

Pneumonias

- **Classification:**

Based on anatomic part of lung parenchyma:

- Lobar pneumonia
- Bronchopneumonia (or Lobular pneumonia)
- Interstitial pneumonia.

Based on etiology:

- Bacterial pneumonia
- Viral pneumonia
- Pneumonias from other etiologies.

Bacterial pneumonia

- **Lobar pneumonia:**
- Acute bacterial infection of part of a lobe, entire lobe or two lobes of both the lungs, common in young adults in good health
- **Aetiology:**
- Pneumococcal pneumonia: > 90% caused by *Streptococcus pneumoniae*, type 3-S
- Staphylococcal pneumonia: *Staphylococcus aureus* by hematogenous spread
- Streptococcal pneumonia: β -hemolytic streptococci in children/elderly persons, is rare
- Pneumonia by gram negative aerobes ie *Haemophilus influenzae*, *Klebsiella pneumoniae*, *Pseudomonas*, *Proteus* and *E coli*, in children

Morphologic features

- **4 sequential pathologic phases:** Seen in untreated cases
- Stage of congestion(Initial phase)
- Stage of Red hepatisation(Early consolodation)
- Stage of grey hepatisation(Late consolidation)
- Resolution

- **Stage of congestion:** represent early acute response, lasts for 1-2 days

G/A: Affected lobe enlarged, heavy, dark red and congested. Cut surface exudes blood-stained frothy fluid.

M/E:

- i) Dilatation and congestion of the capillaries in the alveolar walls.
- ii) Pale eosinophilic oedema fluid in the air spaces.
- iii) A few red cells and neutrophils in the intra-alveolar fluid.
- iv) Numerous bacteria in the alveolar fluid by Gram's staining.

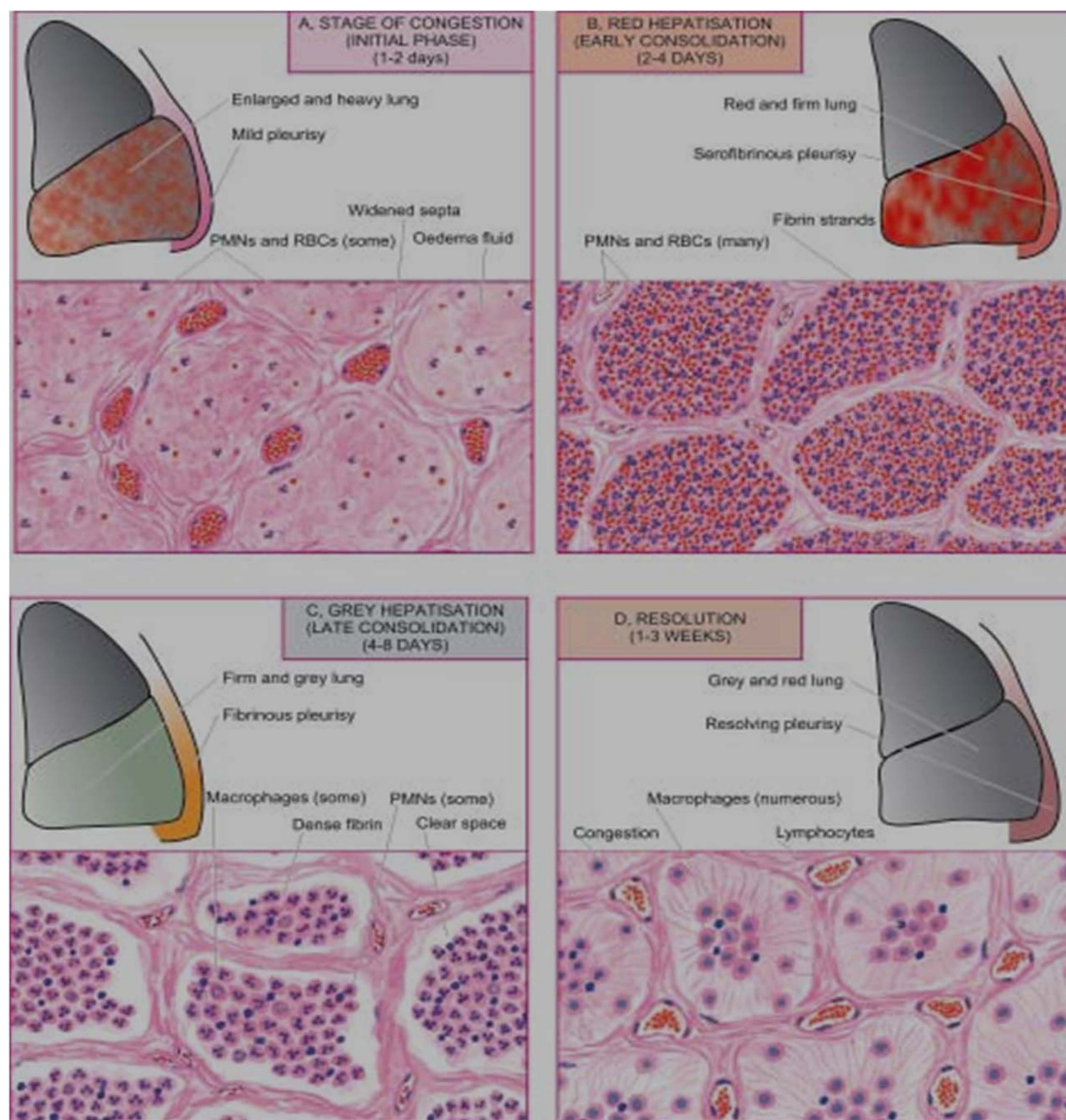
- **Stage of Red Hepatisation:** Liver like consistency of affected lobe. Lasts for 2-4 days.
- **G/A:**
- Affected lobe is red, firm and consolidated. The cut surface is airless, red-pink, dry, granular and has liver-like consistency.
- **M/E:**
- i) The oedema fluid of the preceding stage is replaced by strands of fibrin.
- ii) Marked cellular exudate of neutrophils and extravasation of red cells.

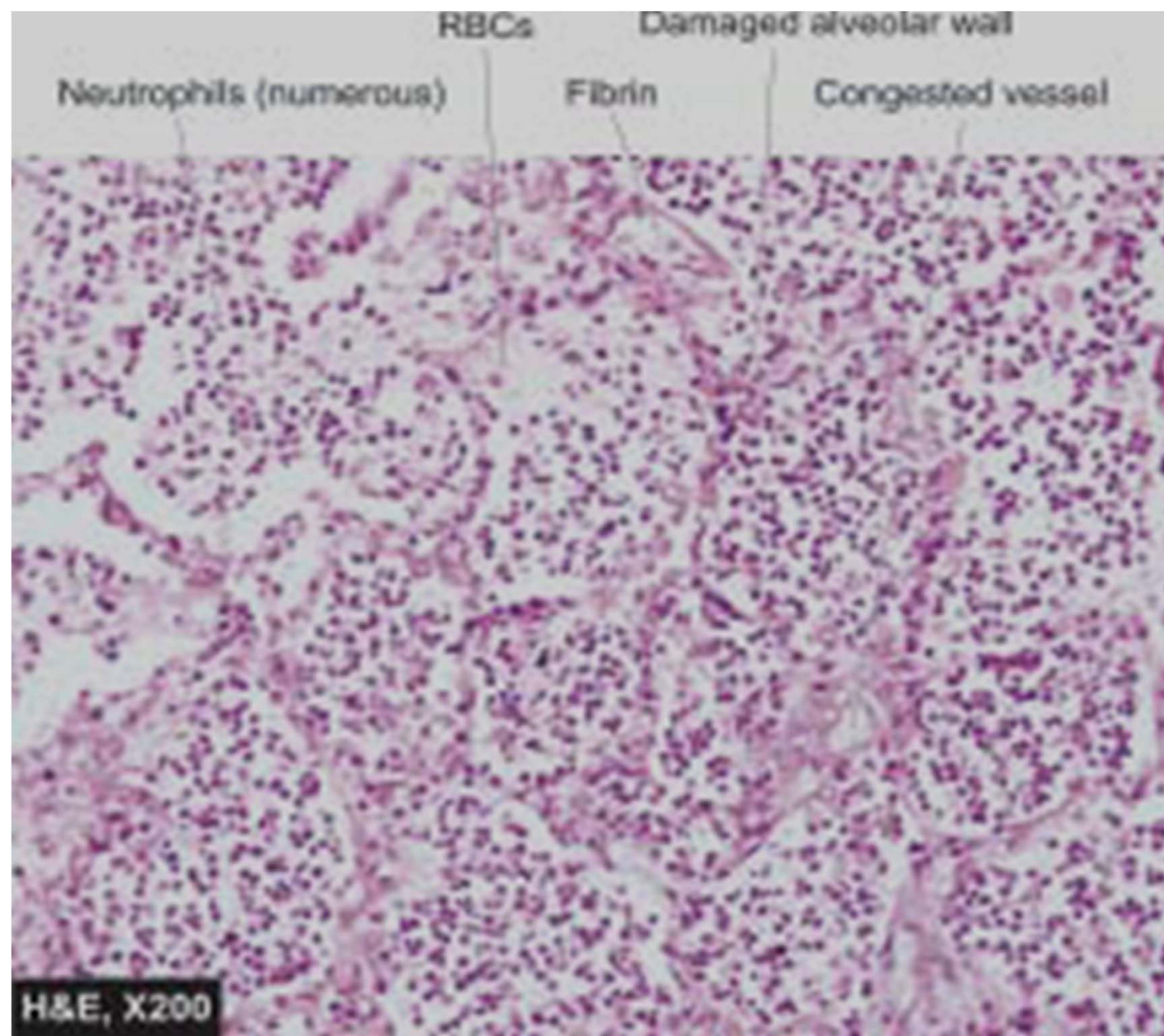
- iii) Many neutrophils show ingested bacteria.
- iv) The alveolar septa are less prominent than in the first stage due to cellular exudation.

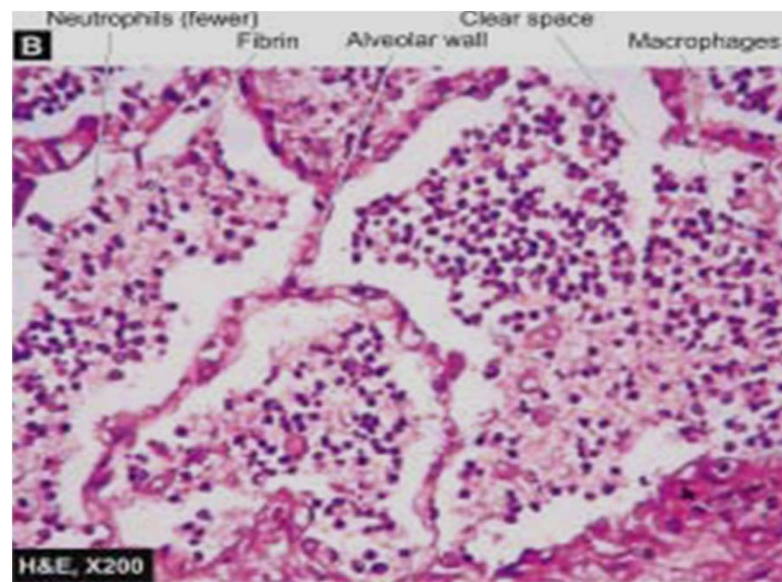
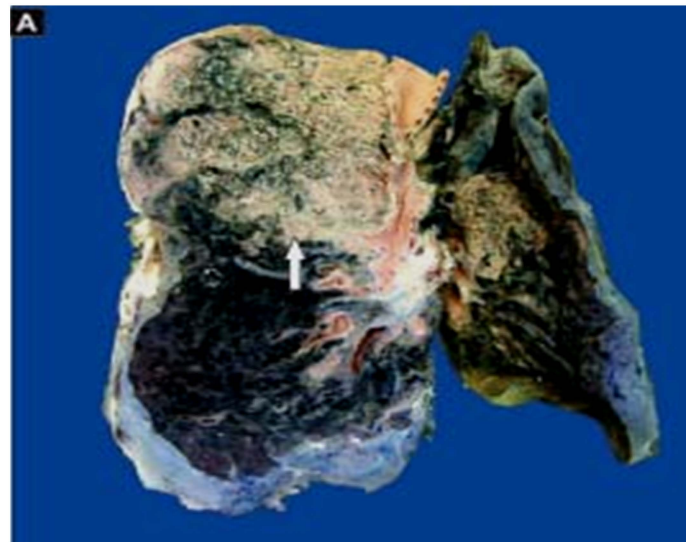
Stage of Grey hepatisation:

- This phase lasts for 4-8 days
- **G/A:**
- Affected lobe firm and heavy. Cut surface is dry, granular and grey in appearance with liver like consistency. Change in colour from red to grey begins at the hilum and spreads towards the periphery.

- **M/E:**
- i) Fibrin strands are dense and more numerous.
- ii) Cellular exudate of neutrophils is reduced due to disintegration of many inflammatory cells as evidenced by their pyknotic nuclei. The red cells are also fewer. The macrophages begin to appear in the exudate.
- iii) The cellular exudate is often separated from the septal walls by a thin clear space.
- iv) The organisms are less numerous and appear as degenerated forms.







- **Stage of Resolution:**

- Begins from 8-9th day and lasts for 1-3 weeks

- **G/A:**

- Cut surface is grey-red or dirty brown and frothy, yellow, creamy fluid can be expressed on pressing. Pleural reaction may also show resolution but may undergo organisation leading to fibrous obliteration of pleural cavity.

M/E:

- i) Macrophages are the predominant cells in the alveolar spaces, neutrophils diminish in number. Many macrophages contain engulfed neutrophils and debris

- ii) Granular and fragmented strands of fibrin in the alveolar spaces are seen due to progressive enzymatic digestion.
- iii) Alveolar capillaries are engorged.
- iv) Progressive removal of fluid content as well as cellular exudate from the air spaces, partly by expectoration but mainly by lymphatics, resulting in restoration of normal lung parenchyma with aeration.

Complications

- Organisation -in 3%, carnification
- Pleural effusion –in 5%
- Empyema -<1%
- Lung abscess –when secondarily infected
- Metastatic infection
- **Clinically:**
- Chills, Fever, malaise, chest pain, dyspnoea, , cough with expectoration, tachycardia, tachypnoea

Bronchopneumonia

- Infection of the terminal bronchioles that extends into the surrounding alveoli resulting in patchy consolidation of the lung.
- Common in infancy & old age
- **Aetiology:**
- Staphylococci, streptococci, pneumococci, *Klebsiella pneumoniae*, *Haemophilus influenzae*, and gram-negative bacilli like *Pseudomonas* and coliform bacteria.

Morphology

- **G/A:**
- Patchy areas of red or grey consolidation affecting one or more lobes, frequently found bilaterally and more often involving the lower zones of the lungs.
- **C/S:** Patchy consolidated lesions are dry, granular, firm, red or grey in colour, 3 to 4 cm in diameter, slightly elevated over the surface and are often centred around a bronchiole
- Patchy areas are best picked up by passing the fingertips on the cut surface

- **M/E:**
- i) Acute bronchiolitis.
- ii) Suppurative exudate, consisting chiefly of neutrophils, in the peribronchiolar alveoli.
- iii) Thickening of the alveolar septa by congested capillaries and leucocytic infiltration.
- iv) Less involved alveoli contain oedema fluid.
- **Complications:** as in Lobar pneumonia

