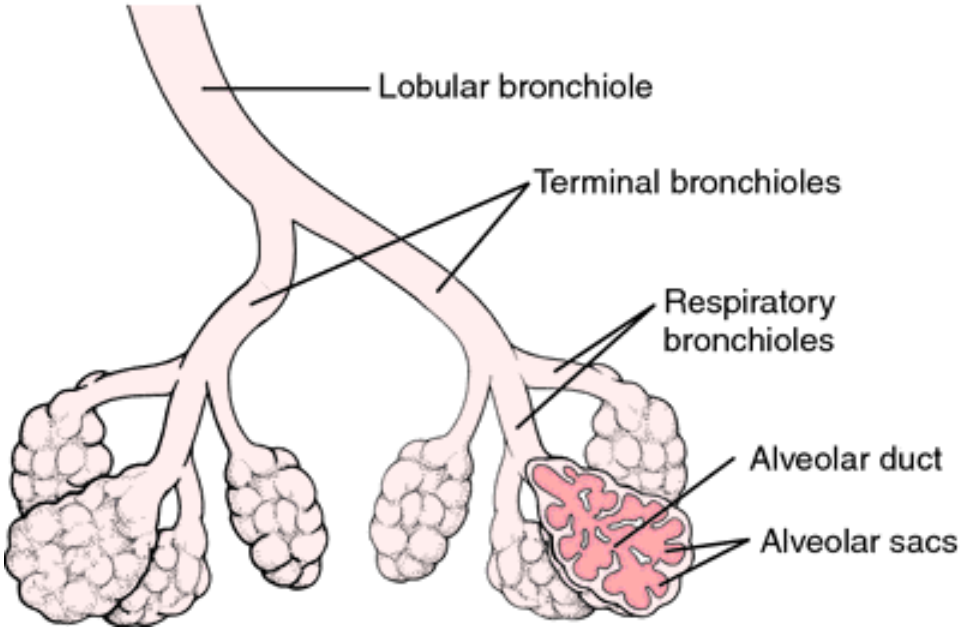
Pneumonia

- Acute inflammation of lung parenchyma distal to the terminal bronchioles
- Consist of
  - Respiratory bronchiole
  - Alveolar ducts
  - Alveolar sacs
  - Alveoli



Pneumonia Pathophysiology

Microbial pathogens enter the lung by:

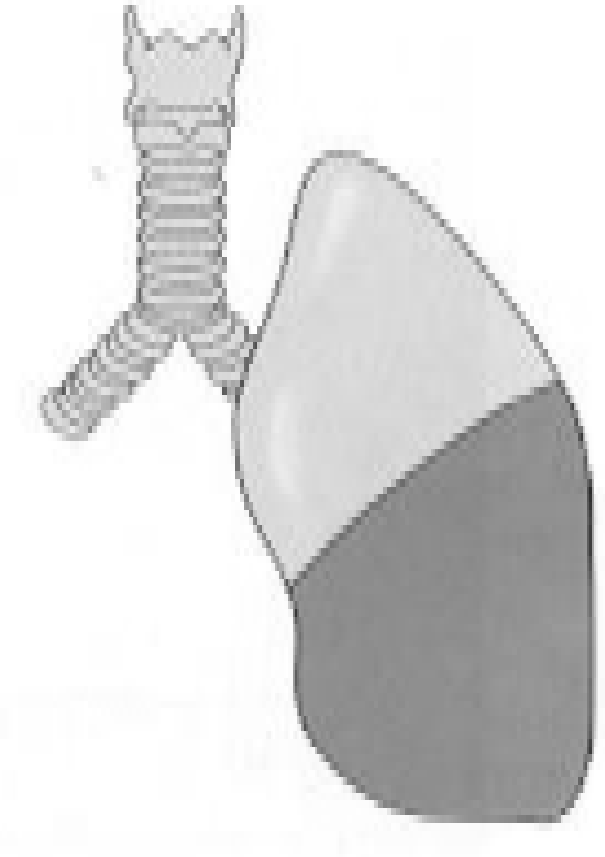
- Inhalation of infectious aerosols
- Hematogenous dissemination
- Aspiration of organisms from oropharynx
- Tracheal intubation

Classification

- Aetiology
  - Bacteria
  - Virus
  - Fungal
- Site
  - Lobar pneumonia
  - Bronchopneumonia
  - Interstitial pneumonia
- Patient setting
  - Community acquired
  - Hospital acquired
- Immune status
  - Healthy
  - Immuno-compromised

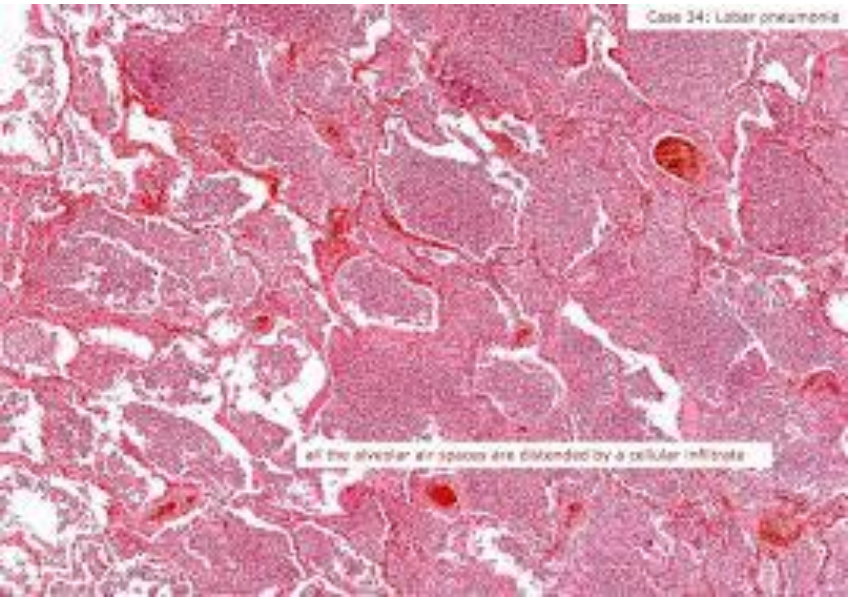
Lobar pneumonia

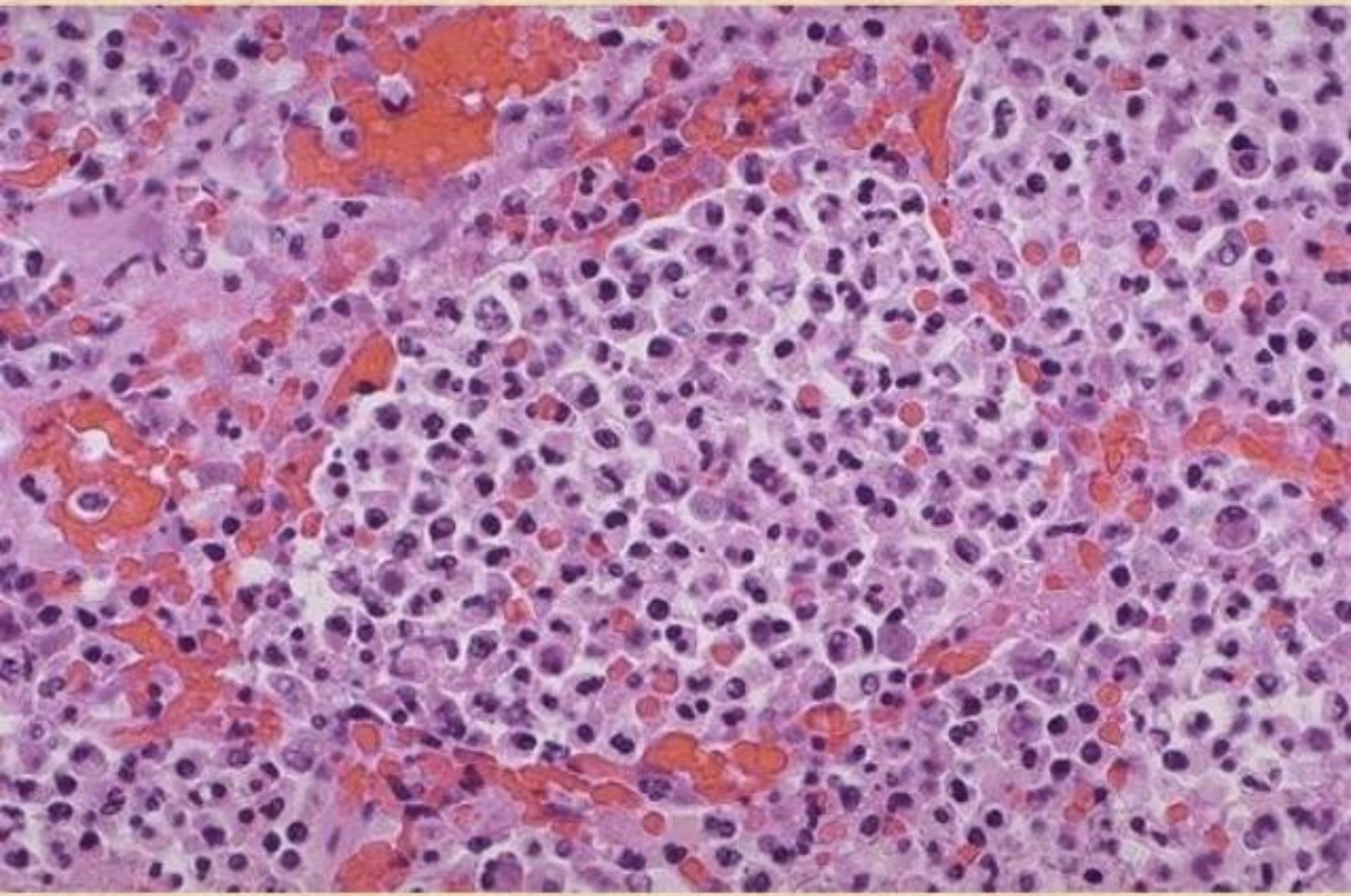
- Acute bacterial infection of an entire lobe or a part of the lobe
- 95 % of cases by Streptococcus pneumoniae
- Lobar pneumonia evolves in four stages.
  - Congestion
  - Red hepatisation
  - Grey hepatisation
  - Resolution



Congestion (1 to 2 days)

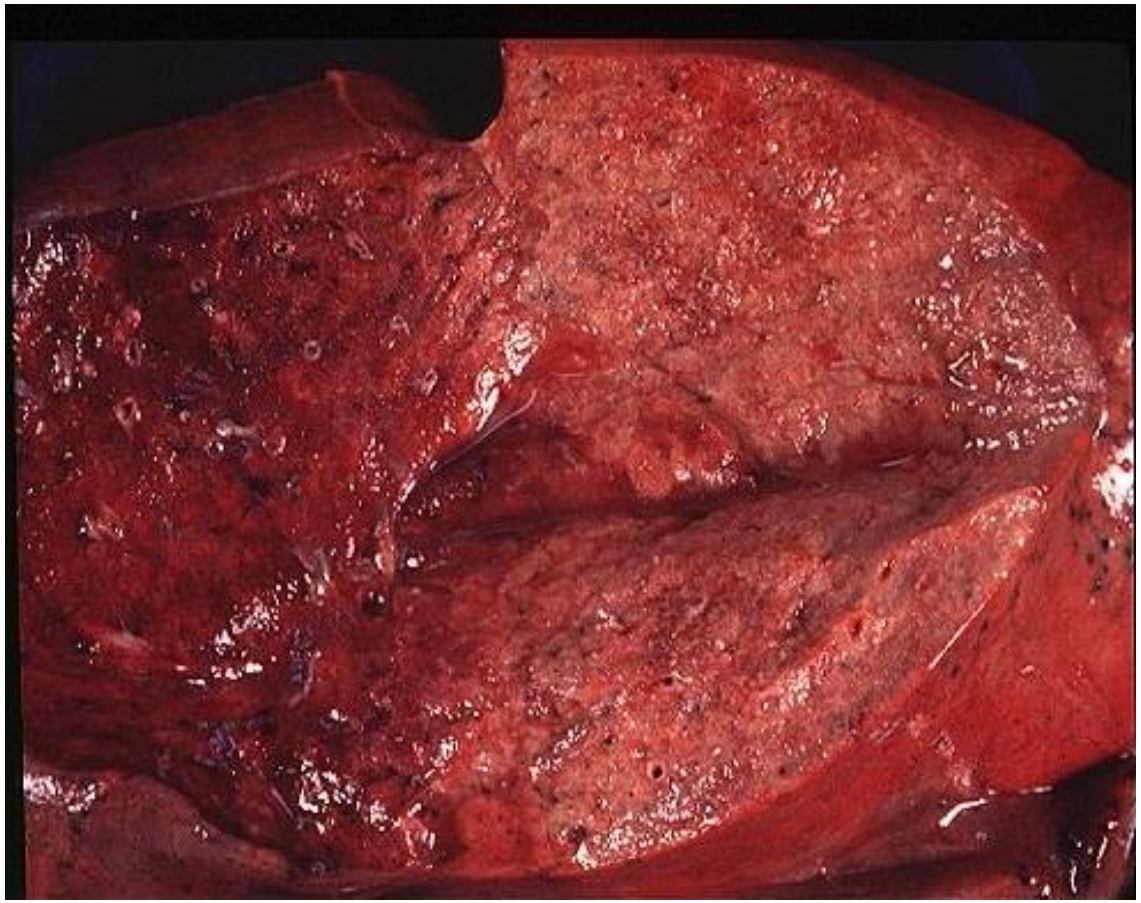
- Micro
  - Dilatation and congestion of capillaries in the alveolar walls
  - Pale eosinophilic oedema fluid in the air spaces
  - Numerous bacteria in the alveolar fluid
  - Few rbc and neutrophils in the intra-alveolar fluid





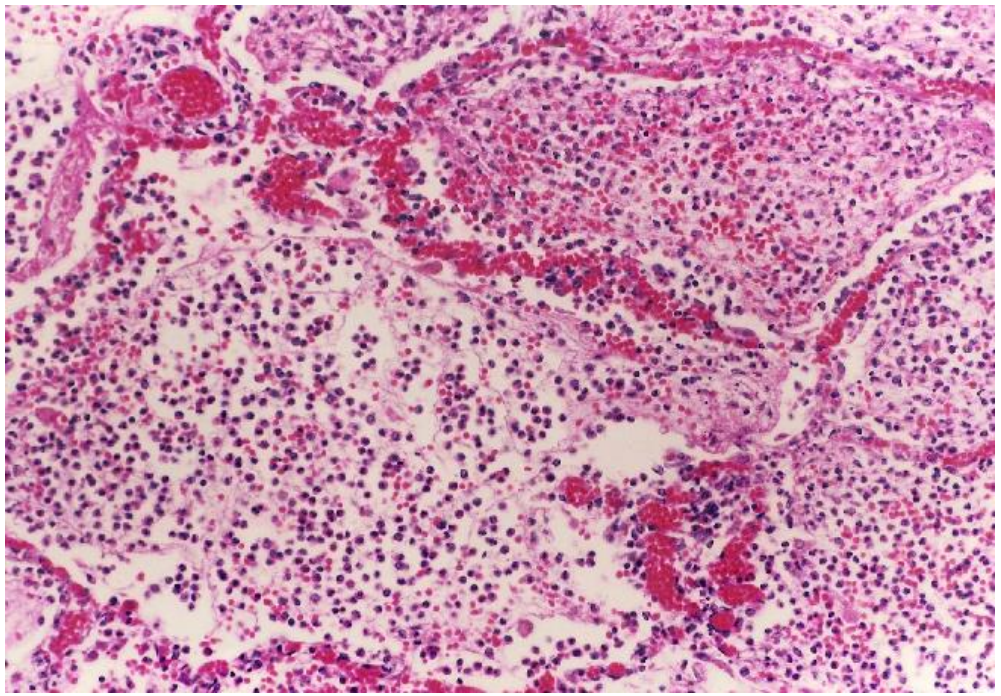
Congestion

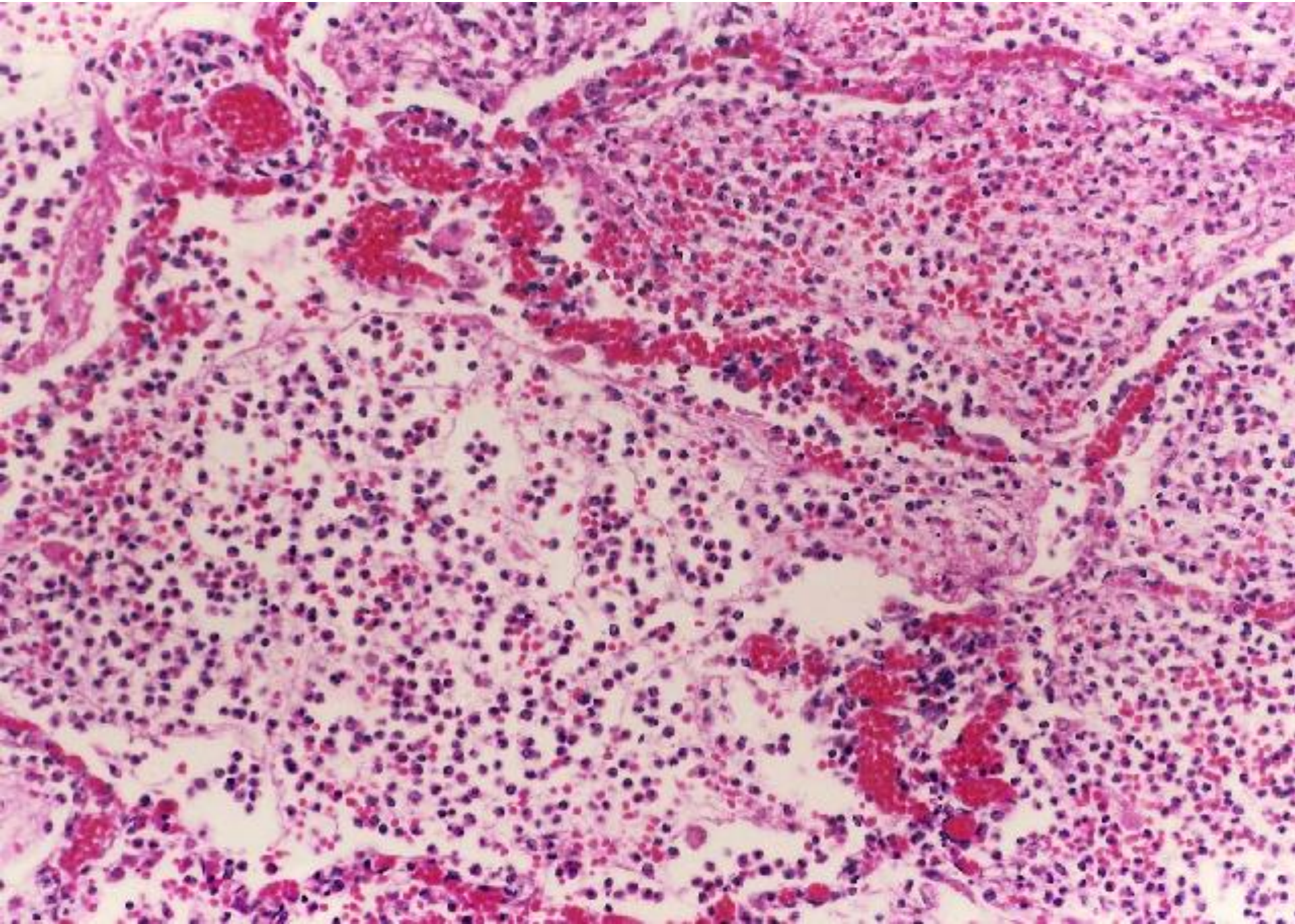
- Early acute inflammatory response to bacterial infection.
- Macro
  - Enlarged
  - Heavy
  - Dark red
  - Congested



Red Hepatisation (2-4 days)

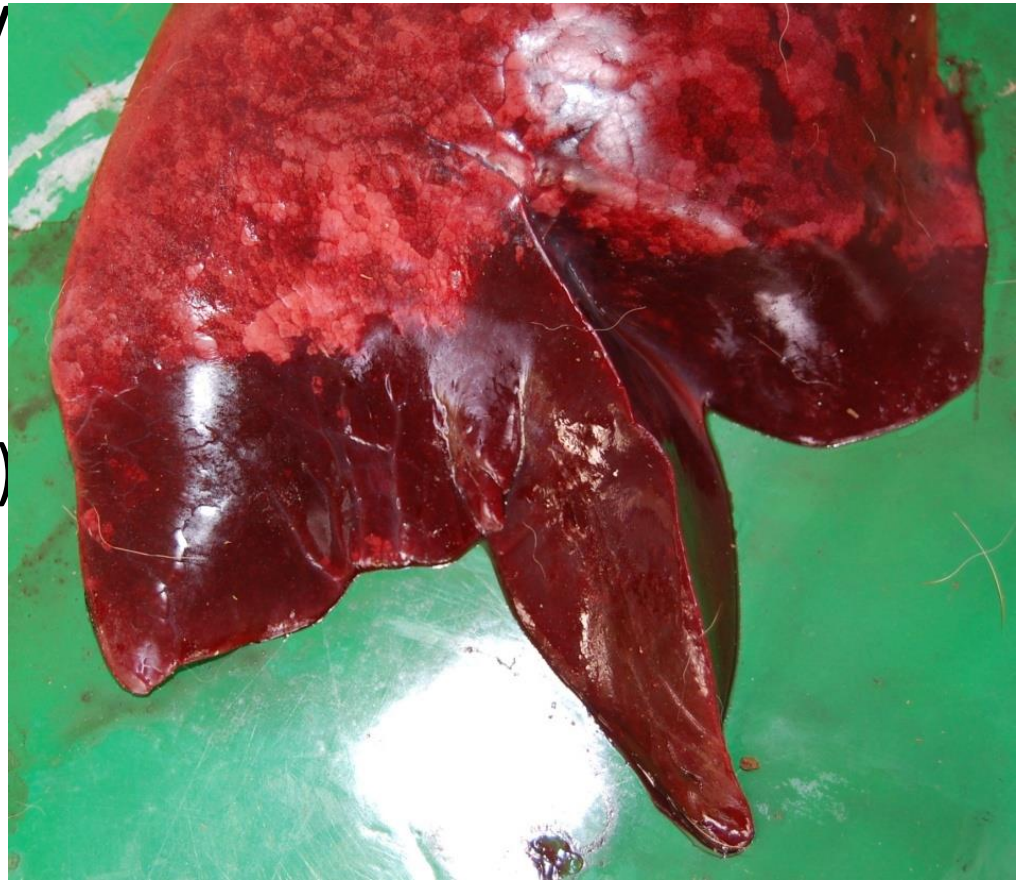
- Micro
  - Oedema fluid is replaced by strands of fibrin
  - Marked cellular exudate of neutrophils and extravasated rbc





Red Hepatisation

- Liver-like consistency
- Macro
  - Red
  - Firm
  - Consolidated (airless)
  - Cut surface
    - Airless
    - Dry

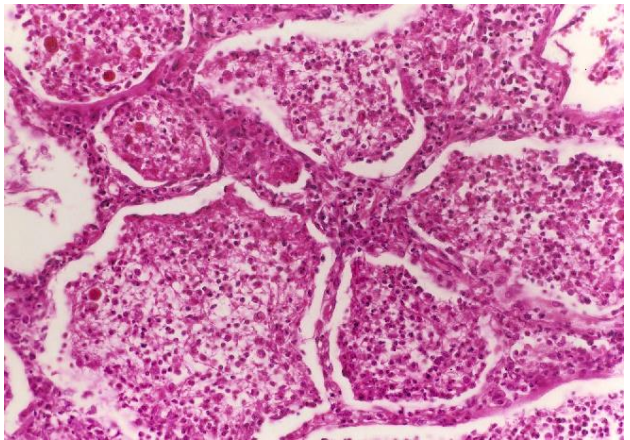


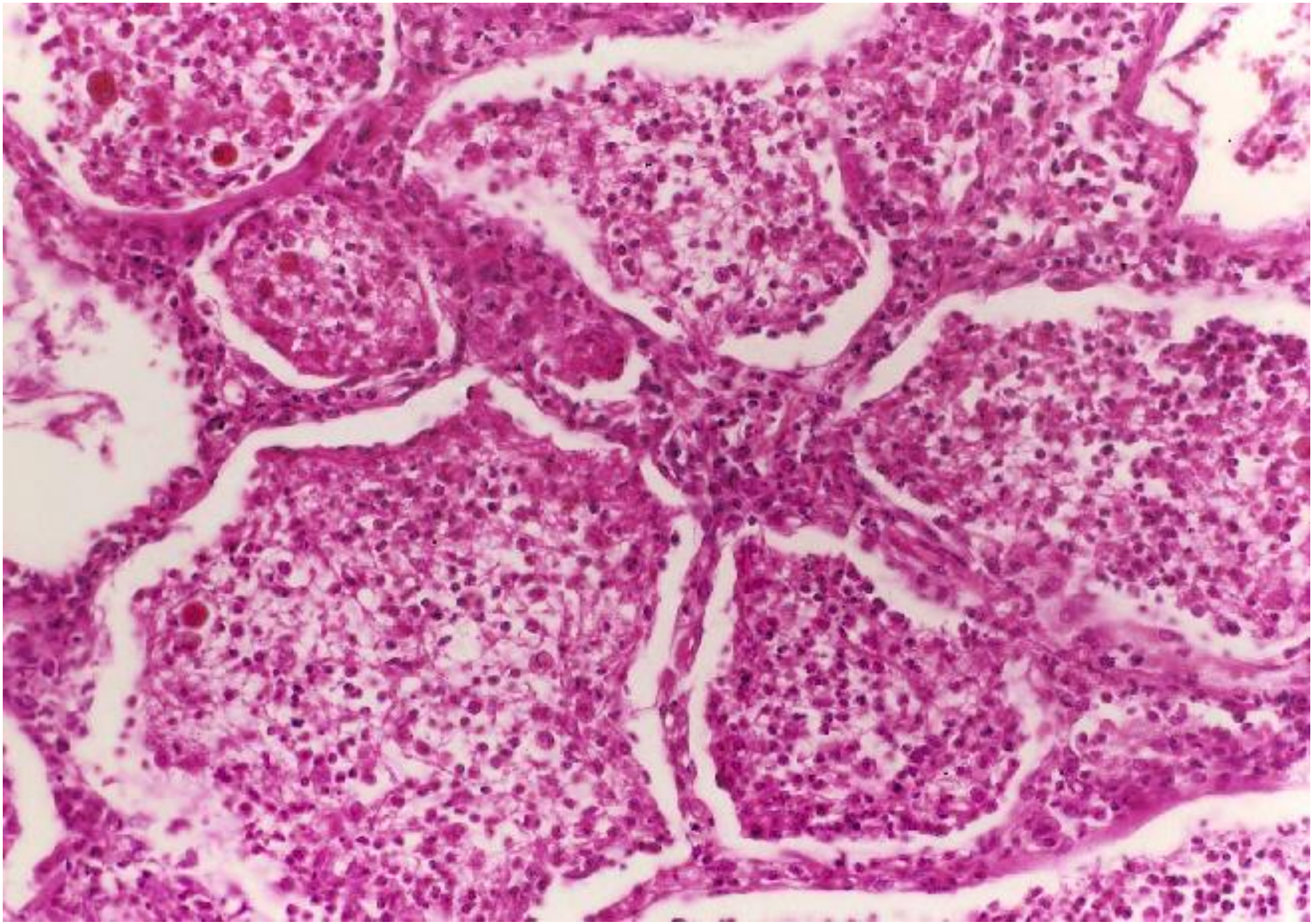
Pleuritis

- A pleural reaction is also associated if the consolidation extends to the surface
- Inflammation of the pleura
- Fibrinopurulent exudate→pleural effusion
- Exudate
  - Resorbed
  - Organized by fibroblasts
    - Leading to fibrous thickening
    - Adhesions → fibrinous tags

Grey Hepatisation (4-8 days)

- Micro
  - Fibrin strands are dense and more numerous
  - Cellular exudate of neutrophils is reduced
  - rbc are sparse
  - Macrophages begin to appear
  - Cellular exudate is often separated from the septal walls by a thin clear space
  - Organisms are less





Grey Hepatisation

- Macro
  - Firm
  - Heavy
  - Cut surface
    - dry
    - Granular
    - Grey

Resolution
(Begins by 8th day completed in 1-3 weeks)

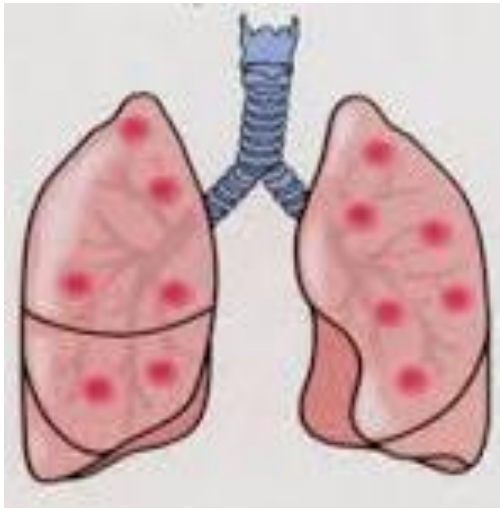
- Macs are the predominent cells in alveolar spaces
- Fragments of fibrin seen in alveolar spaces
- Alveolar capillaries are engorged
- Collected fluid removed
  - Lymphatics
  - Expectoration
- Restoration of normal lung parenchyma
- Pleuritis may resolve or undergo organisation→fibrous thickening or permanent adhesions

Resolution

- Macro
  - Solid fibrinous material is liquefied by enzymatic action
  - This restores the normal aeration
  - Cut surface
    - Dirty brown
    - Pleural reaction show resolution

Bronchopneumonia

- Infection of the terminal bronchioles
- First cause bronchiolitis→spread through resp passage→reach alveoli
- Results in patchy consolidation
- Common in
  - Extremes of life
  - 2^{ry} infection following viral infection
  - Chronic debilitating illness



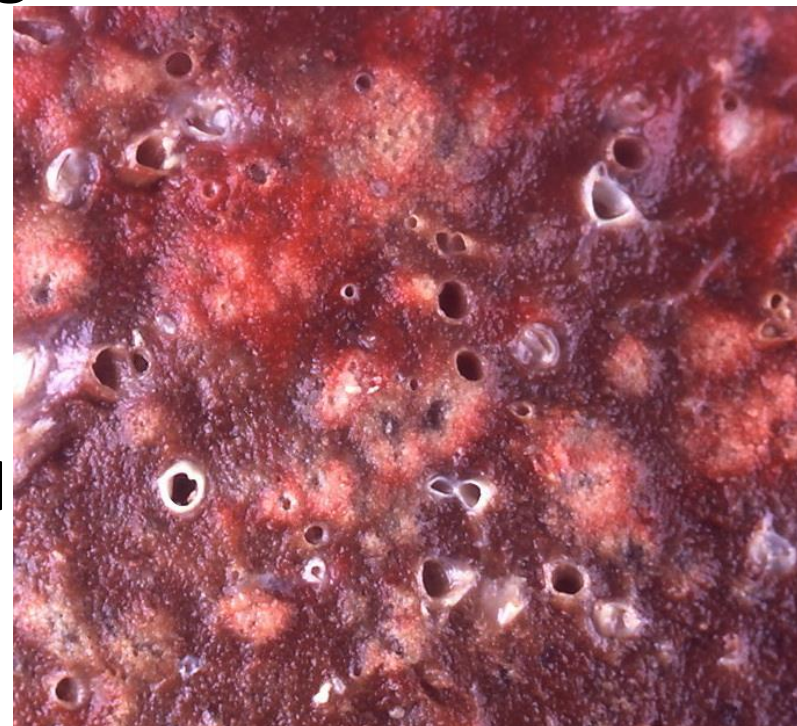
Bronchopneumonia

- Common causative organisms
  - Staphylococci
  - Streptococci
  - Pneumococci
  - *Klebsiella pneumoniae*

Bronchopneumonia morphology

Macroscopy

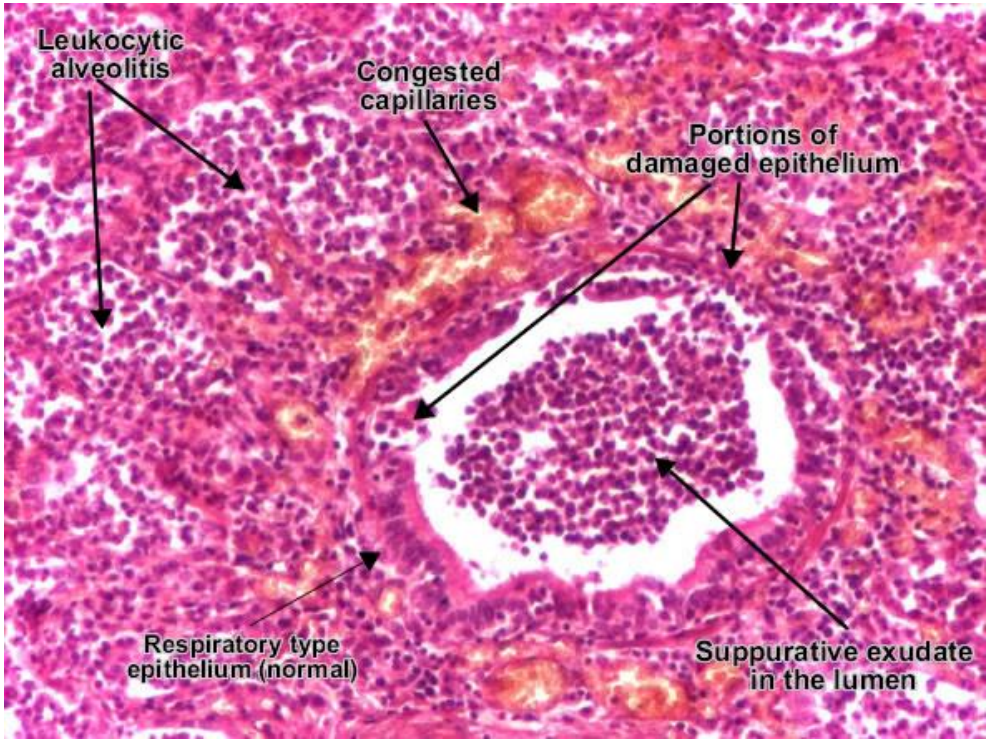
- Frequently bilateral
- Patchy areas of red/grey consolidation
- More often involves the lung bases
- Cut surface
  - 3-4 cm in diameter
  - Poorly demarcated margins
  - Elevated, dry, granular, firm
  - Centered around a bronchiole
- Unaffected areas appear normal

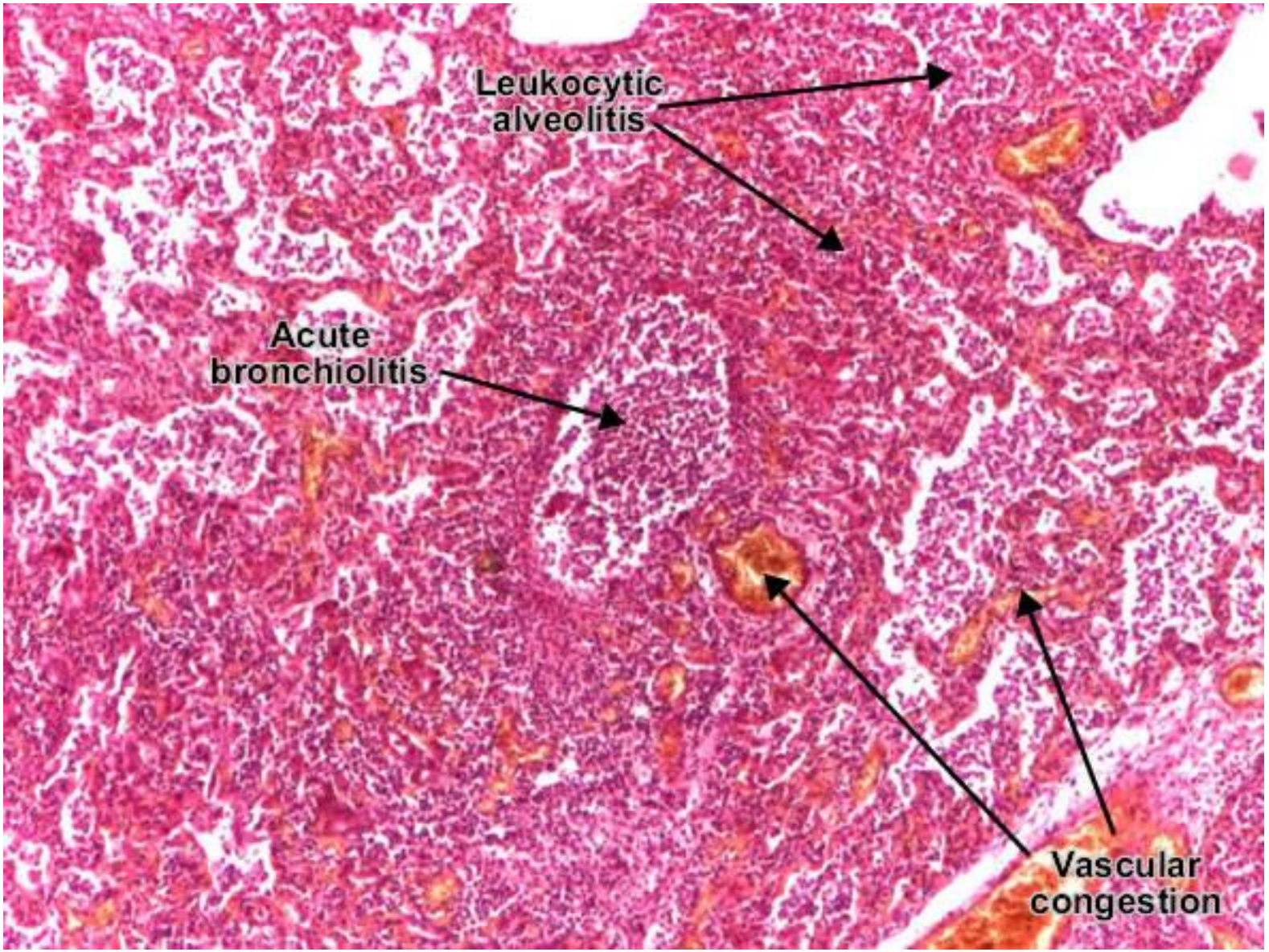


Bronchopneumonia morphology

Microscopy

- Acute bronchiolitis
- Suppurative exudate in bronchioles
- Inflammation in surrounding alveoli
- Less involved alveoli contain oedema fluid




Leukocytic alveolitis
Acute bronchiolitis
Vascular congestion

Complications

- Organisation
  - Resolution does not occur
  - Fibrosed, tough, airless leathery lung tissue
  - Results in carnification

Complications

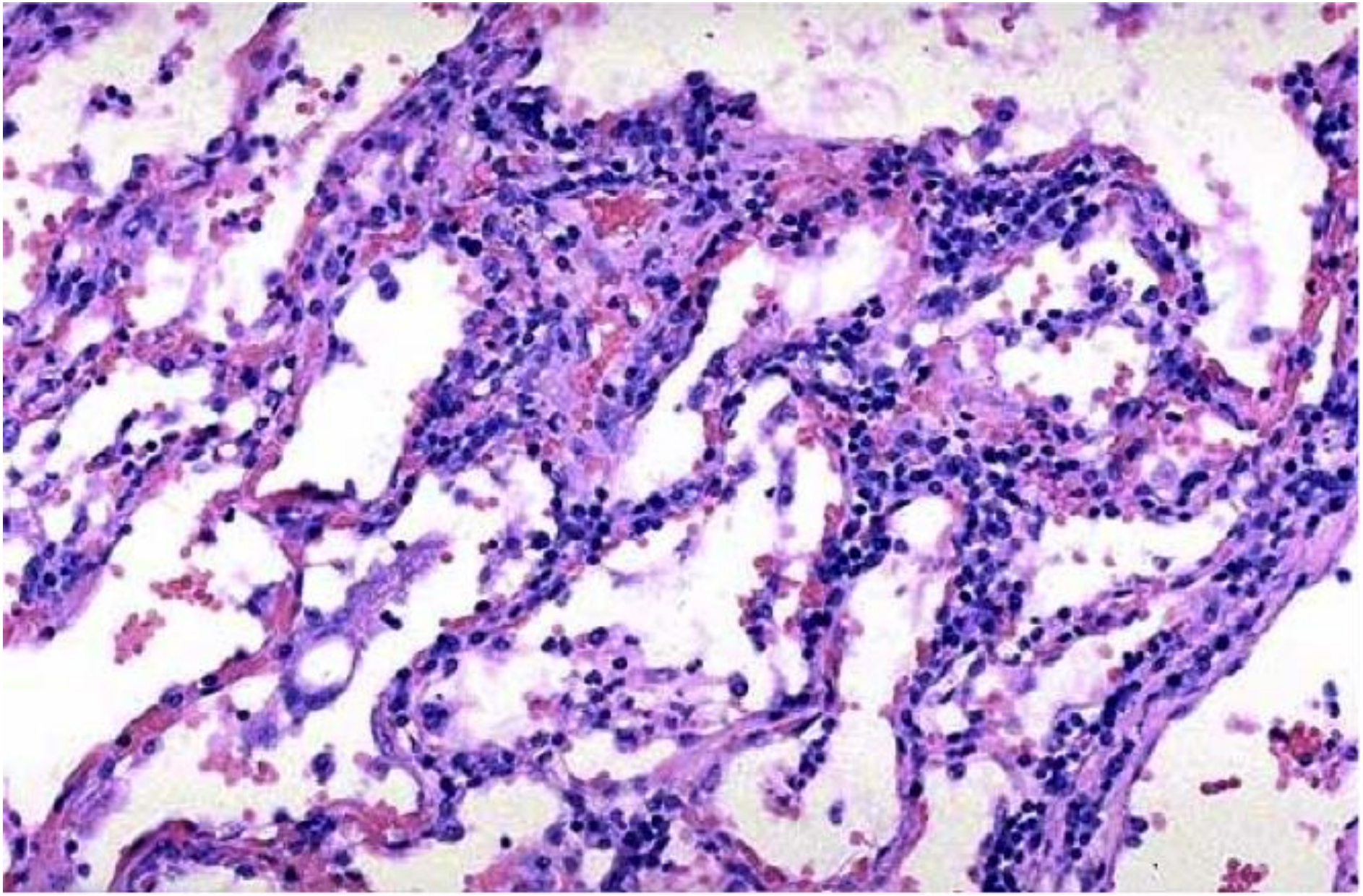
- Pleural effusion
- Empyema
- Lung abscess
- Metastatic infection
  - Infection may extend into the pericardium and the heart→purulent pericarditis, bacterial endocarditis, myocarditis

Complications

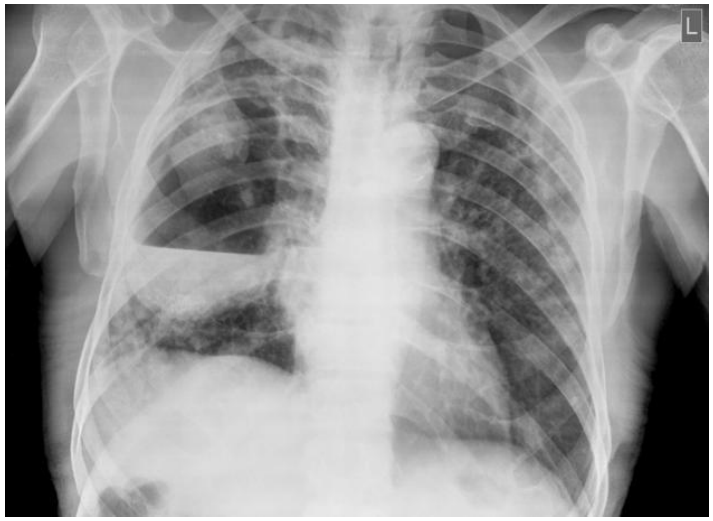
- Bronchopneumonia
  - Complete resolution is uncommon
  - There is some degree of destruction to the bronchiole
  - This results in foci of bronchiolar fibrosis and end up with bronchiectasis

Atypical pneumonia

- Caused by atypical bacteria and viruses
- ‘Walking pneumonia’
- Macroscopy
  - Patchy or lobar areas of congestion without consolidation
- Microscopy
  - Interstitial inflammation
  - Alveoli are unaffected



Lung abscess



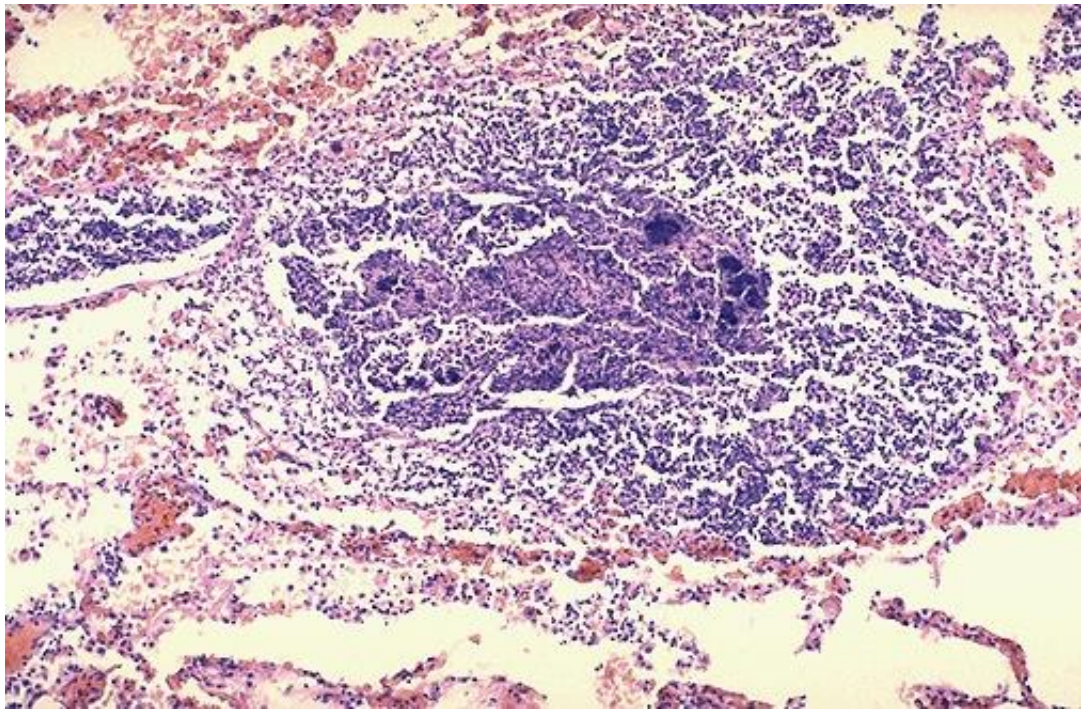
- Localised area of necrosis of lung tissue with suppuration

Lung abscess

- Macro
  - Single/multiple
  - Basal/scattered
  - Poorly defined ragged wall
  - Abscess cavity is filled with exudate
  - Advance abscess- fibroblastic proliferation →fibrous wall

Lung abscess

- Micro
  - Destruction of the lung parenchyma
  - Suppurative exudate
  - Cavity initially surrounded by Acute infla cells then by macs, lymphocytes



Thank You