

**Author(s):** Stephen Ramsburgh, M.D., Gerald Abrams, M.D., 2009

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# Pathology Labs

M2 – Respiratory Sequence

Gerald Abrams M.D.

Fall, 2008



# **M-2 Respiratory Laboratory - 1**

**63 Aspiration pneumonia**

**26 Tuberculosis**

**64 Pneumonia**

**29 Aspergillosis**

**200 ARDS**

# **M-2 Respiratory Laboratory - 1**

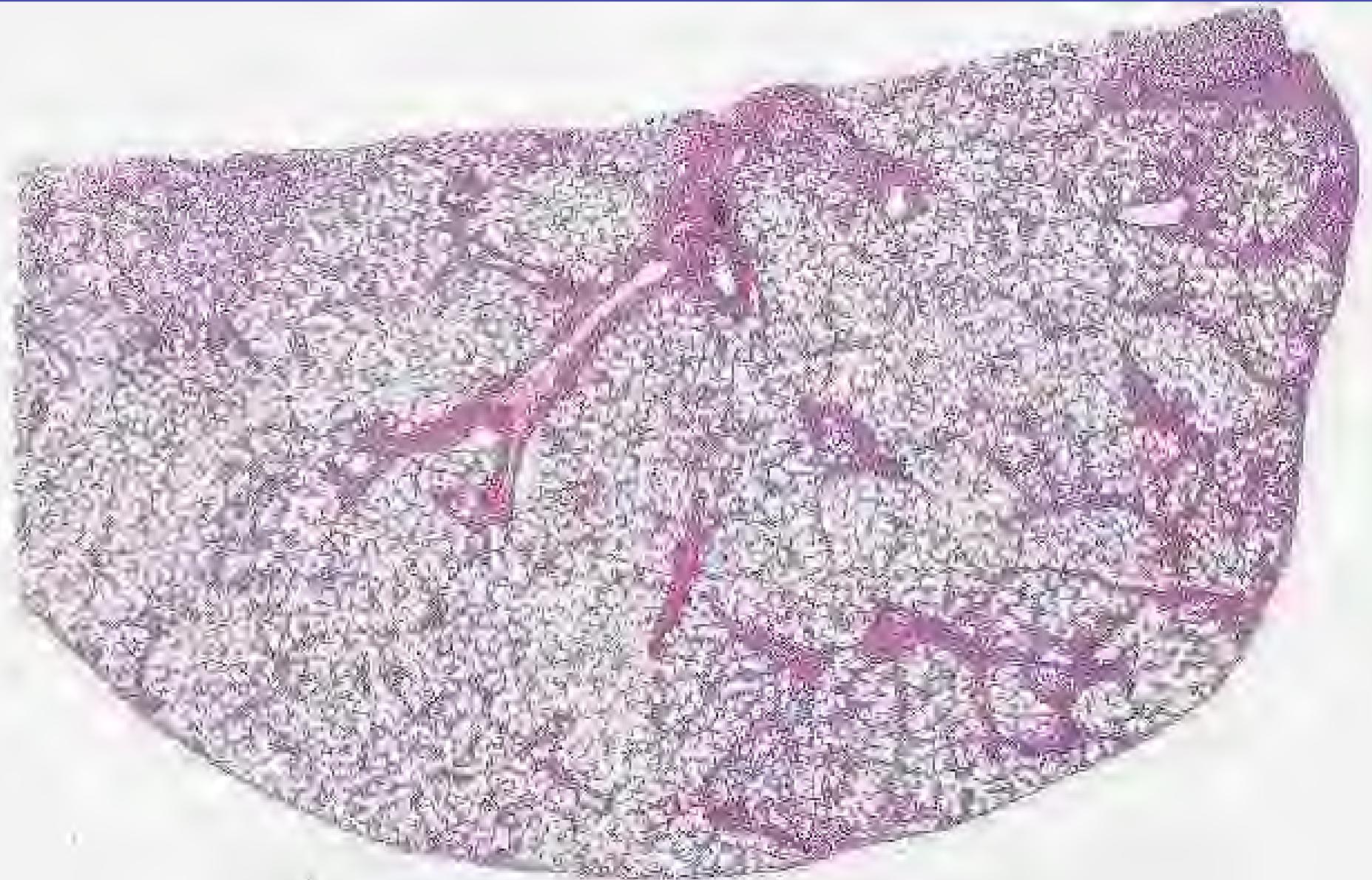
**63    Aspiration pneumonia**

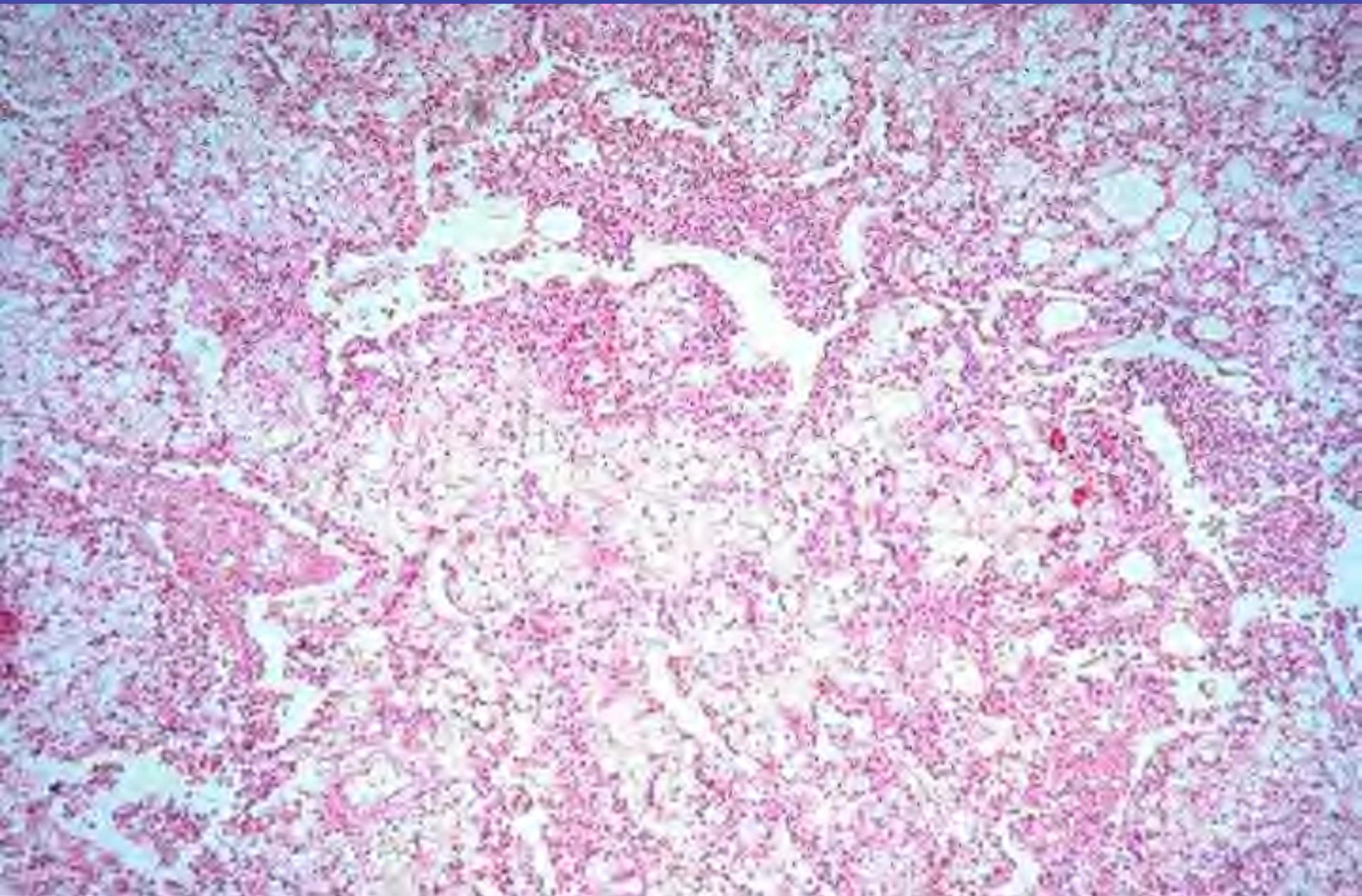
**26    Tuberculosis**

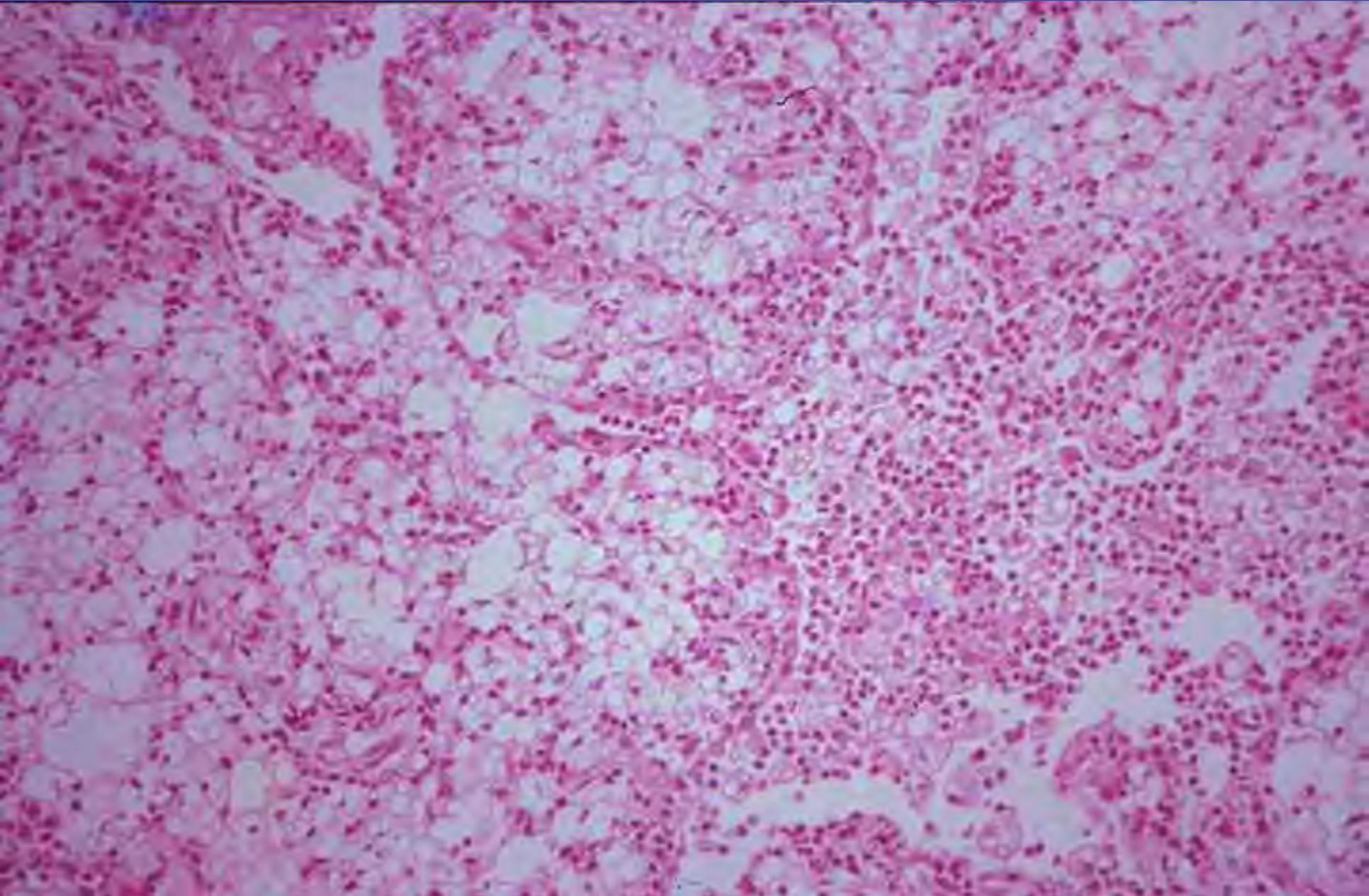
**64    Pneumonia**

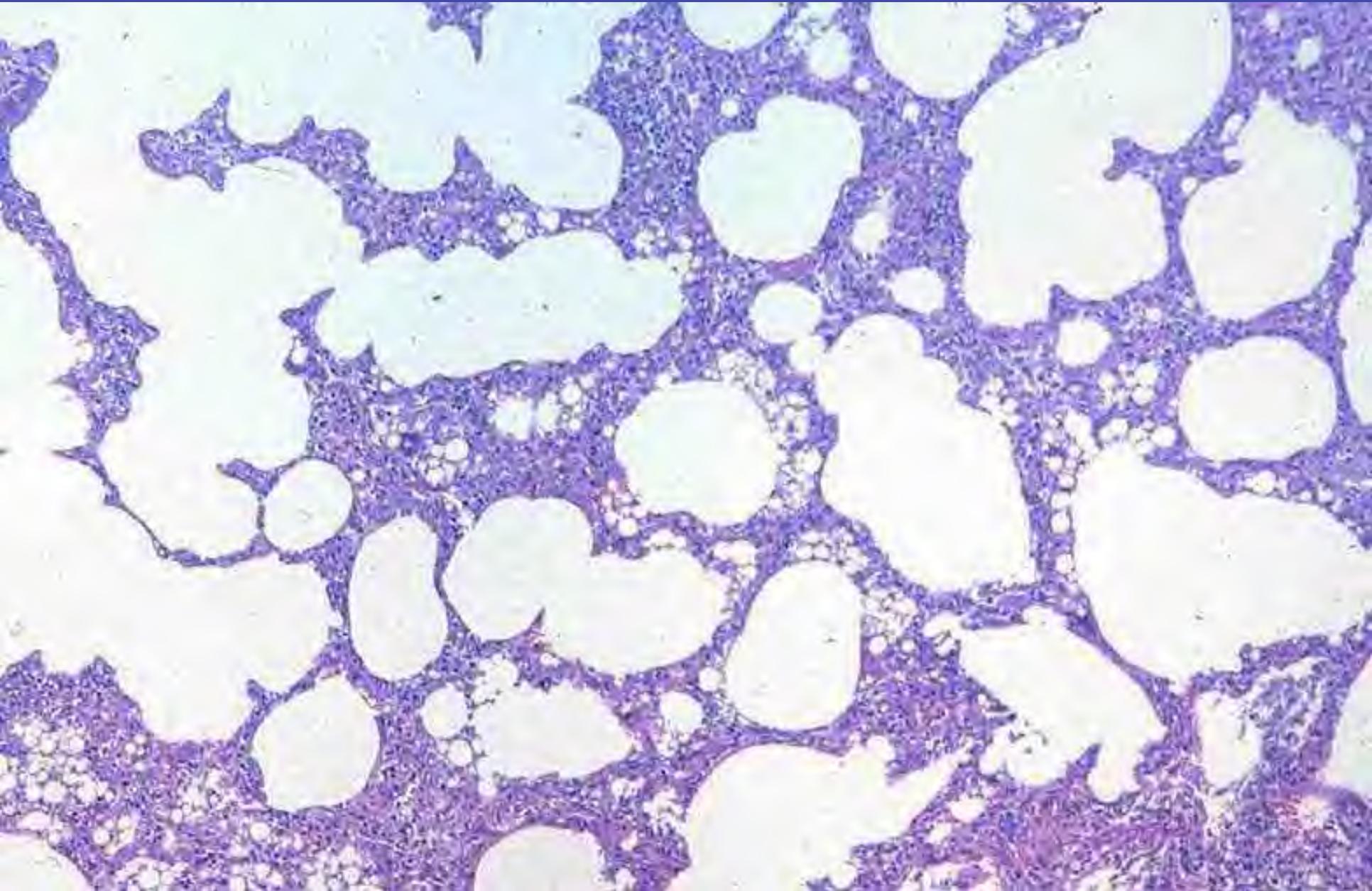
**29    Aspergillosis**

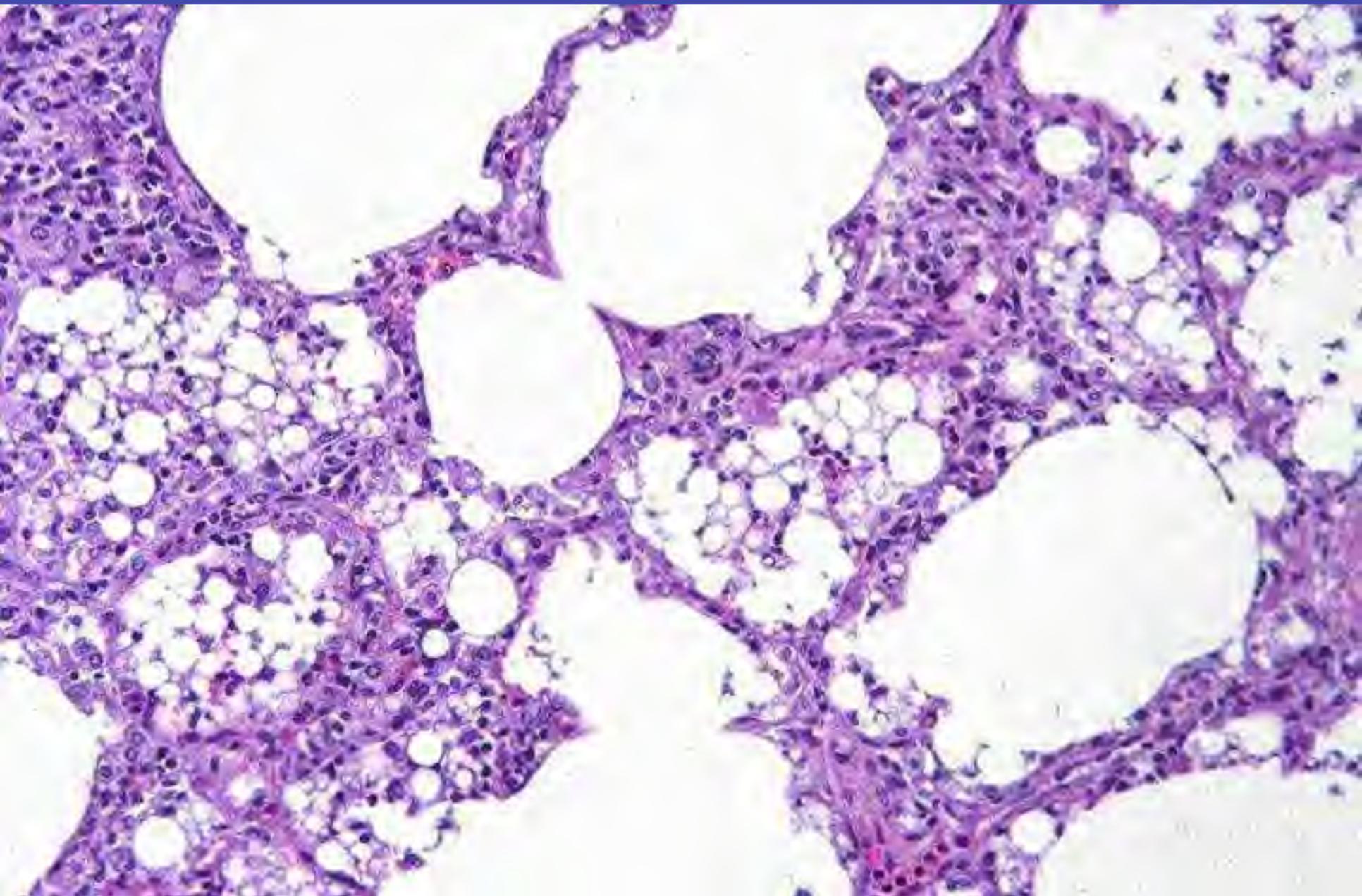
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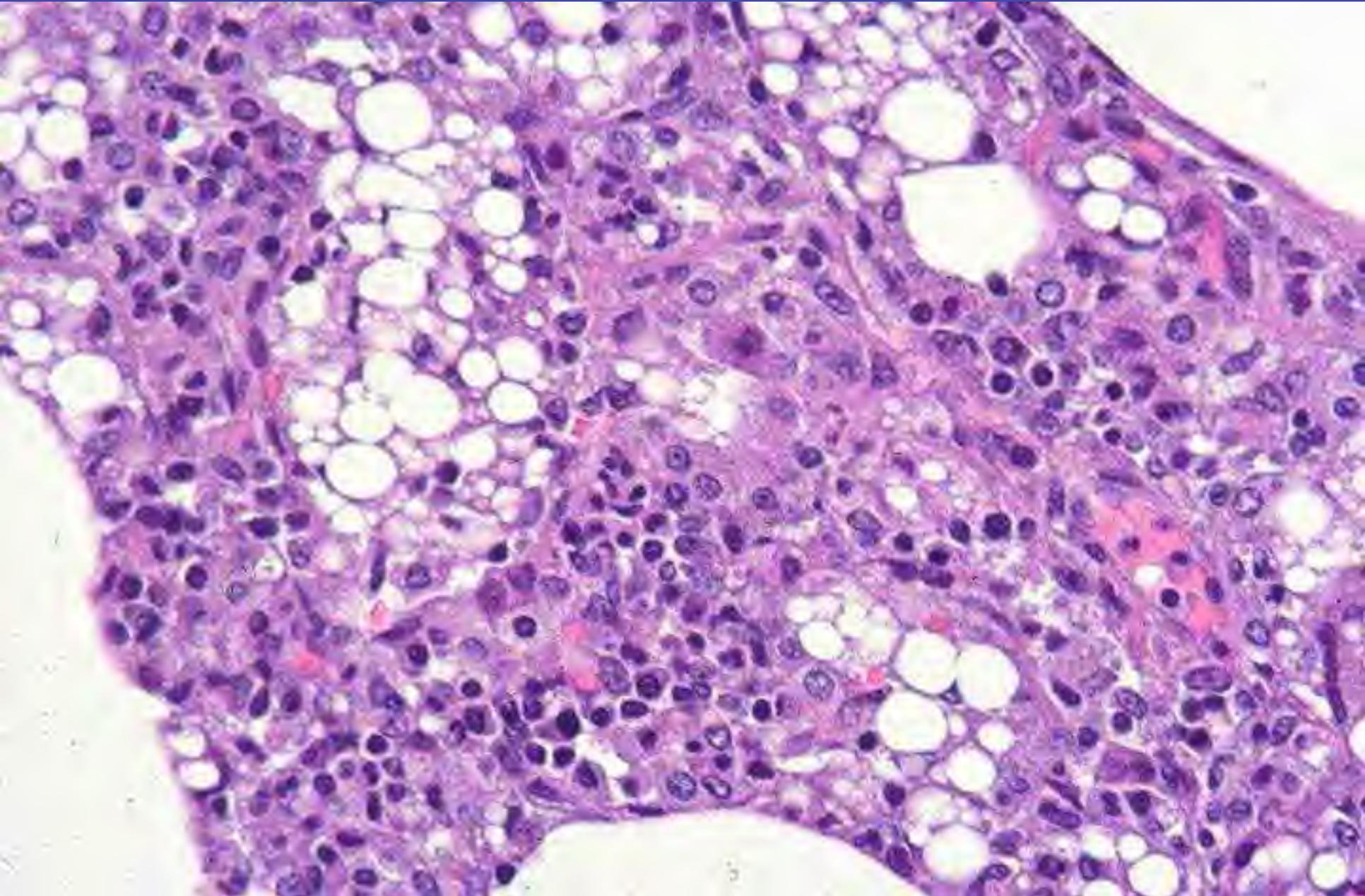


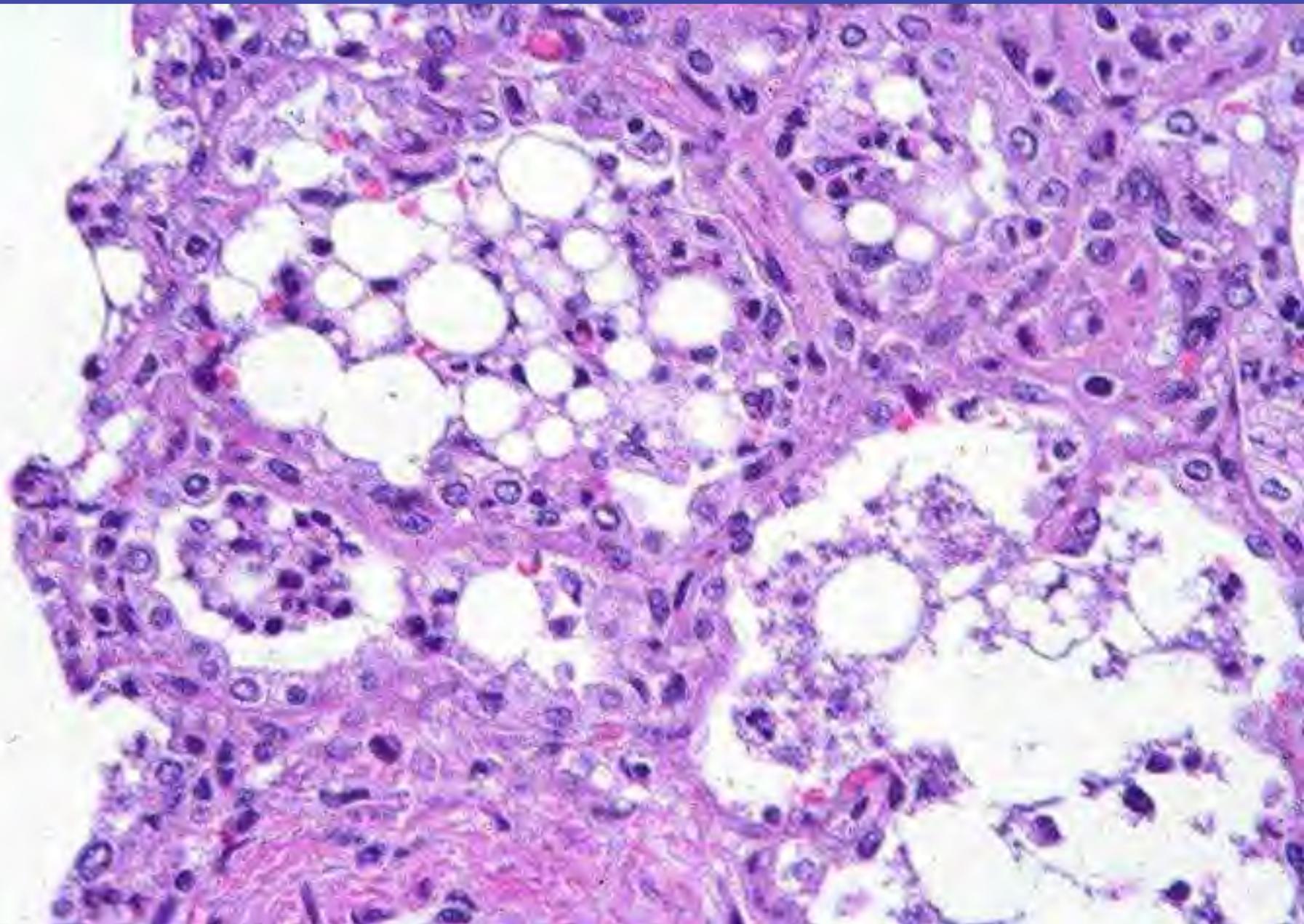


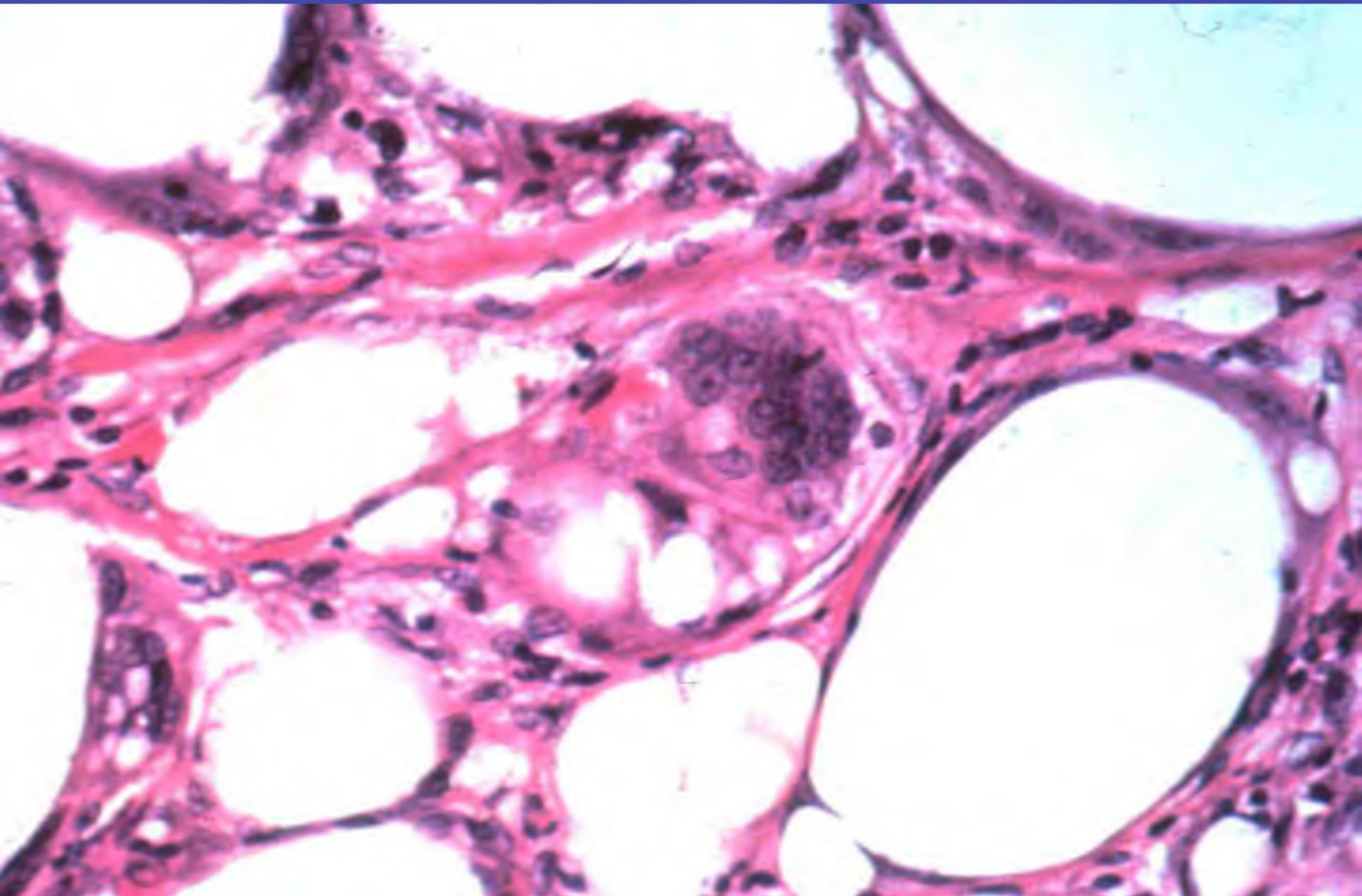


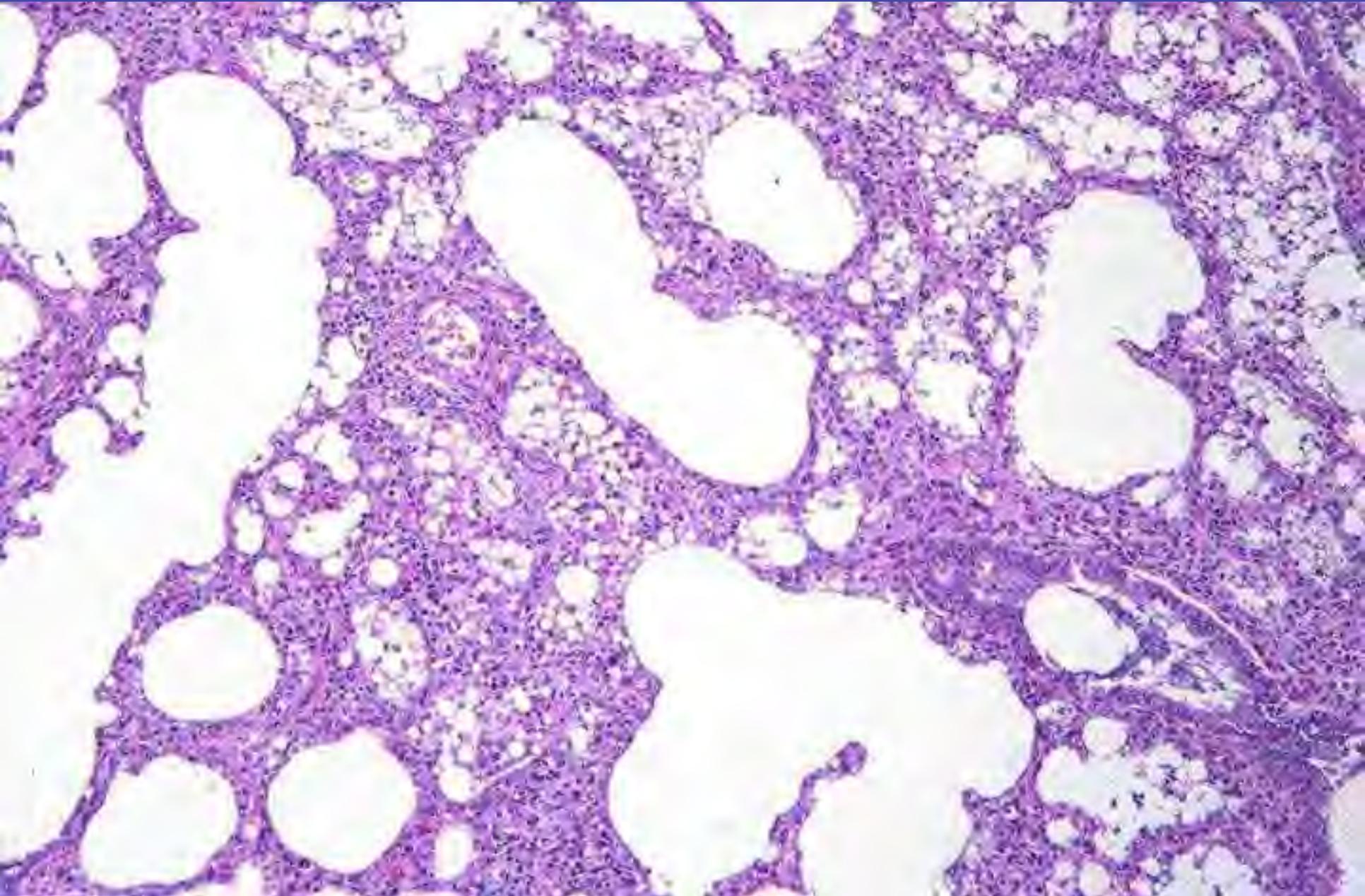


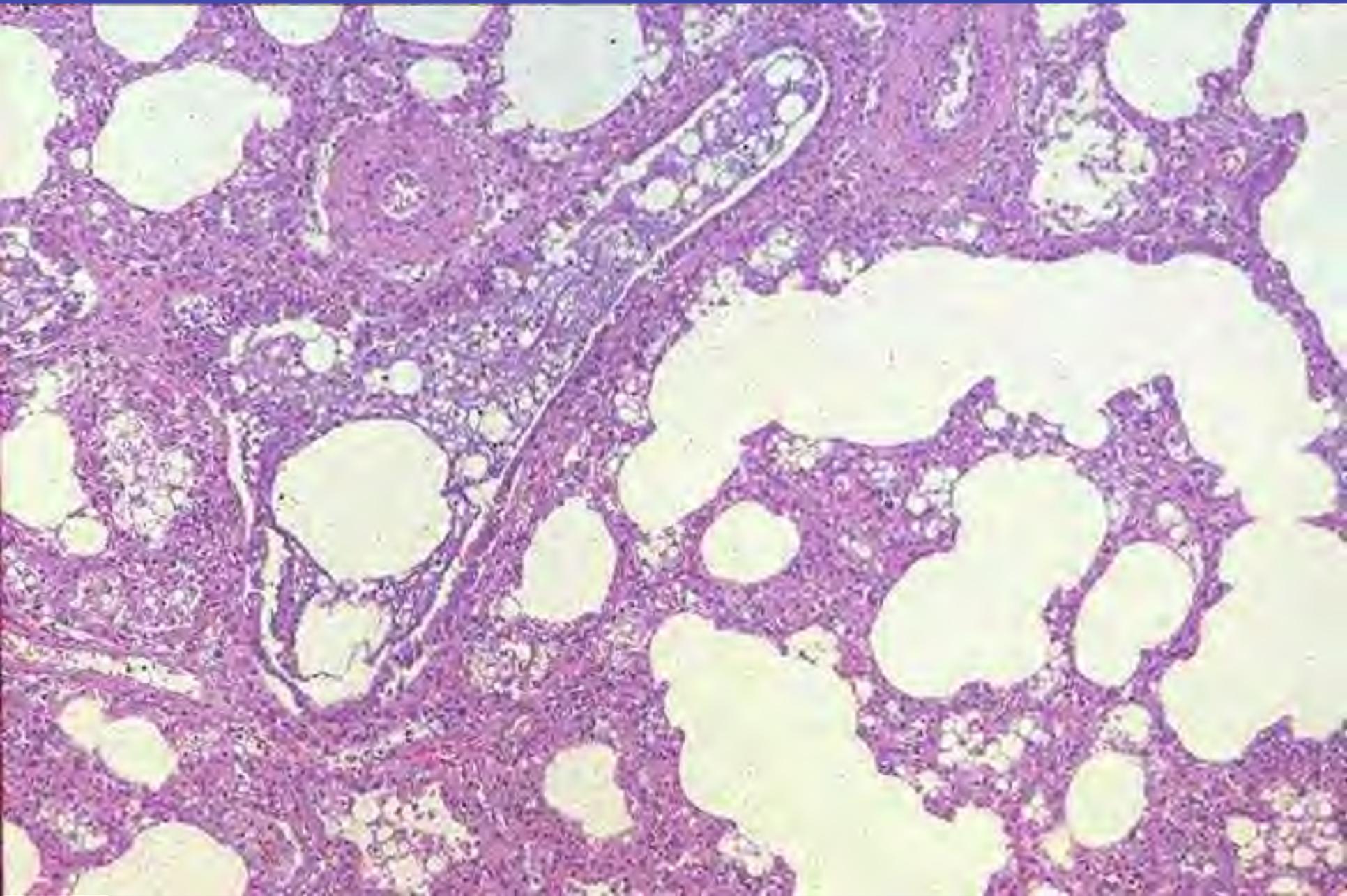


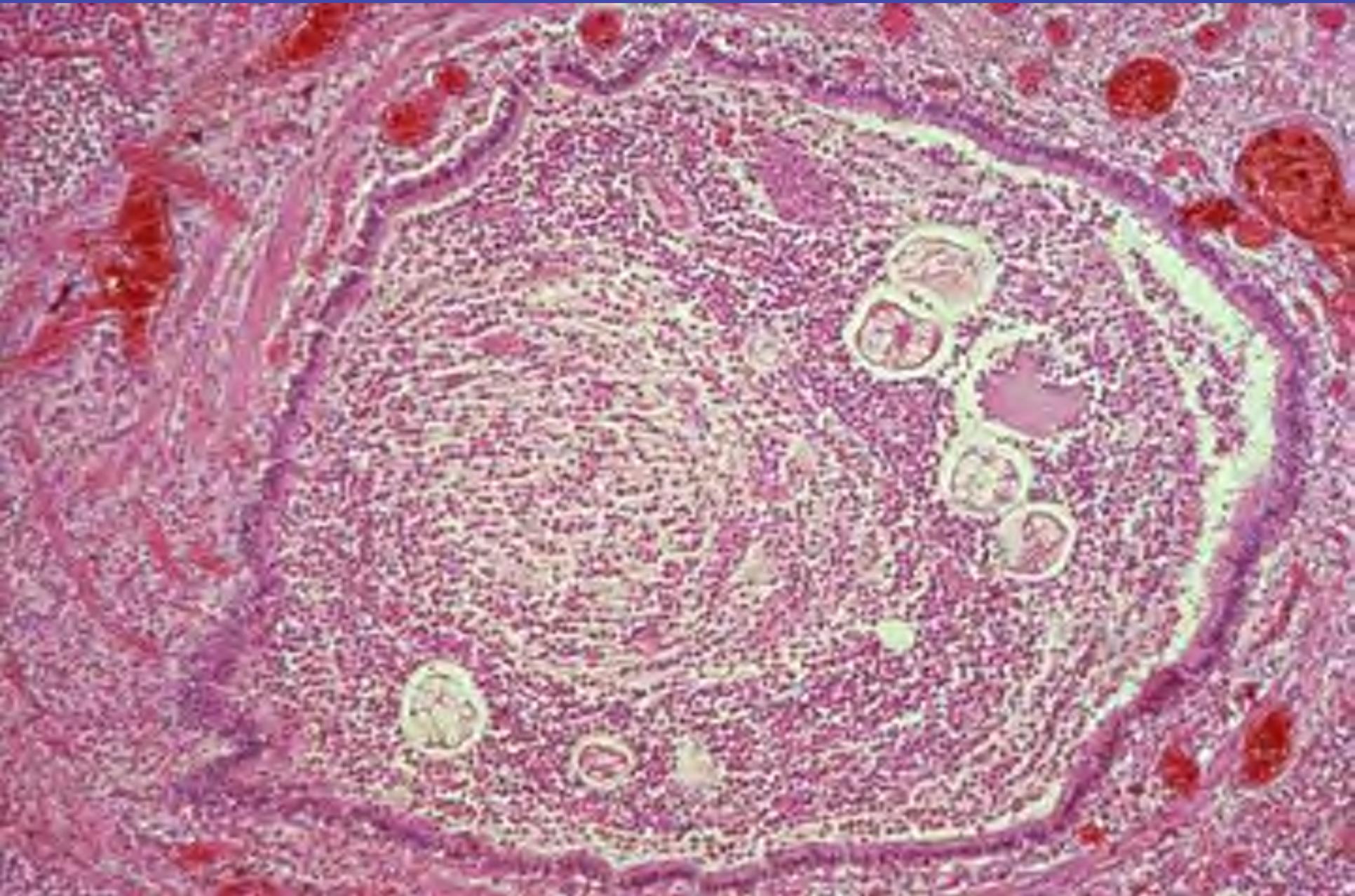


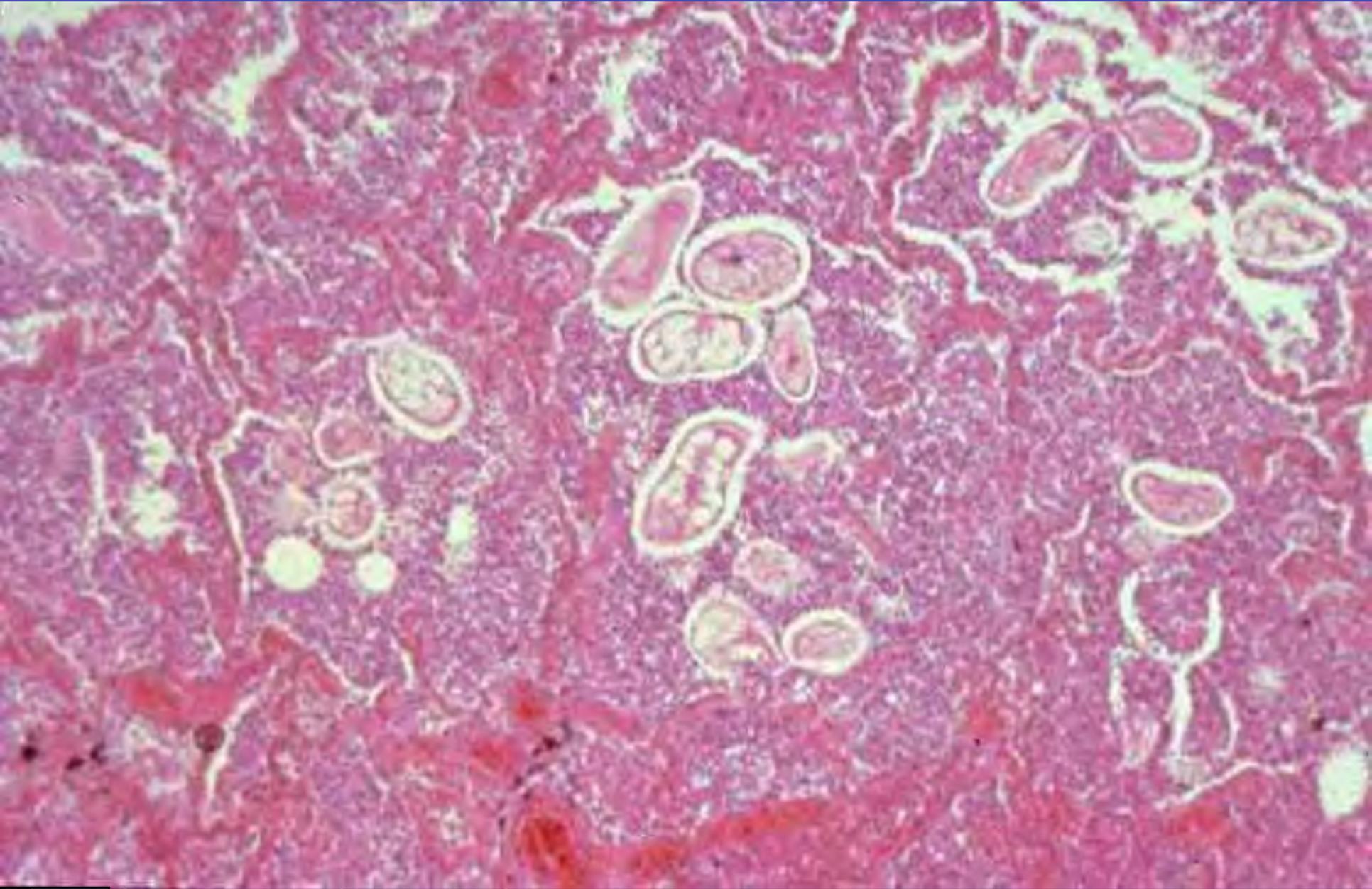












# **M-2 Respiratory Laboratory - 1**

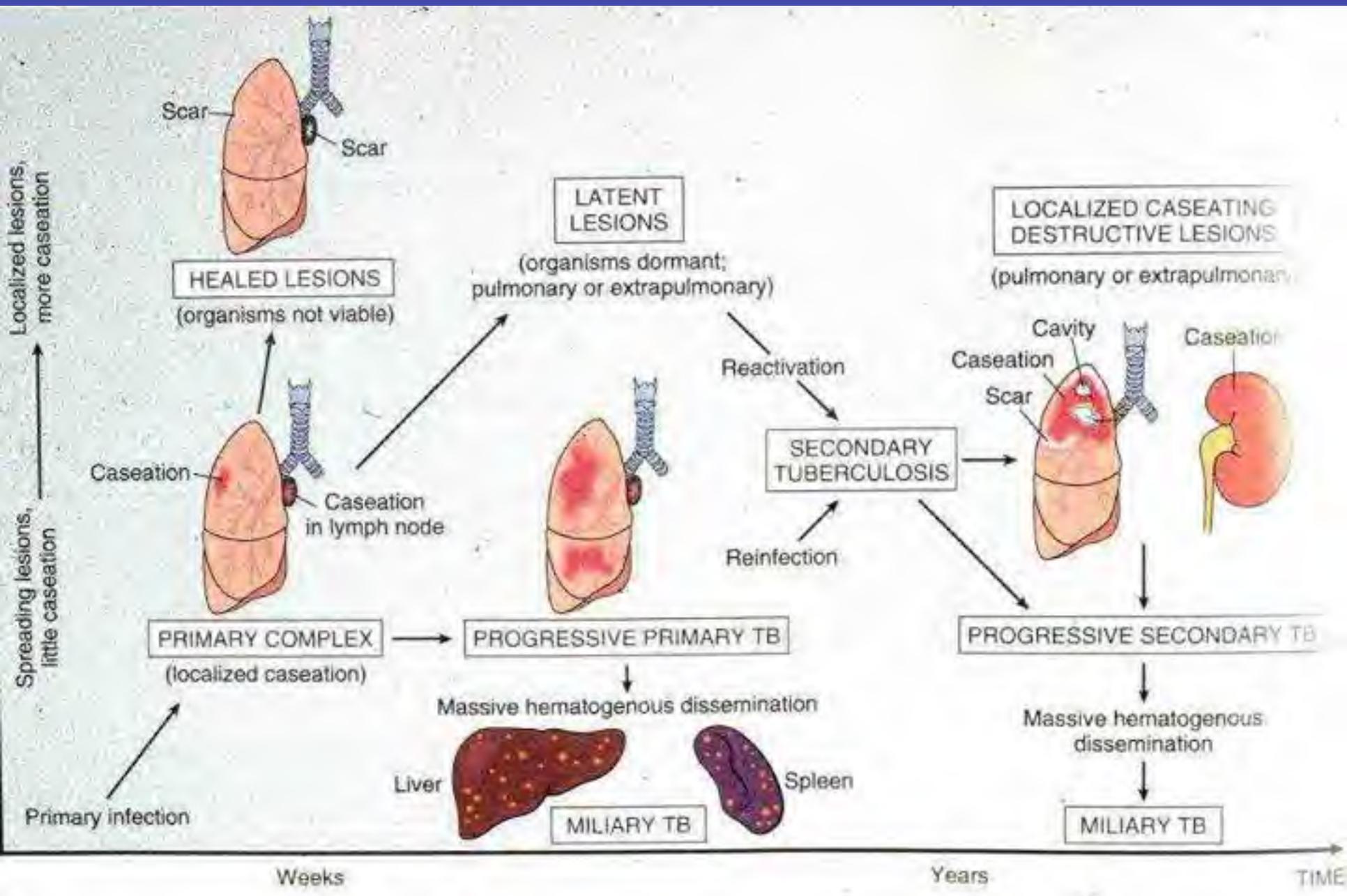
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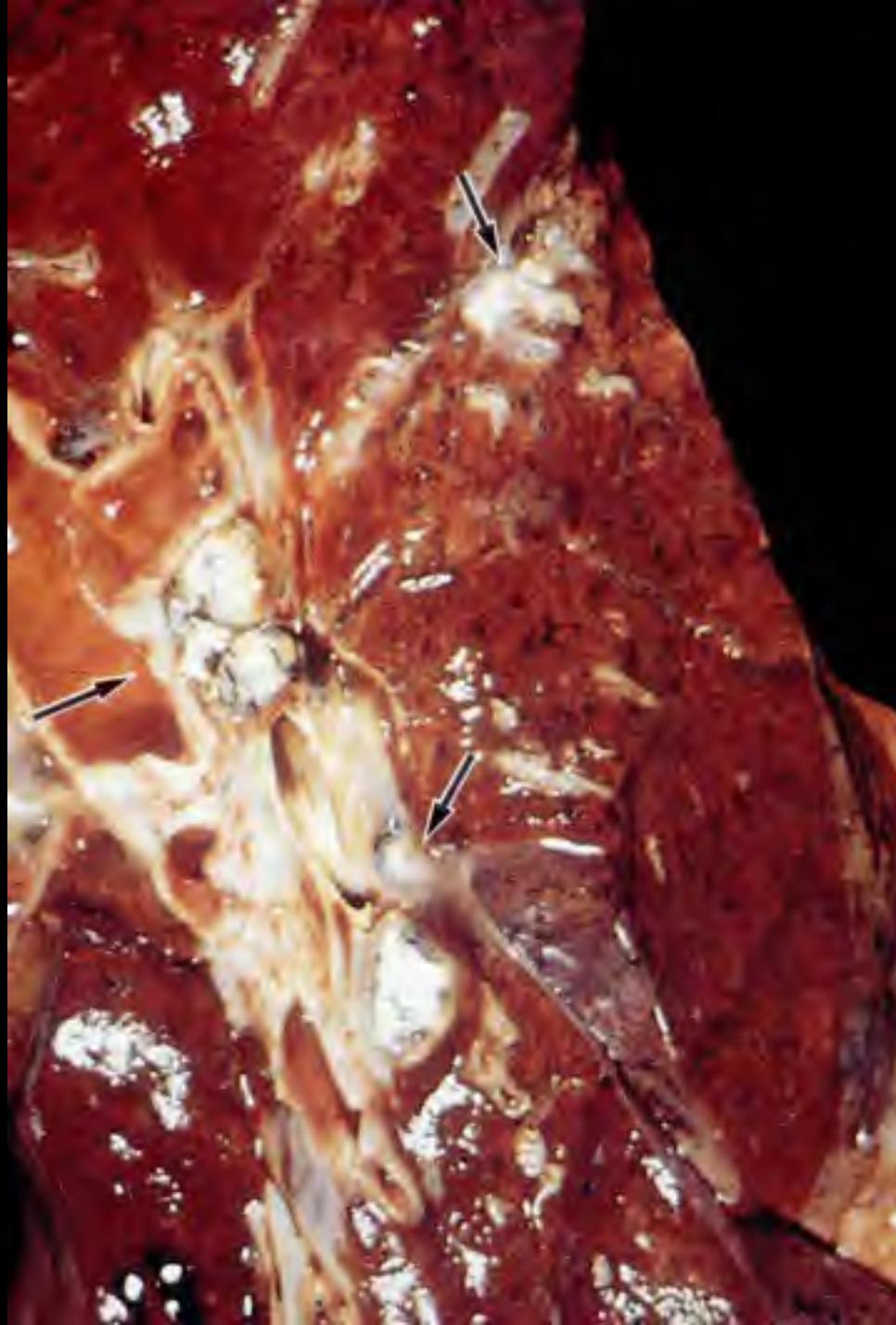
**26 Tuberculosis**

**64 Pneumonia**

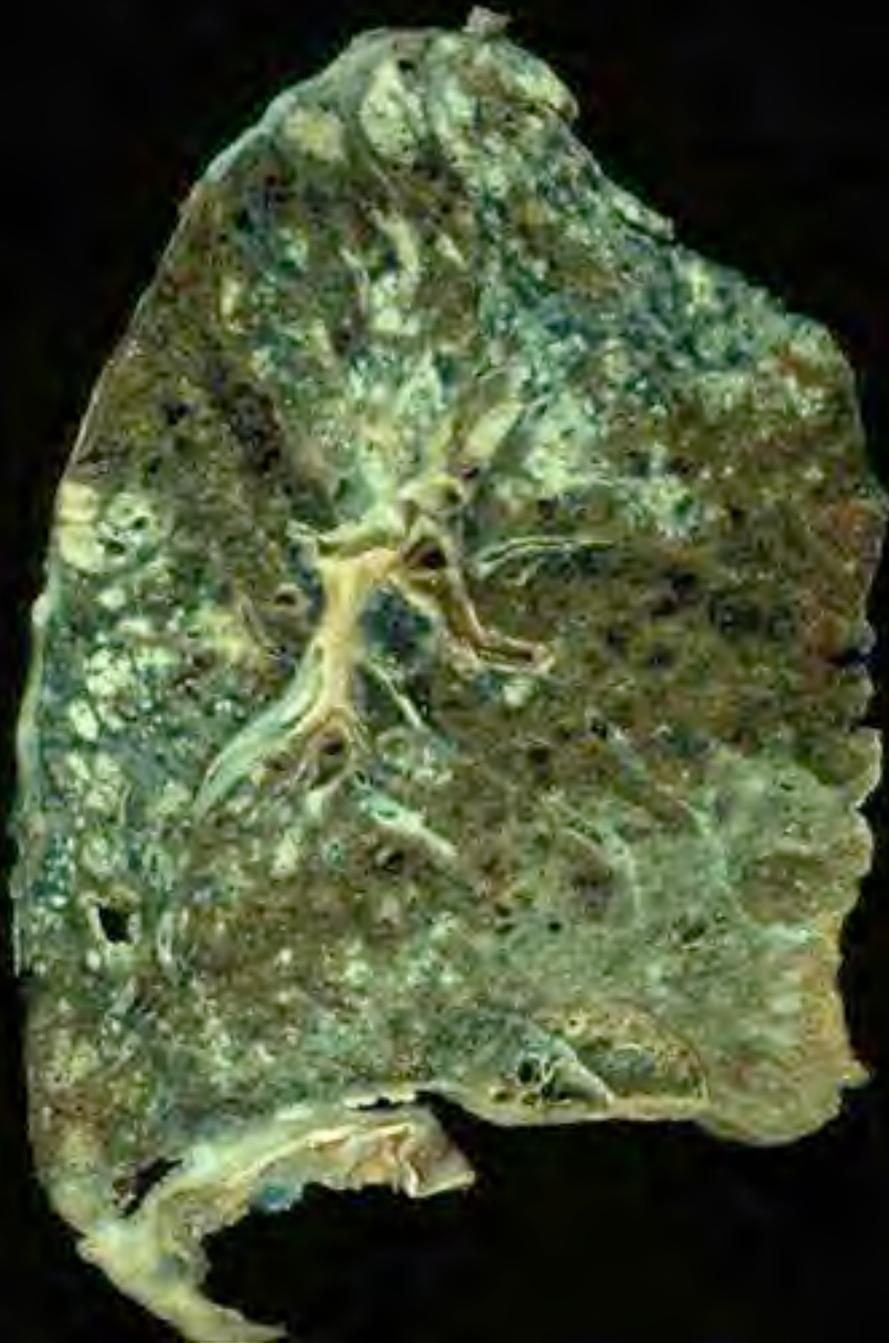
**29 Aspergillosis**

**200 ARDS**



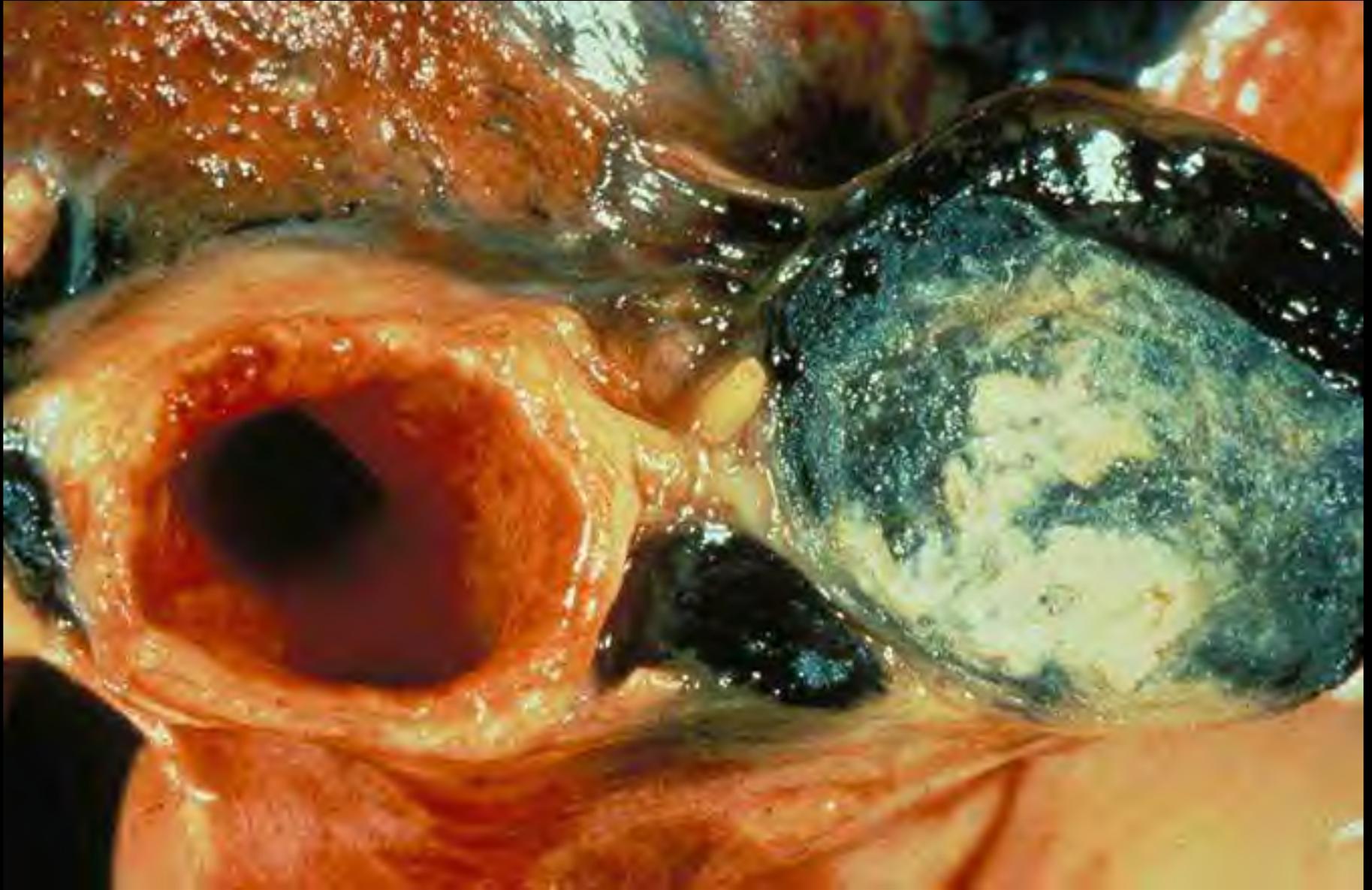


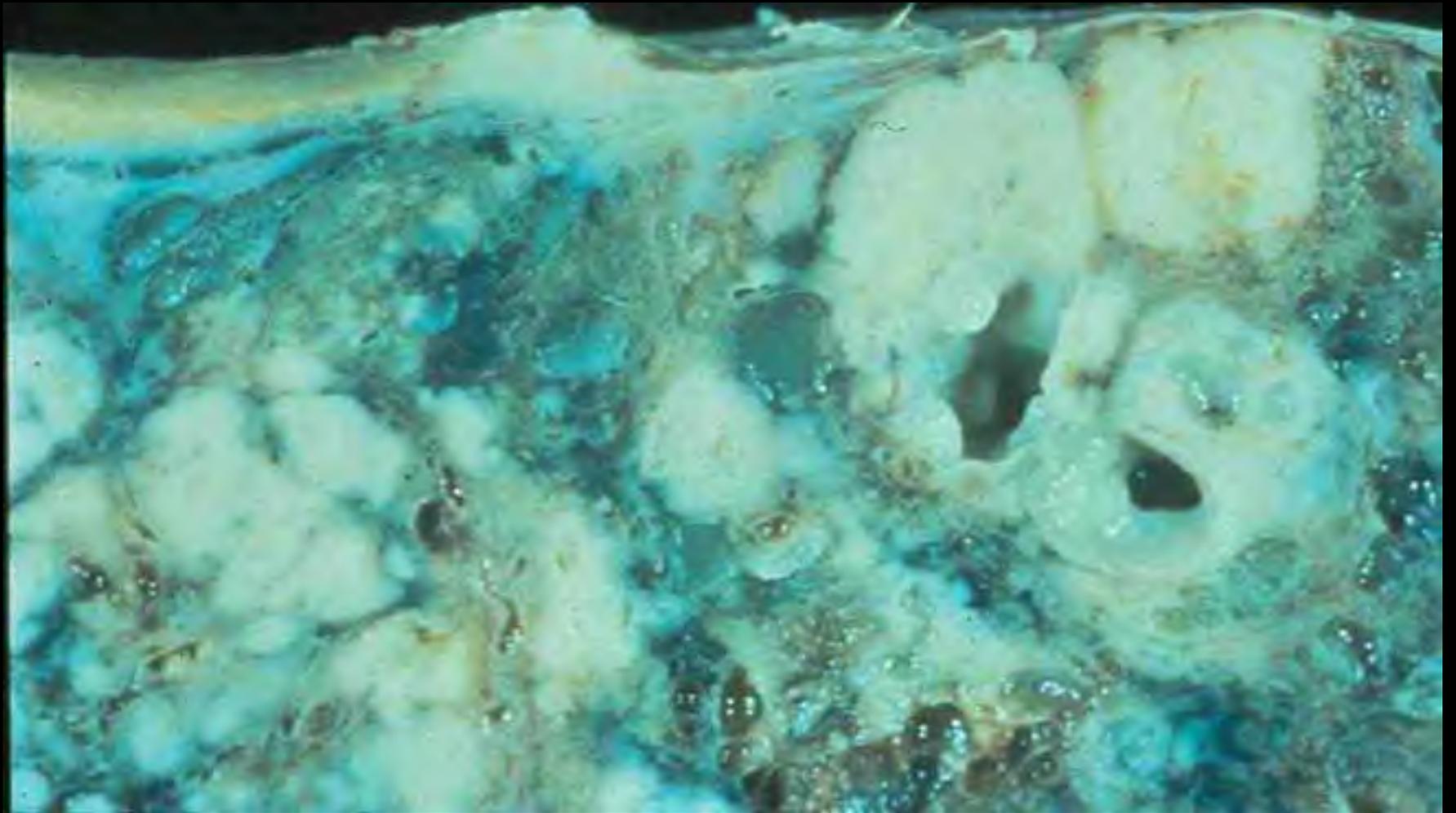


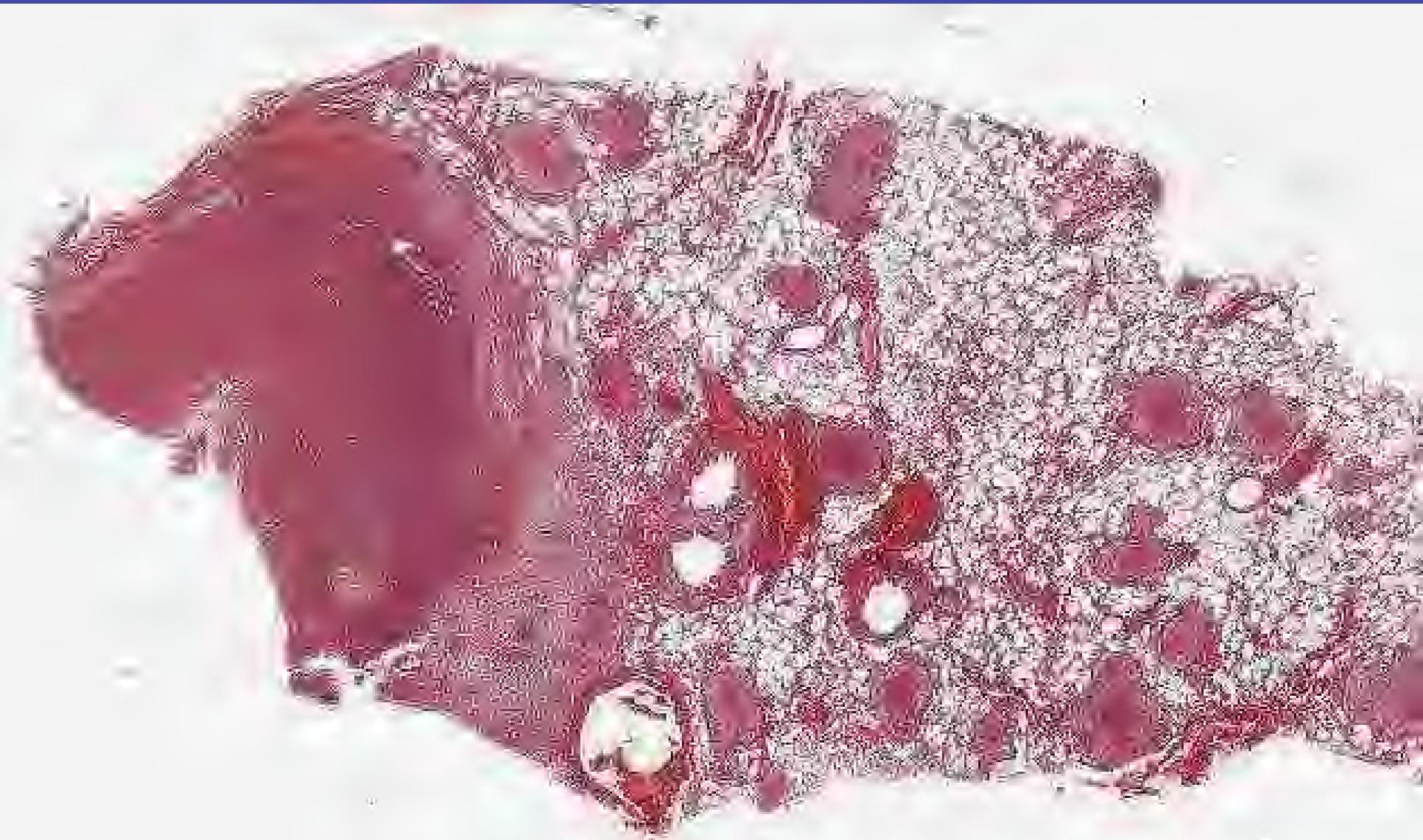


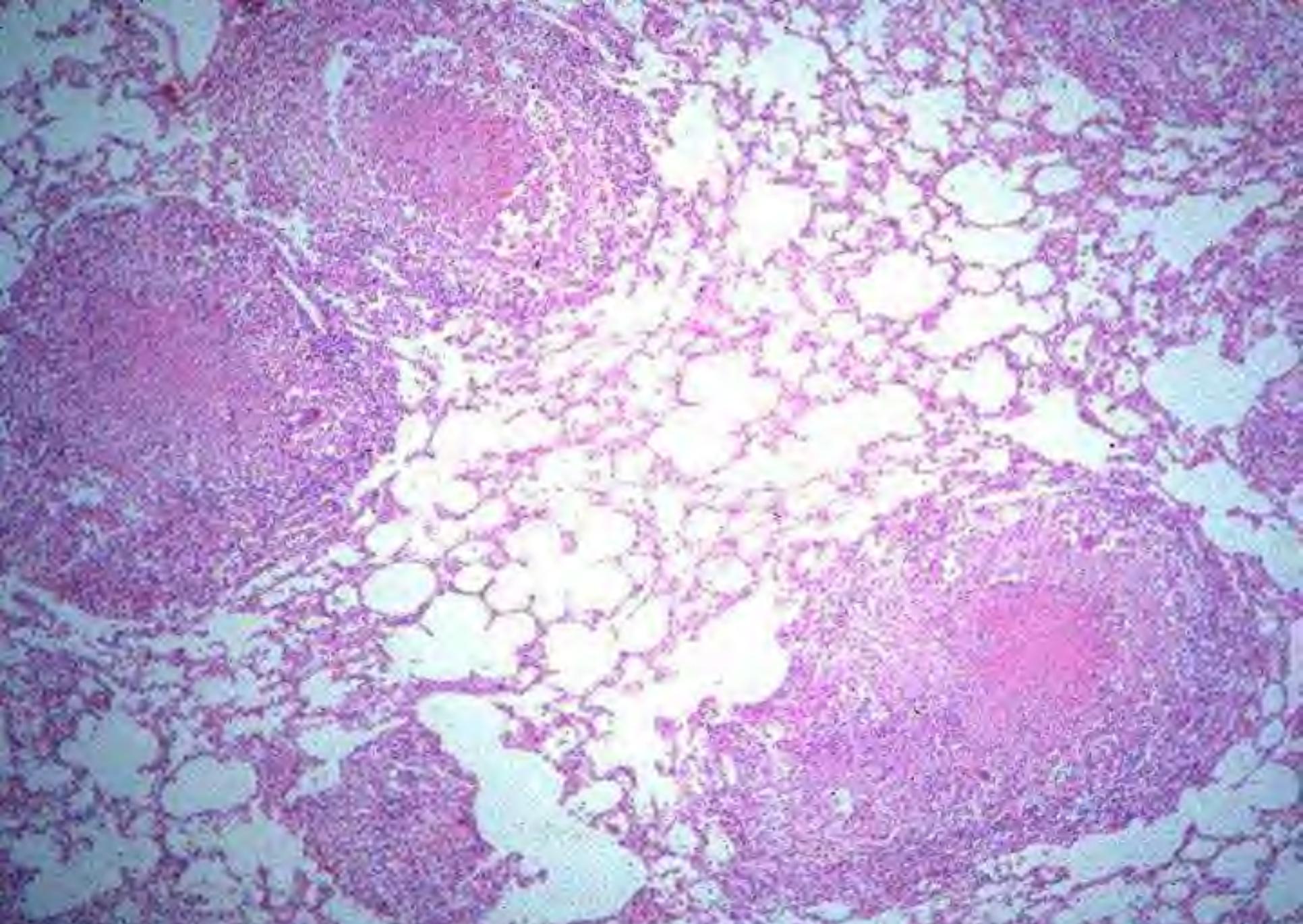


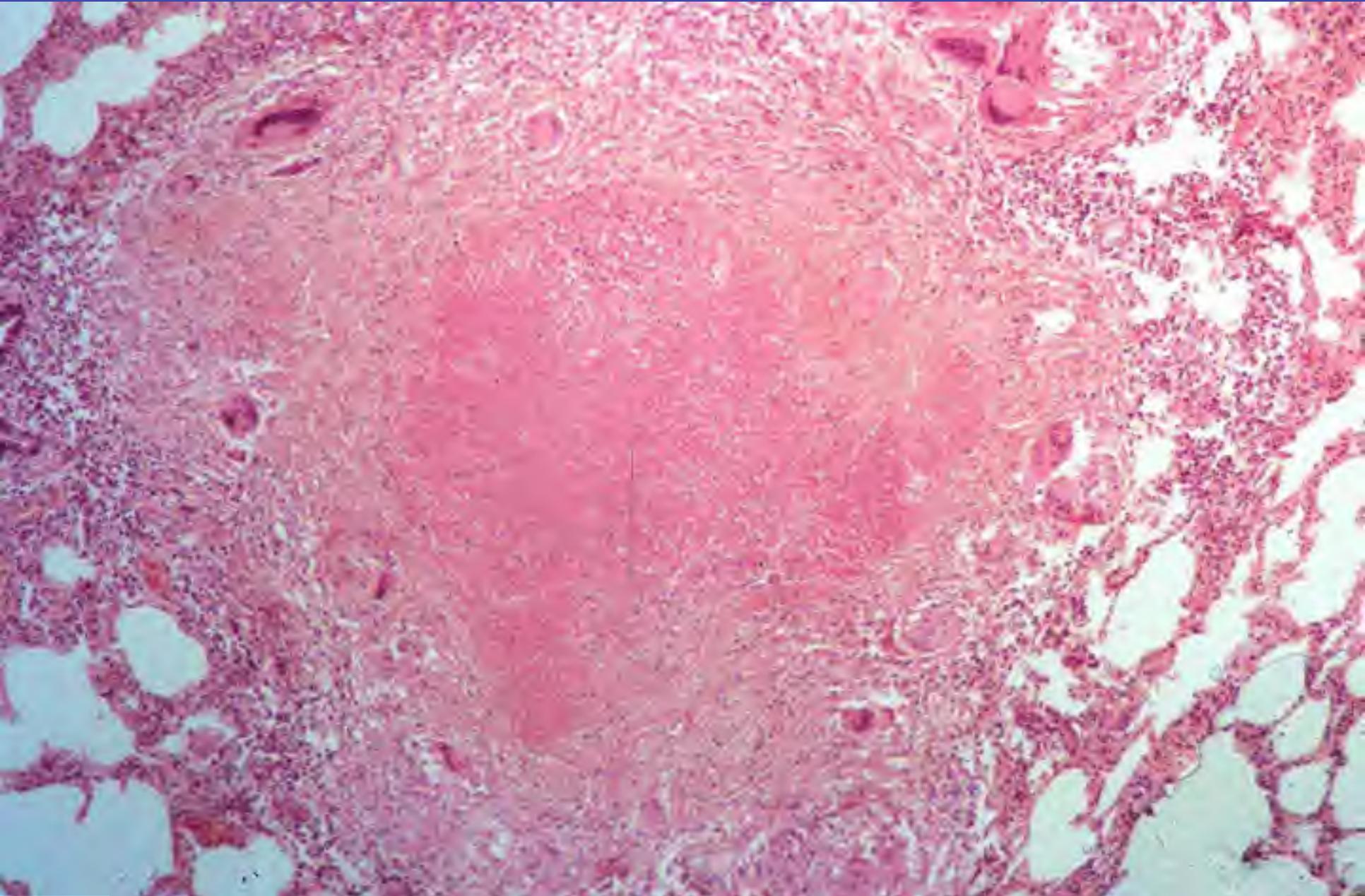


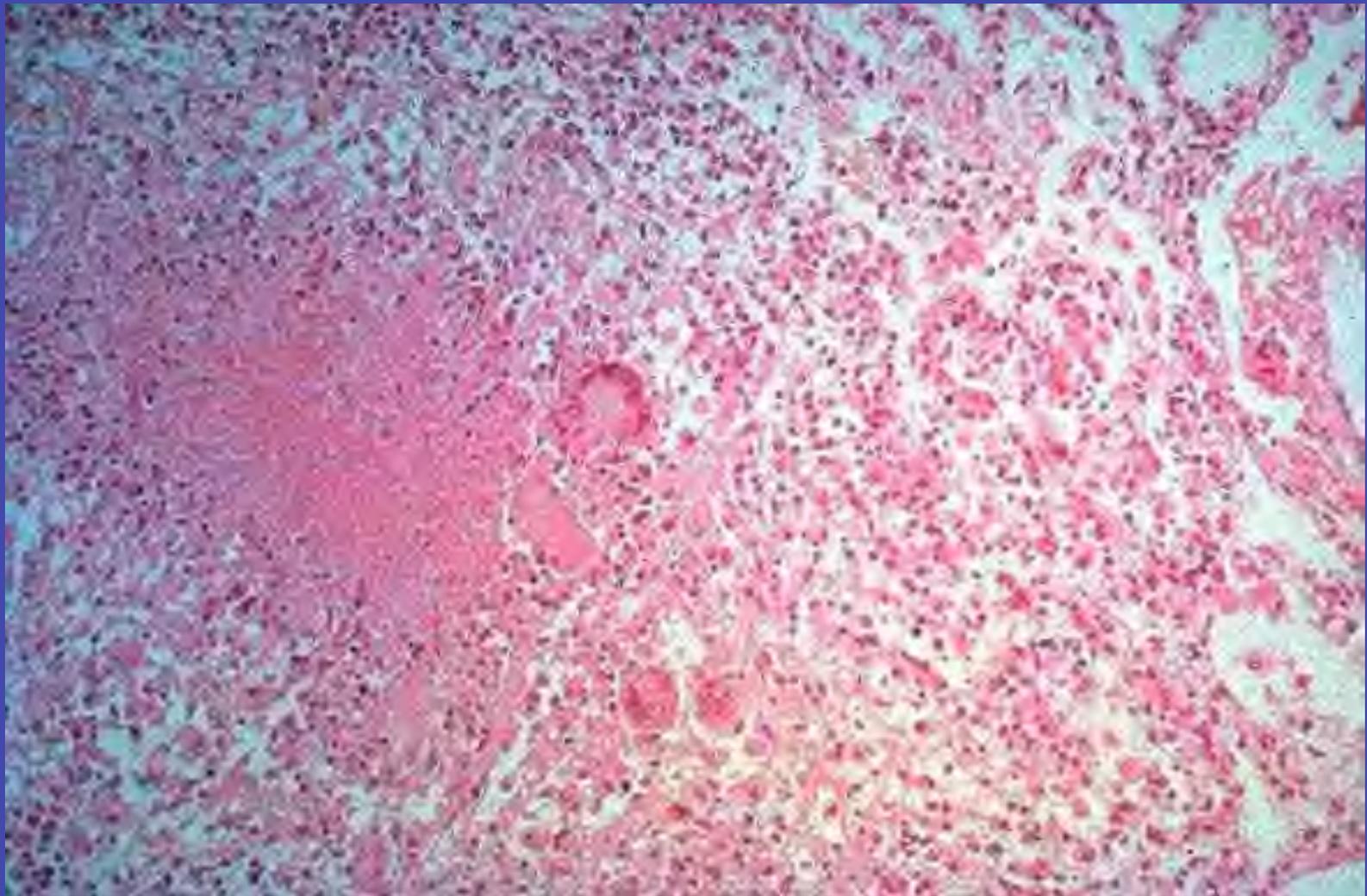


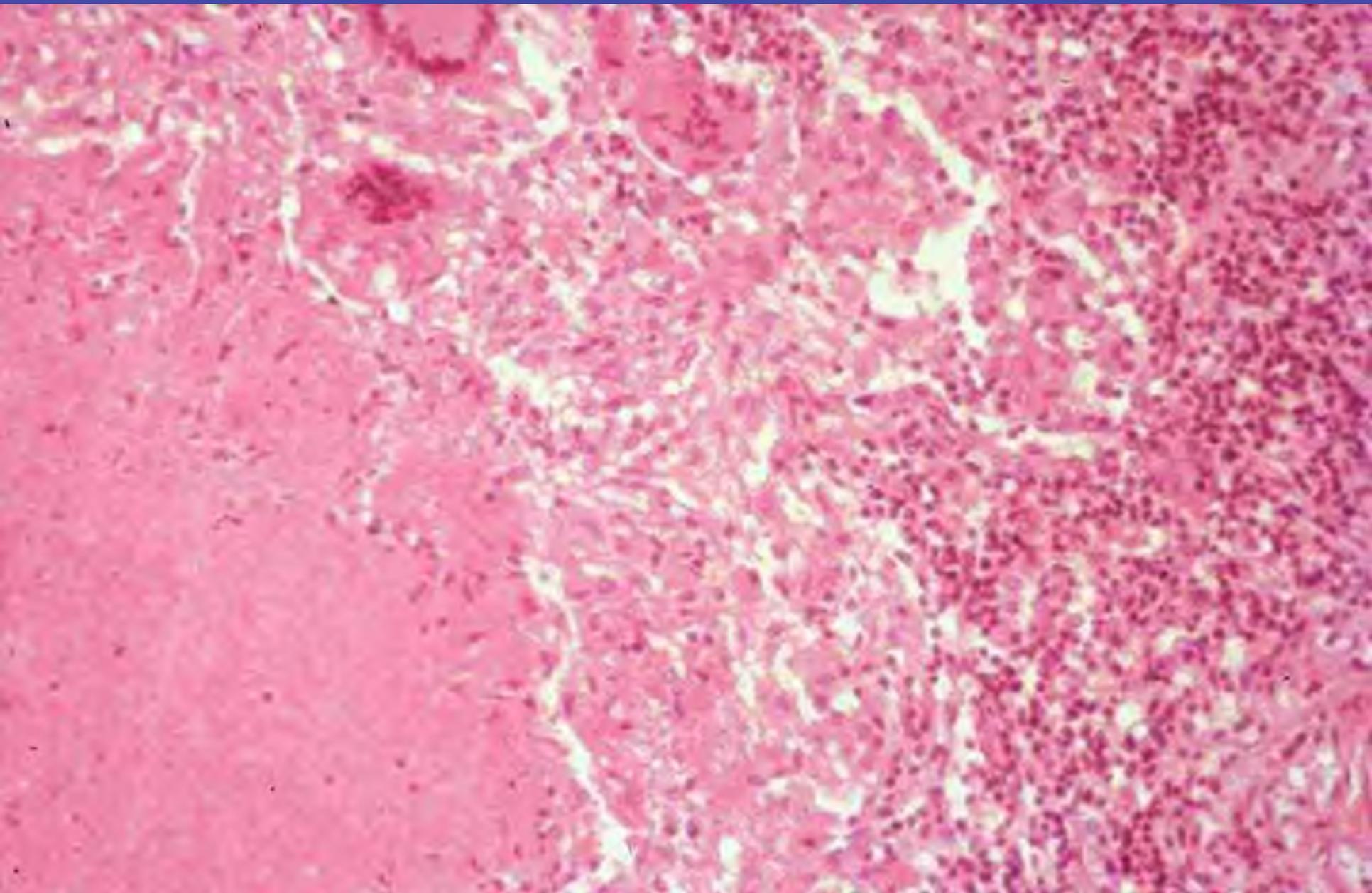


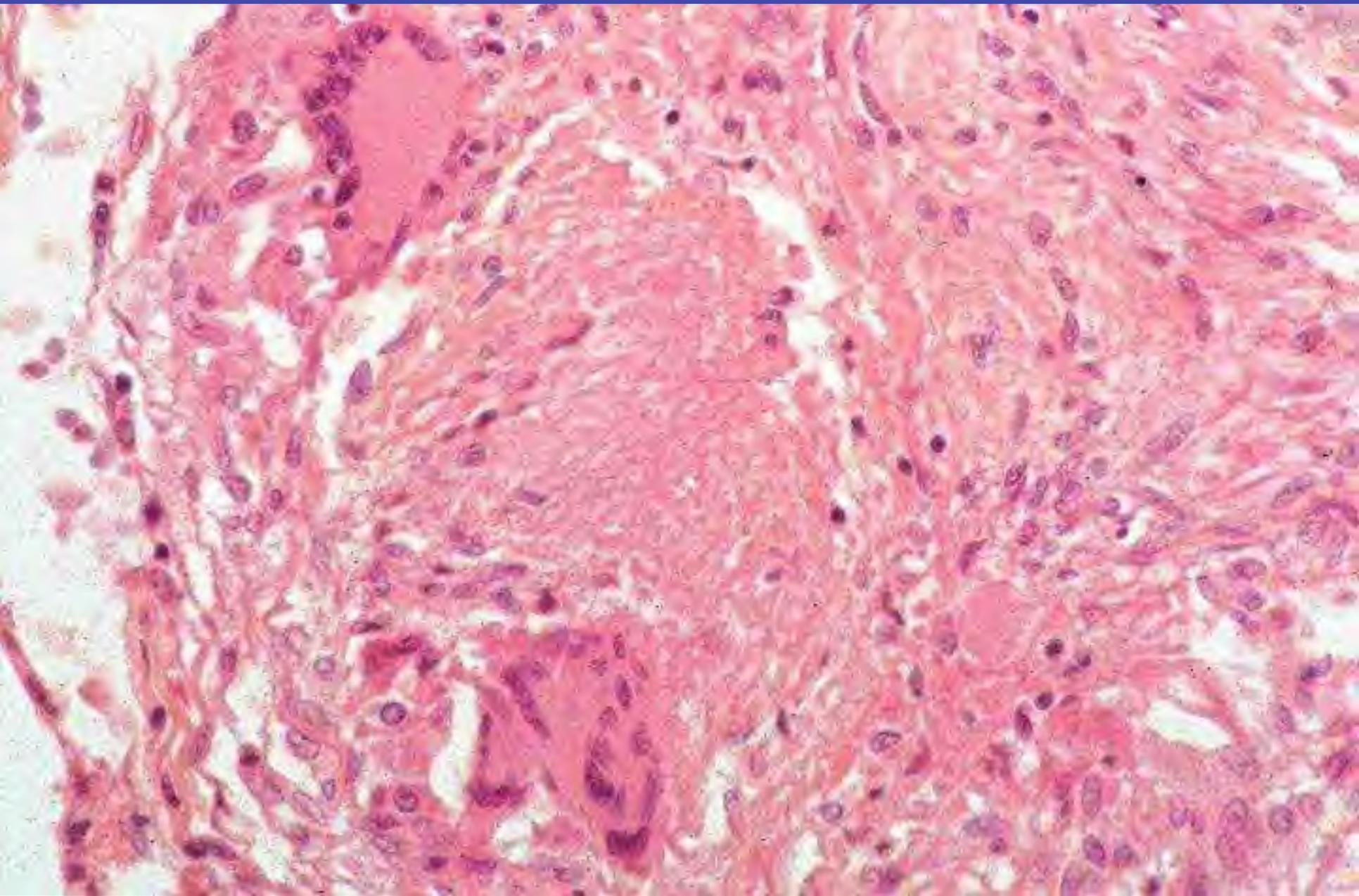


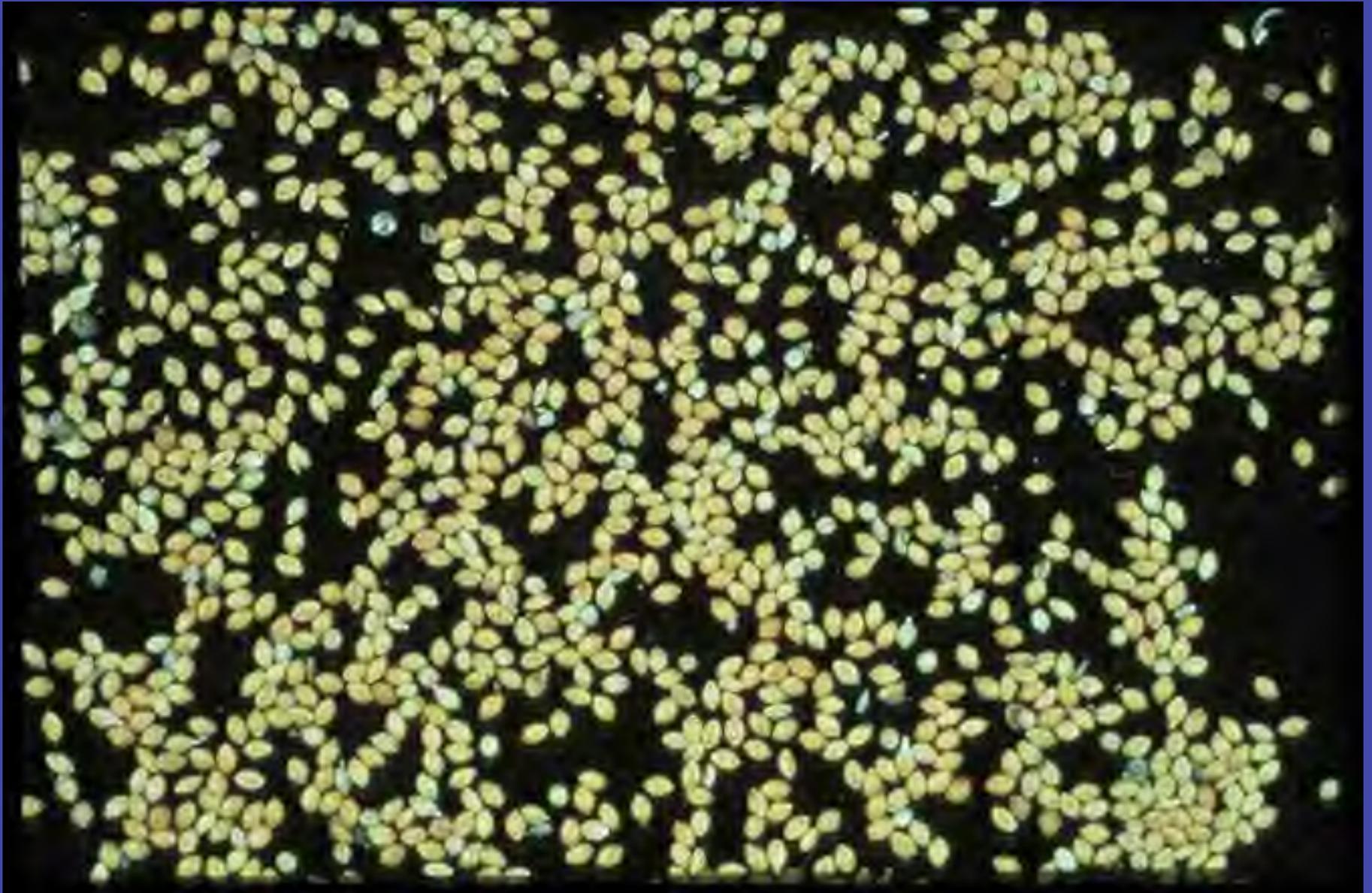




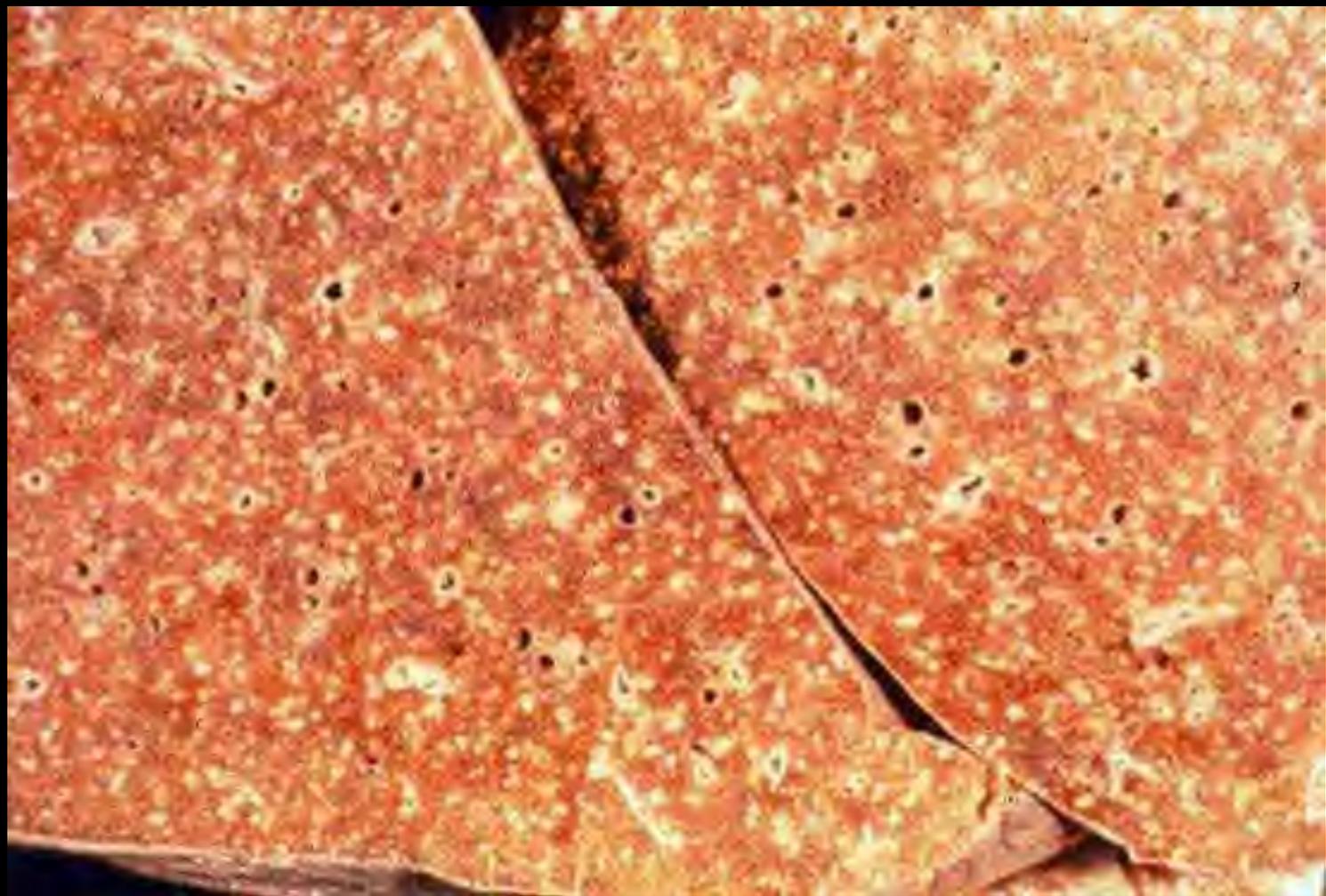


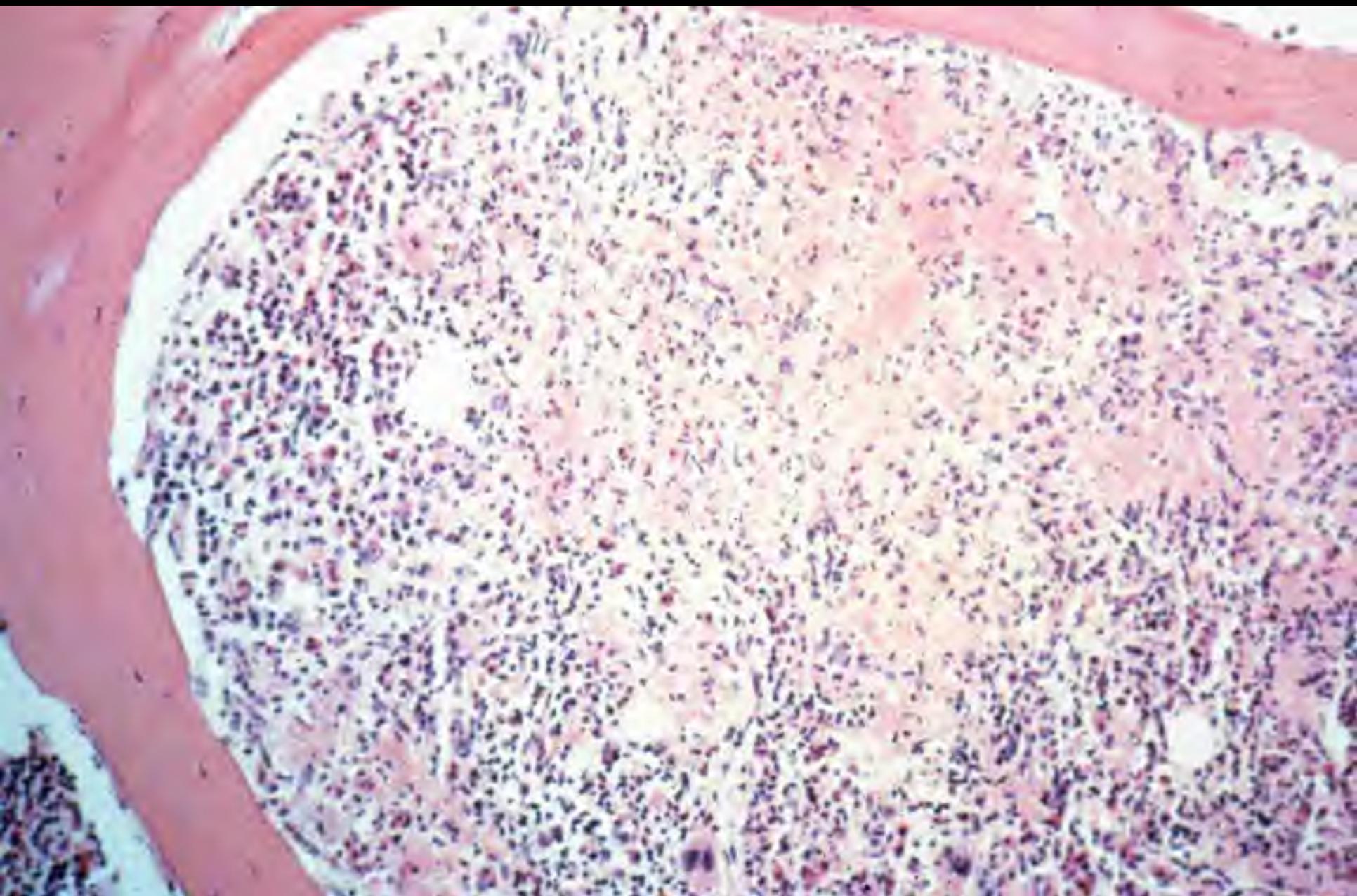












# **M-2 Respiratory Laboratory - 1**

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**26 Tuberculosis**

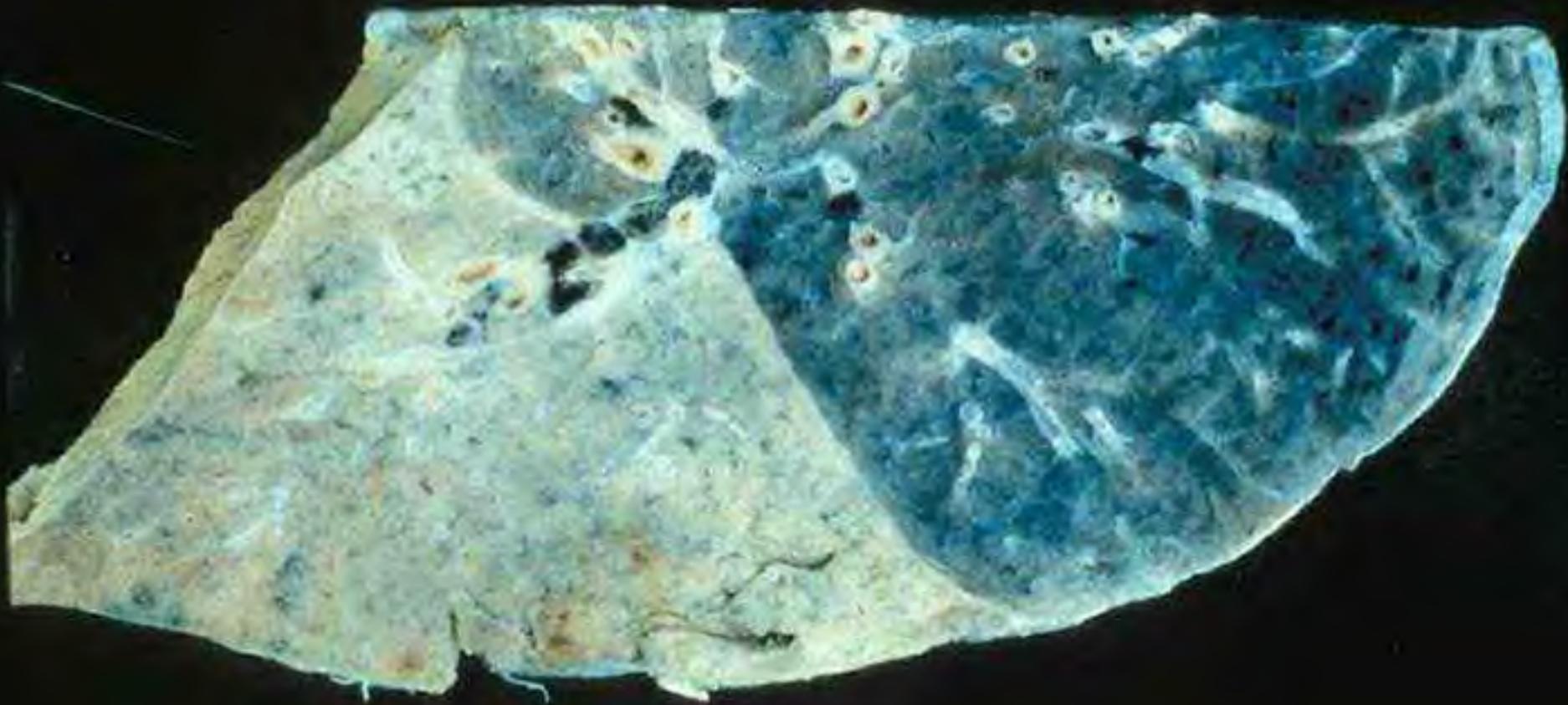
**64 Pneumonia**

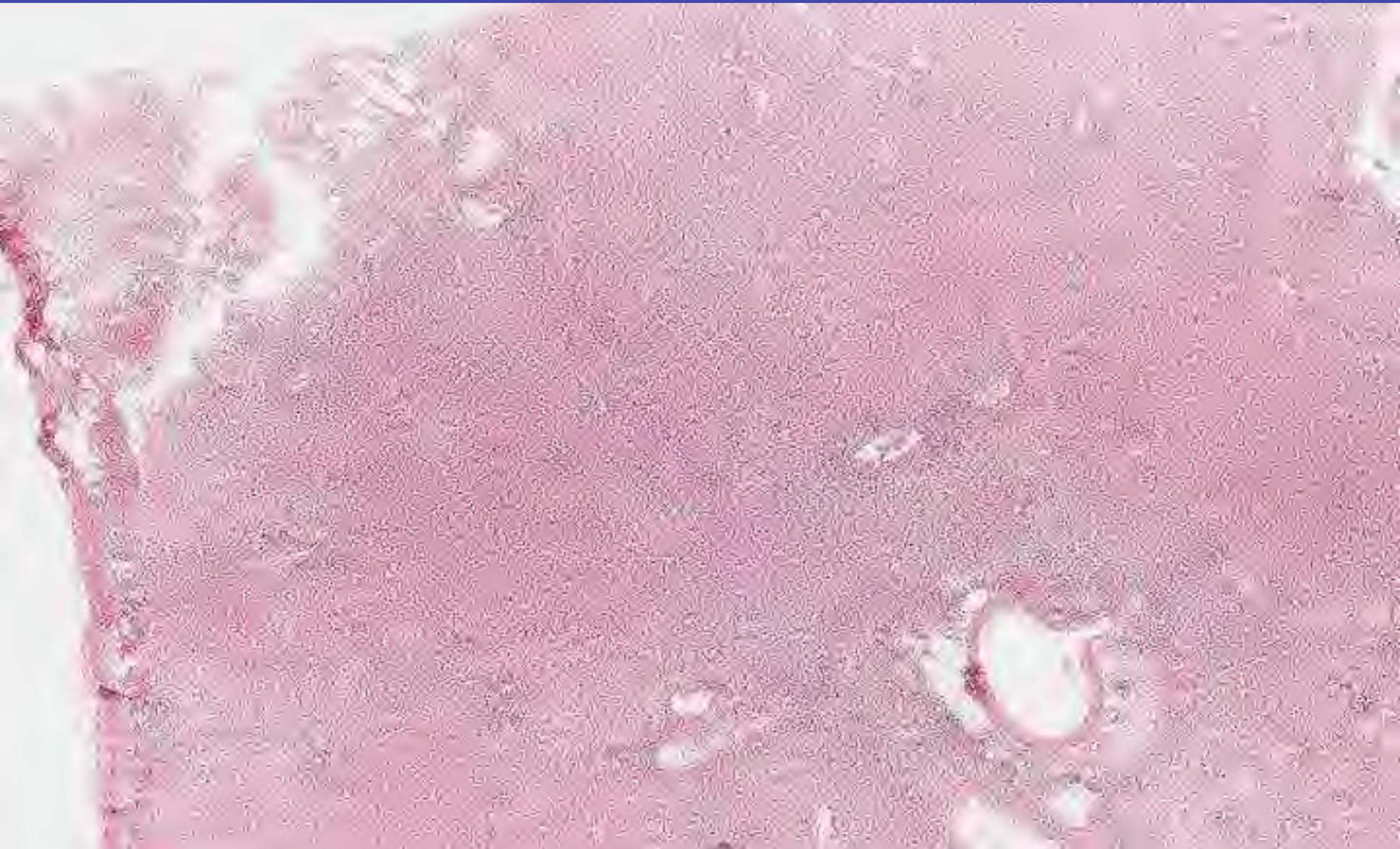
**29 Aspergillosis**

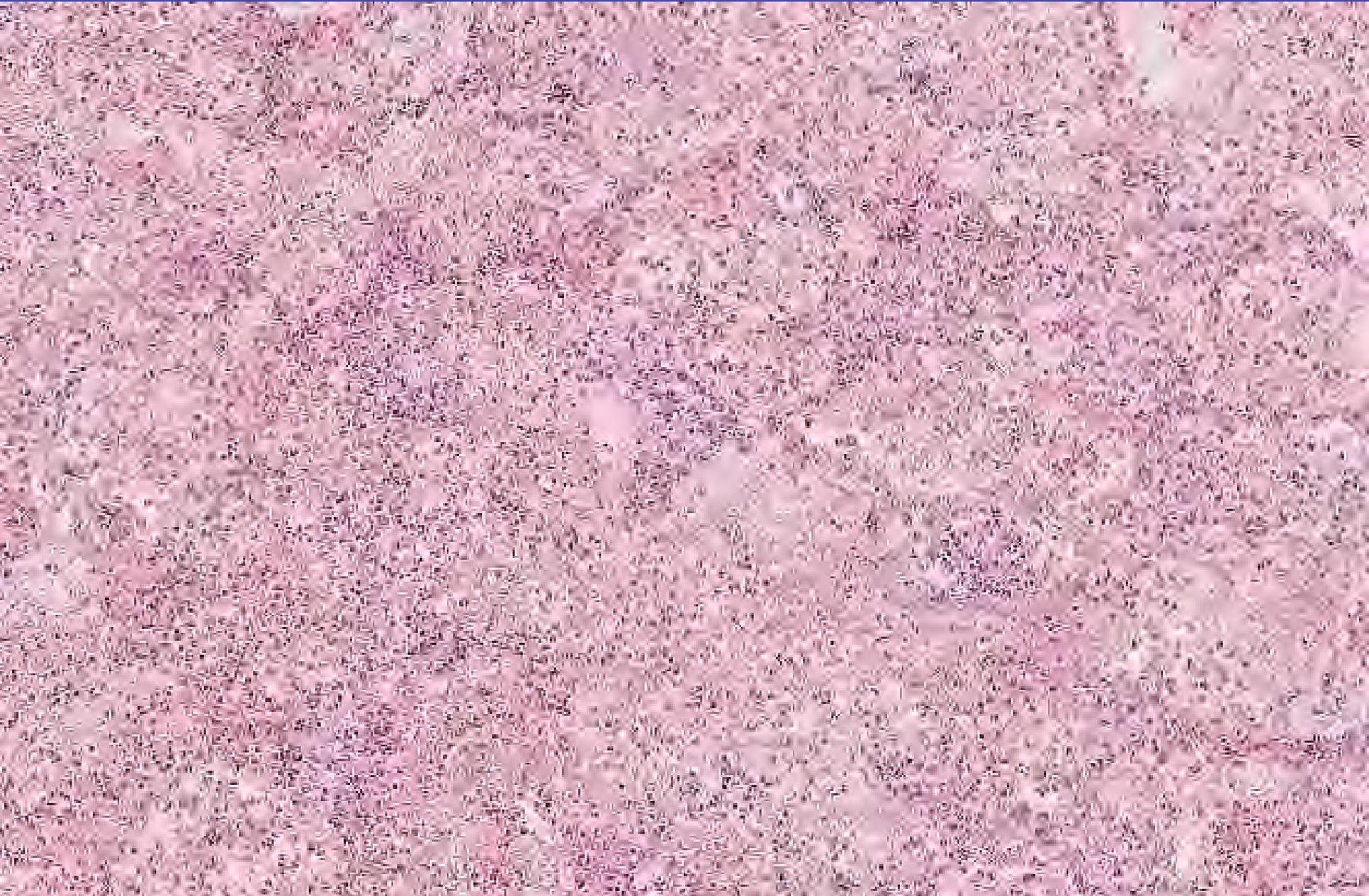
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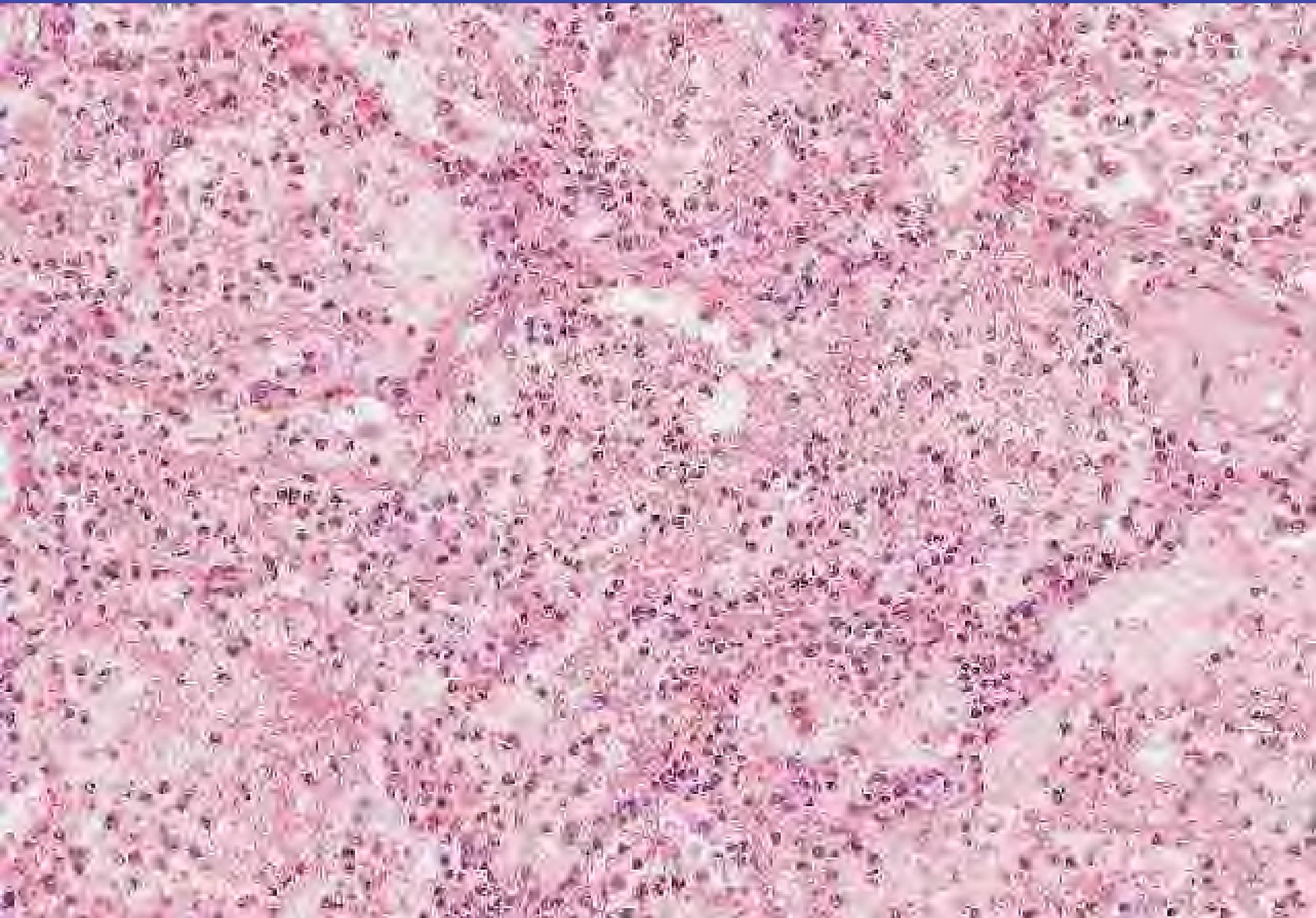


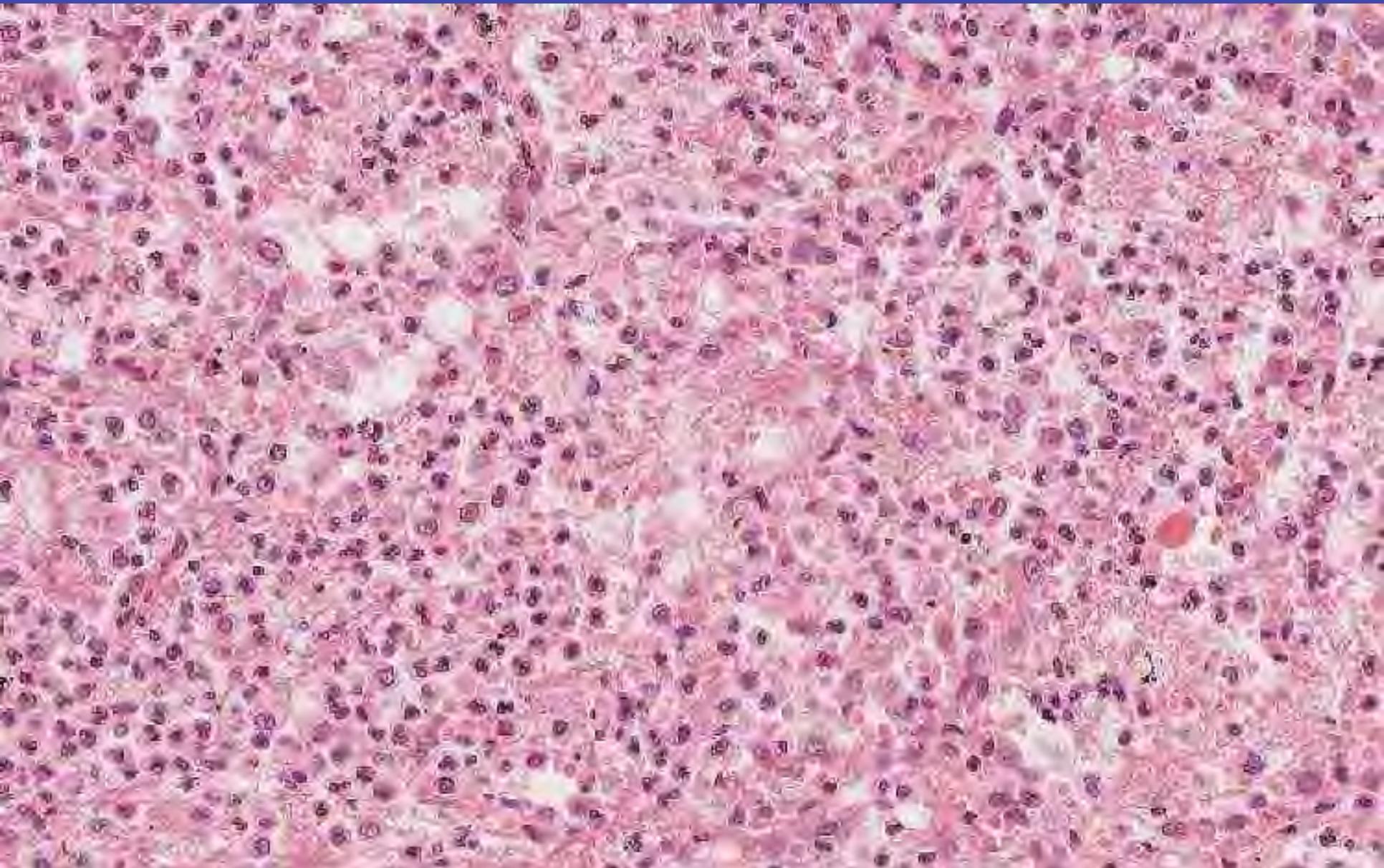


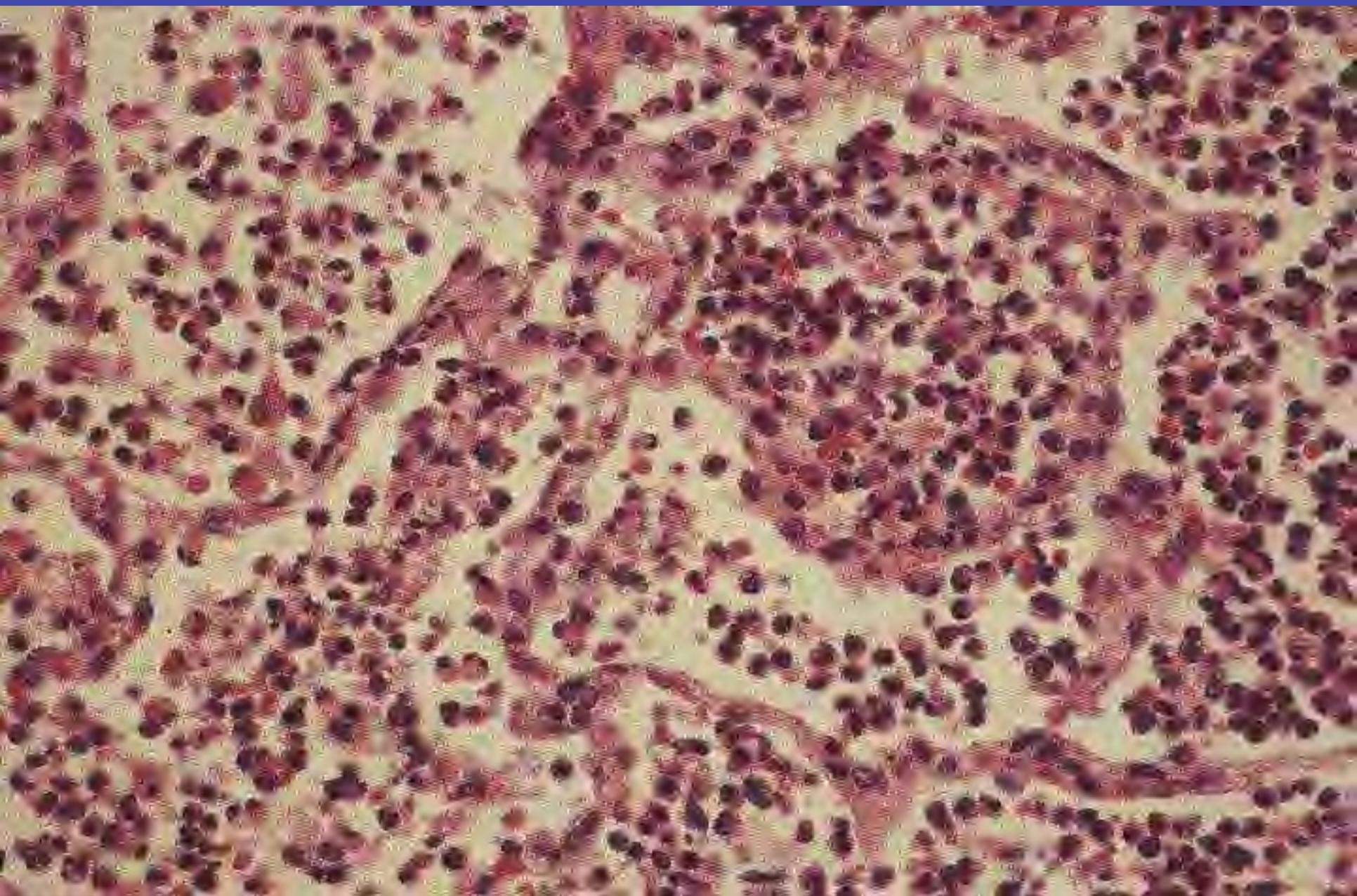


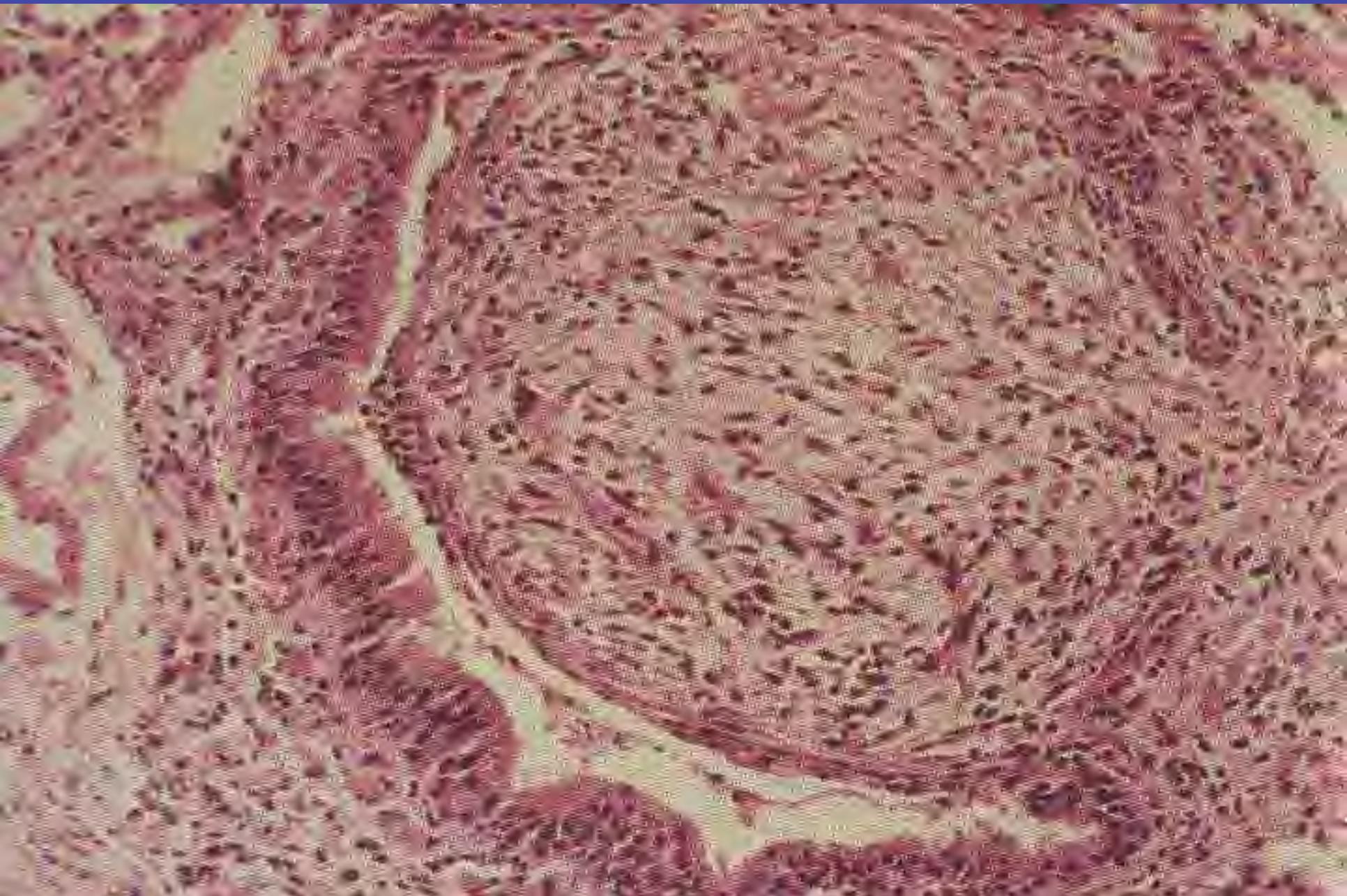


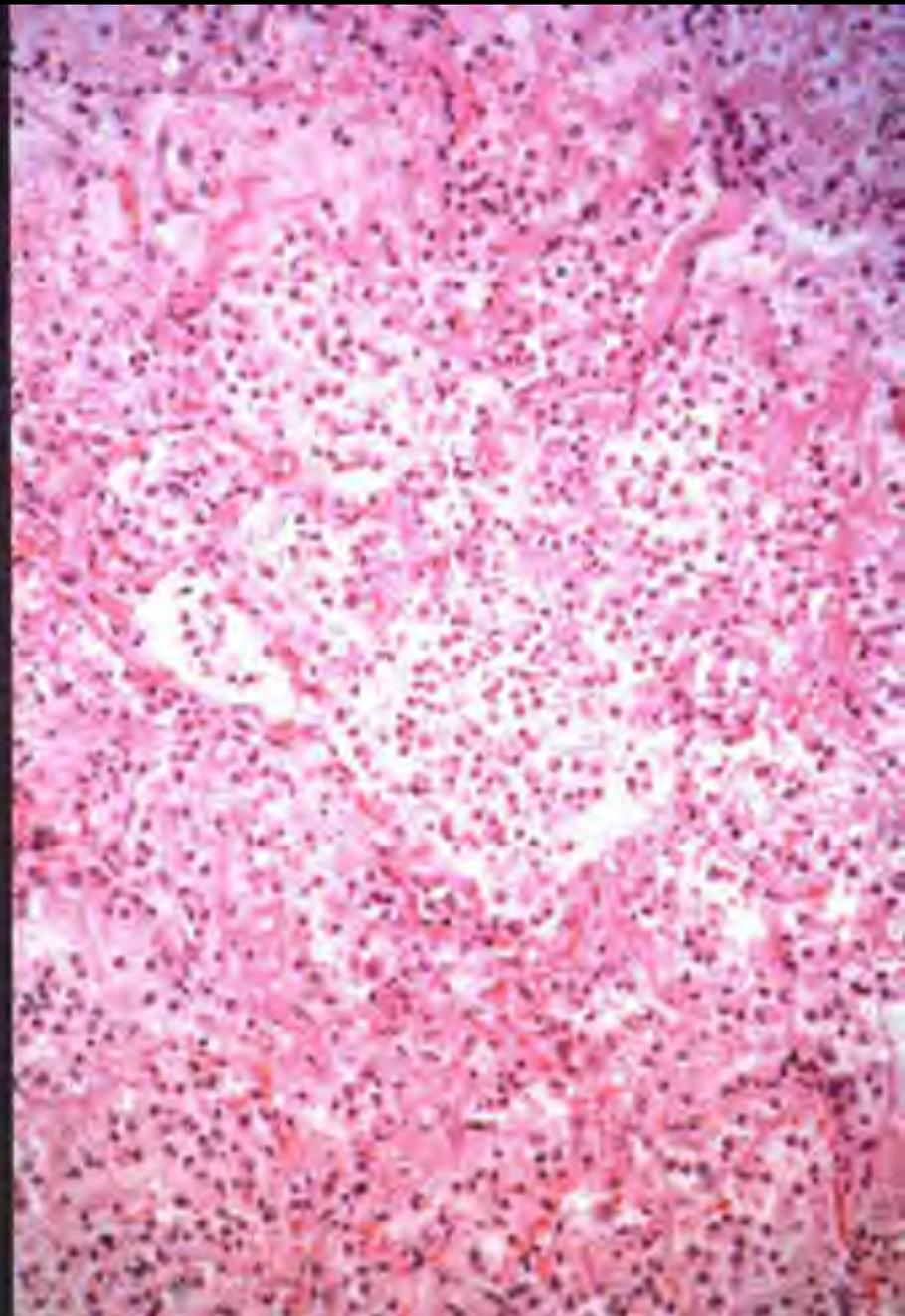
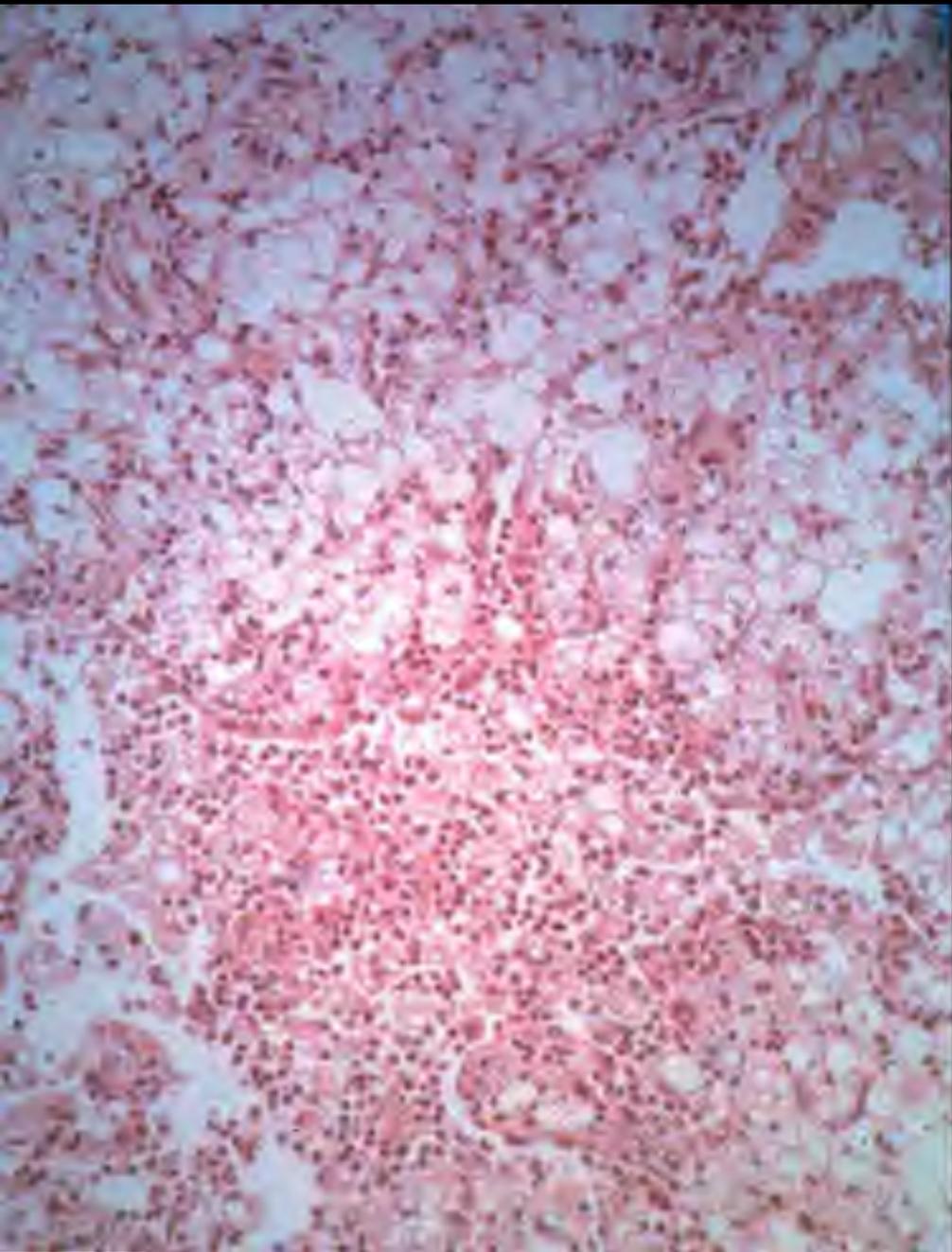












# **M-2 Respiratory Laboratory - 1**

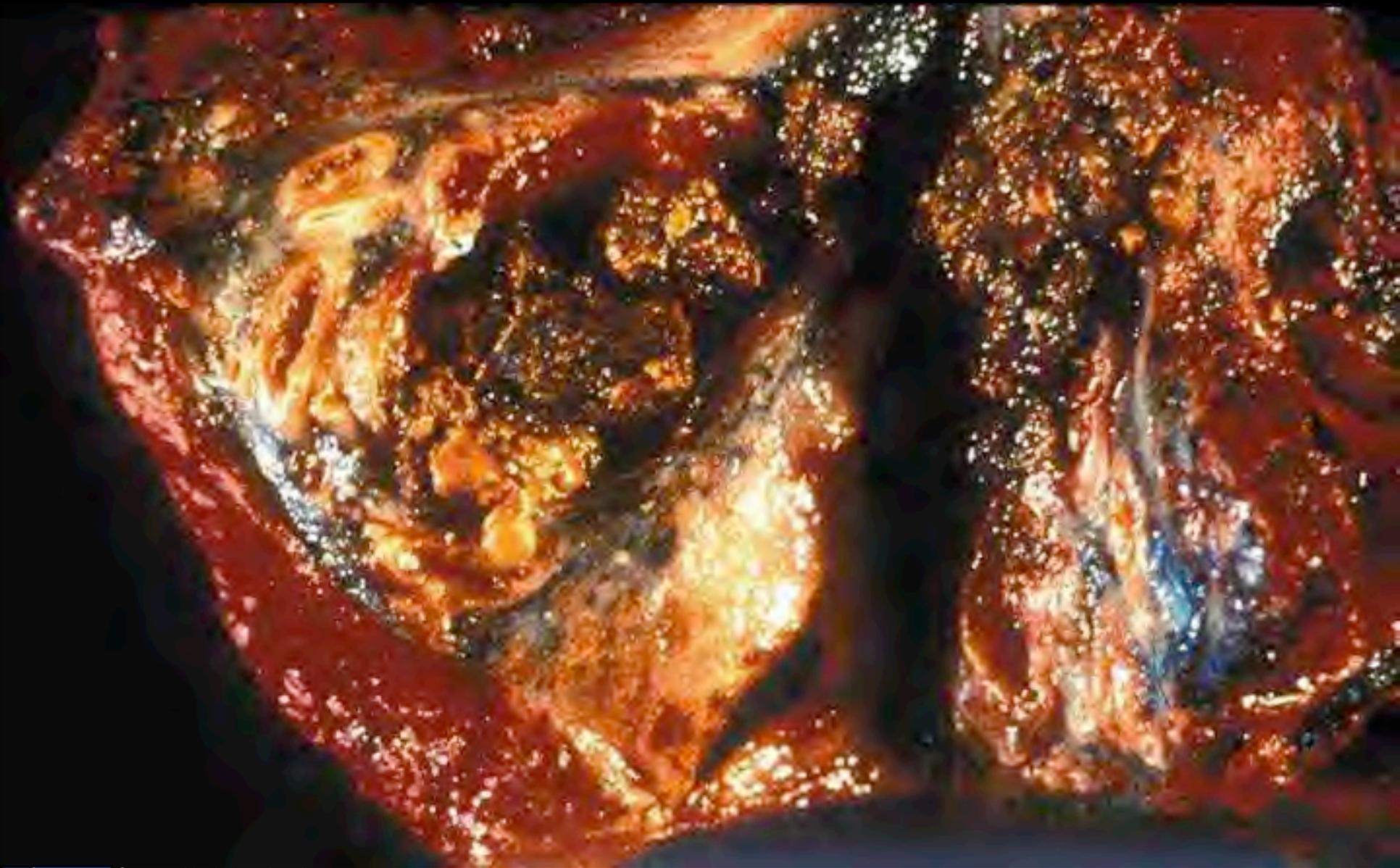
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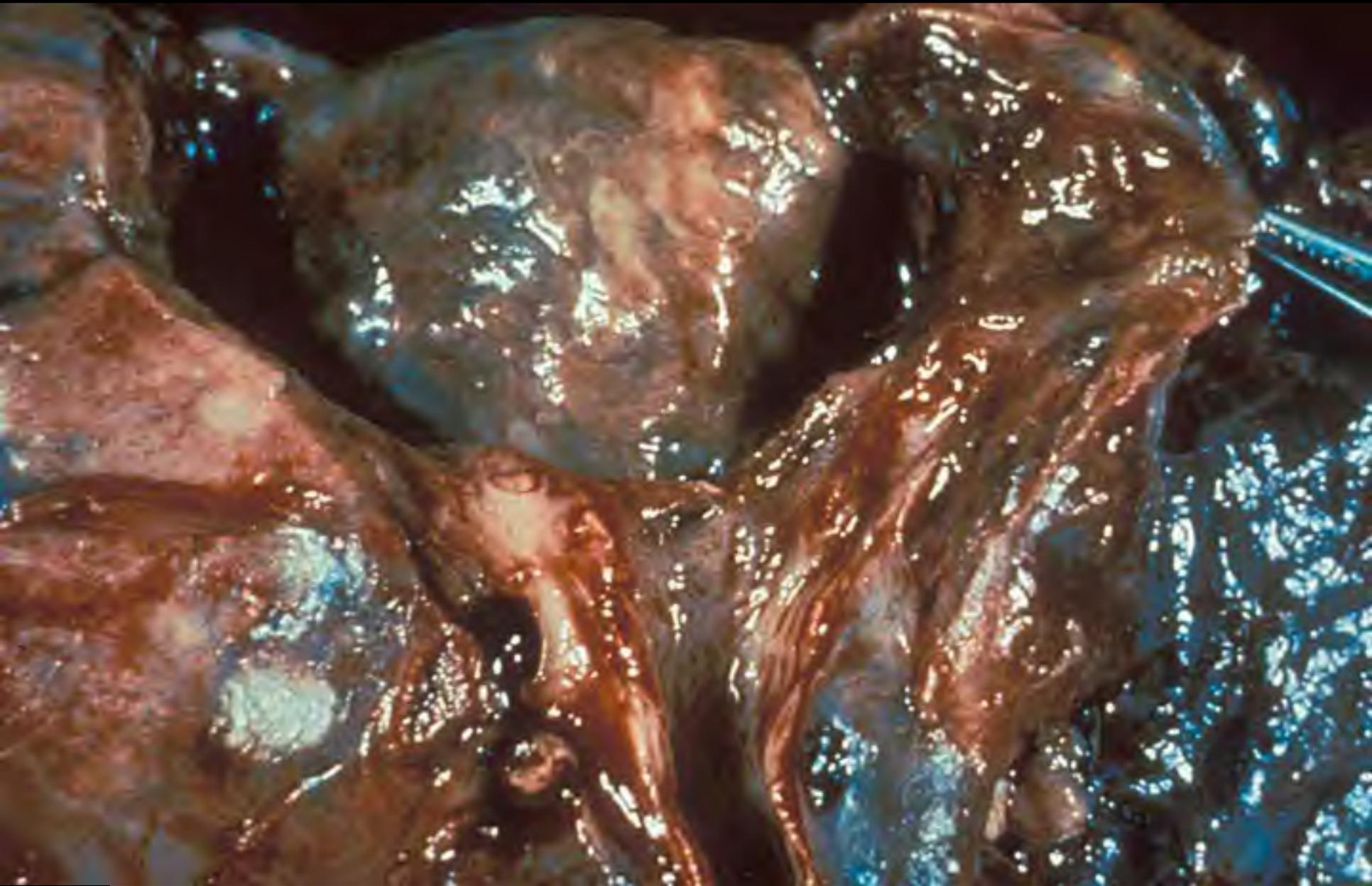
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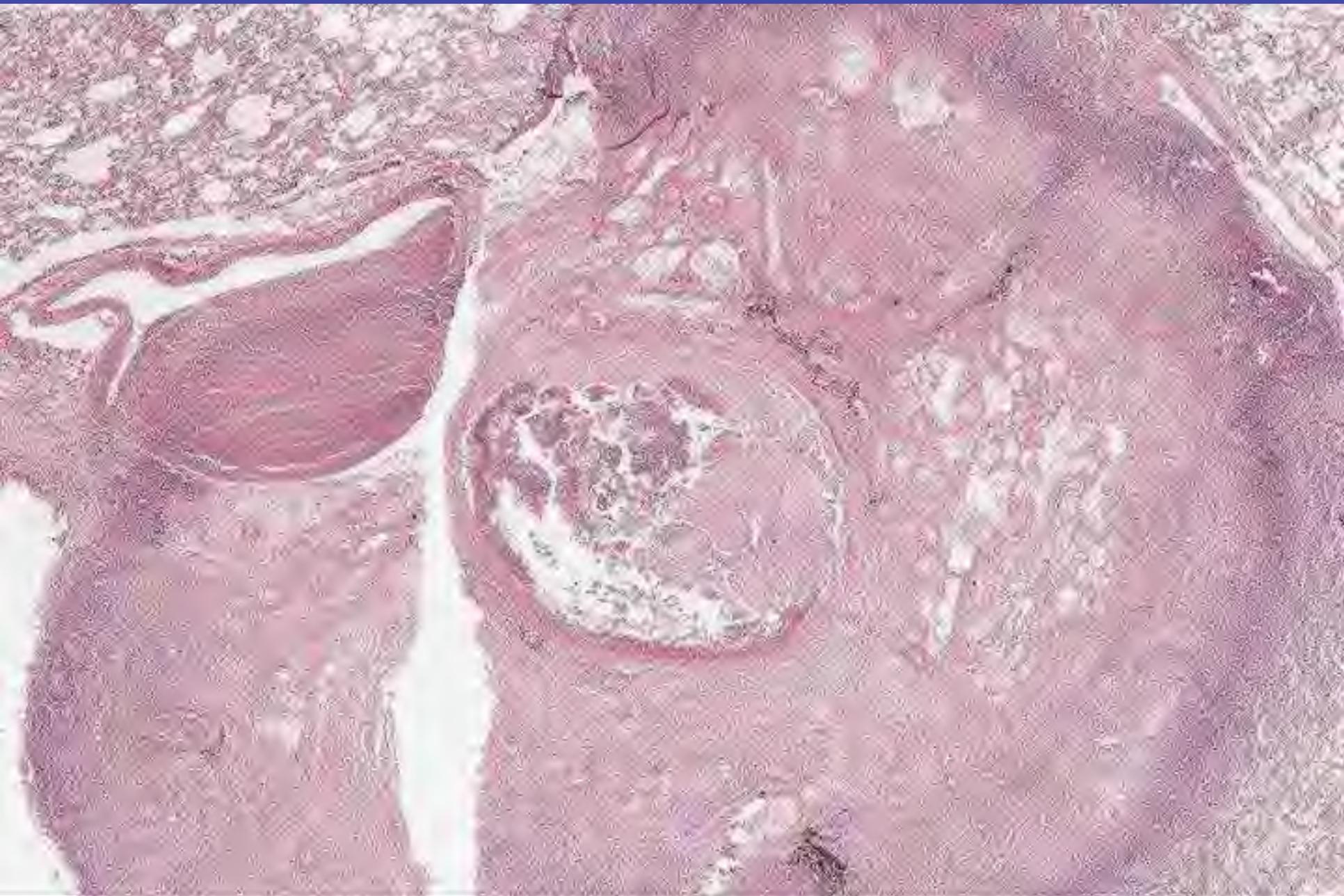
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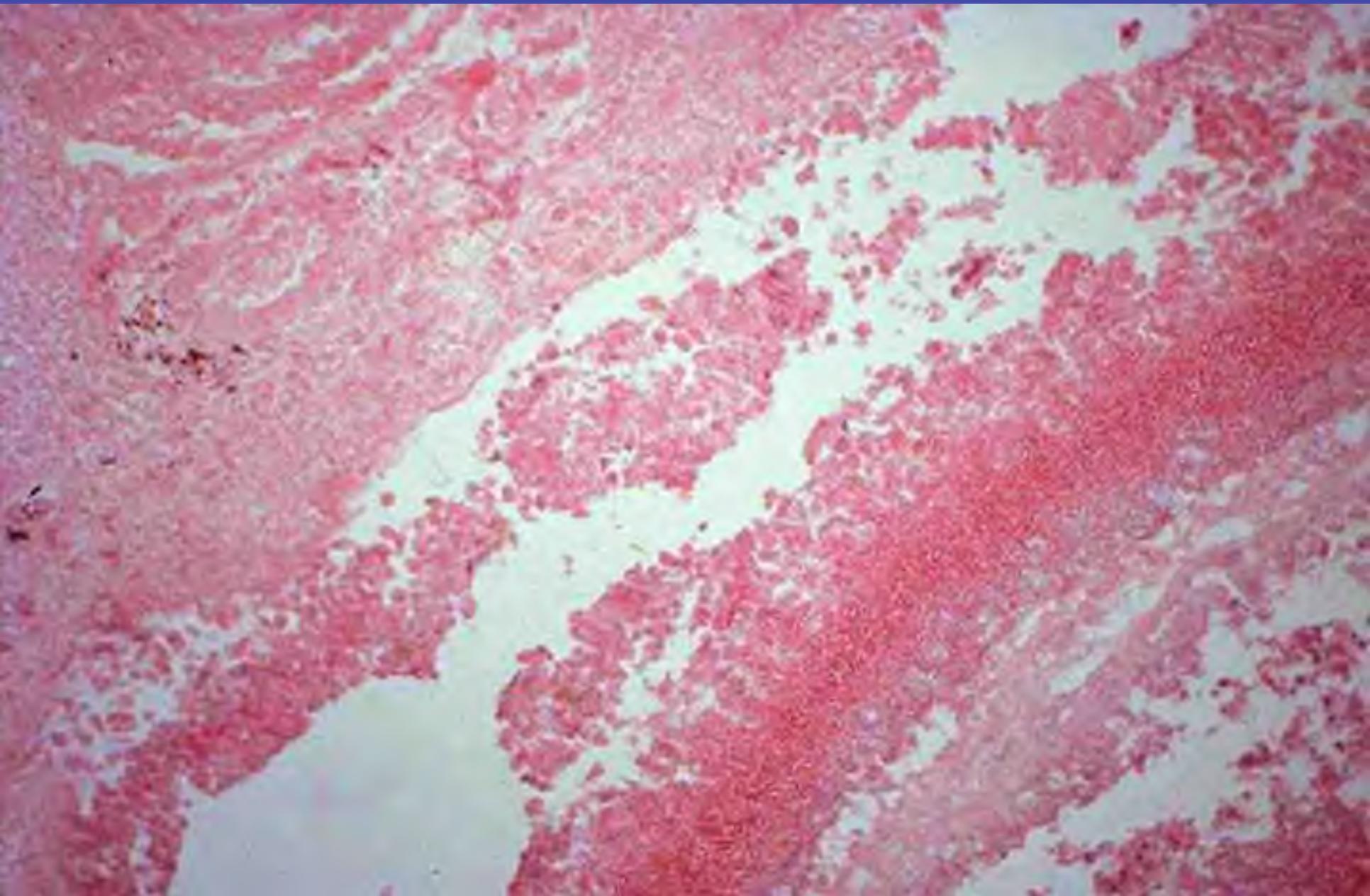
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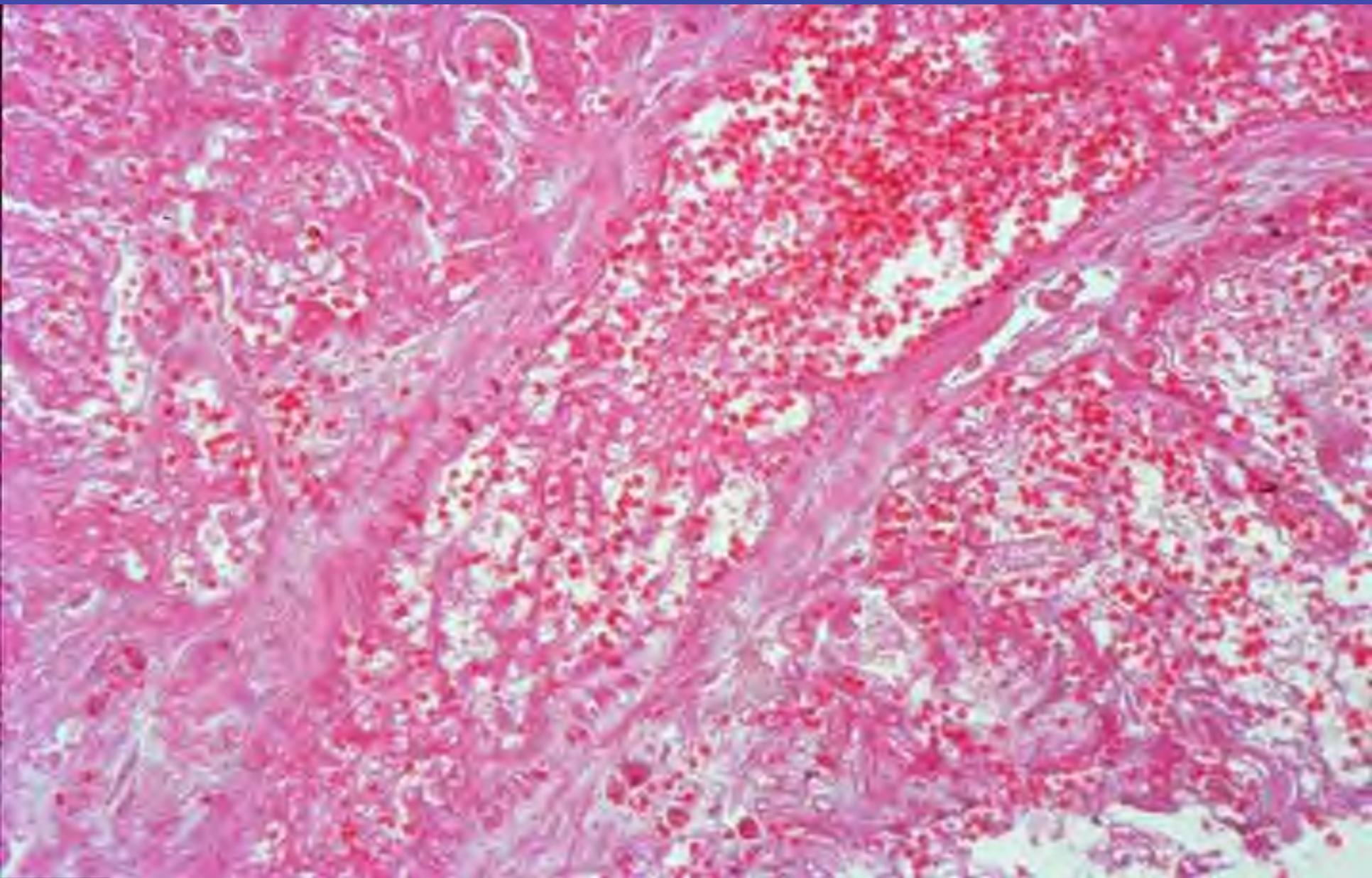


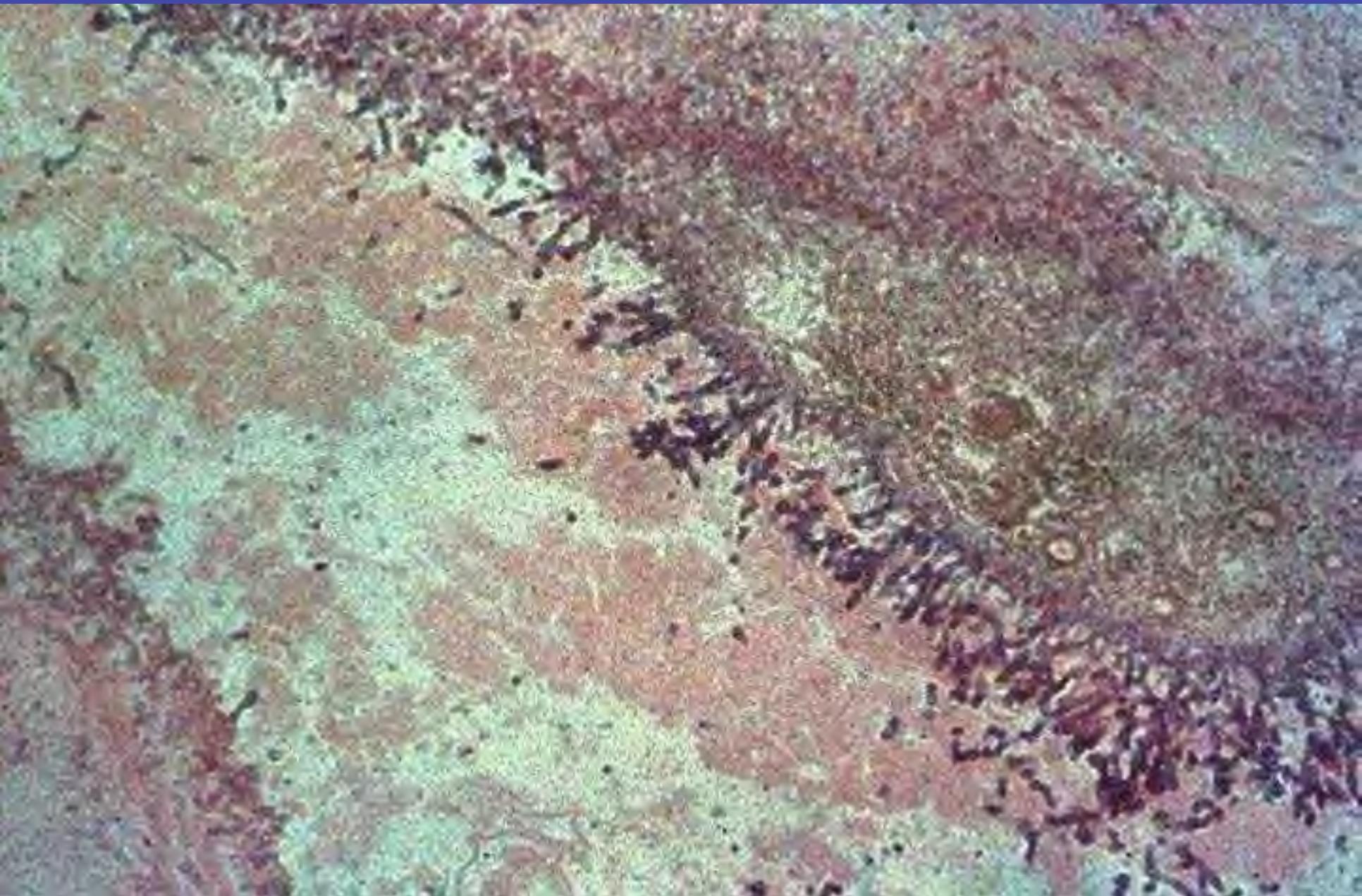


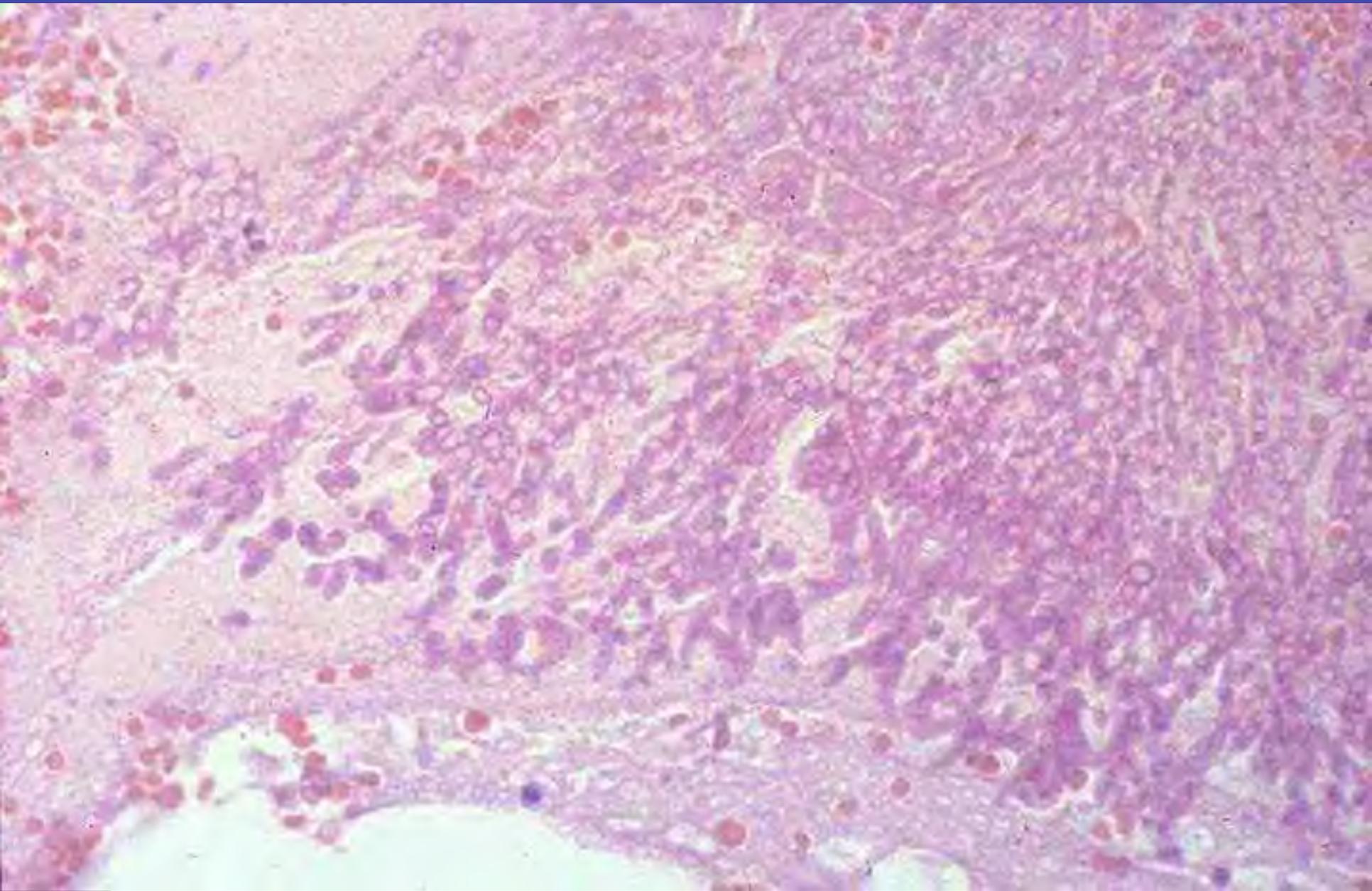


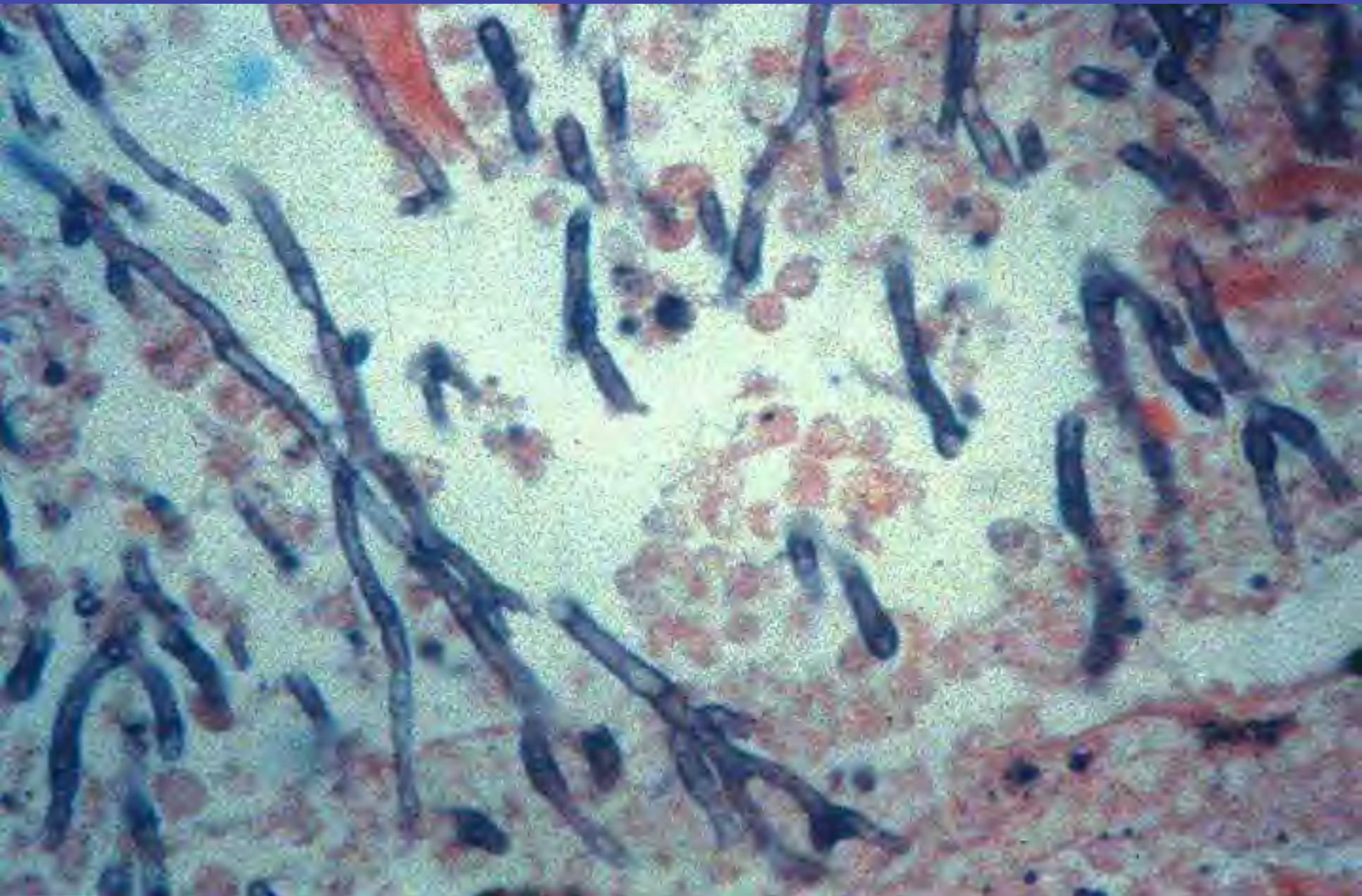


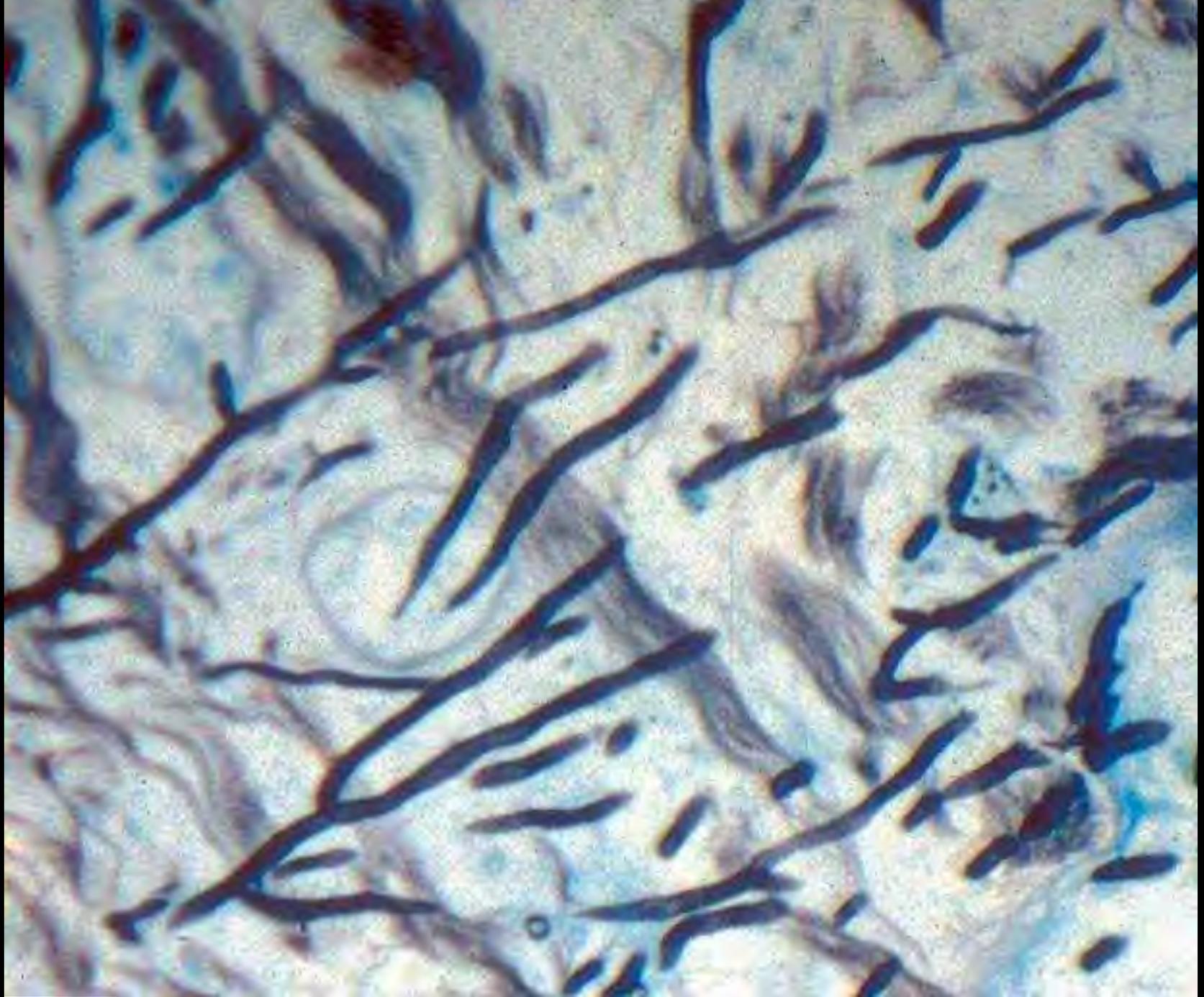














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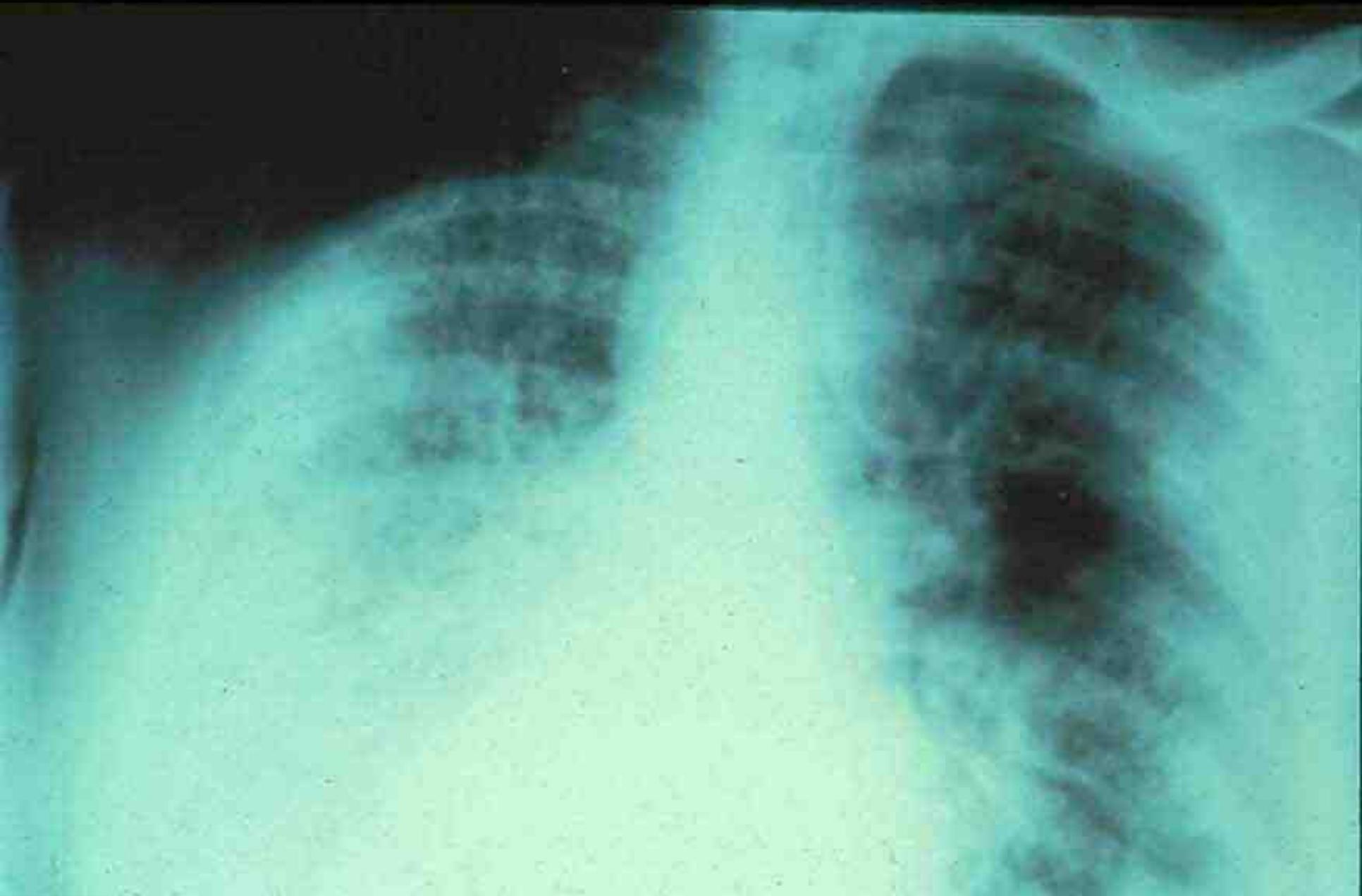
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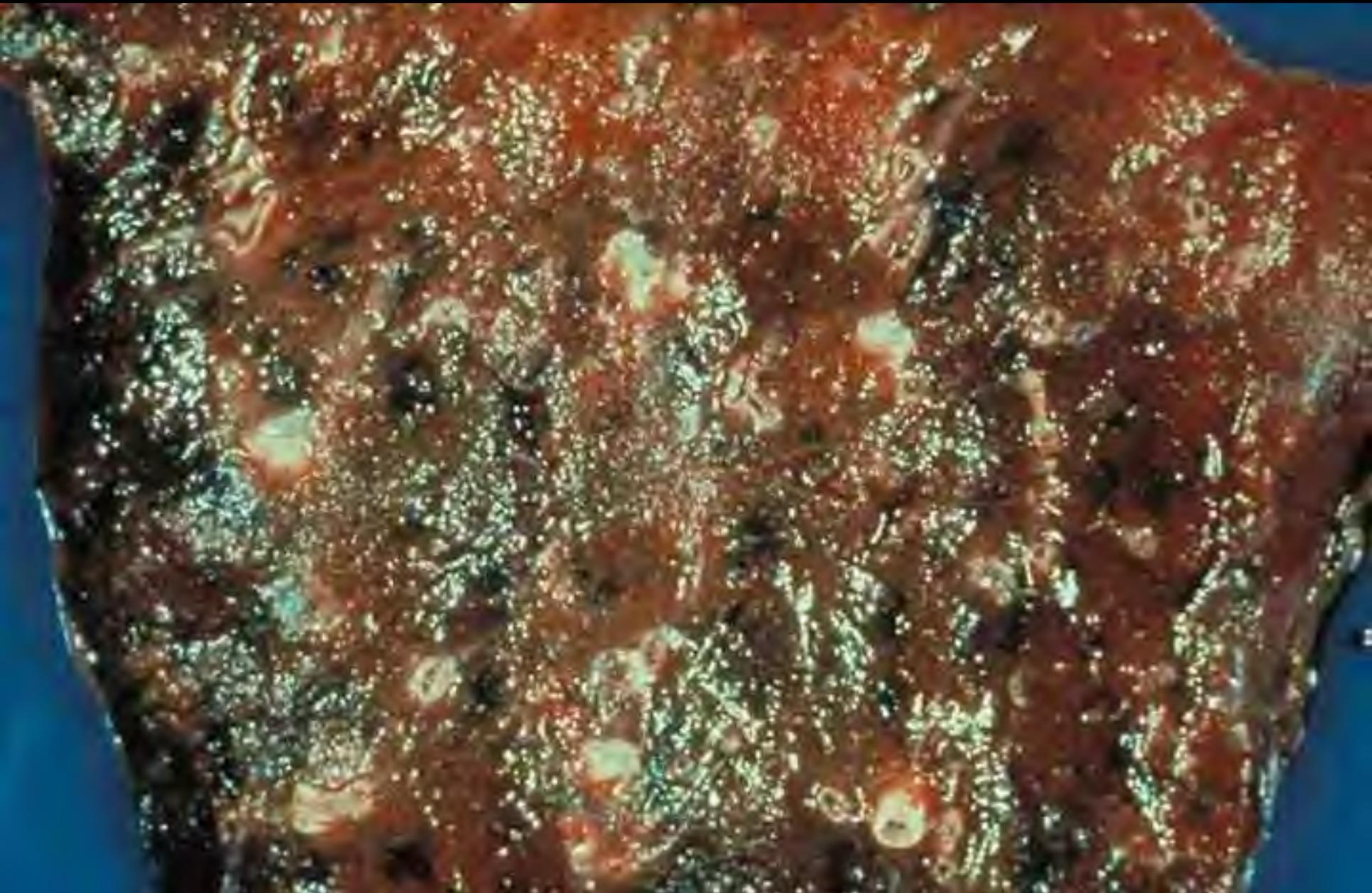
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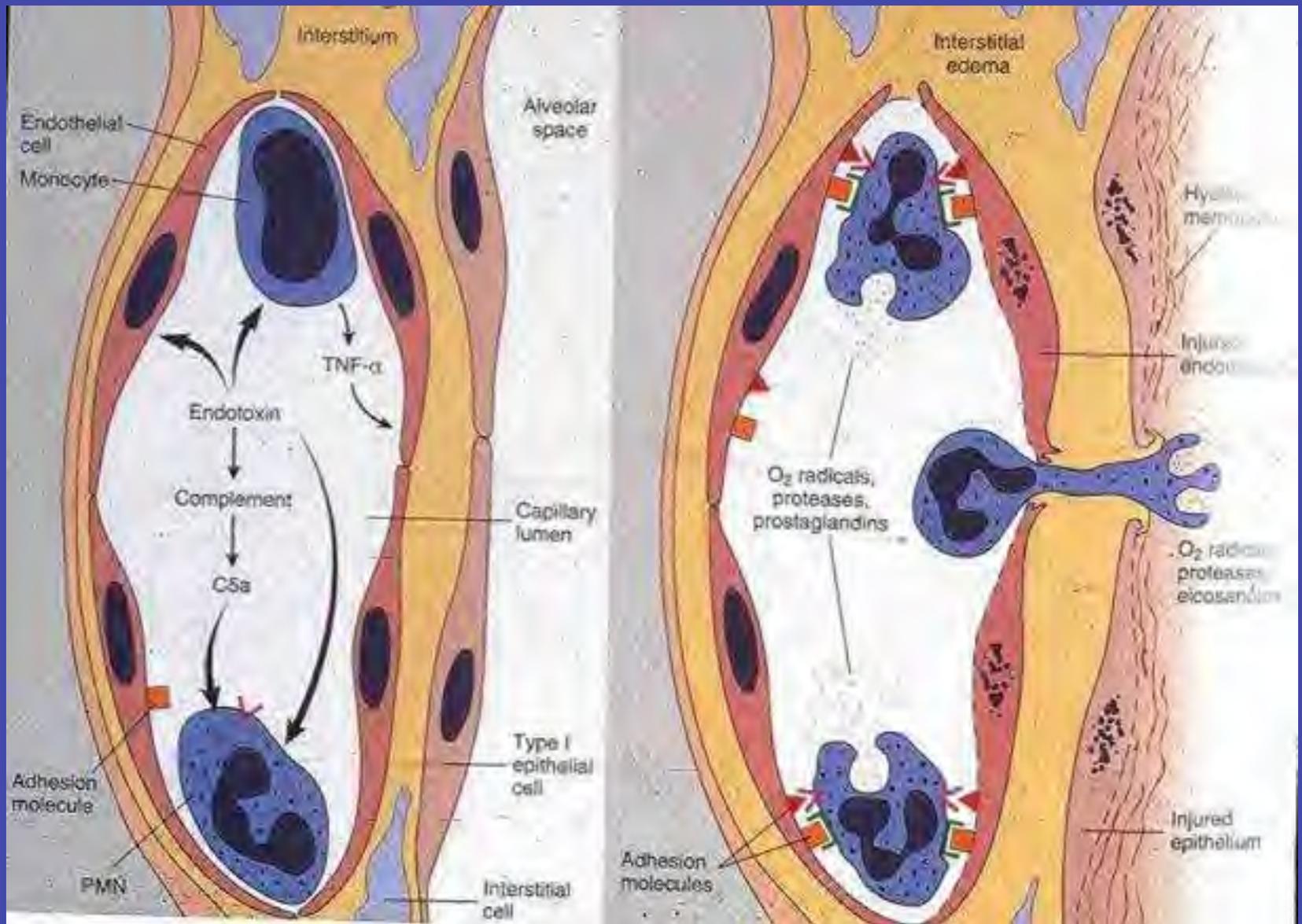
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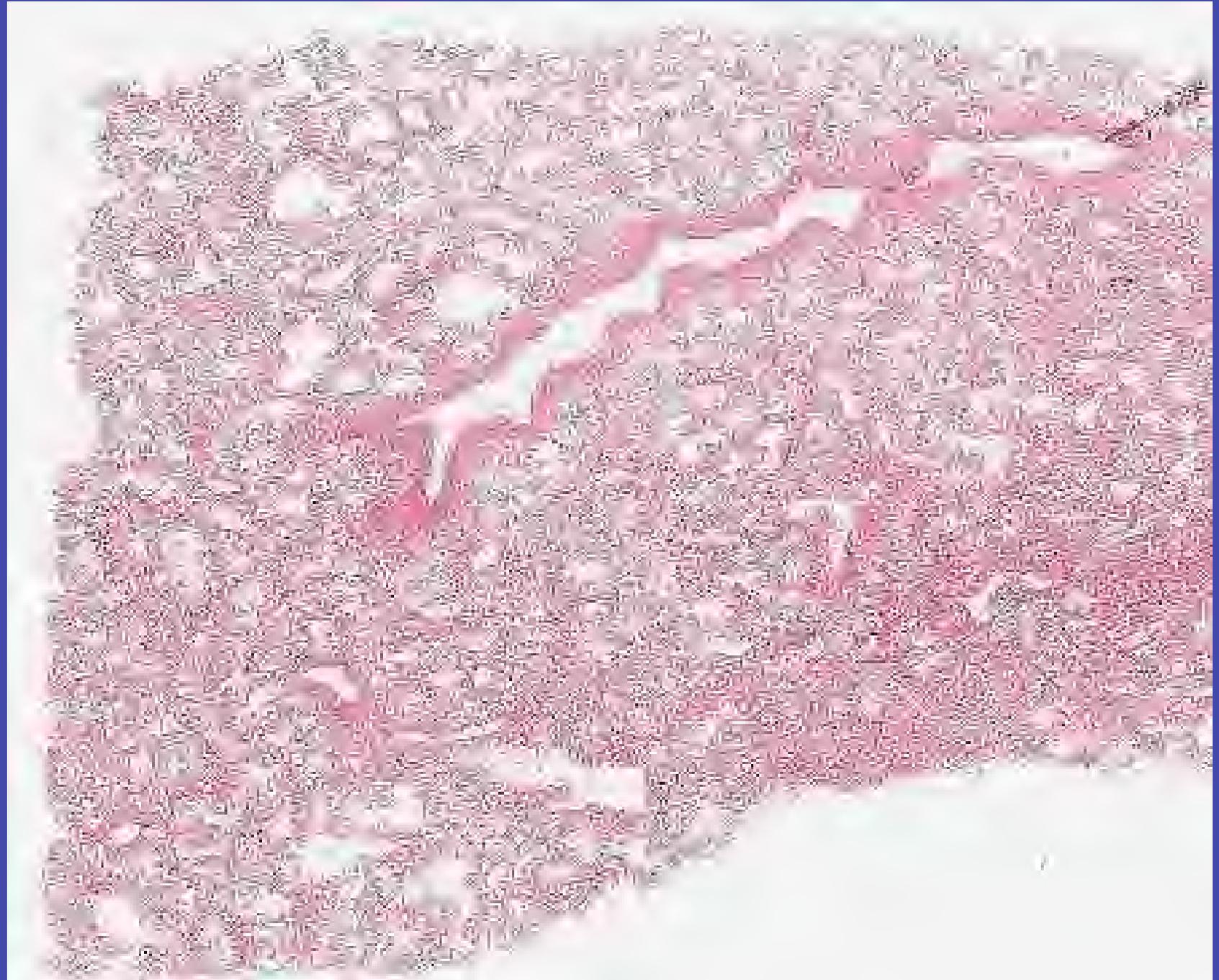
**61 RDS in the newborn**

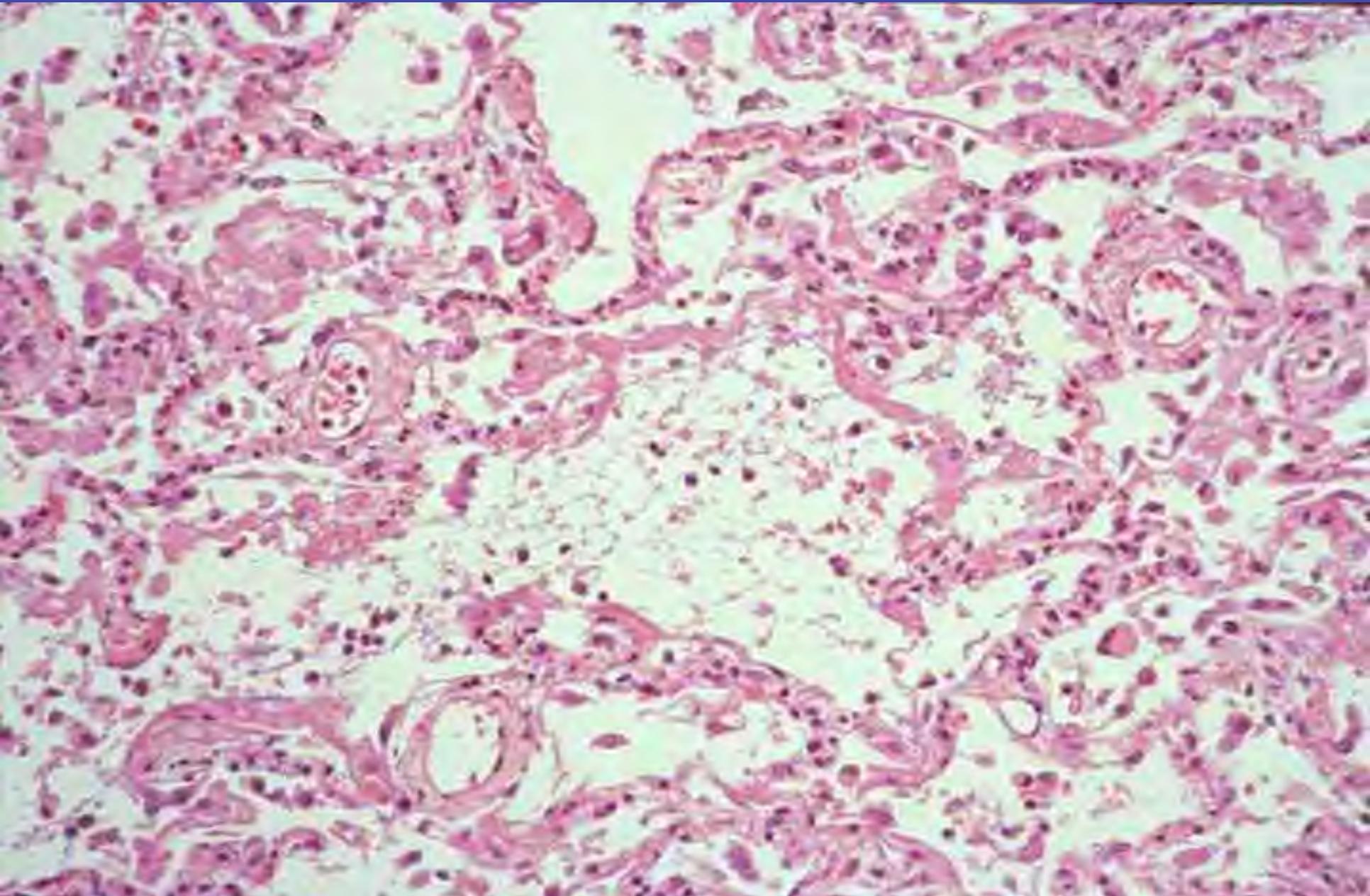


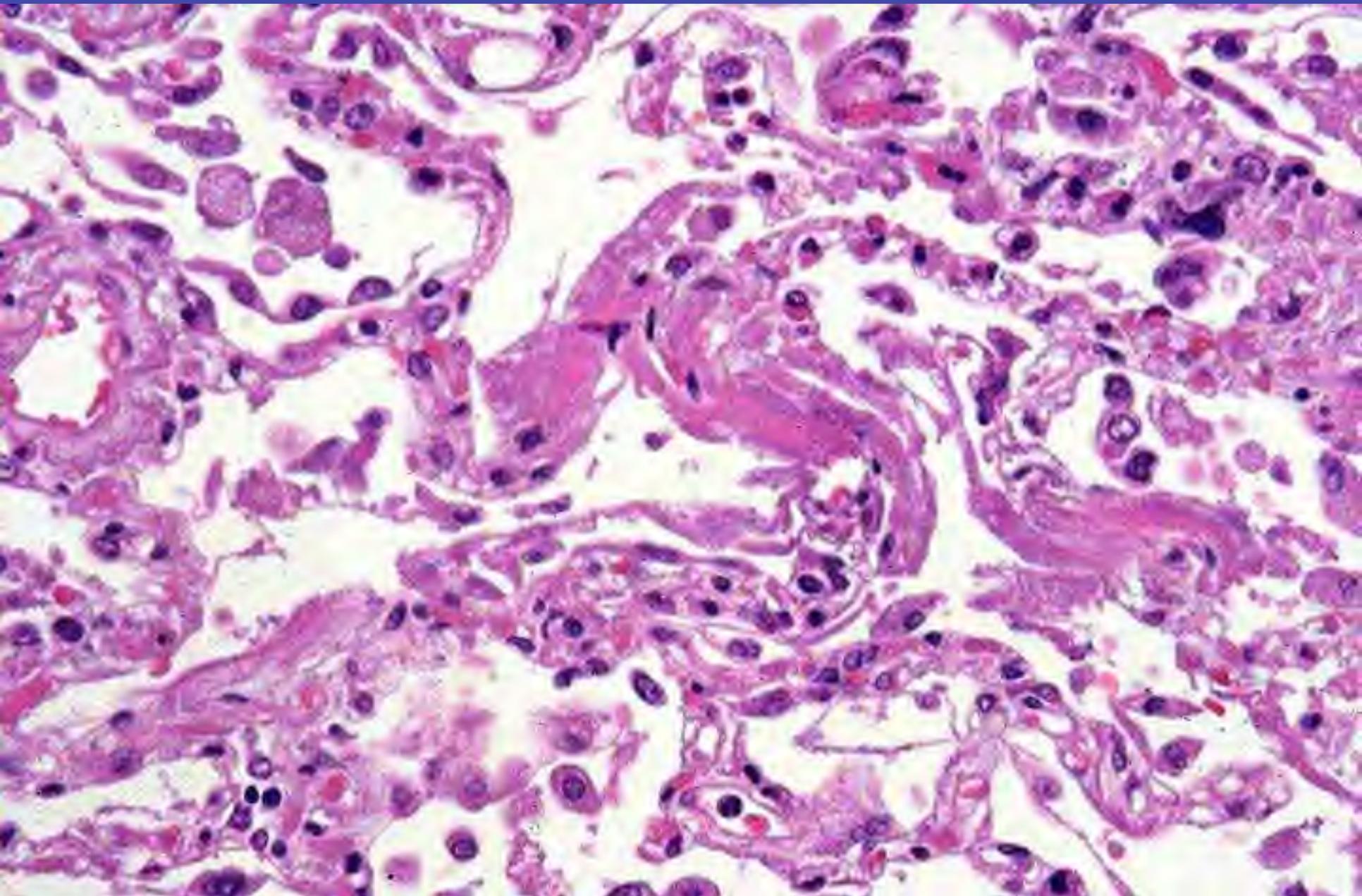


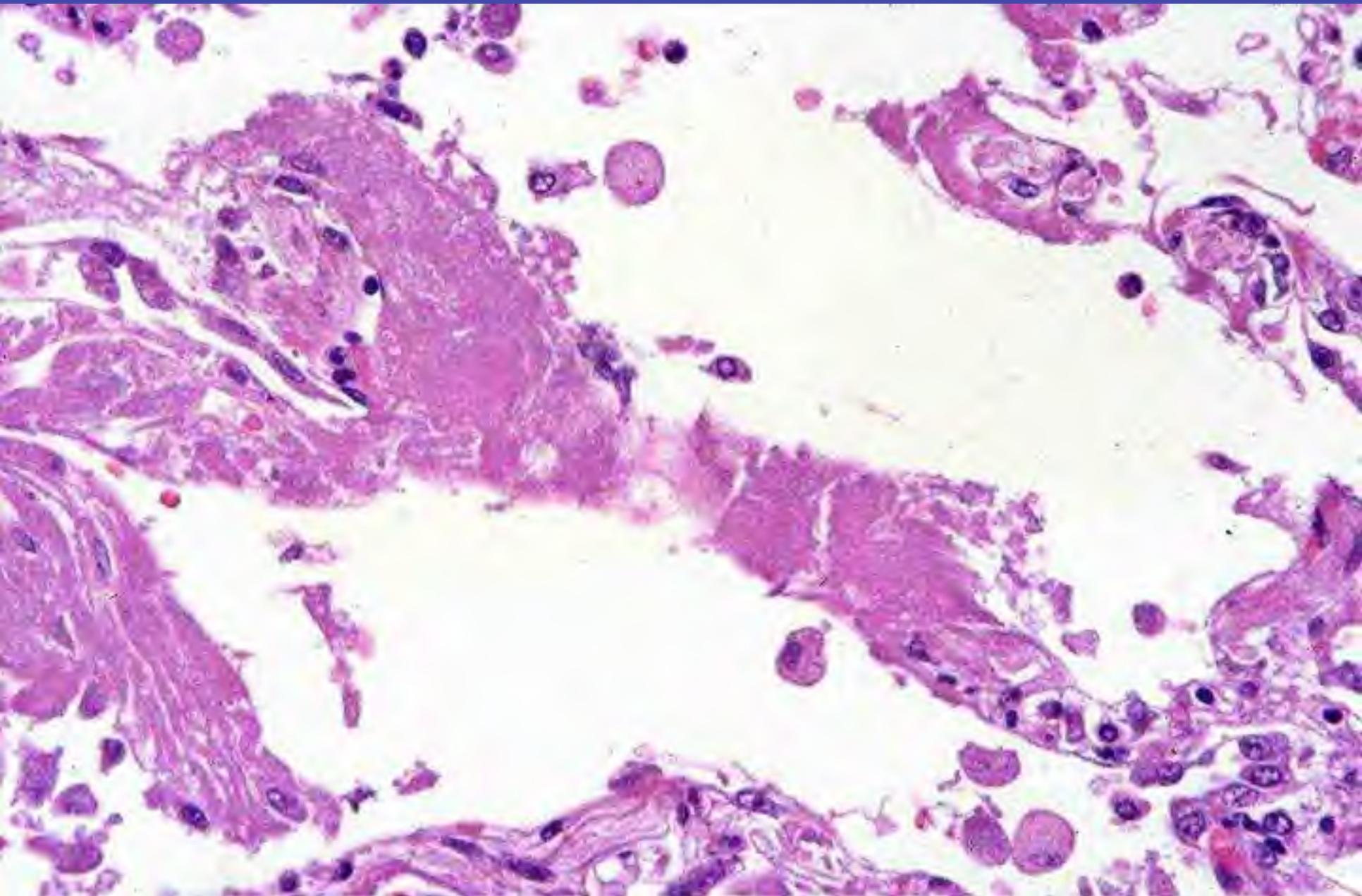


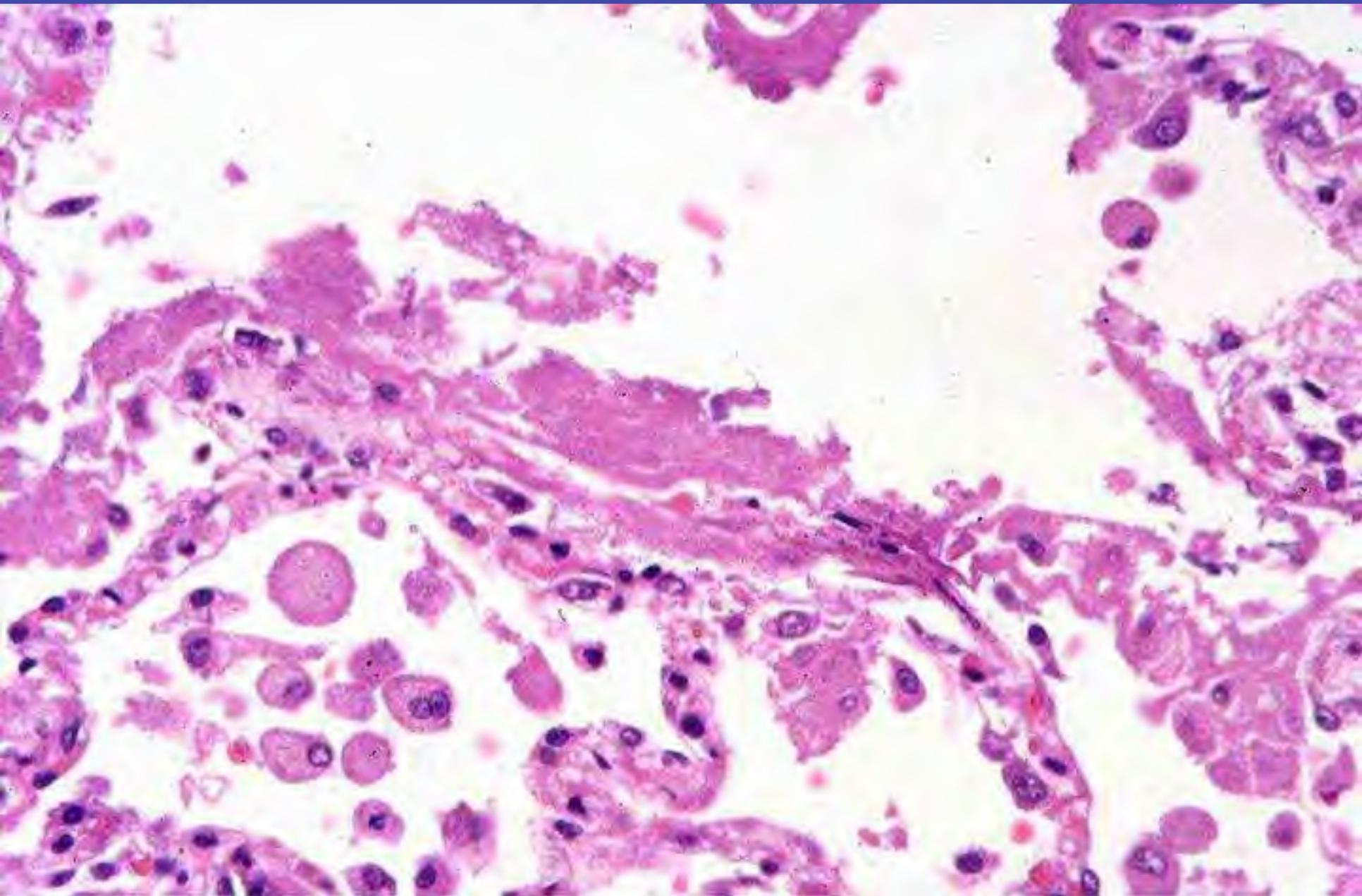


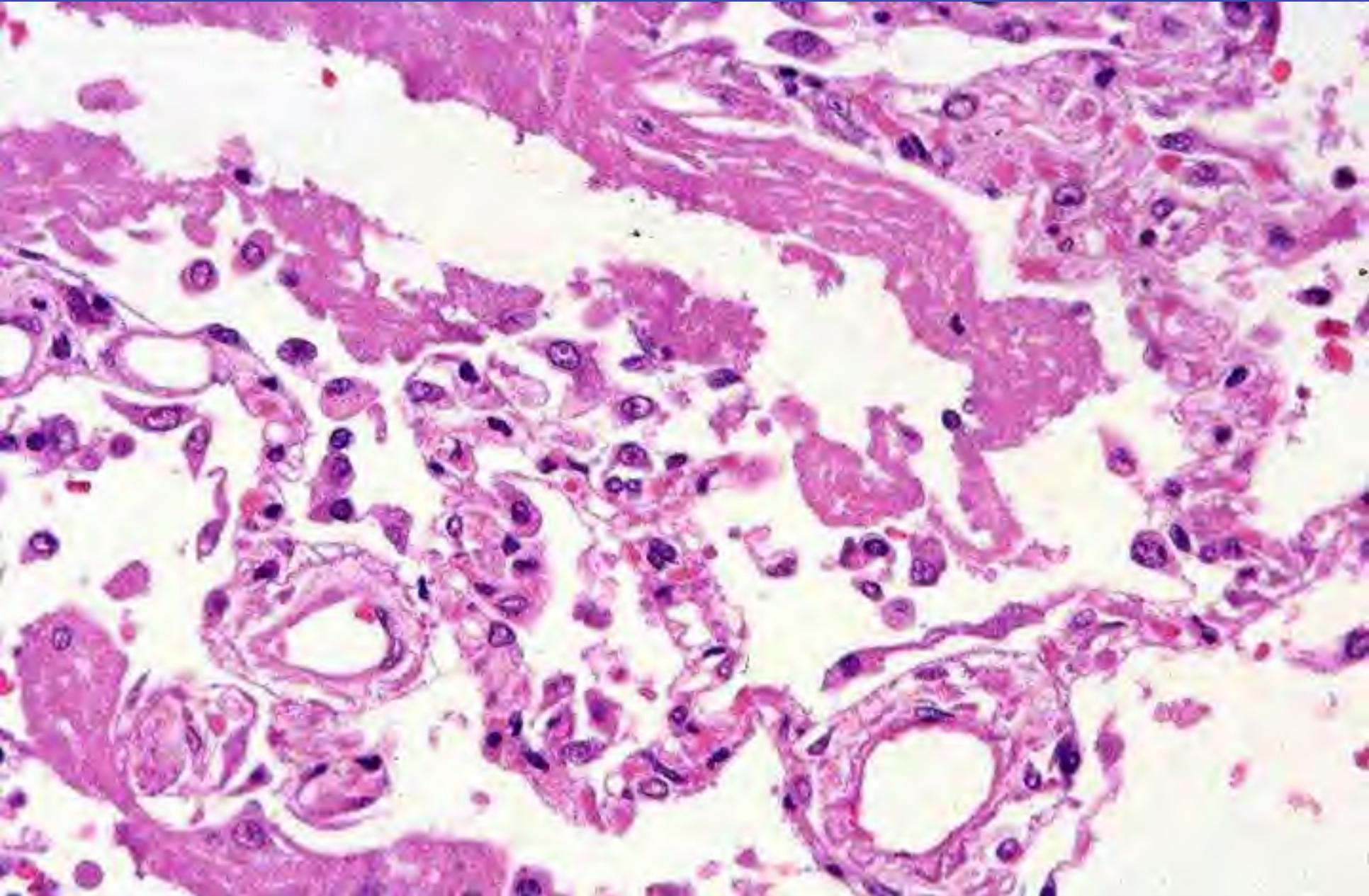


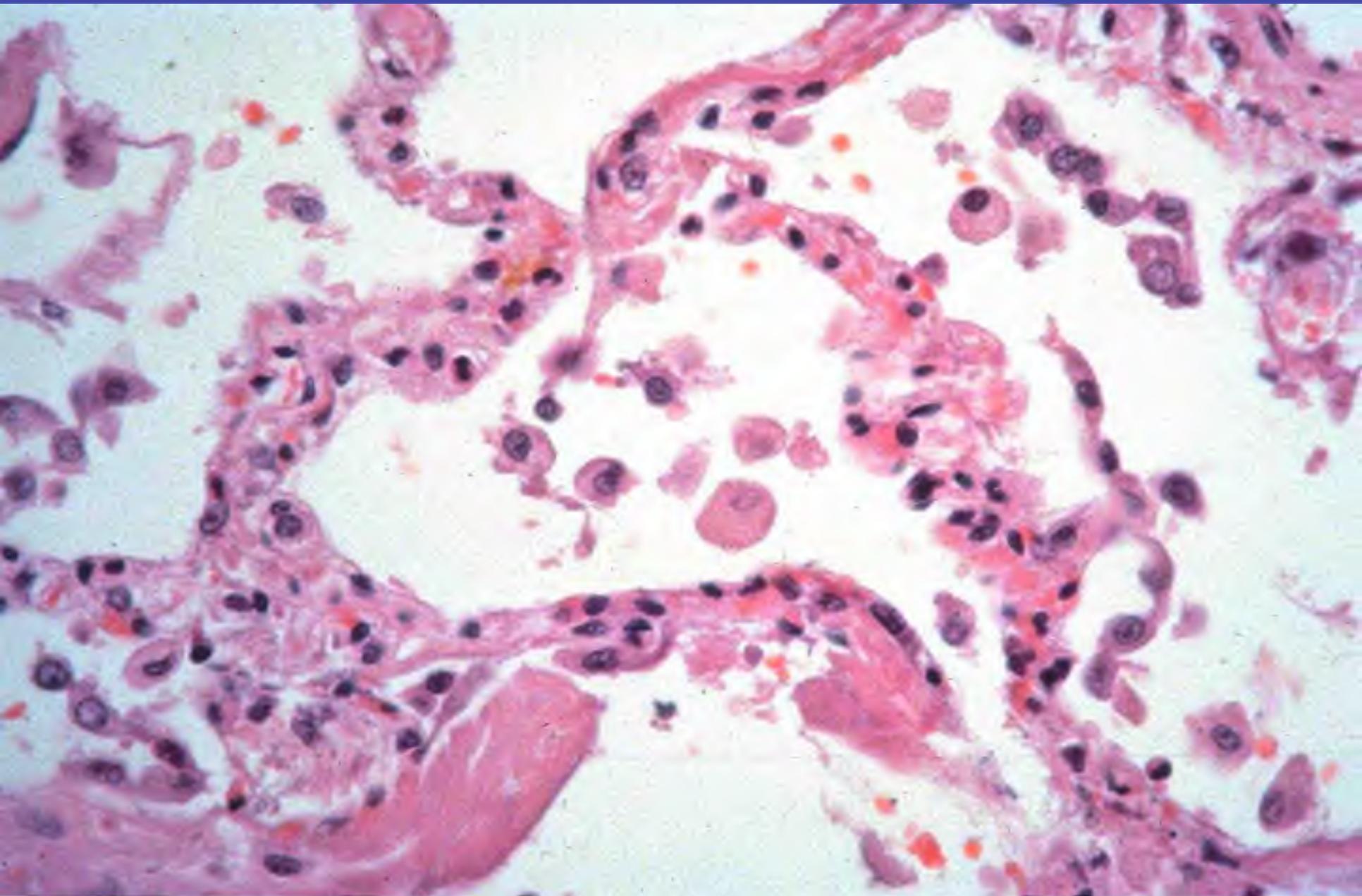












## **M-2 Respiratory Laboratory - 1**

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**61 RDS in the newborn**

# PREMATURITY

Reduced surfactant synthesis, storage, and release

Decreased alveolar surfactant

Increased alveolar surface tension

Atelectasis

Uneven perfusion

Hypoventilation

**Hypoxemia + CO<sub>2</sub> retention**

Acidosis

Pulmonary vasoconstriction

Pulmonary hypoperfusion

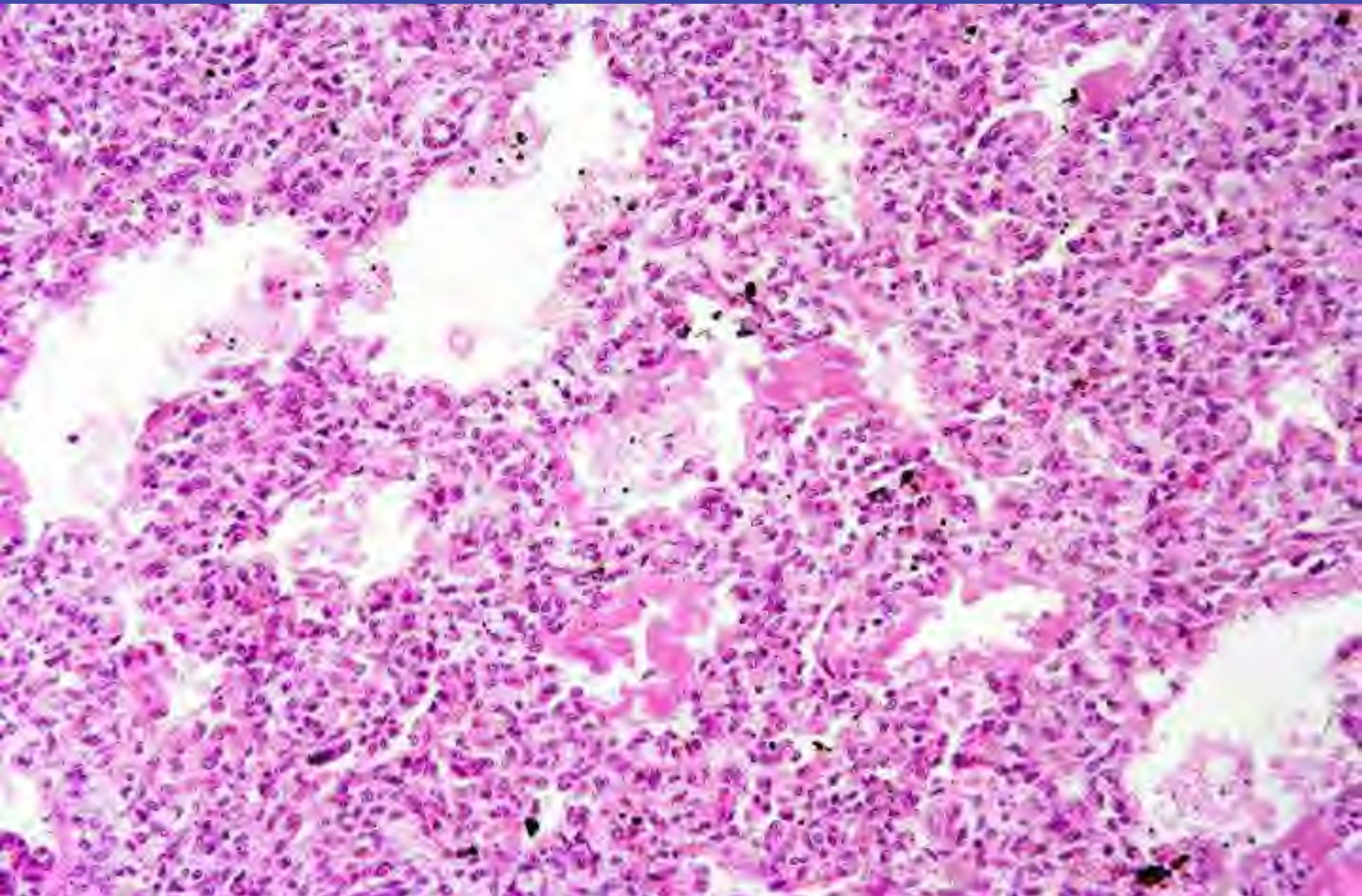
Endothelial damage

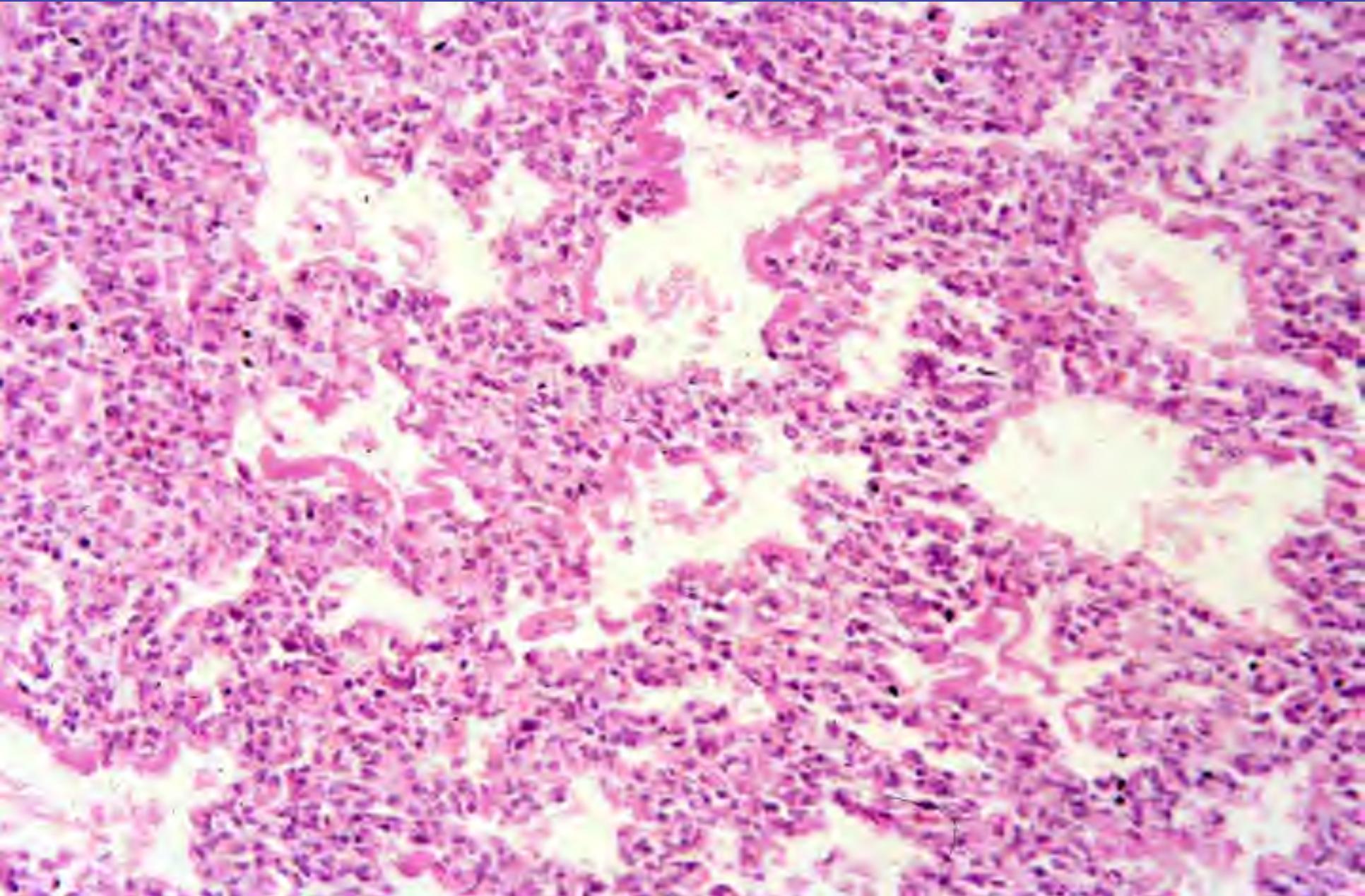
Epithelial damage

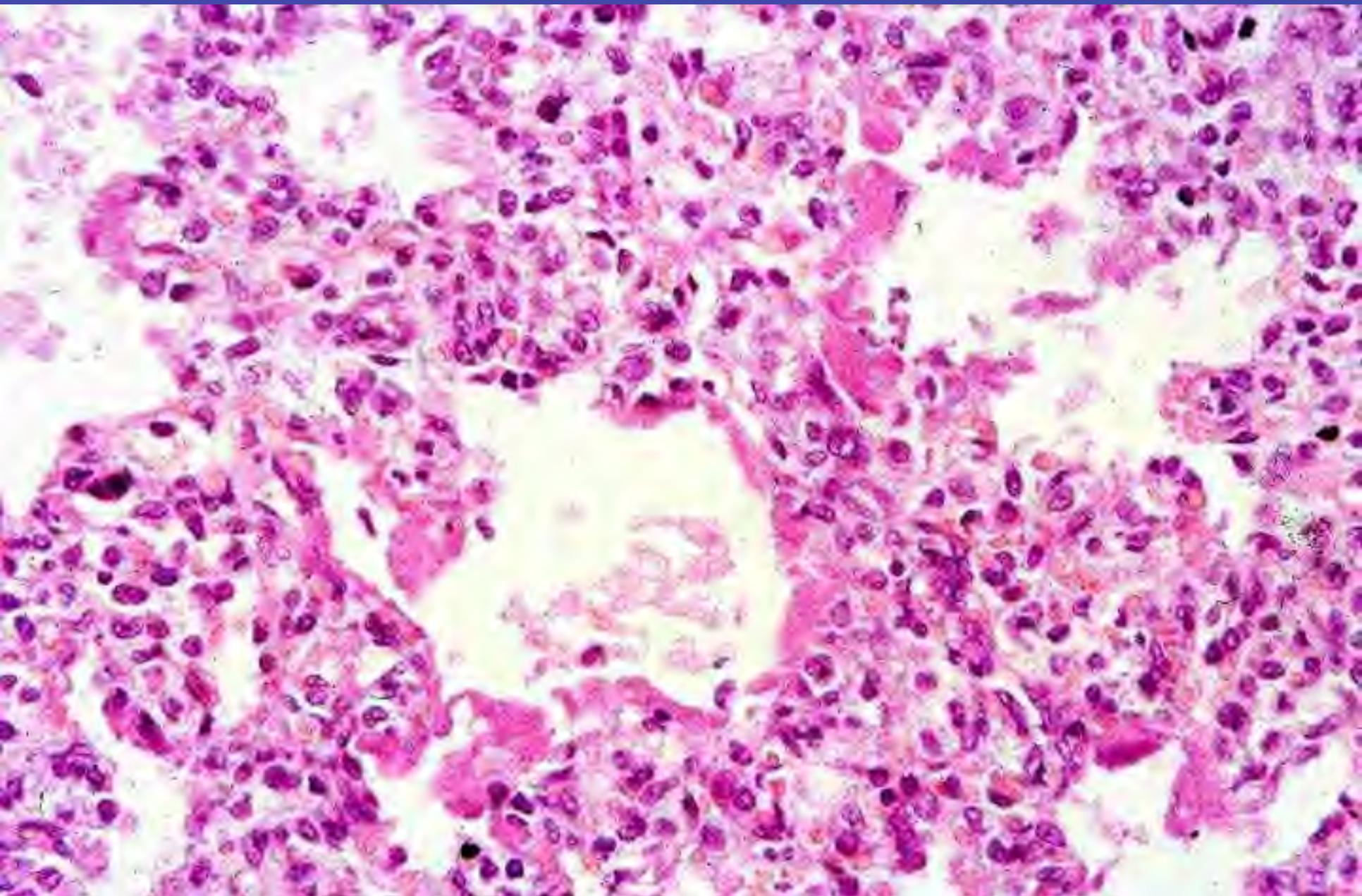
Increased diffusion gradient

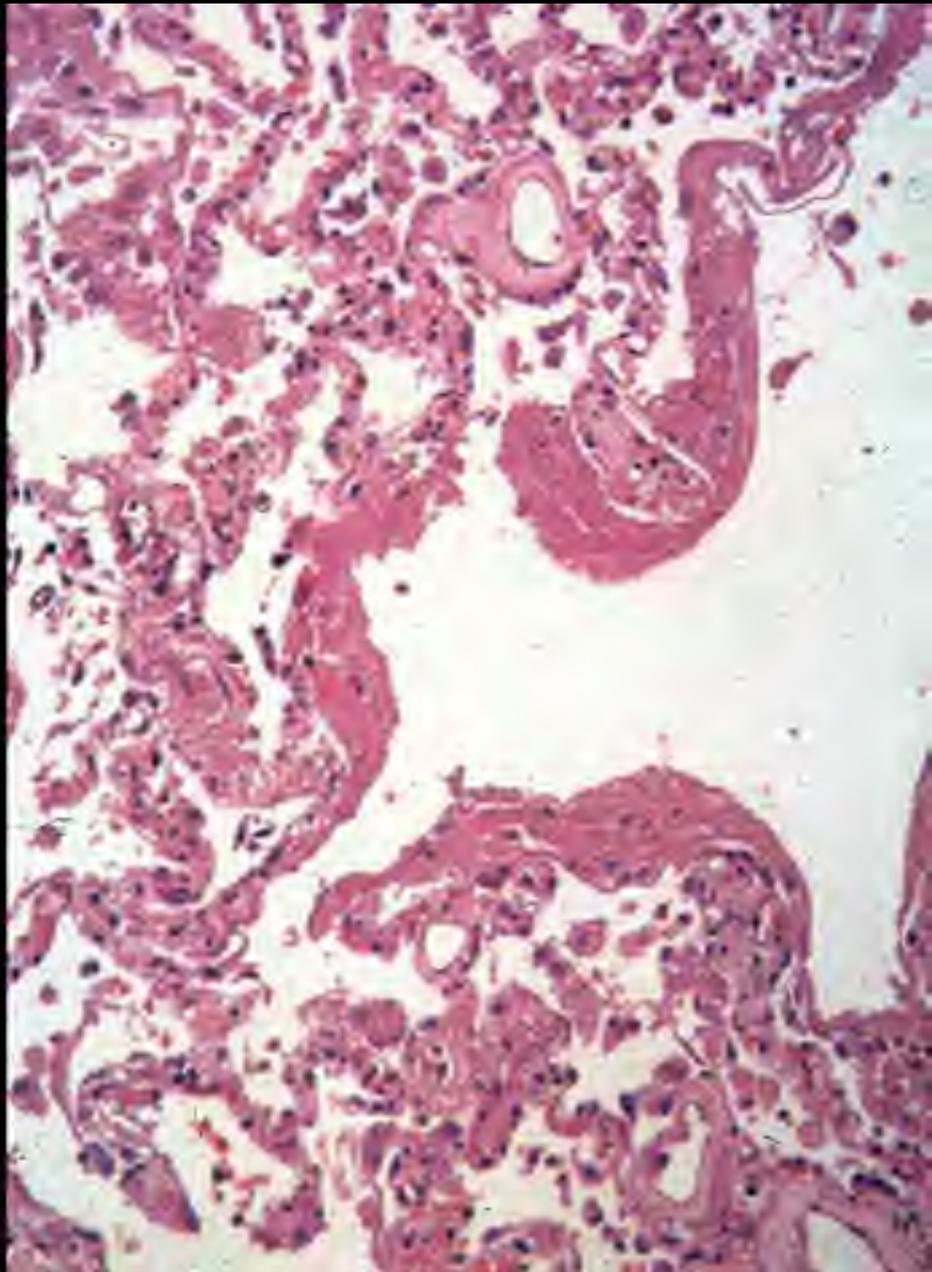
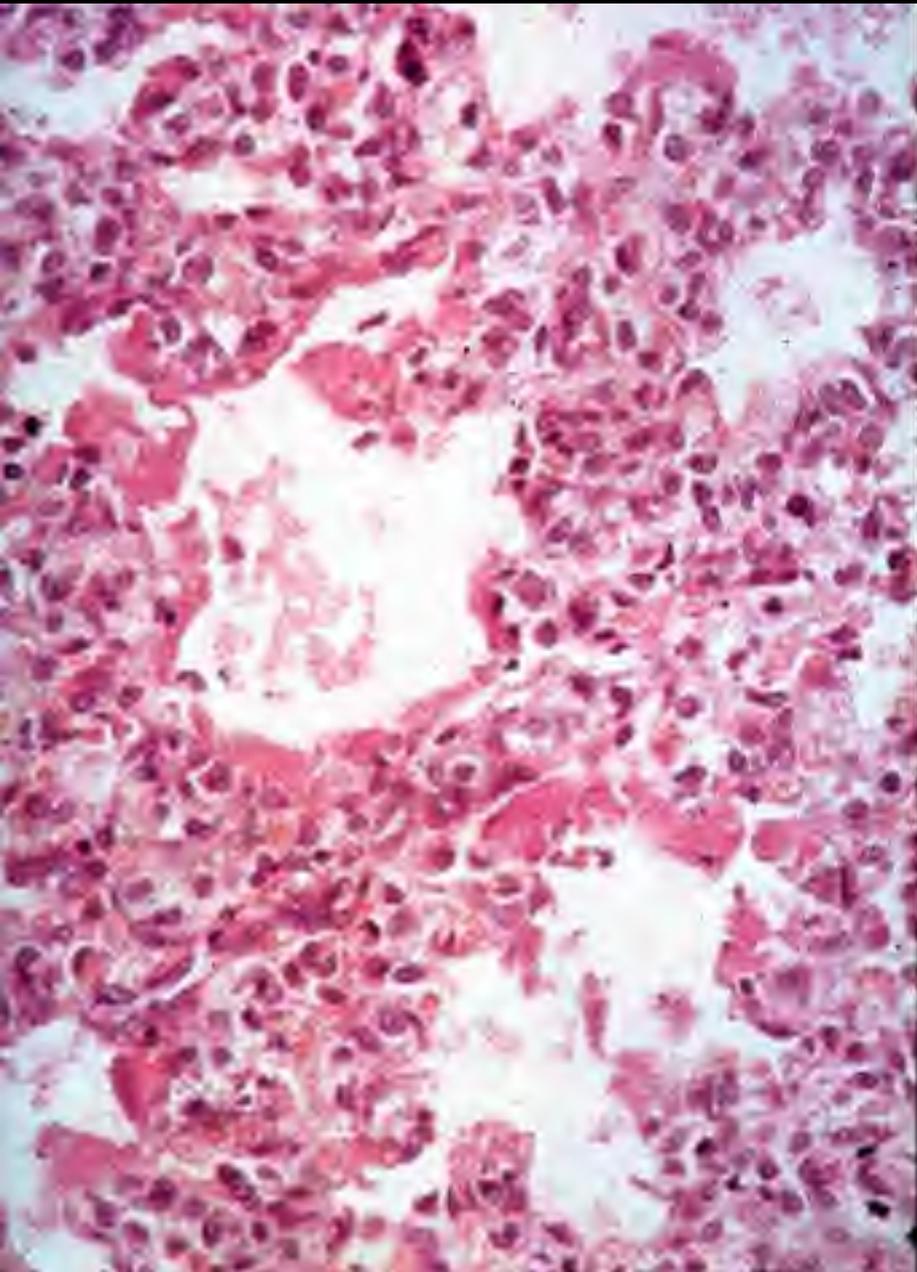
Plasma leak into alveoli

Fibrin + necrotic cells (hyaline membrane)









## **M-2 Respiratory Laboratory - 2**

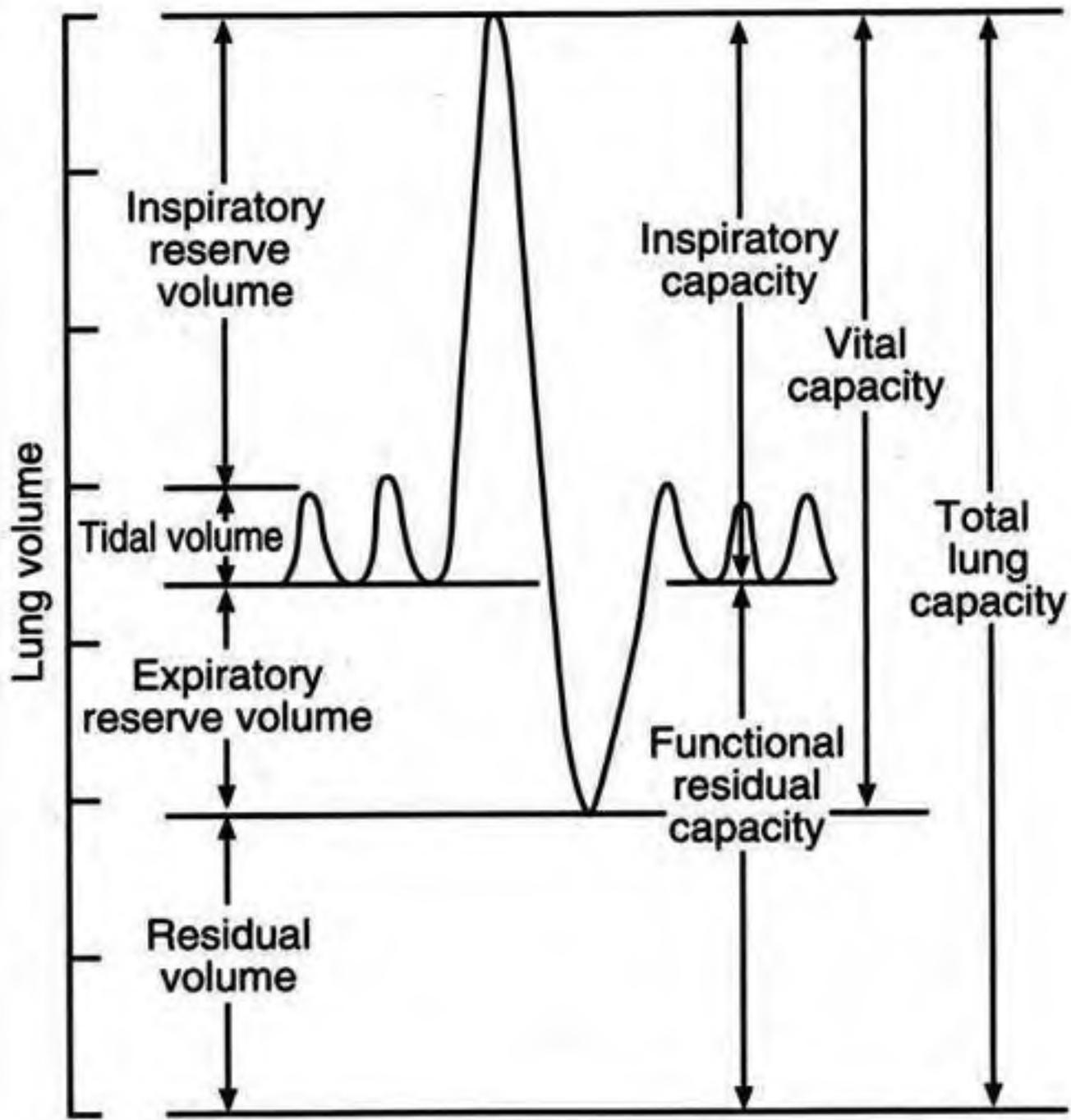
**59 Emphysema**

**67 Bronchiectasis**

**68 Asthma**

**60 Asbestosis**

**CPC**



# **Obstructive Pulmonary Disorders**

**Pathophysiologically characterized by:**  
**Increased resistance to air flow**  
**at any level**

**Pathologic processes include:**

**Emphysema**

**Chronic bronchitis**

**Bronchiectasis**

**Asthma**

**Cystic fibrosis**

# **Restrictive Pulmonary Disorders**

**Pathophysiologically characterized by:**

**Limited lung expansion**

**Reduced lung volume**

**Decreased in driving force for expiration**

**Pathologic processes include:**

**Neuromuscular**

**Chest wall**

**Pleural space**

**Lung parenchyma (ILD)**

# Pulmonary Function Abnormalities

## Restrictive Disorders

<b>FVC</b>	↓↓
<b>FEV<sub>1</sub></b>	↓↓
<b>FRC</b>	↓
<b>RV</b>	↓
<b>TLC</b>	↓

## Obstructive Disorders

	<i>Mild</i>	<i>Severe</i>
<b>FVC</b>	<b>N</b>	↓
<b>FEV<sub>1</sub></b>	↓	↓↓
<b>FRC</b>	<b>N</b>	↑
<b>RV</b>	<b>N</b>	↑
<b>TLC</b>	<b>N</b>	↑

# Gas Exchange in the Lung

## Diffusing capacity (DLCO)

### Factors that affect DLCO:

#### Increase DLCO

Increase body size, lung volume, alveolar  $P_{CO_2}$

Male sex

Supine position

Exercise

Increasing age to 20 years

#### Decrease DLCO

Increase in alveolar  $P_{O_2}$

Most lung diseases

Increasing age after 20 years

## **M-2 Respiratory Laboratory - 2**

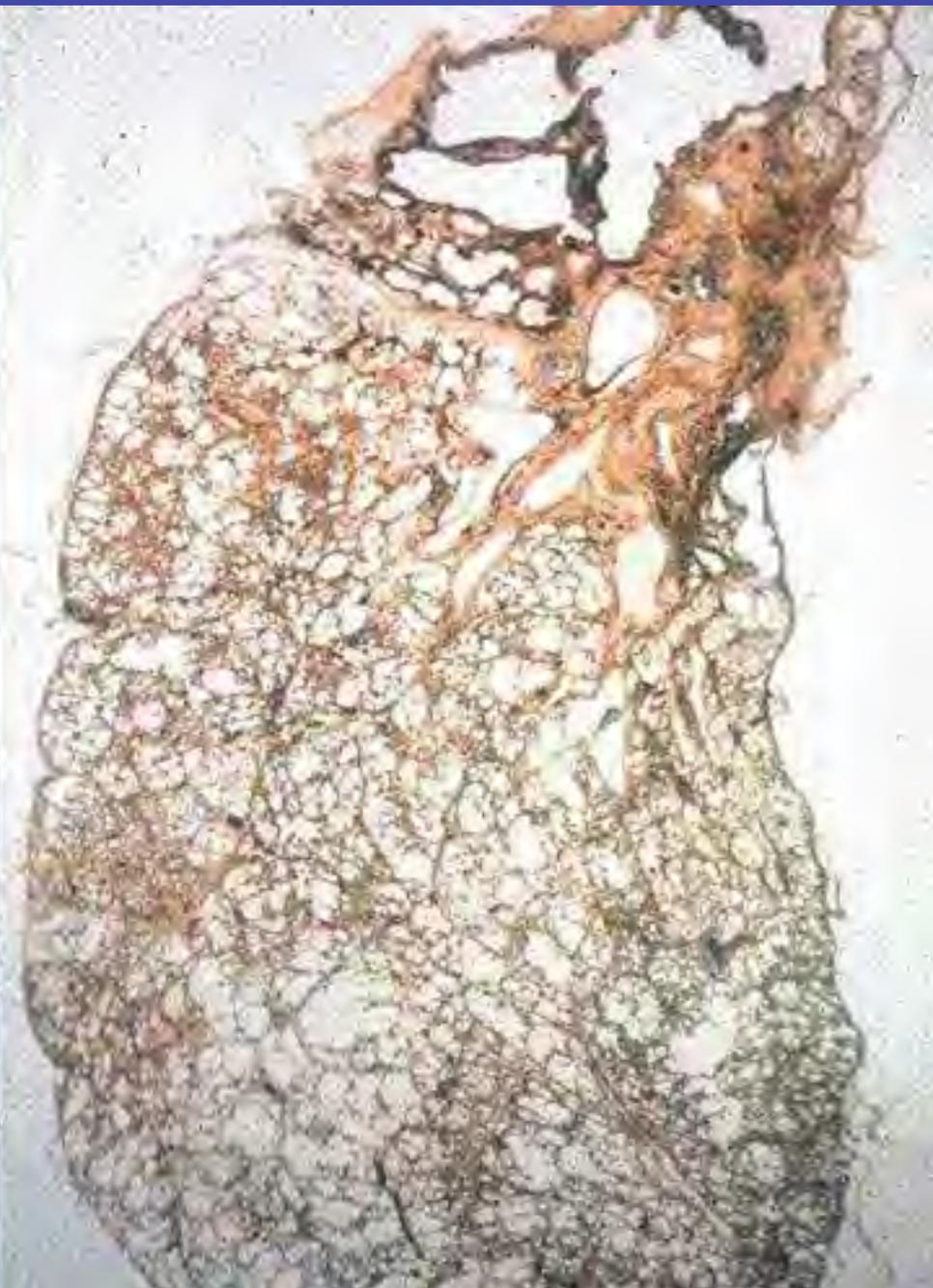
**59 Emphysema**

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**Protease inhibitor**

(antielastase)



*$\alpha_1$ -AT deficiency*

**Protease**

(elastase)



smoking



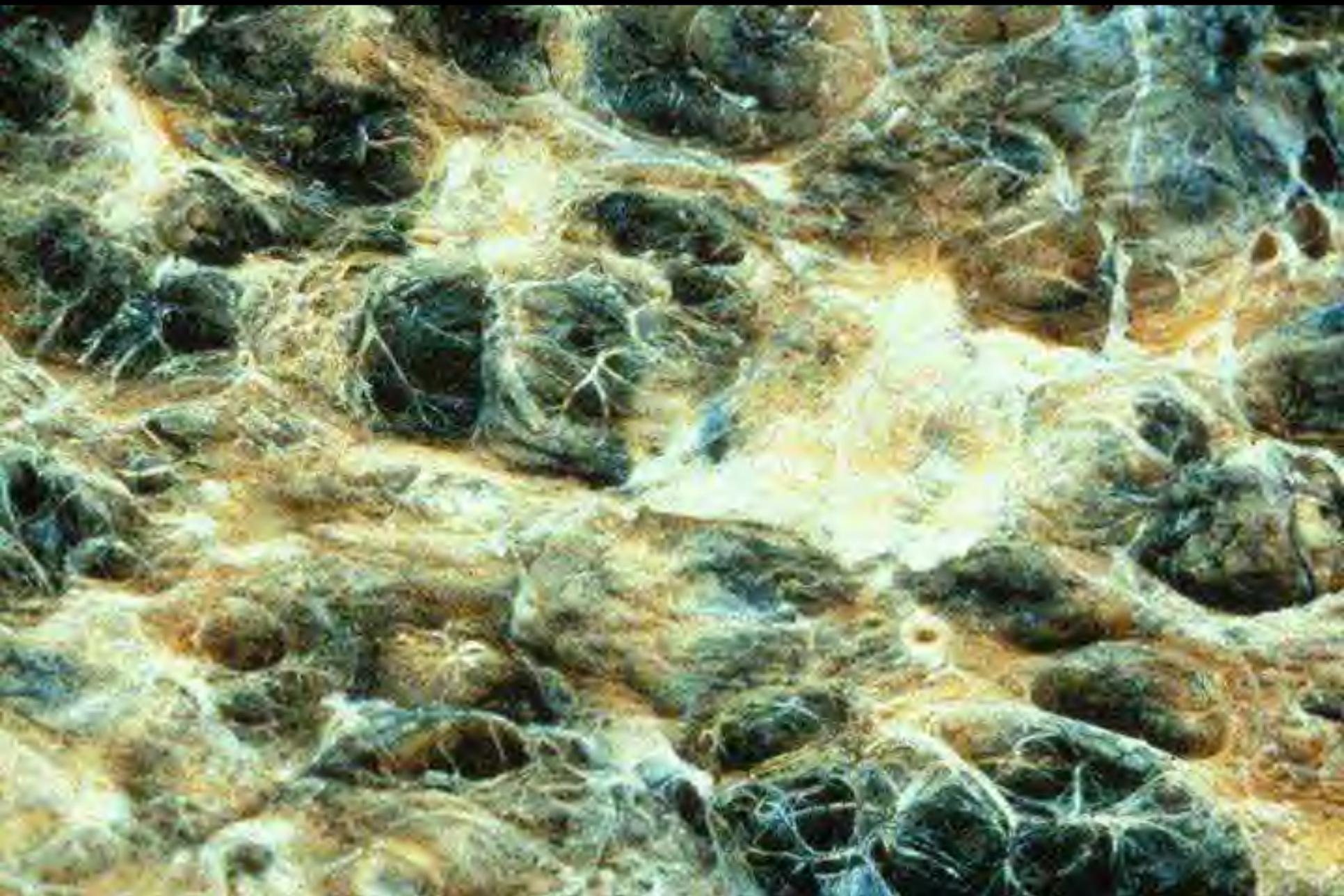
**Elastase**

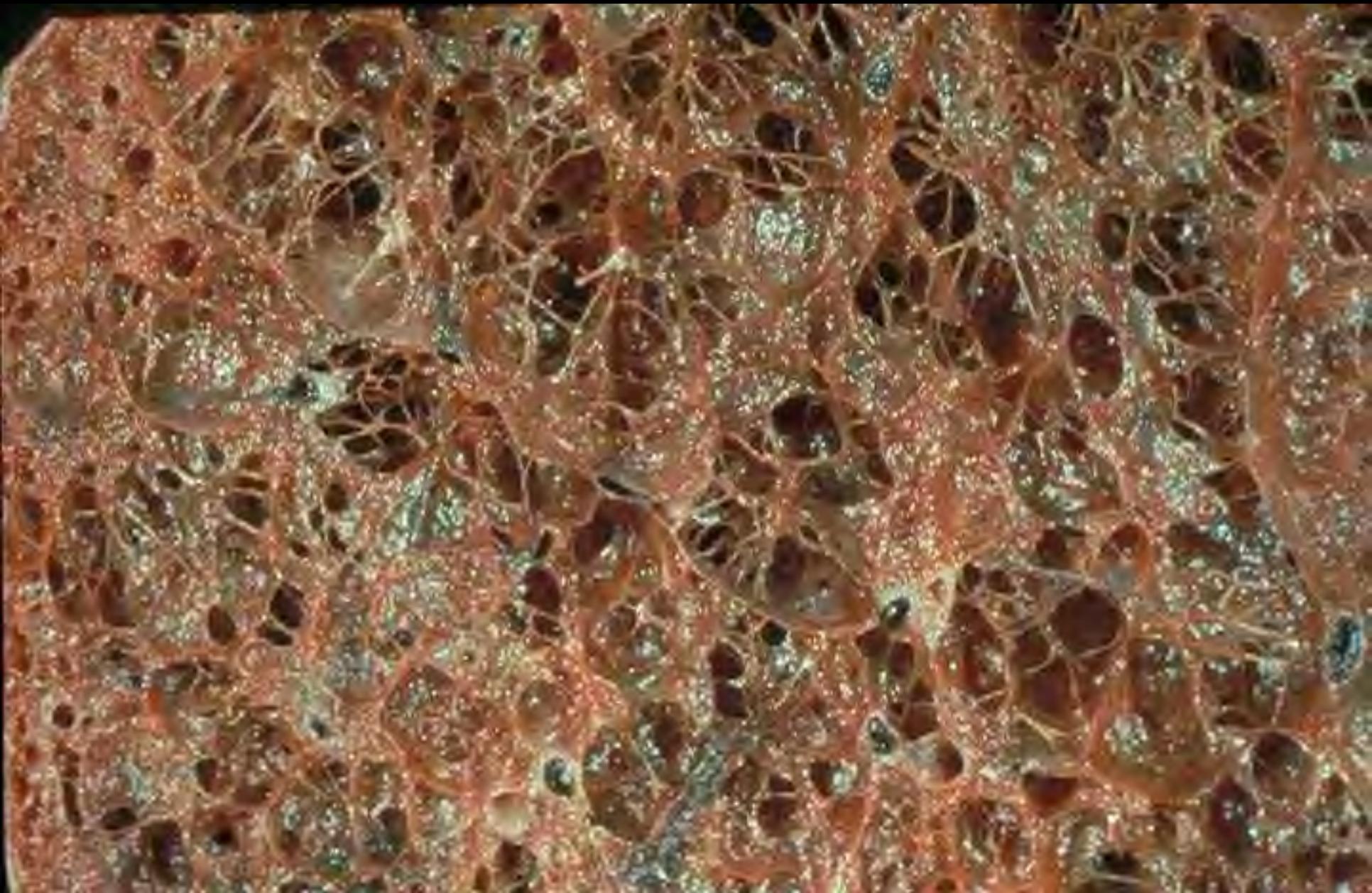
**Collagen and elastin destruction**

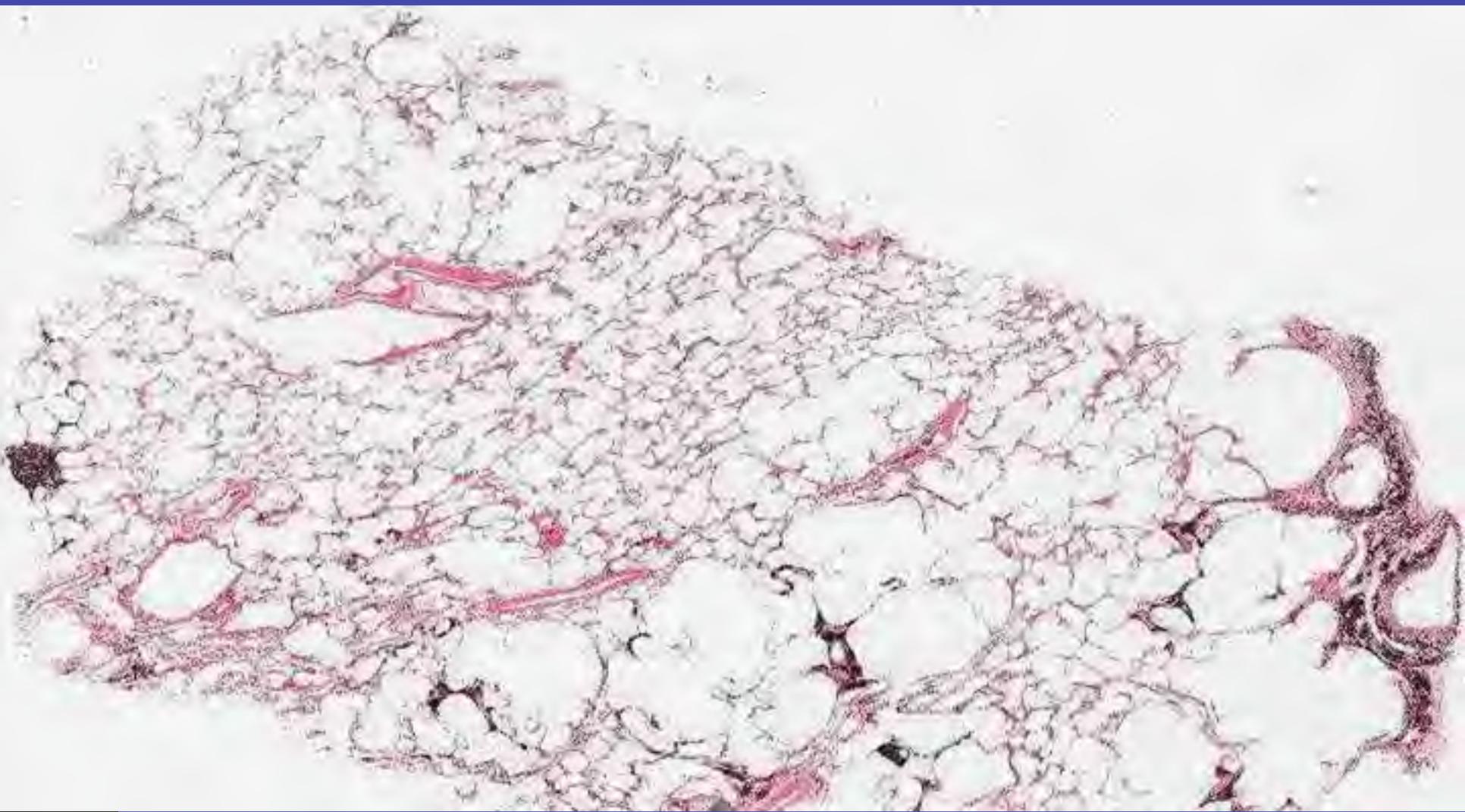
**Emphysema**

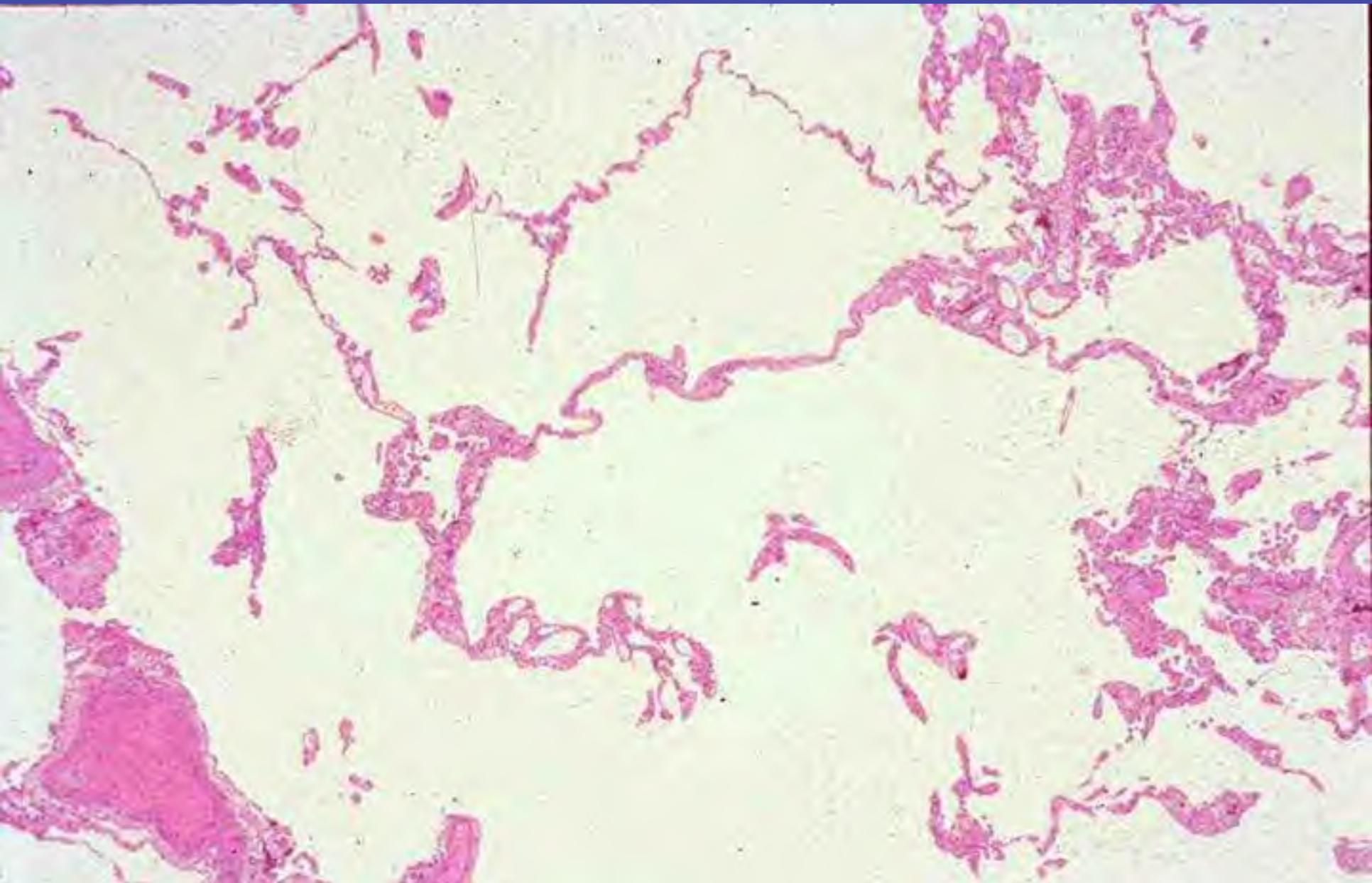


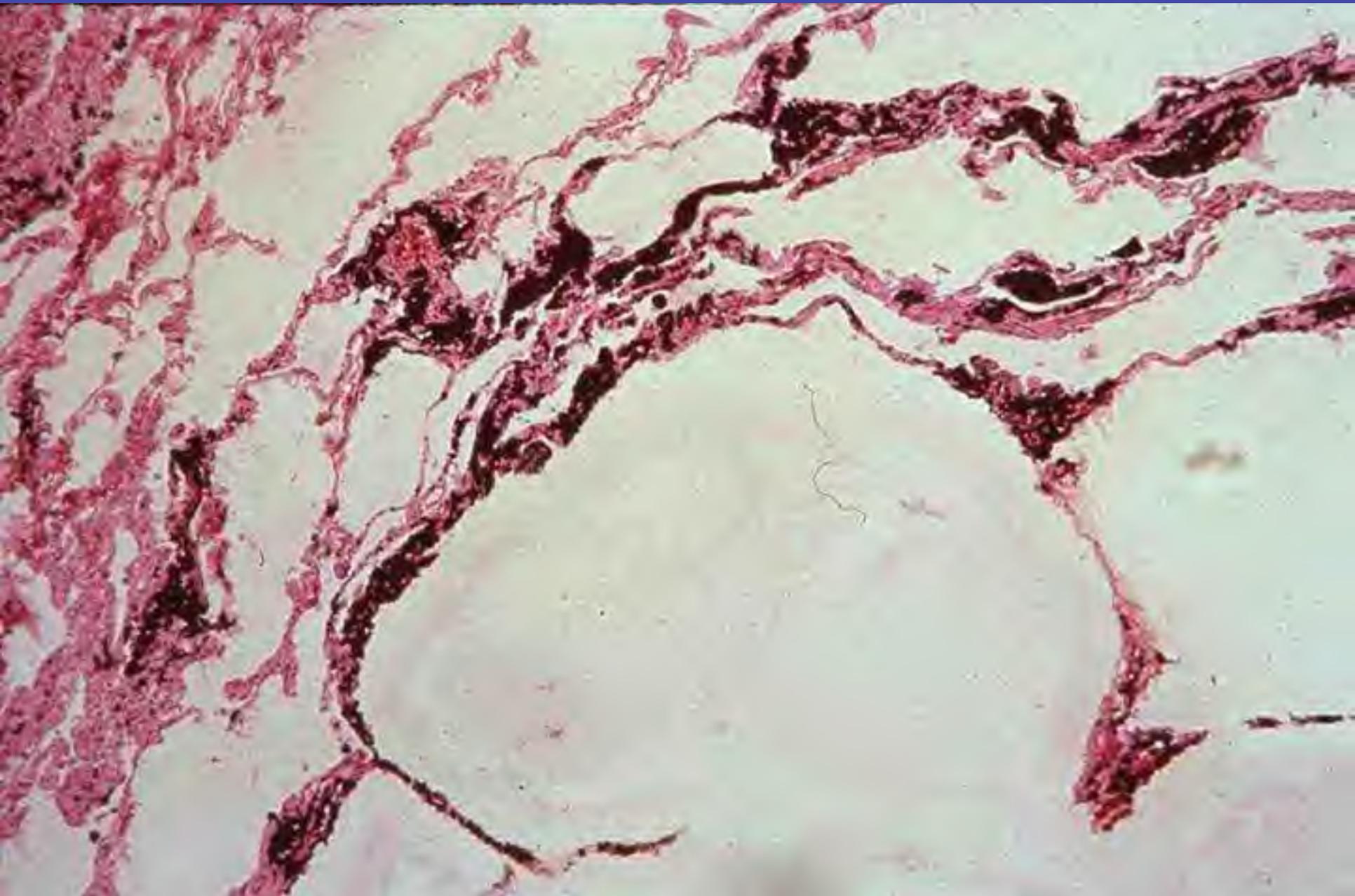


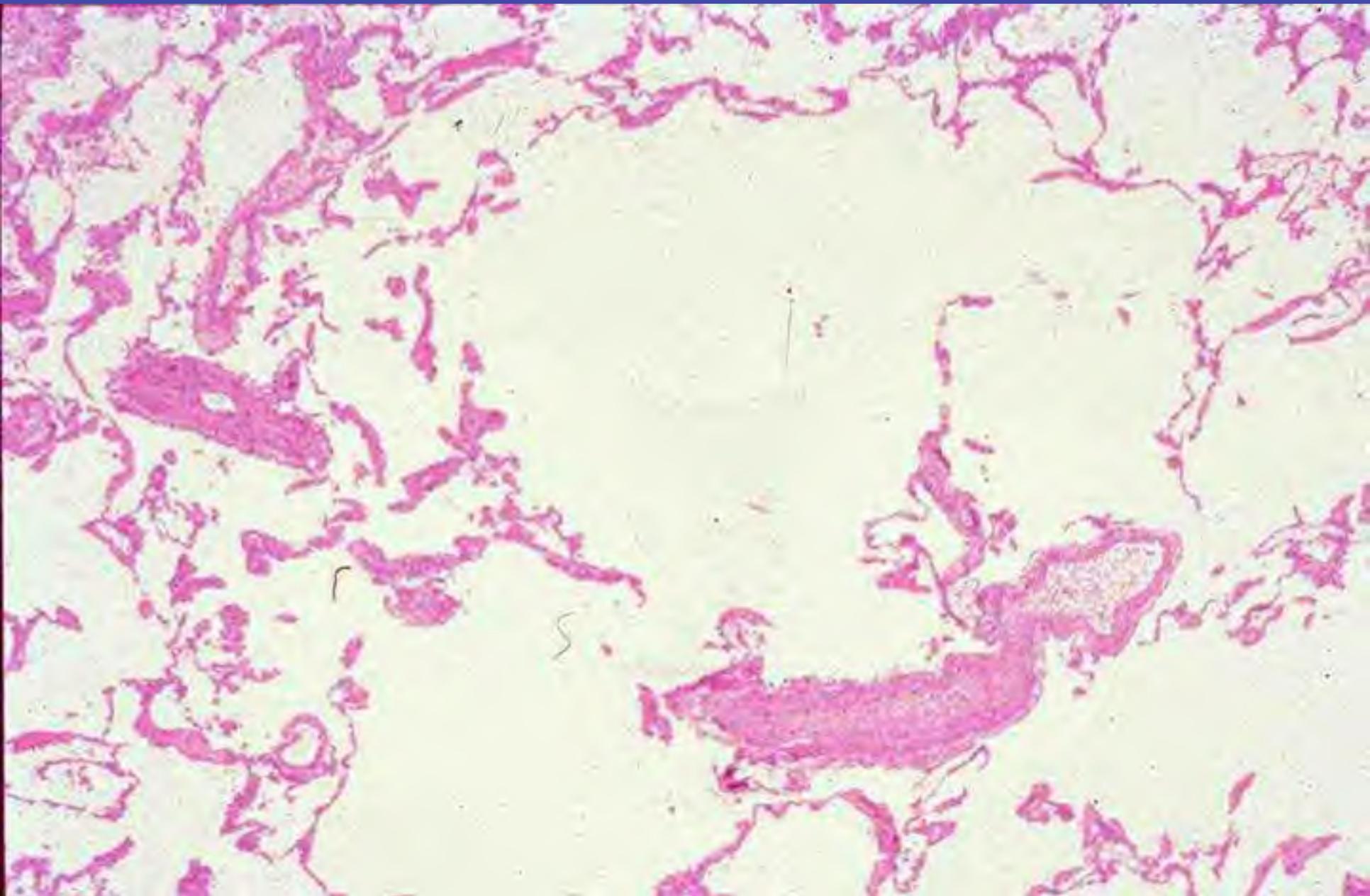


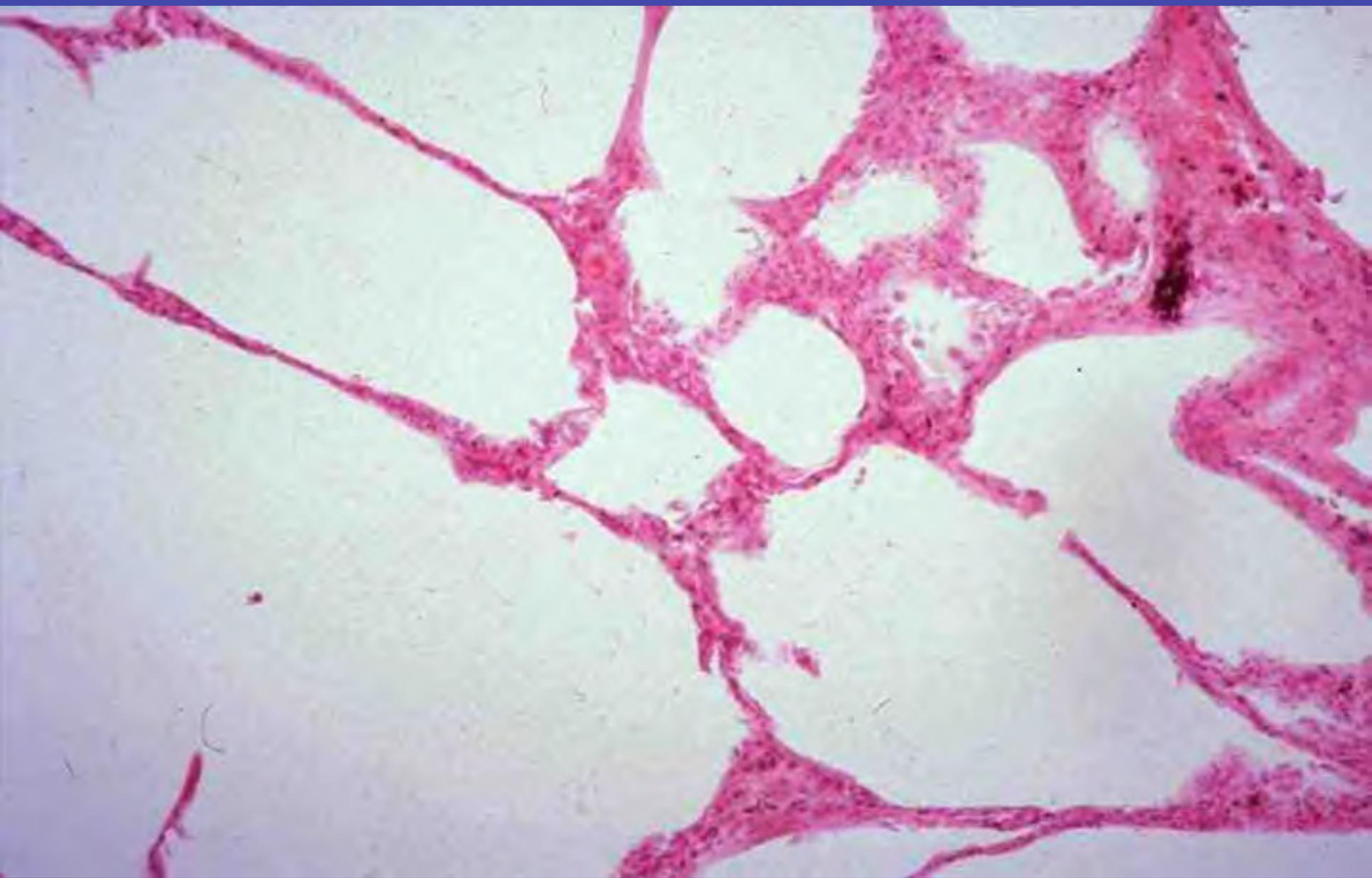




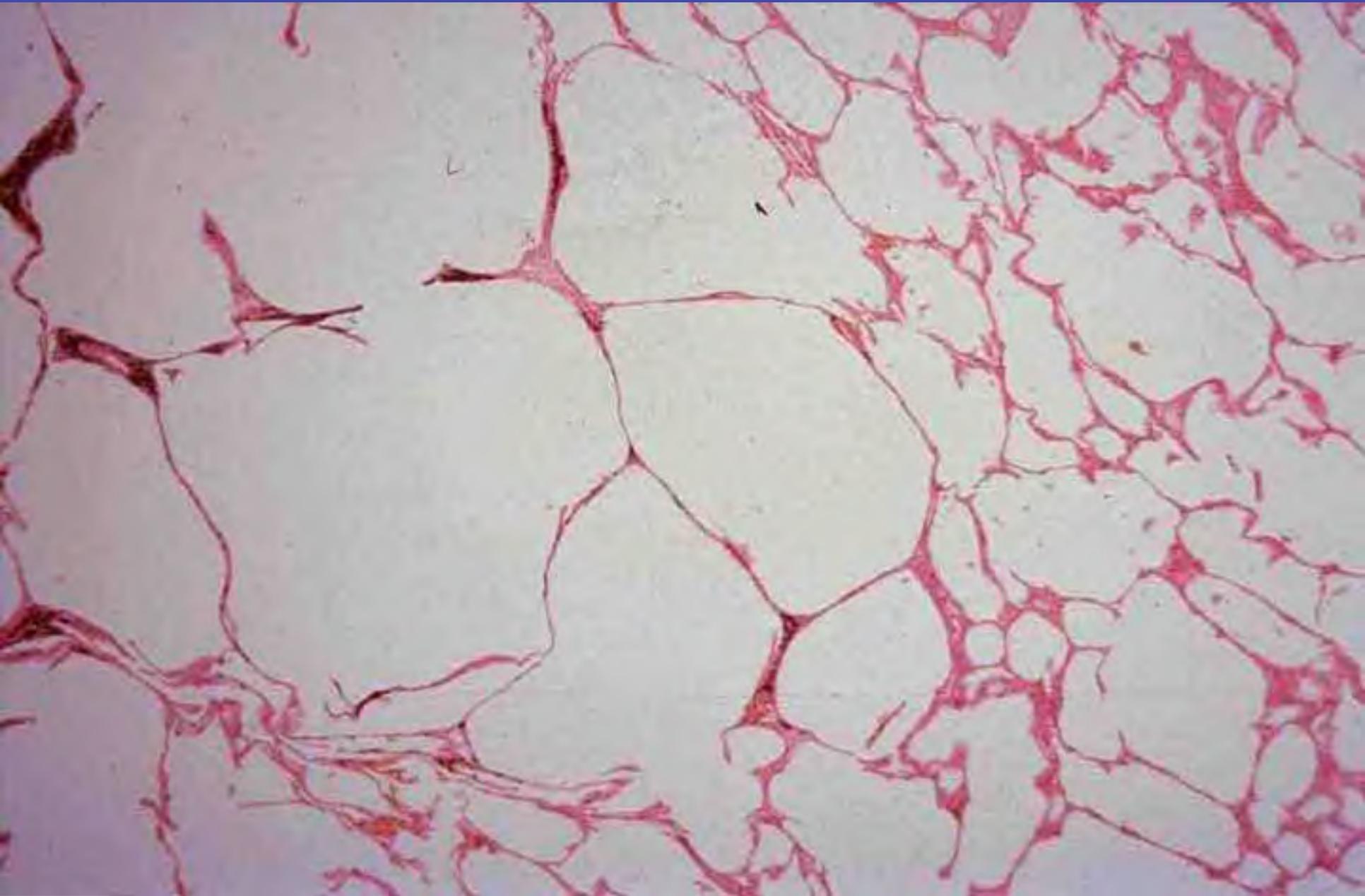


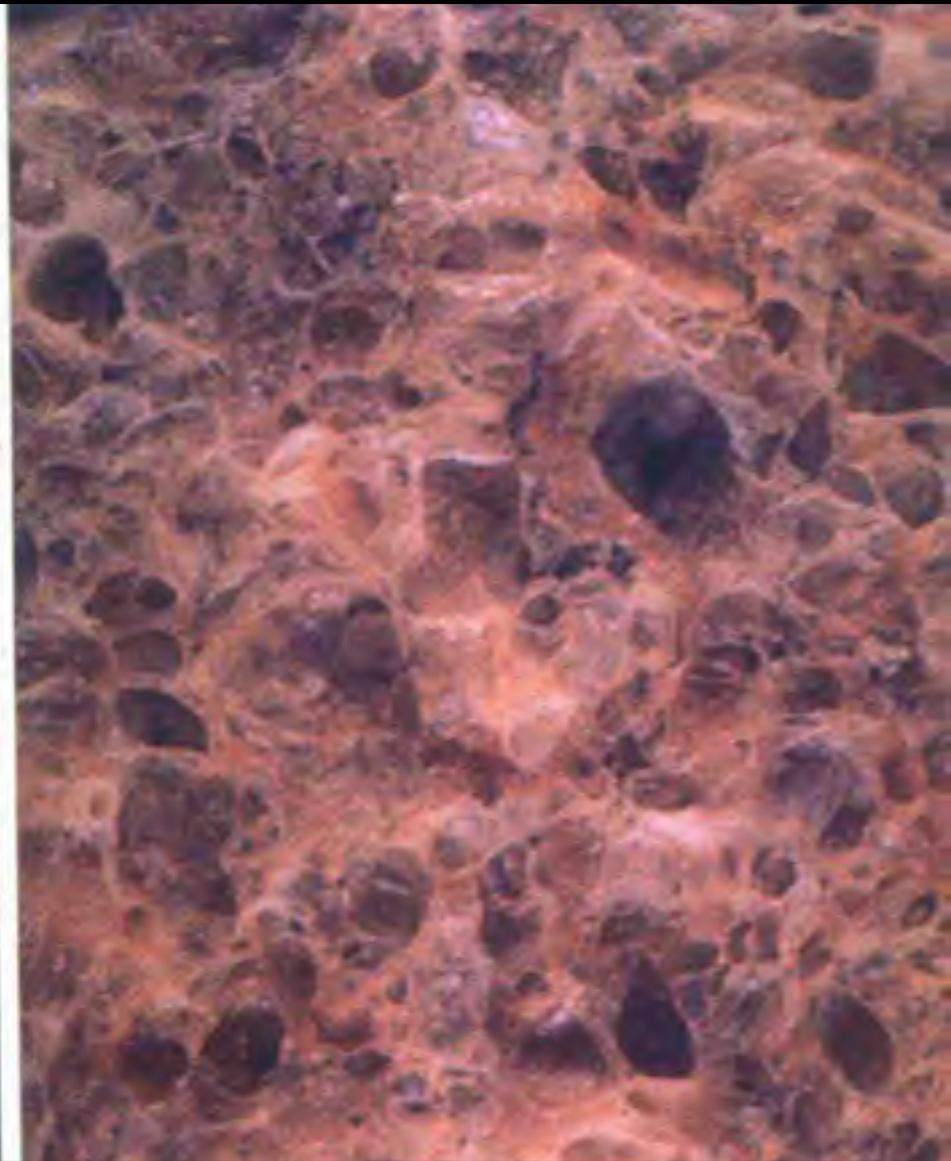
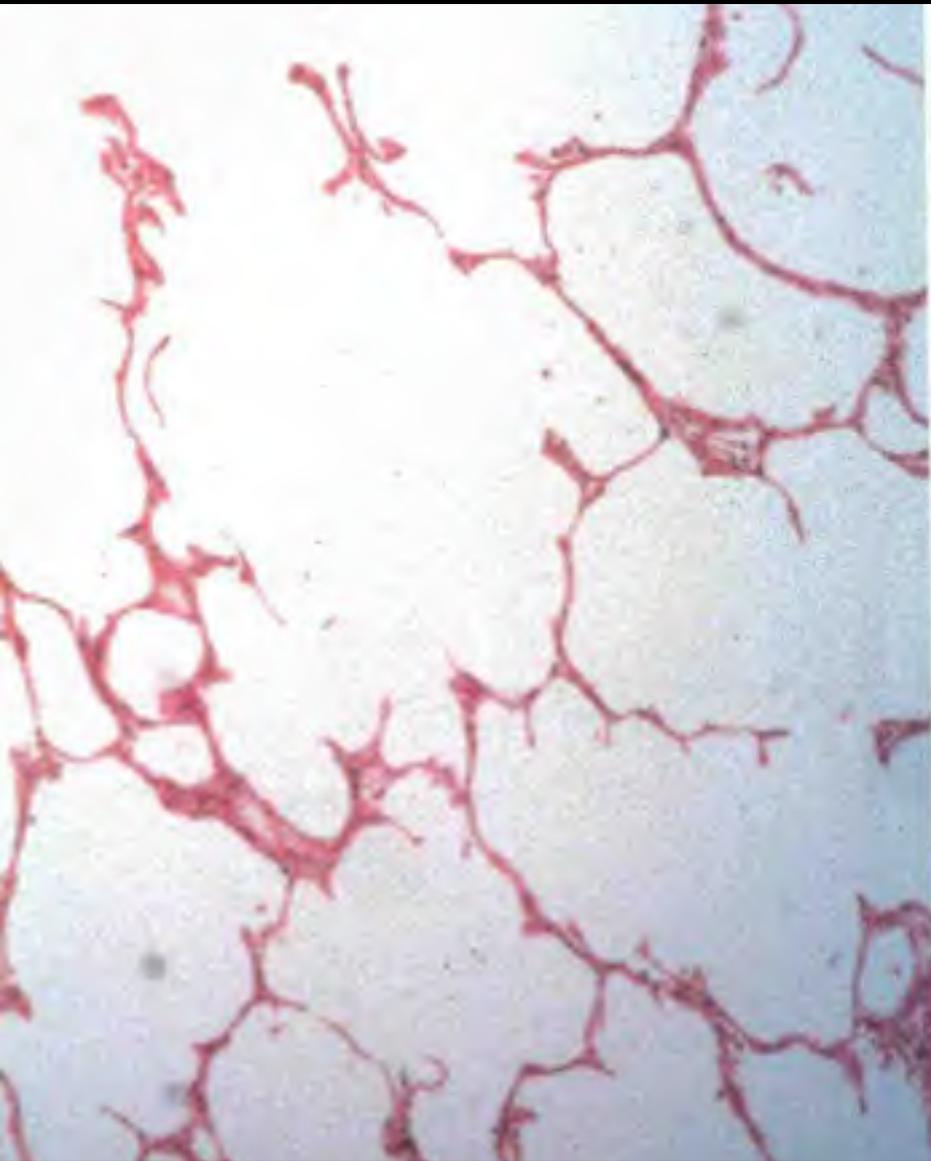












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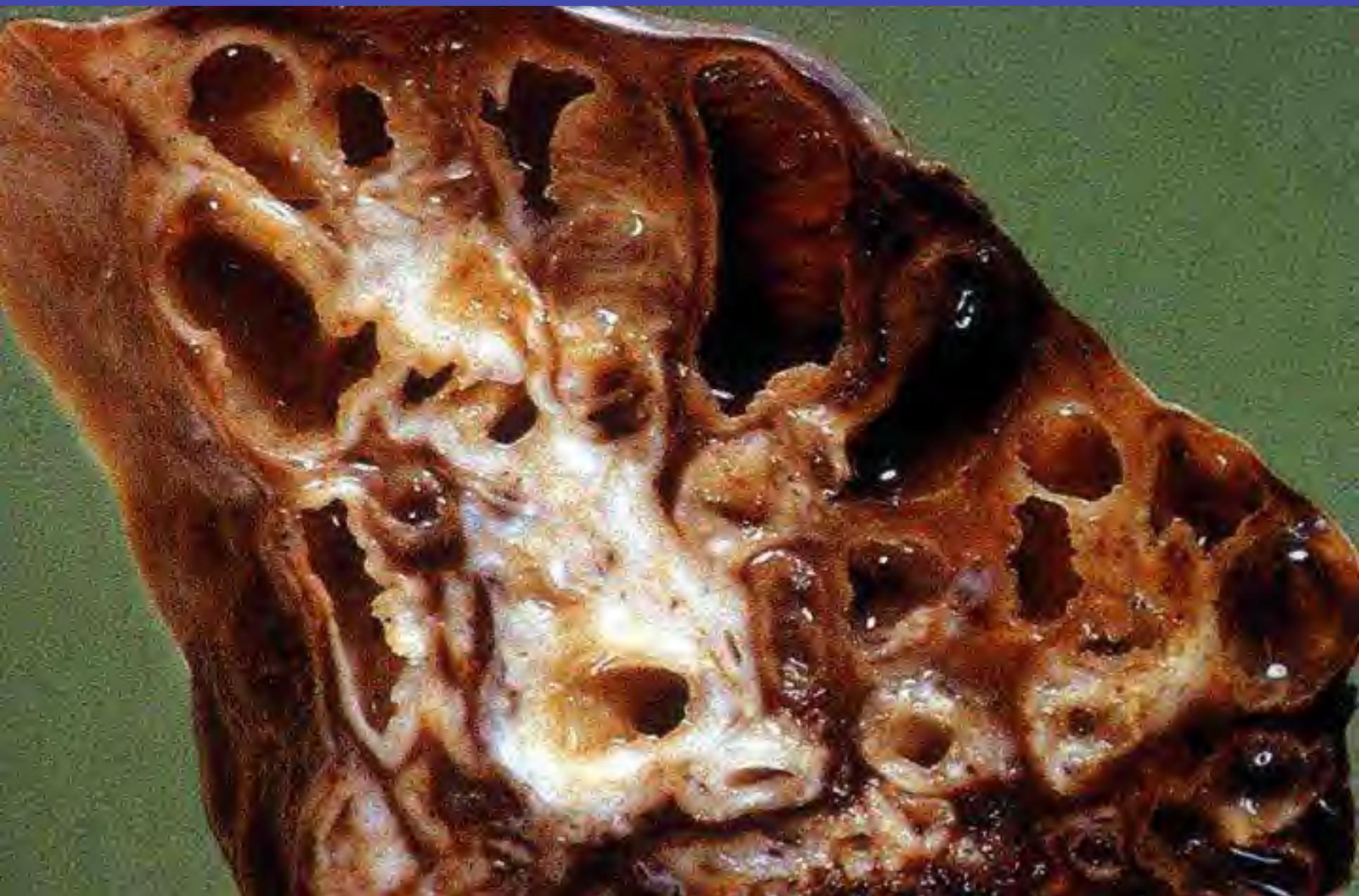
**CPC**



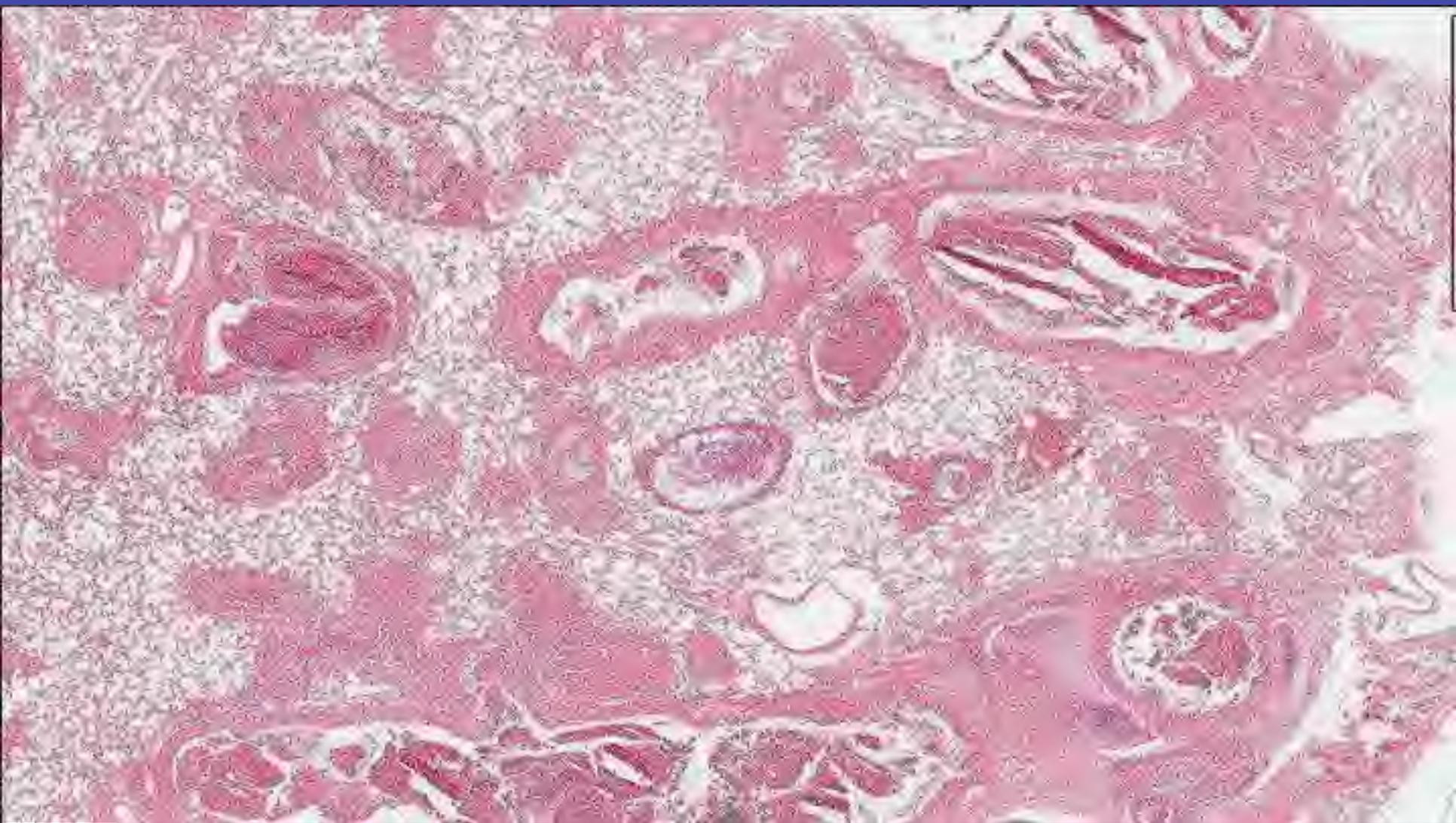


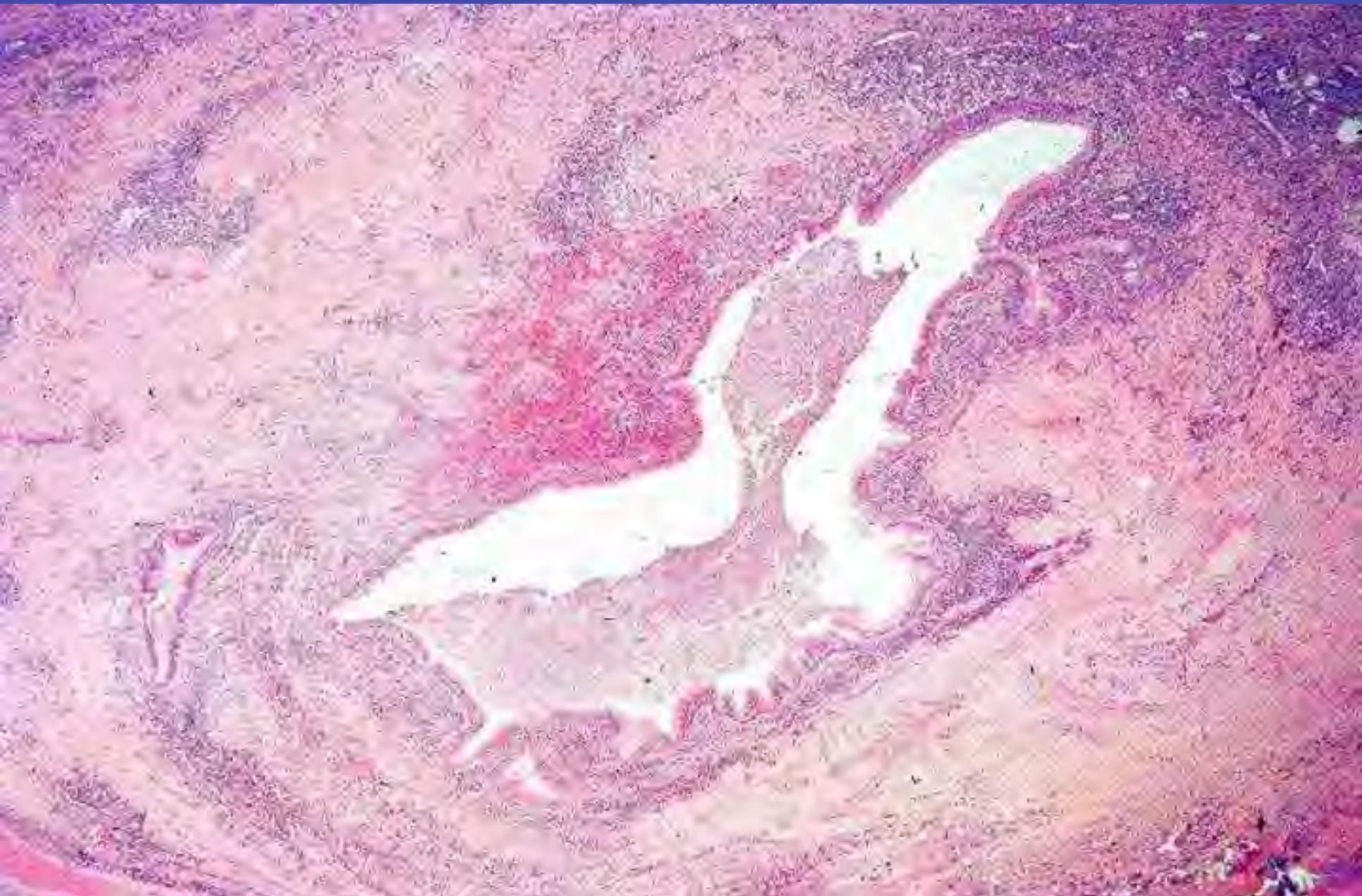


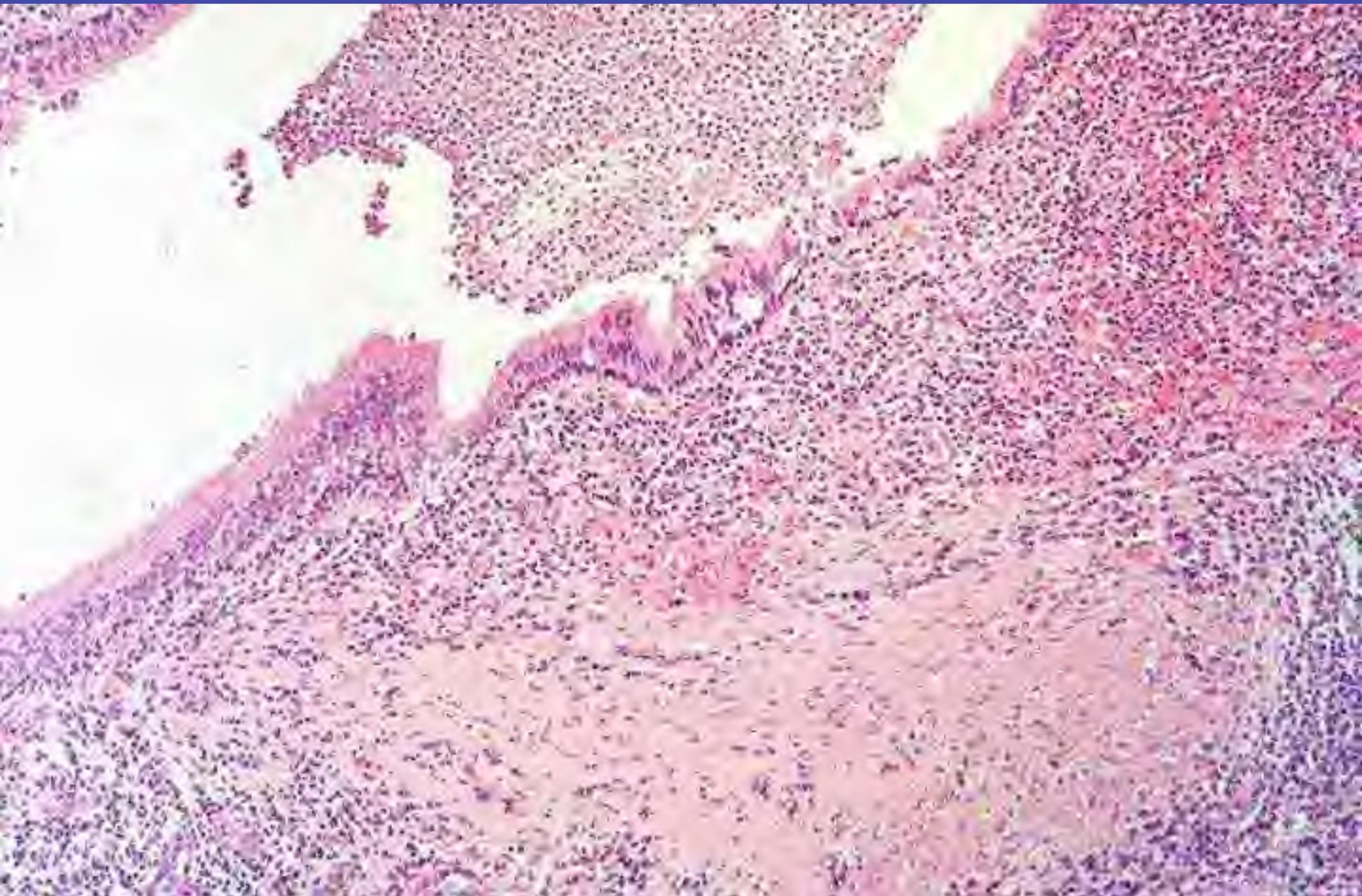


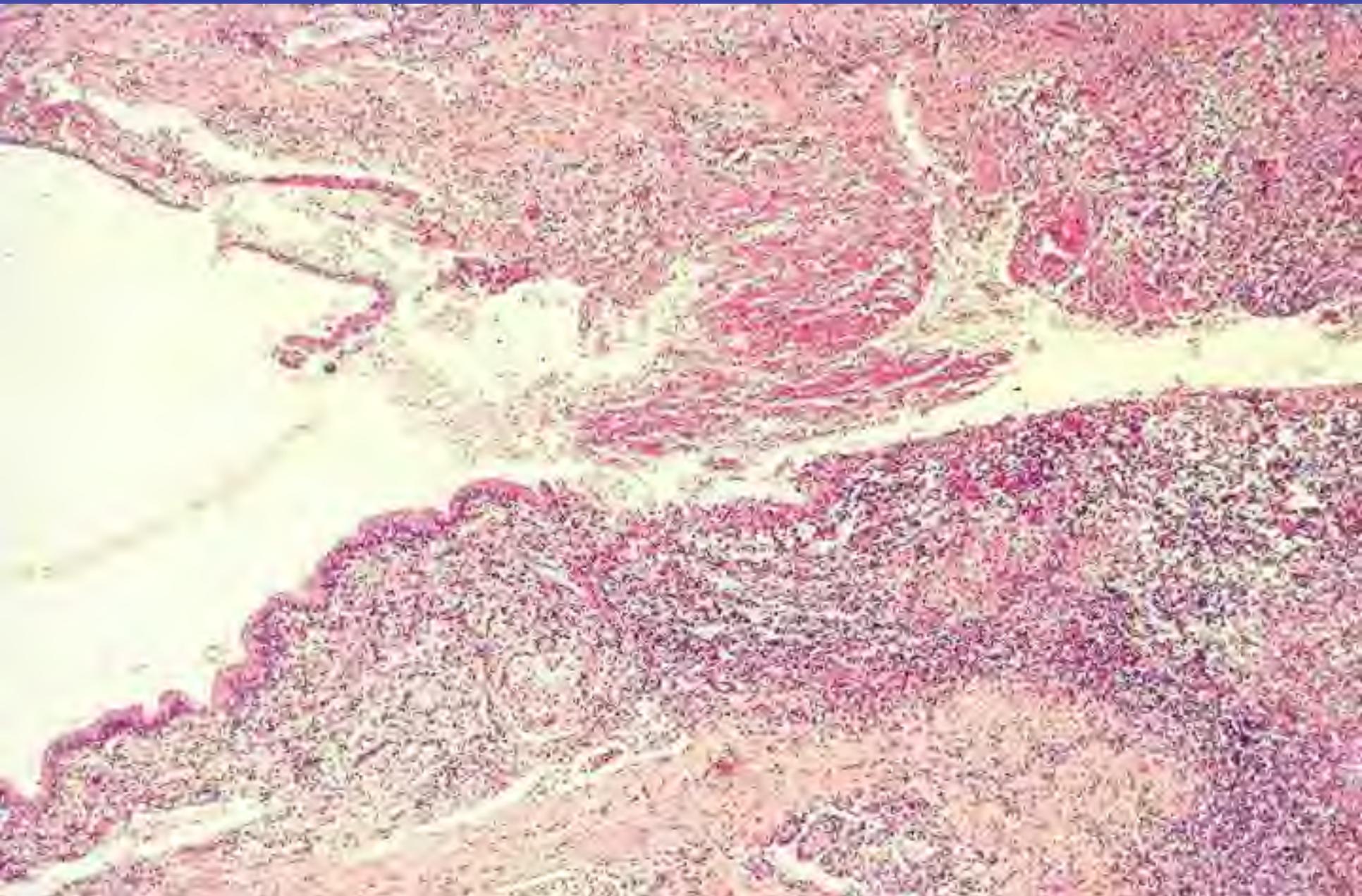


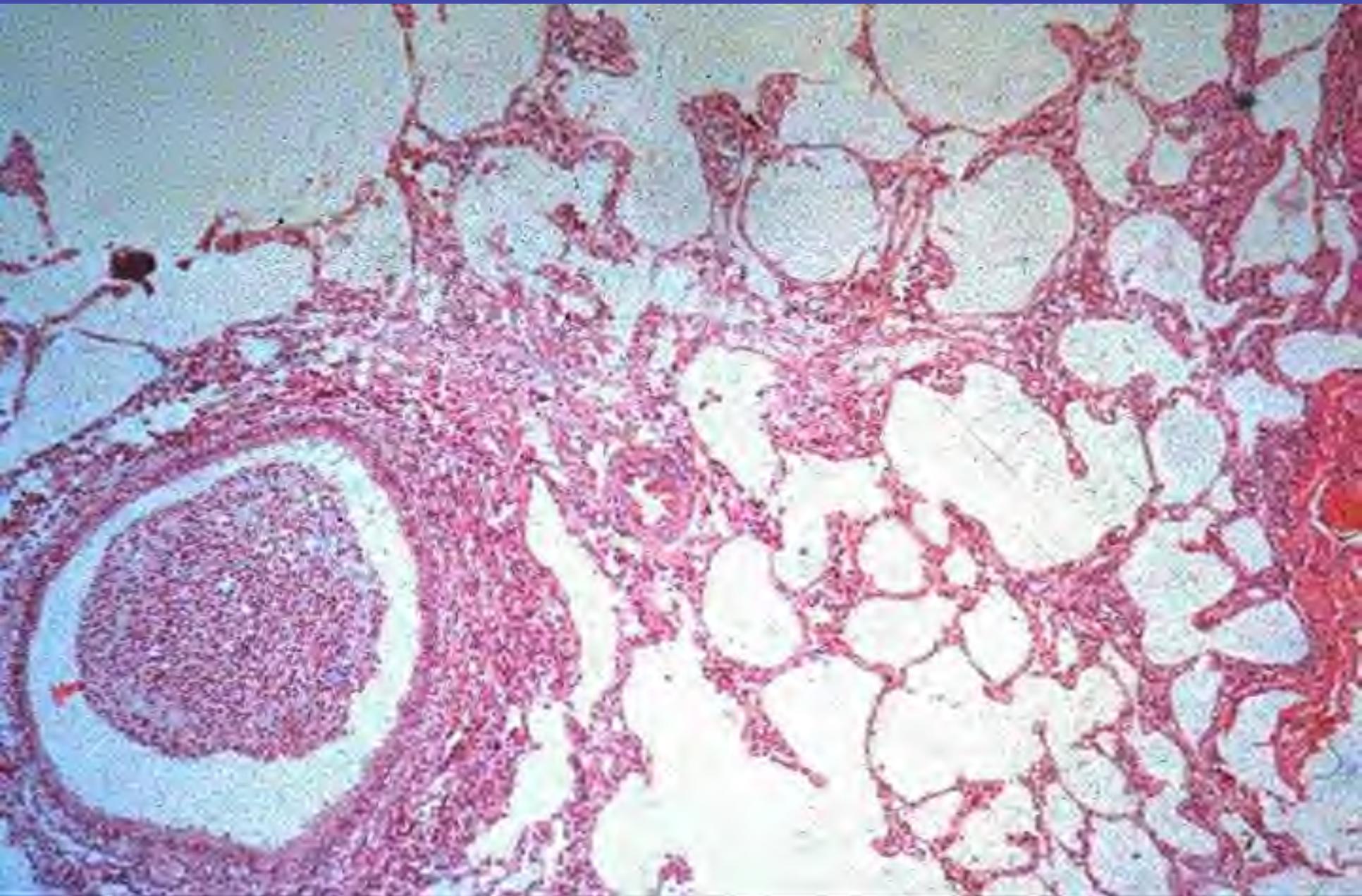


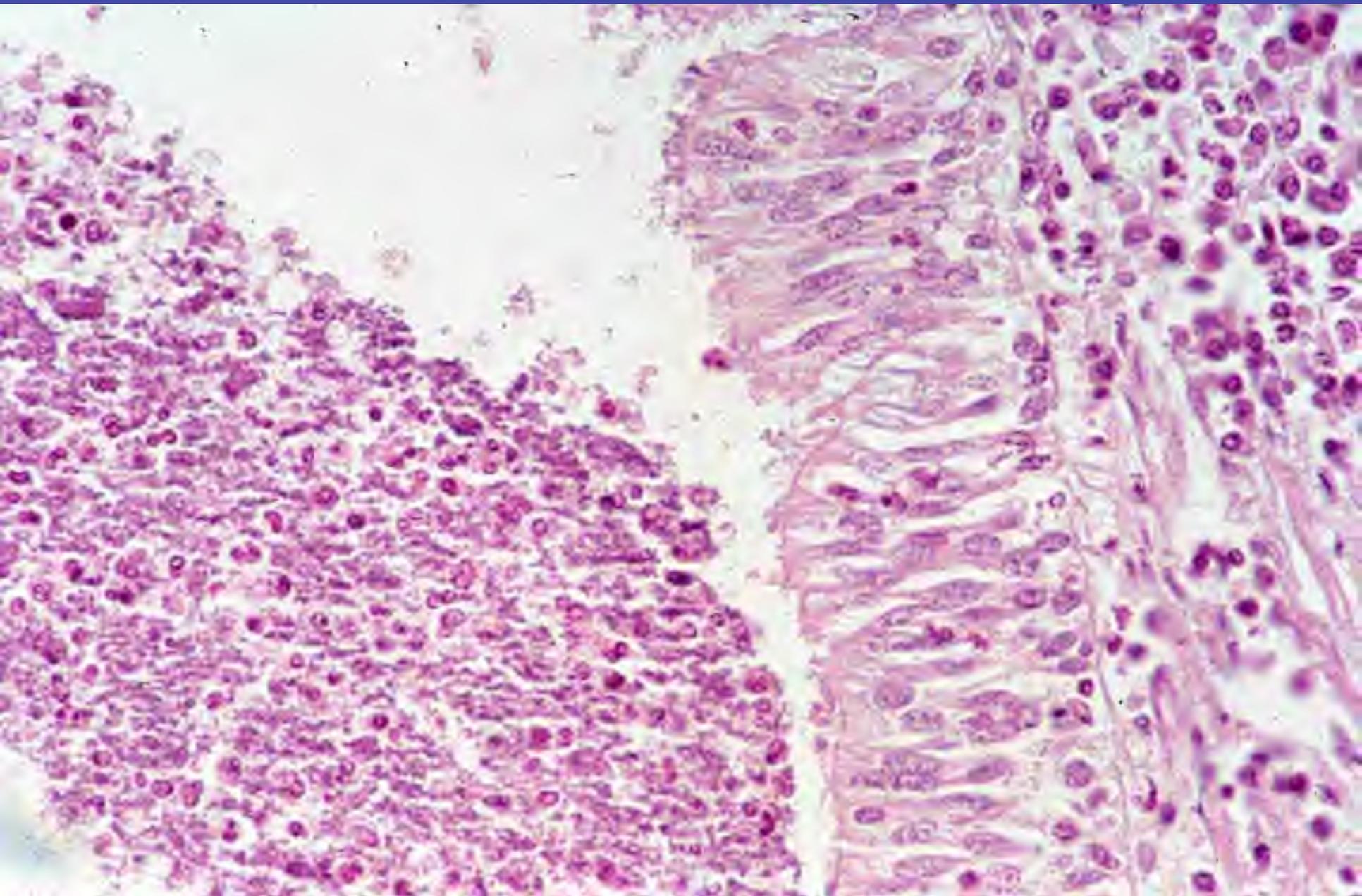












## **M-2 Respiratory Laboratory - 2**

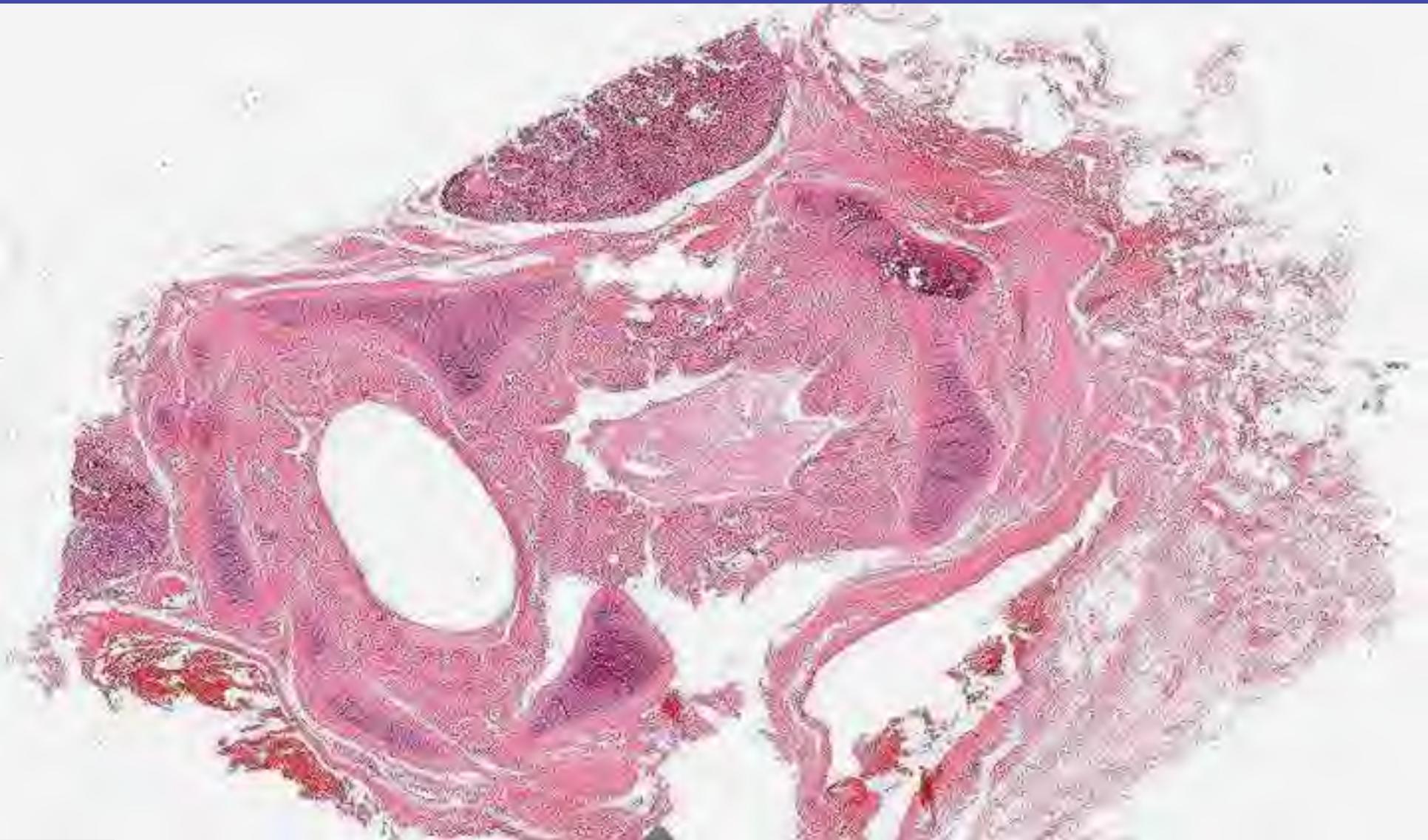
**59 Emphysema**

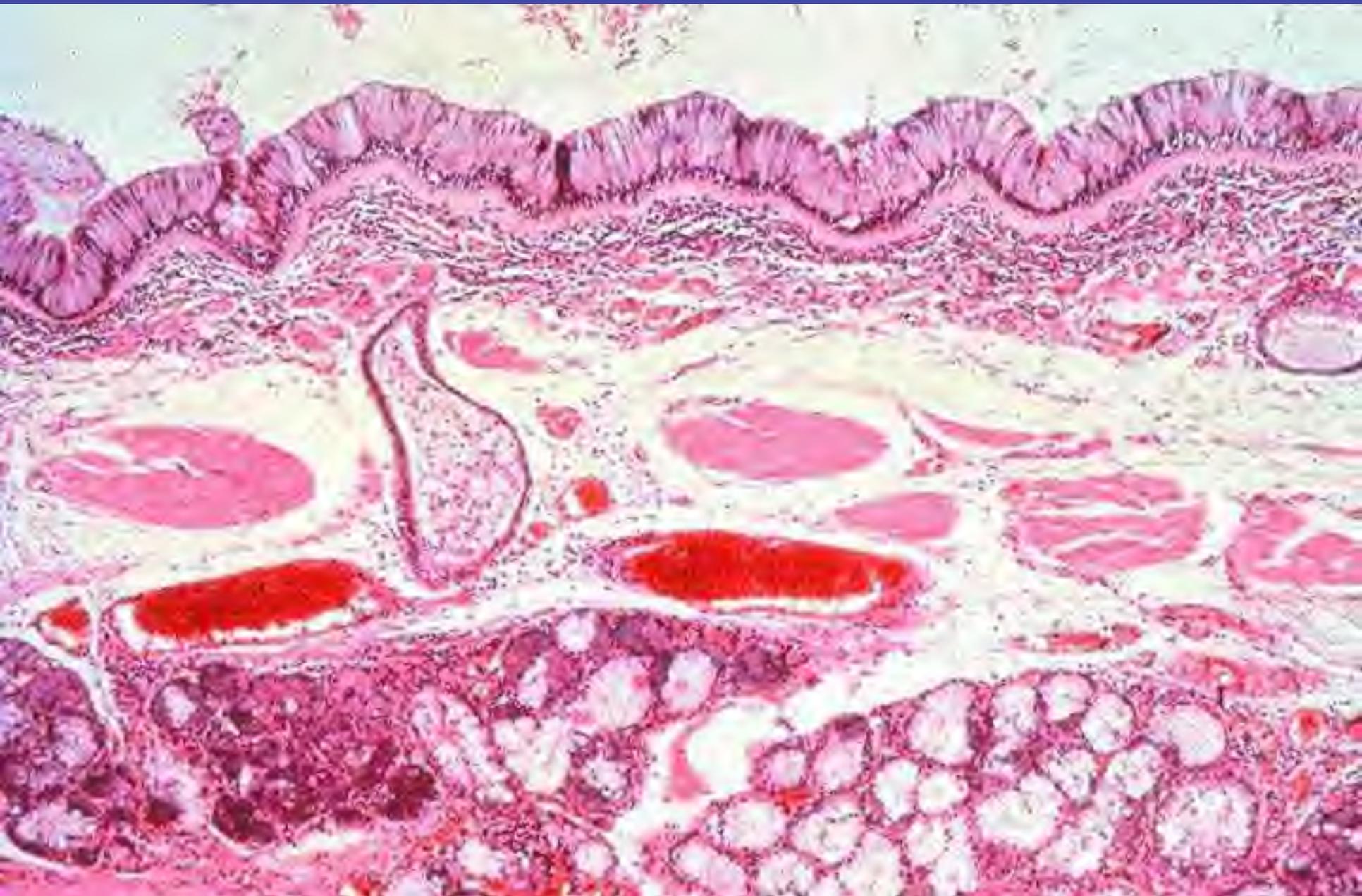
**67 Bronchiectasis**

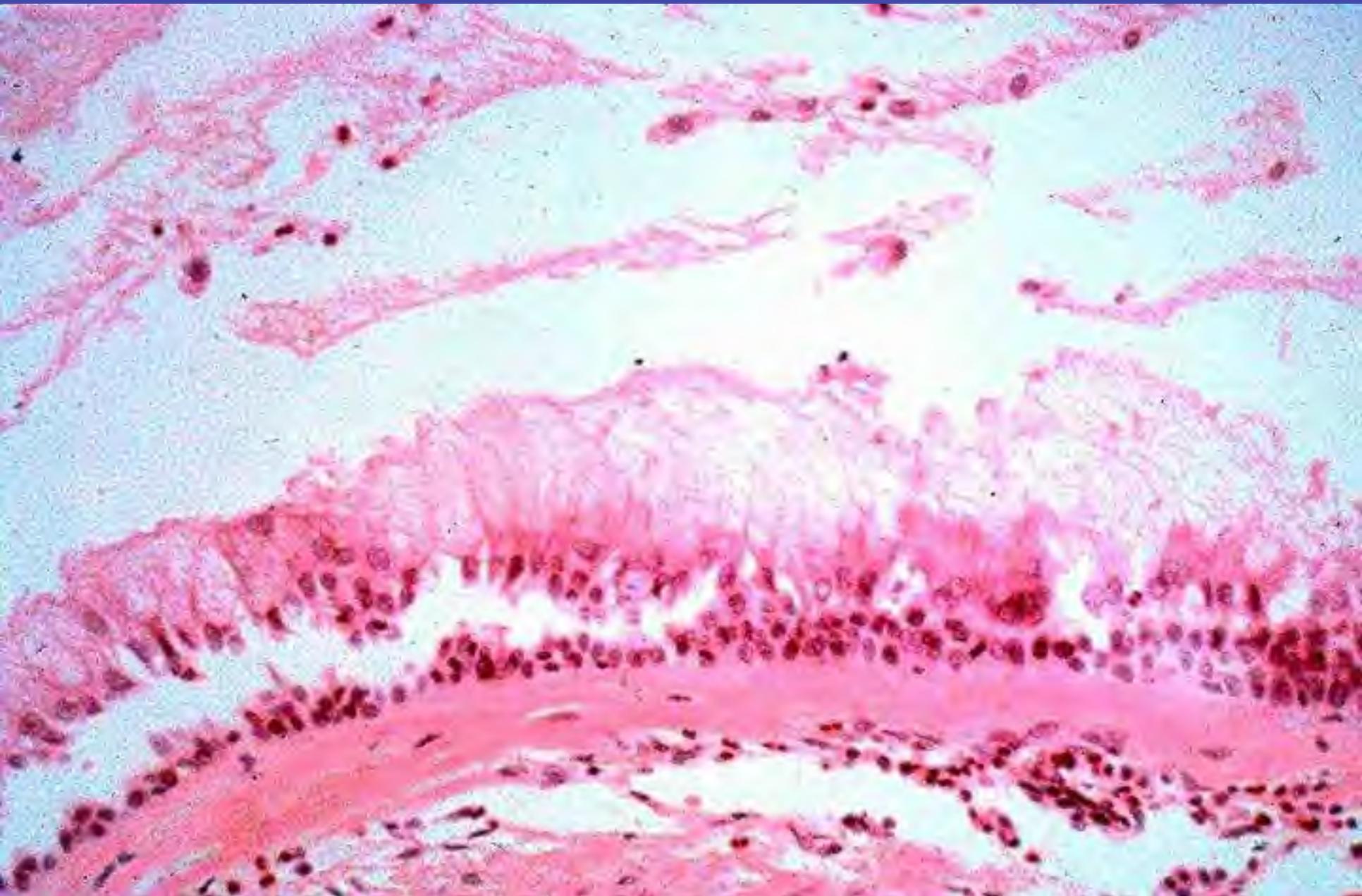
**68 Asthma**

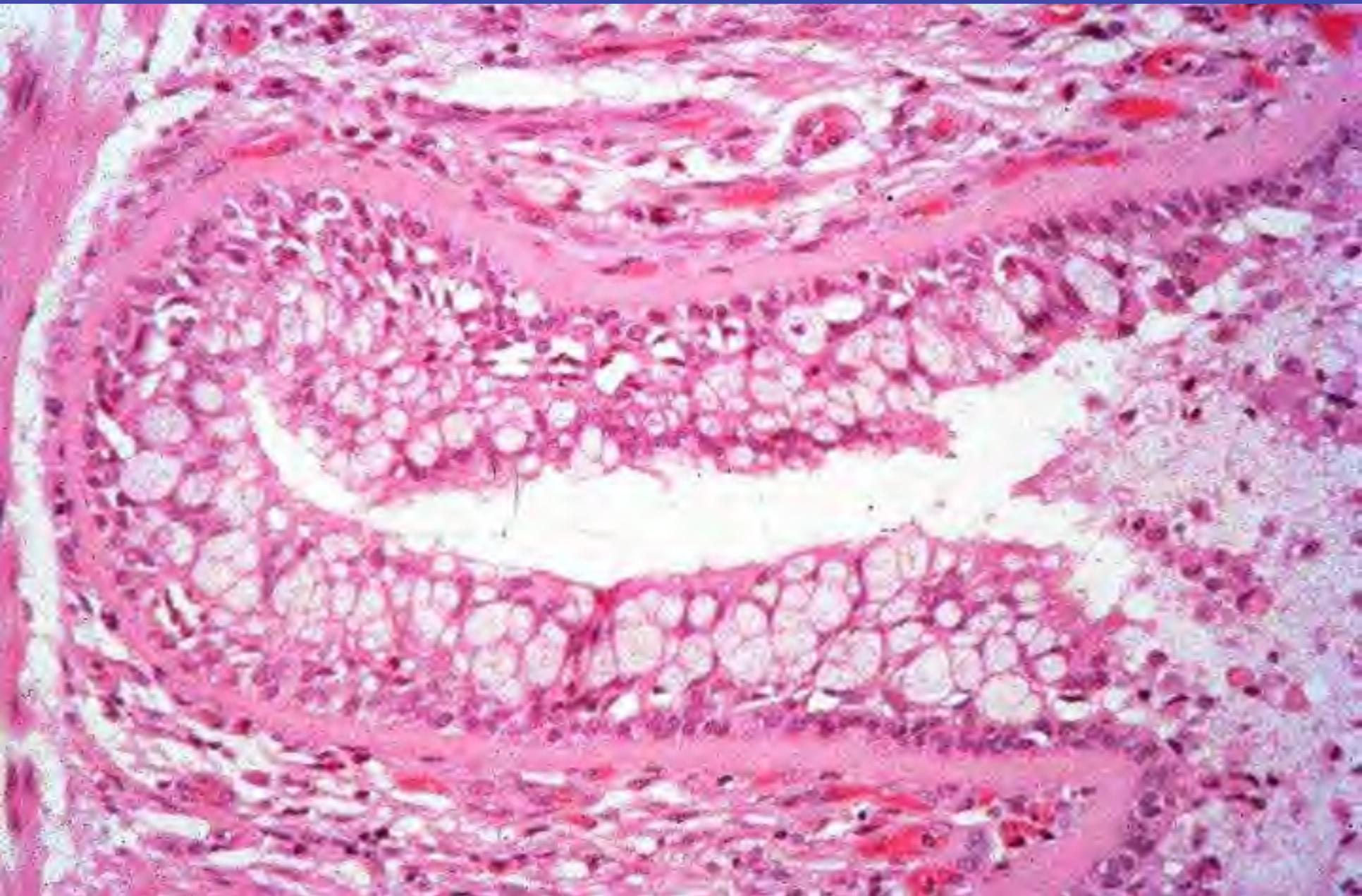
**60 Asbestosis**

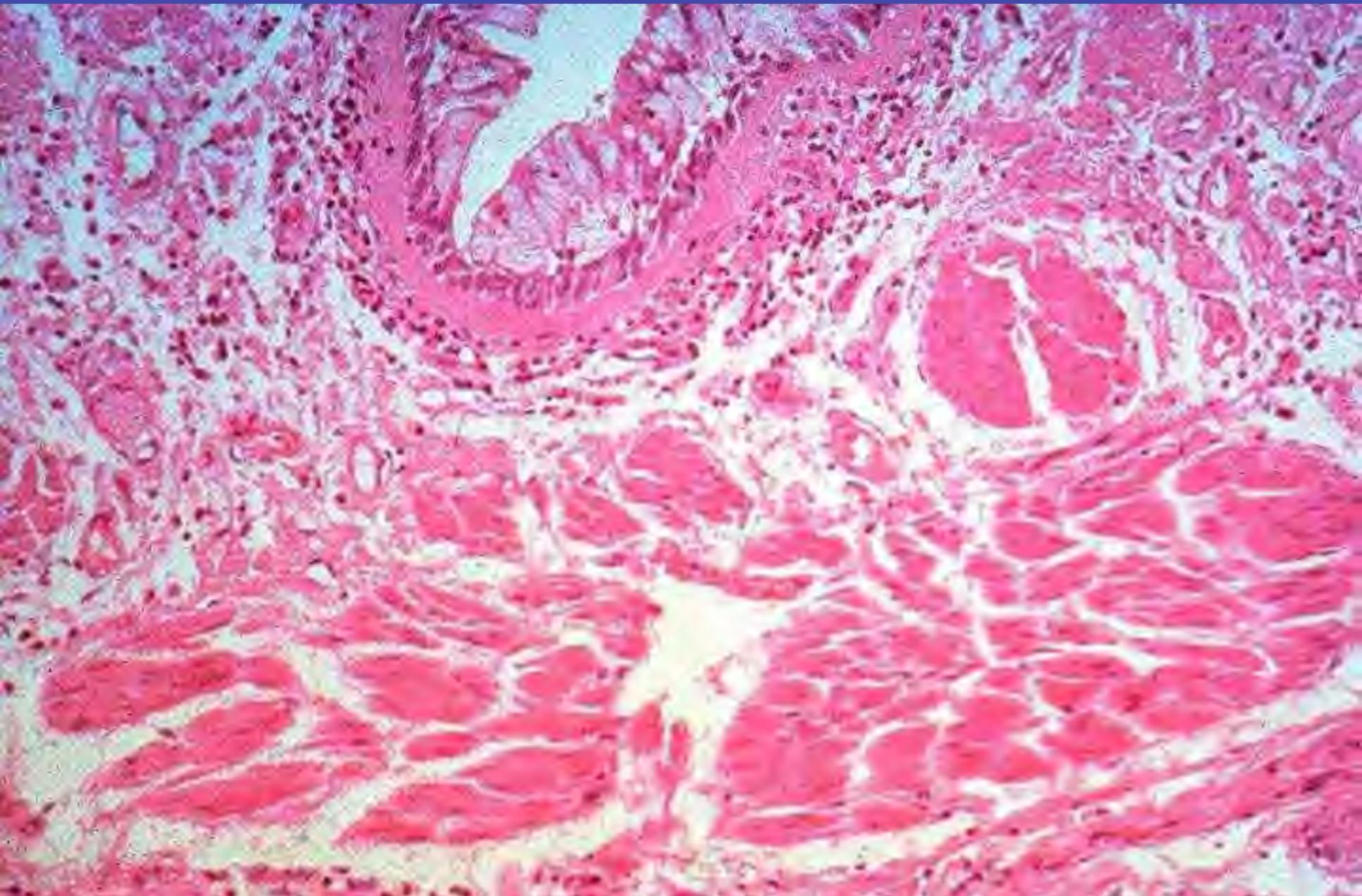
**CPC**

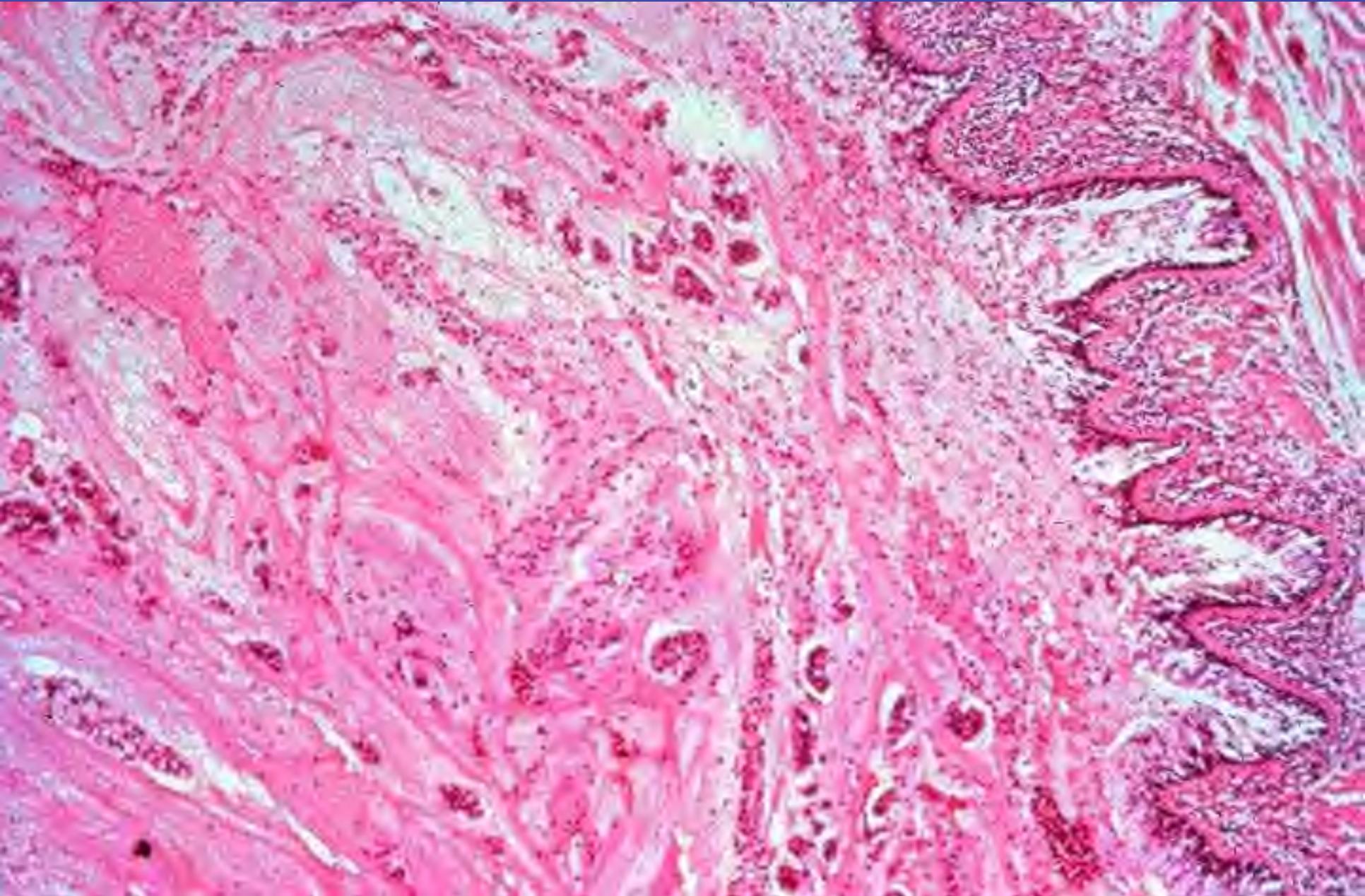


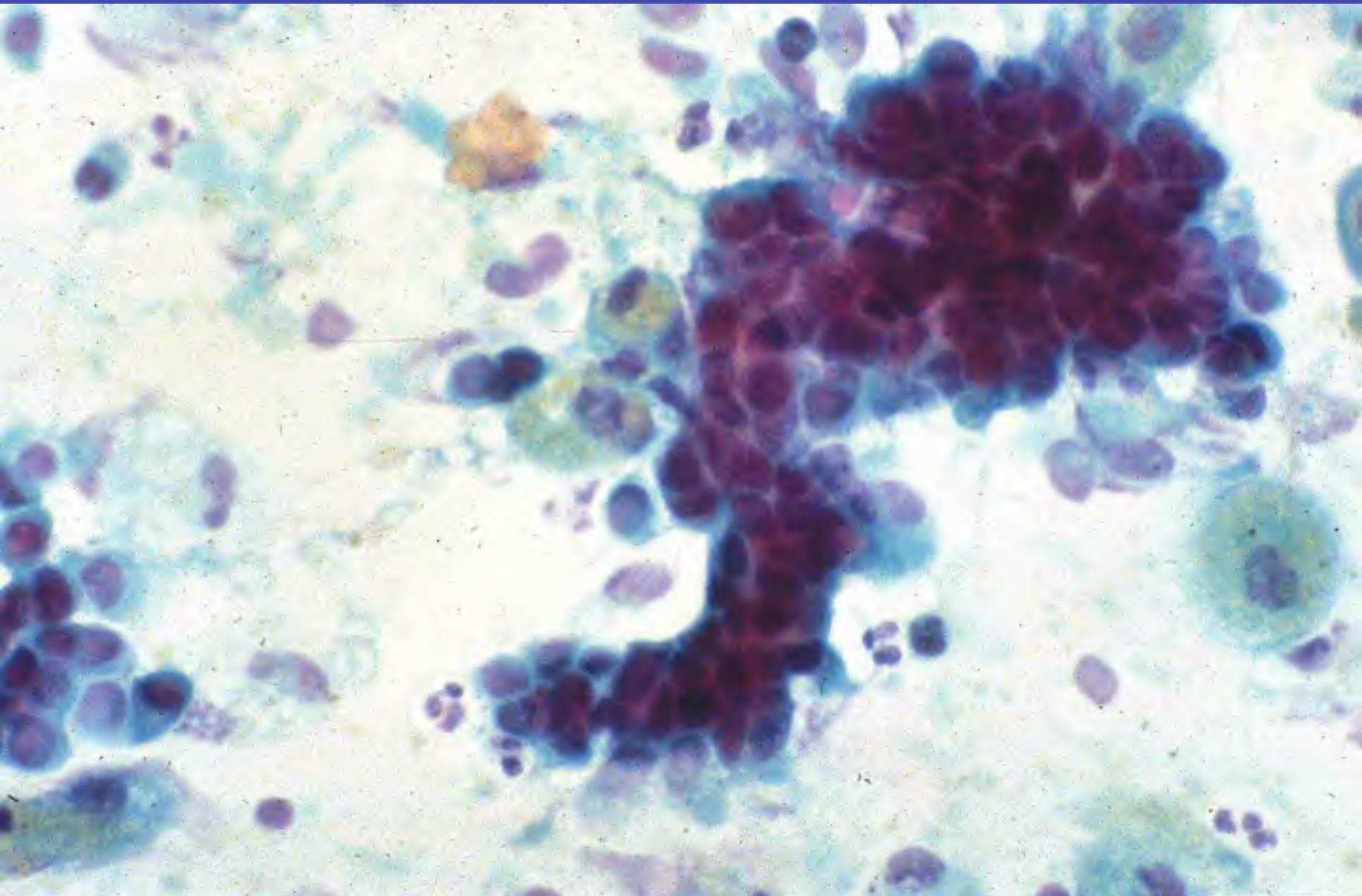


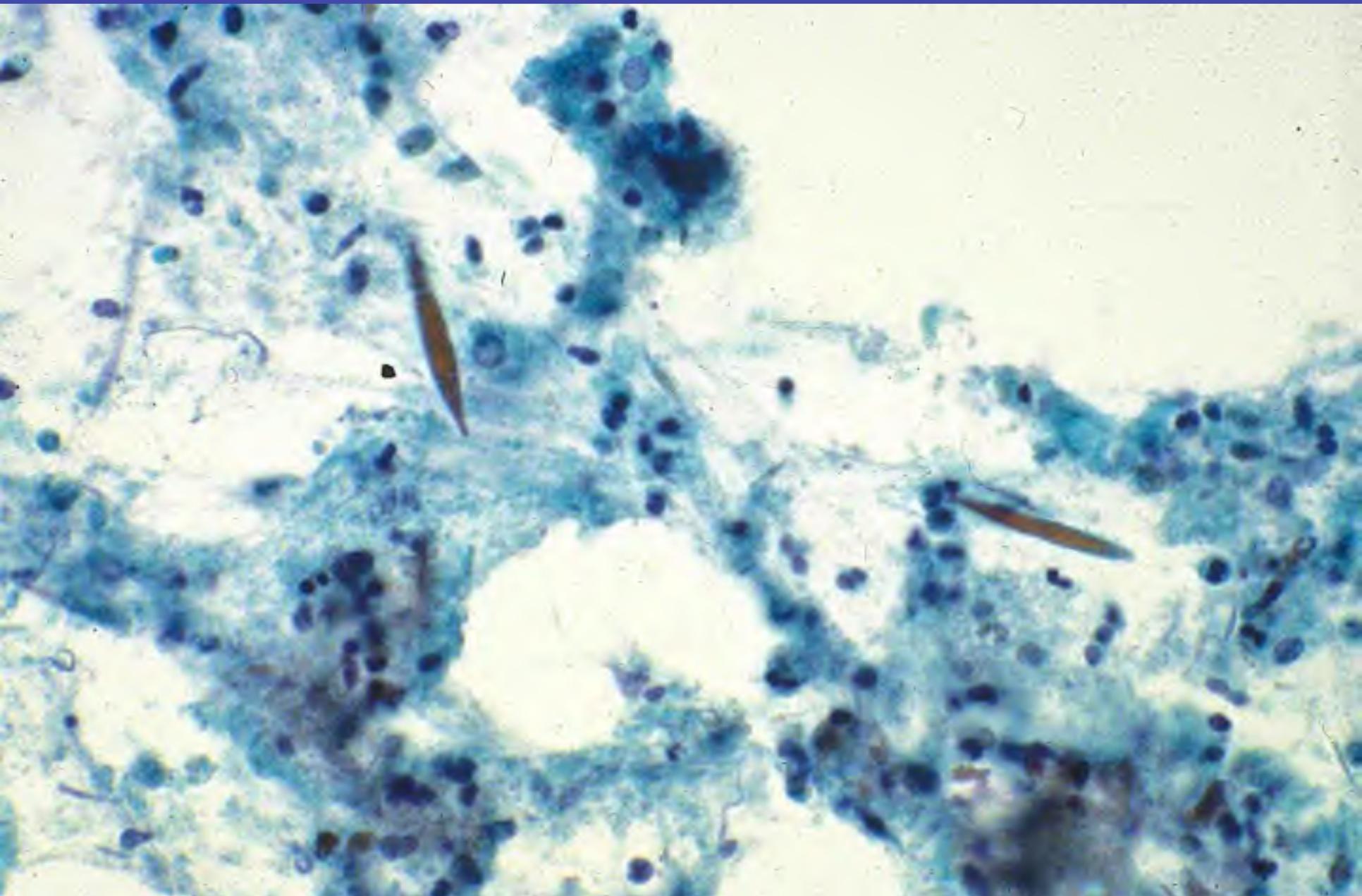


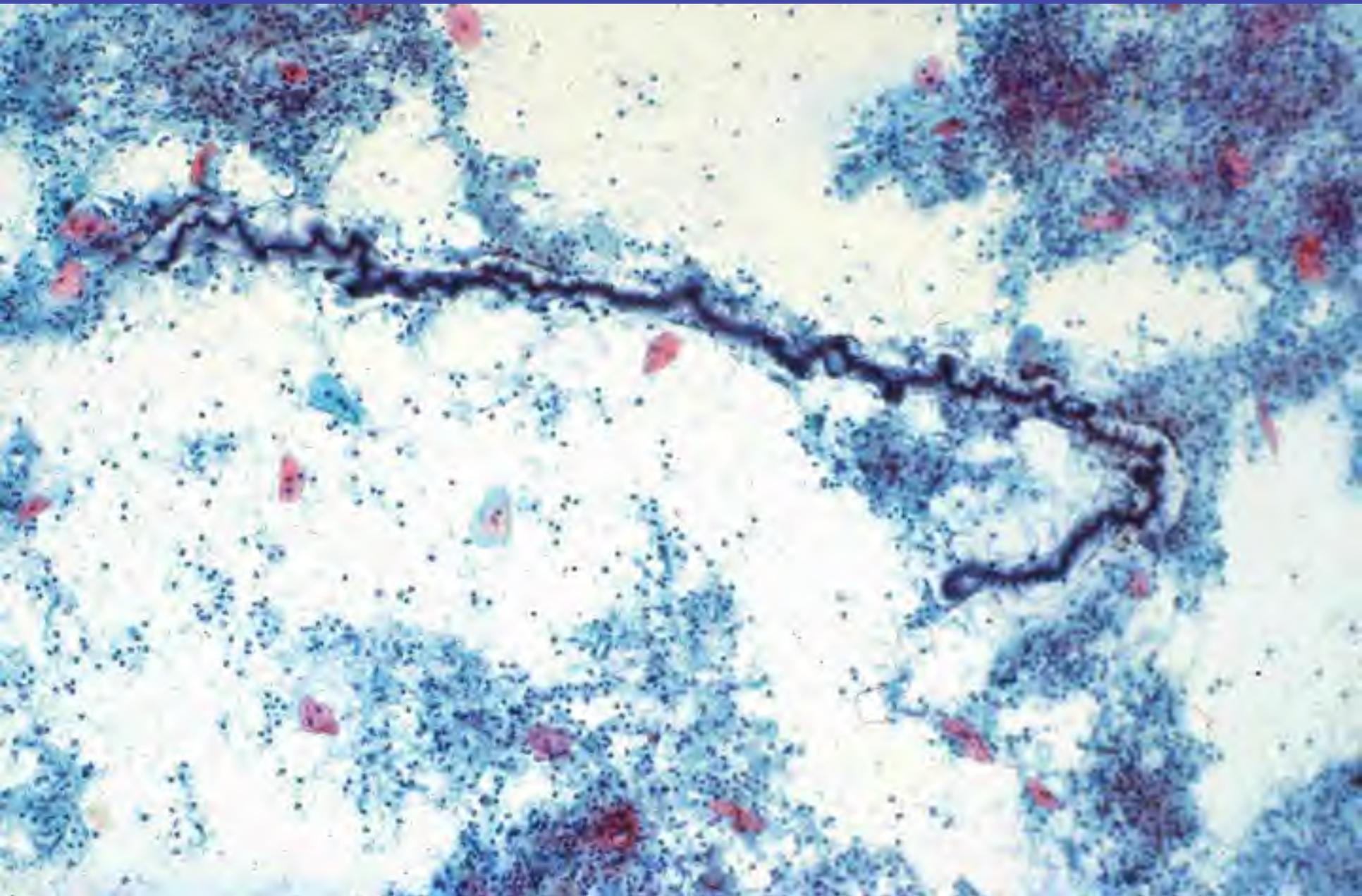


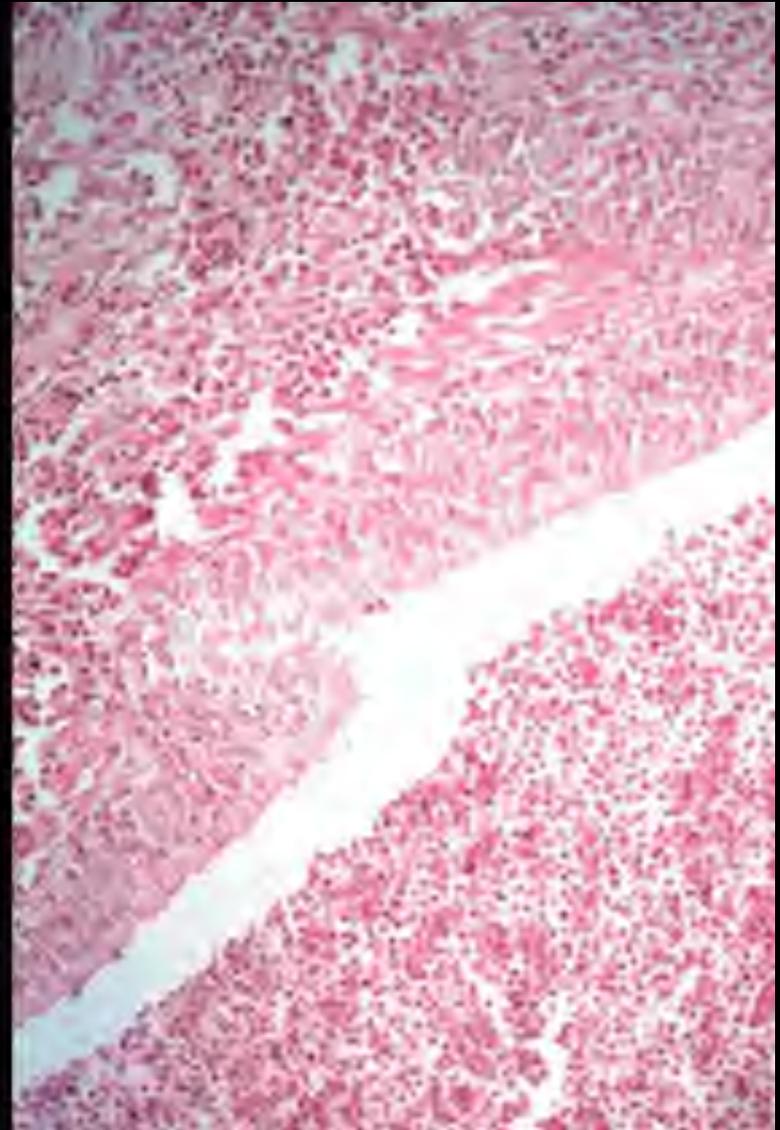
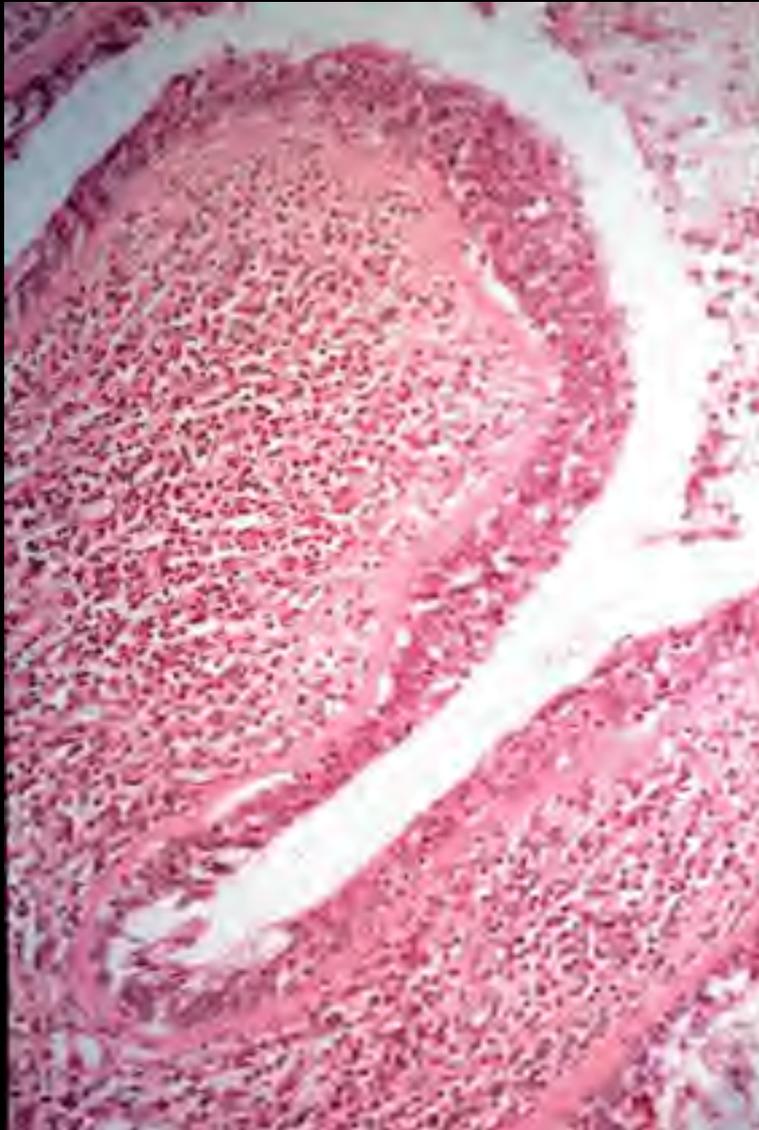












## **M-2 Respiratory Laboratory - 2**

**59 Emphysema**

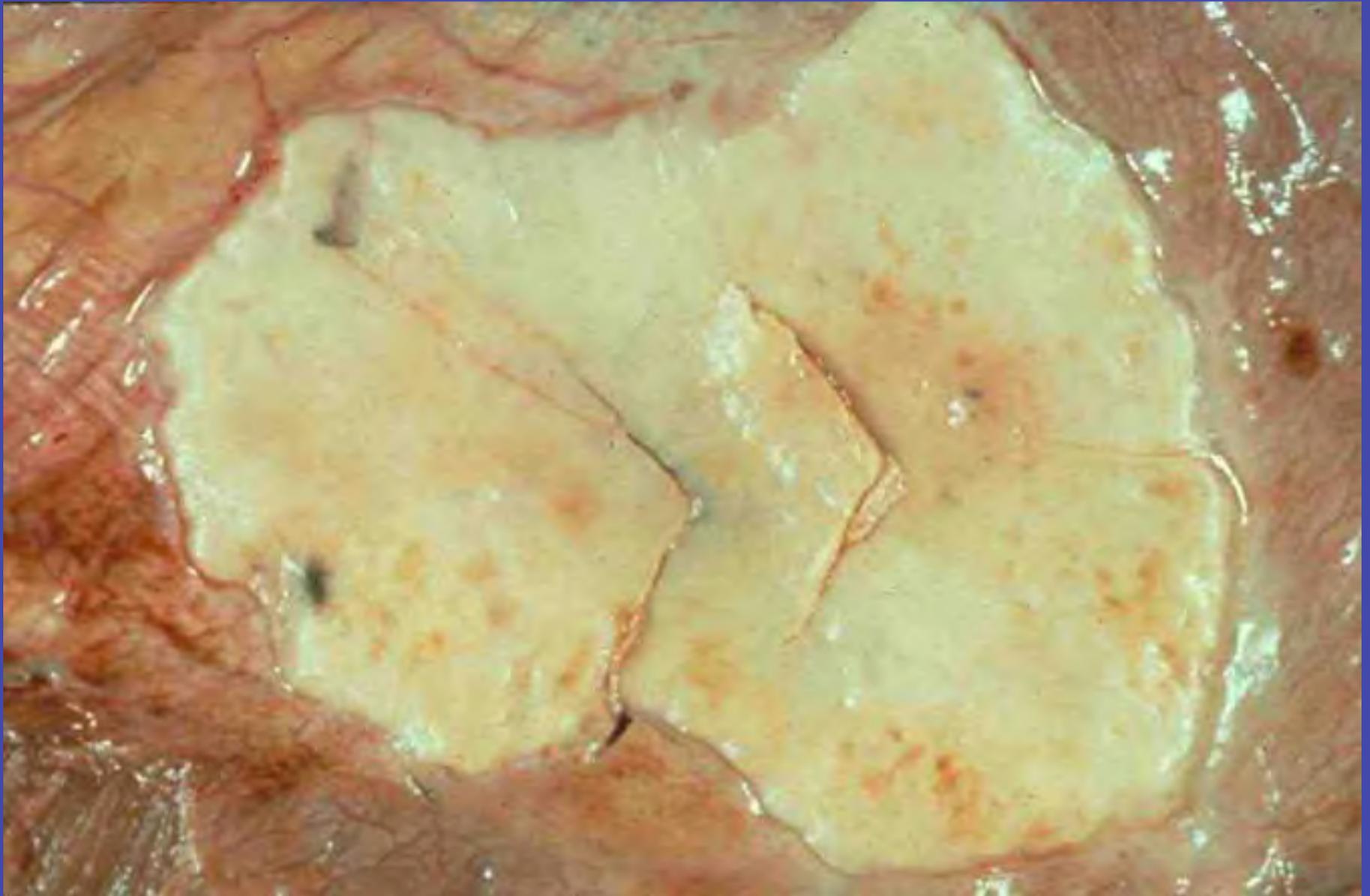
**67 Bronchiectasis**

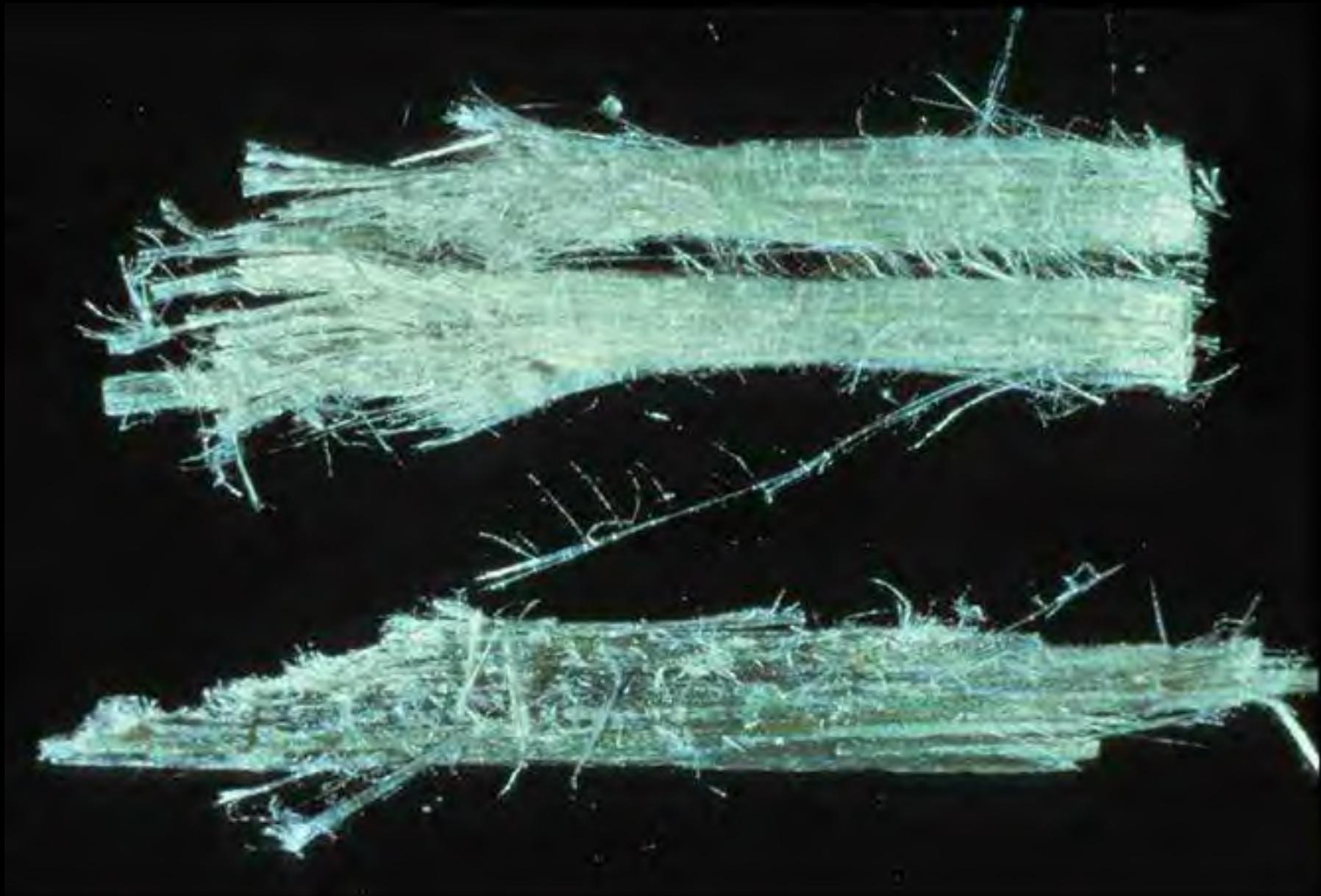
**68 Asthma**

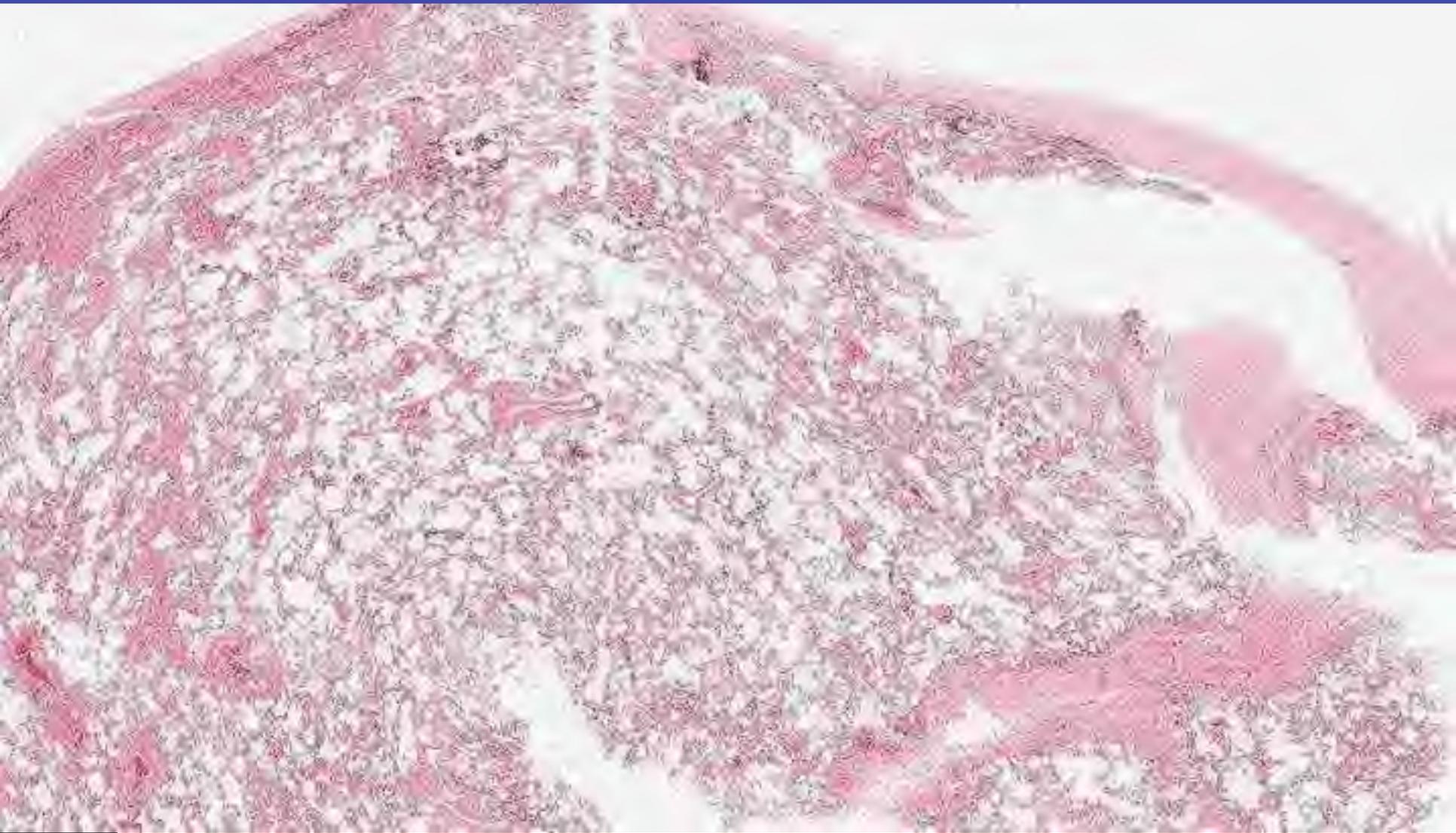
**60 Asbestosis**

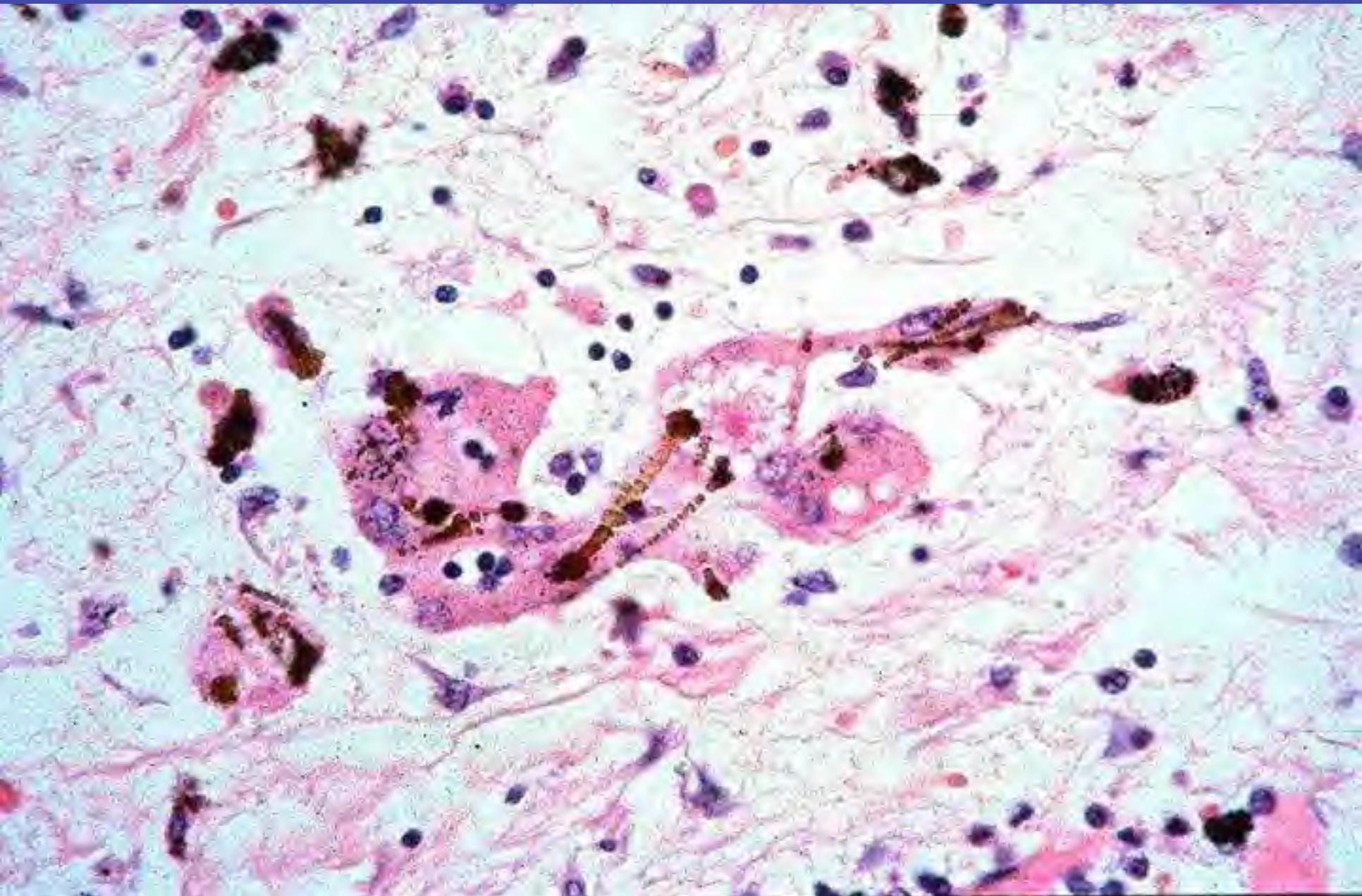
**CPC**

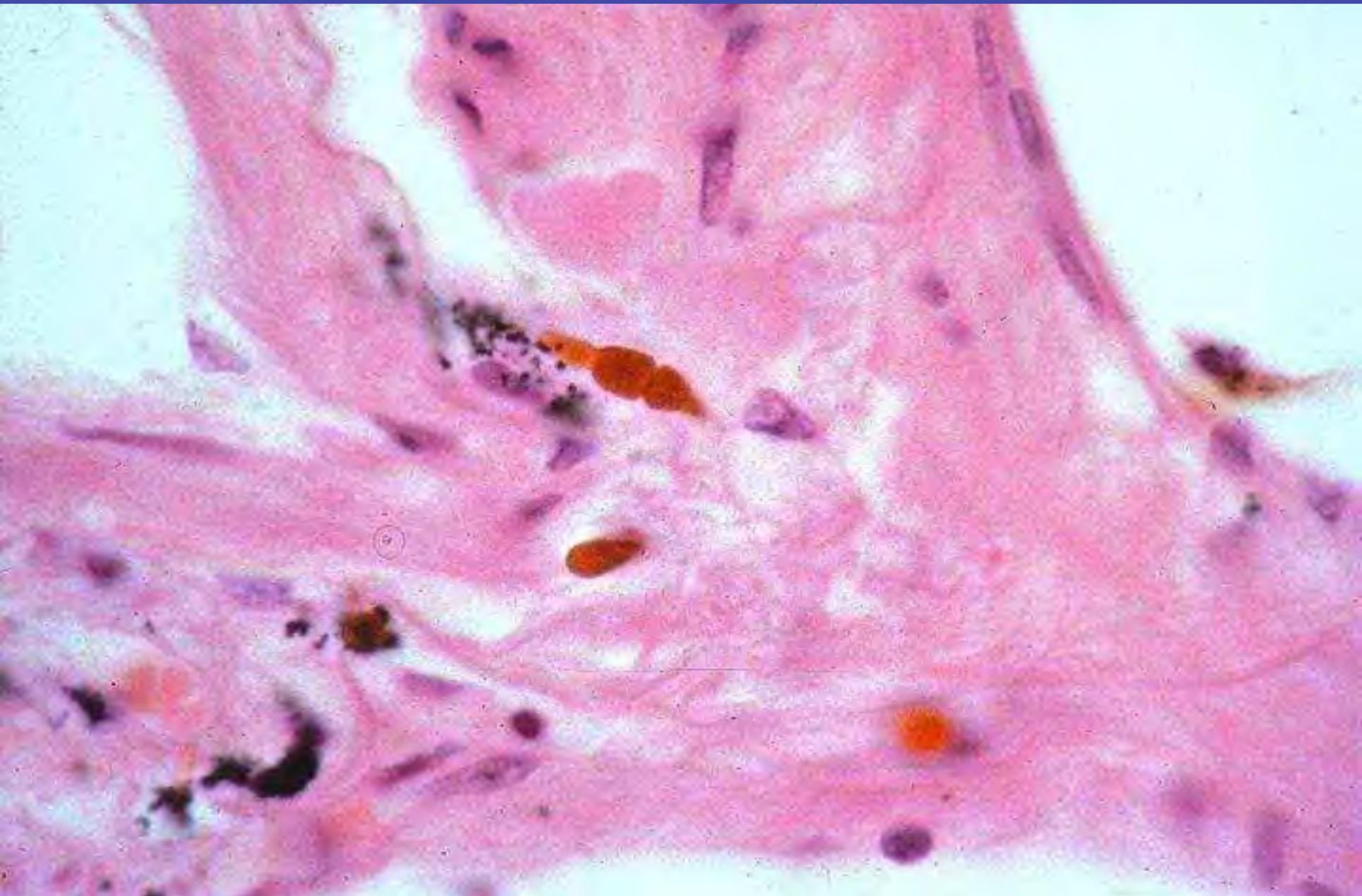












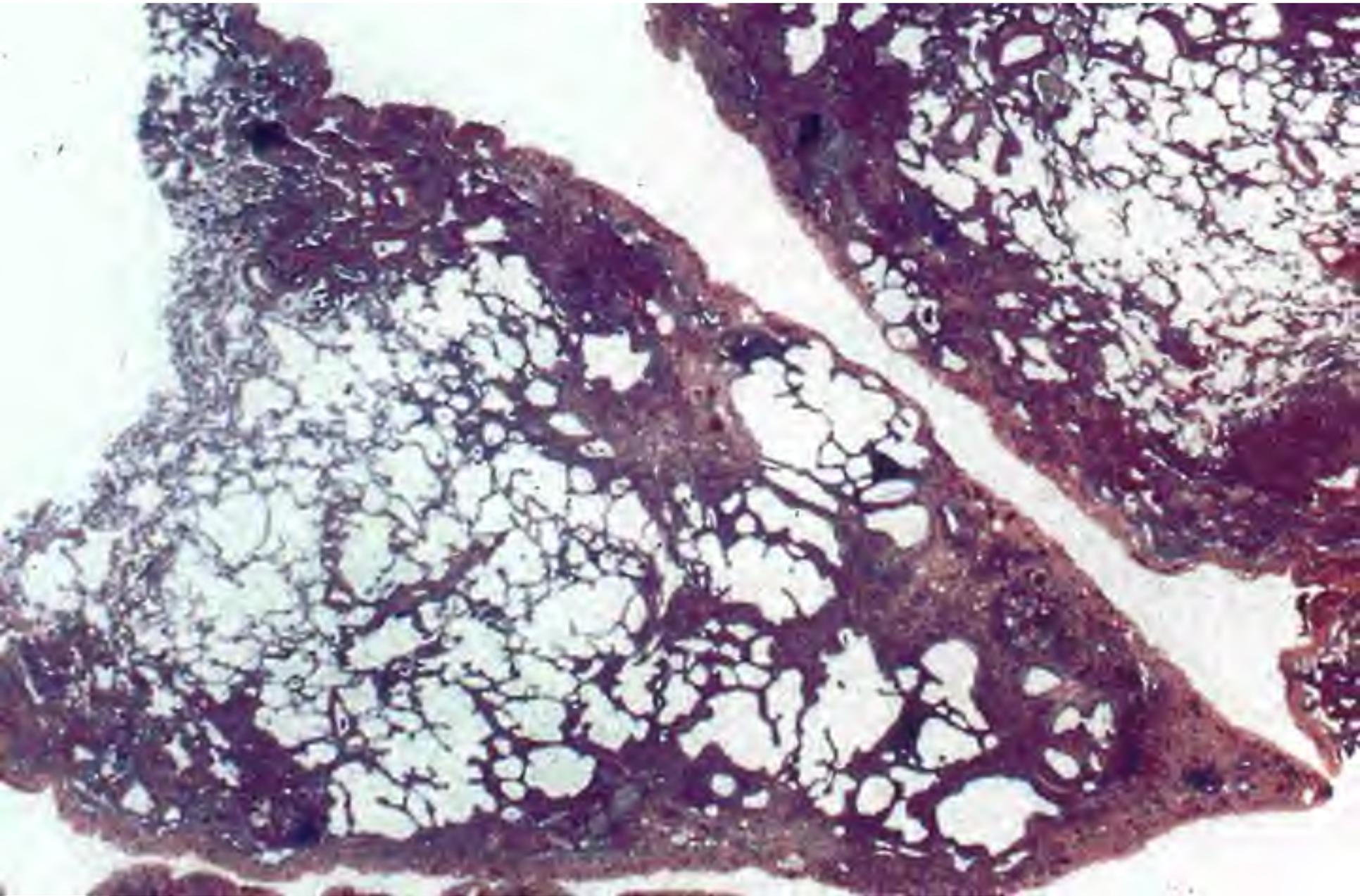


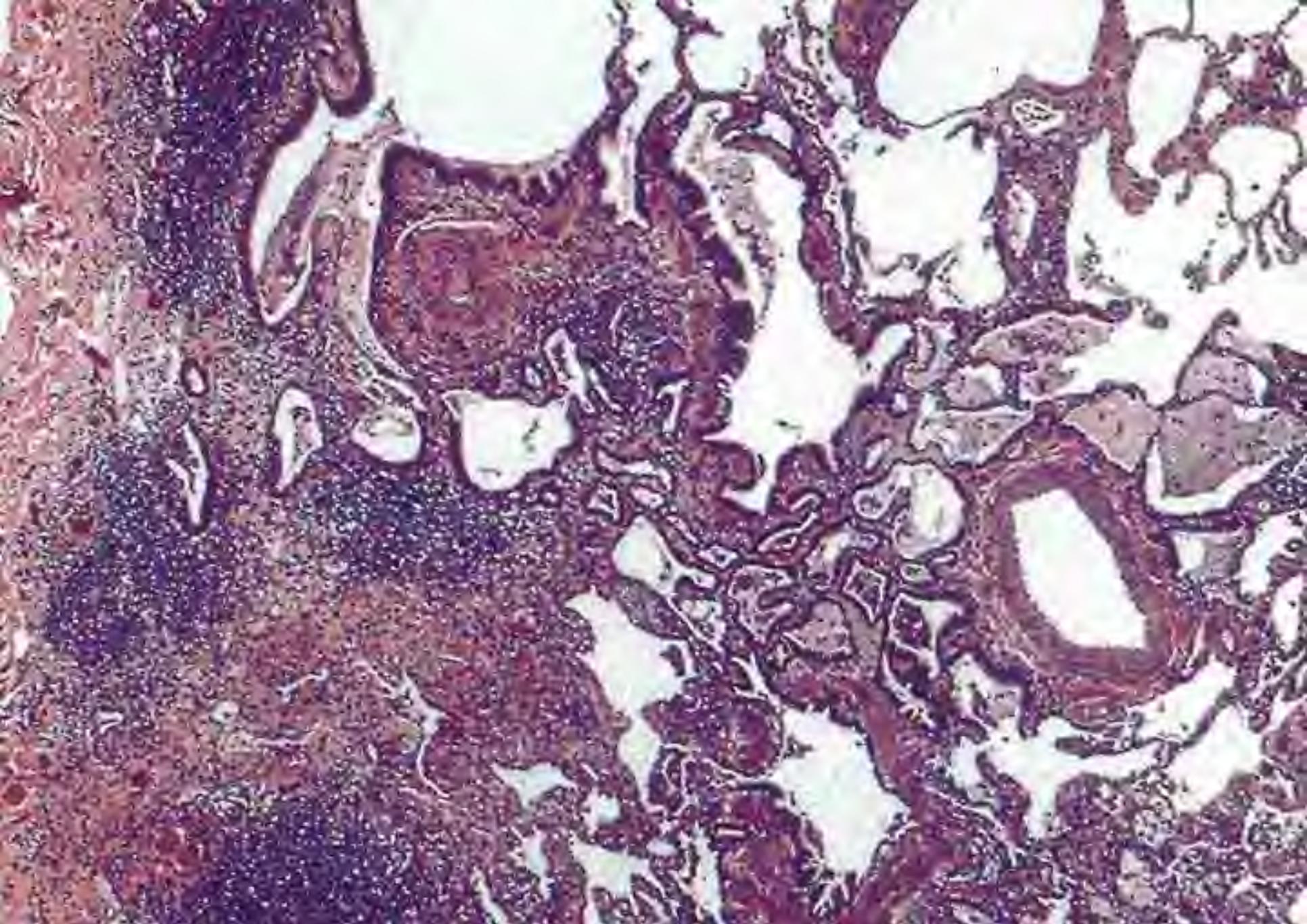


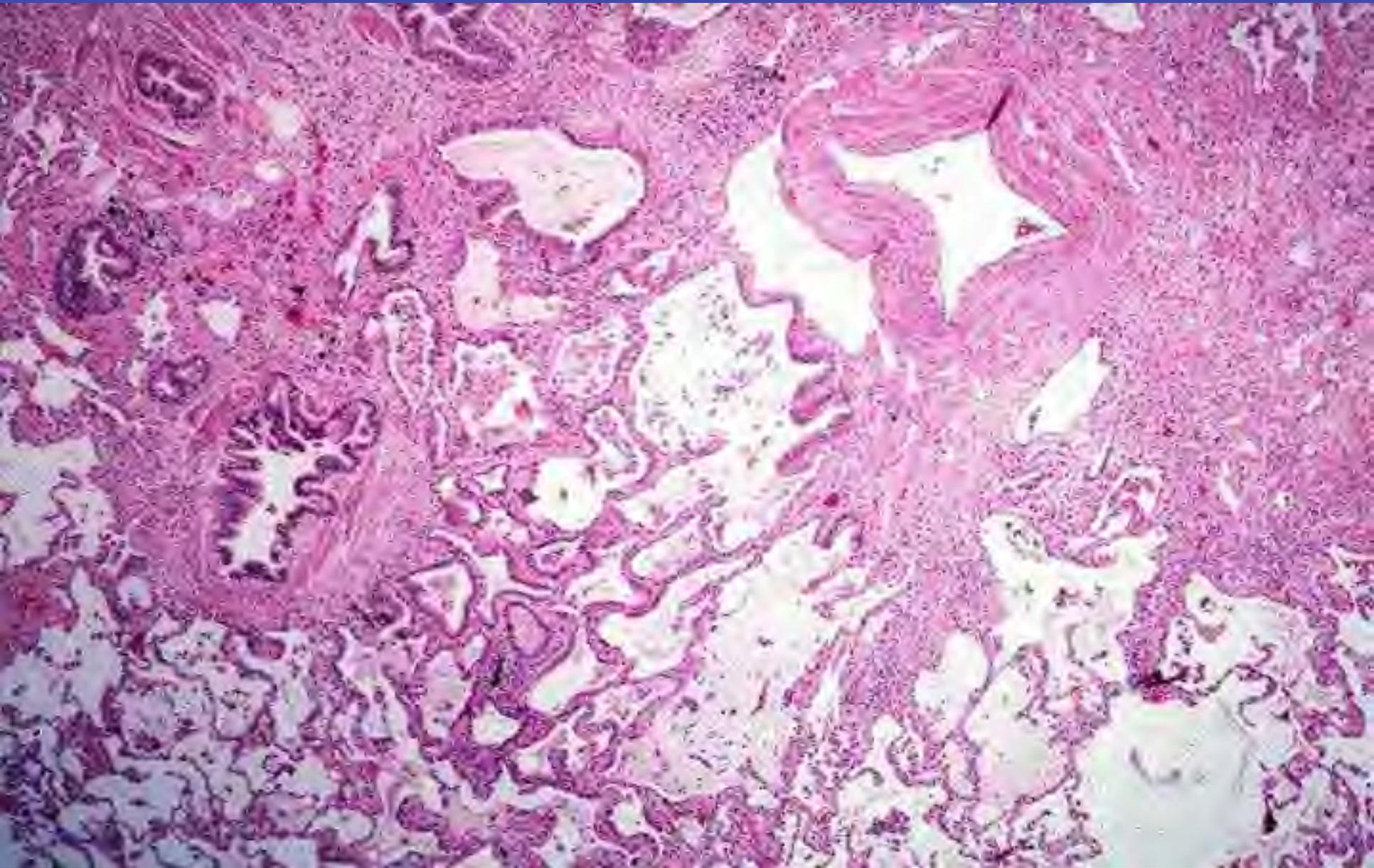


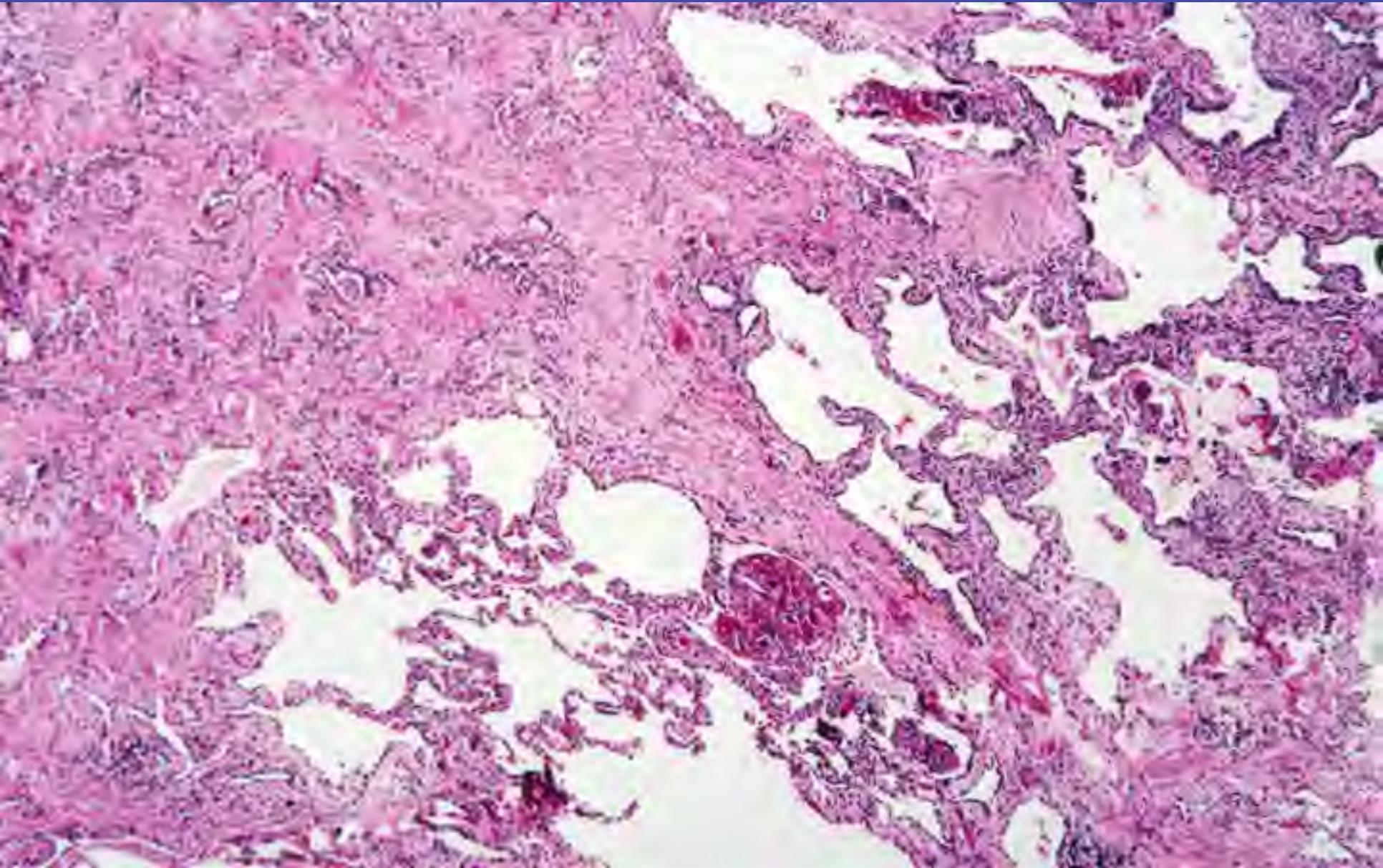
# Idiopathic pulmonary fibrosis (UIP)

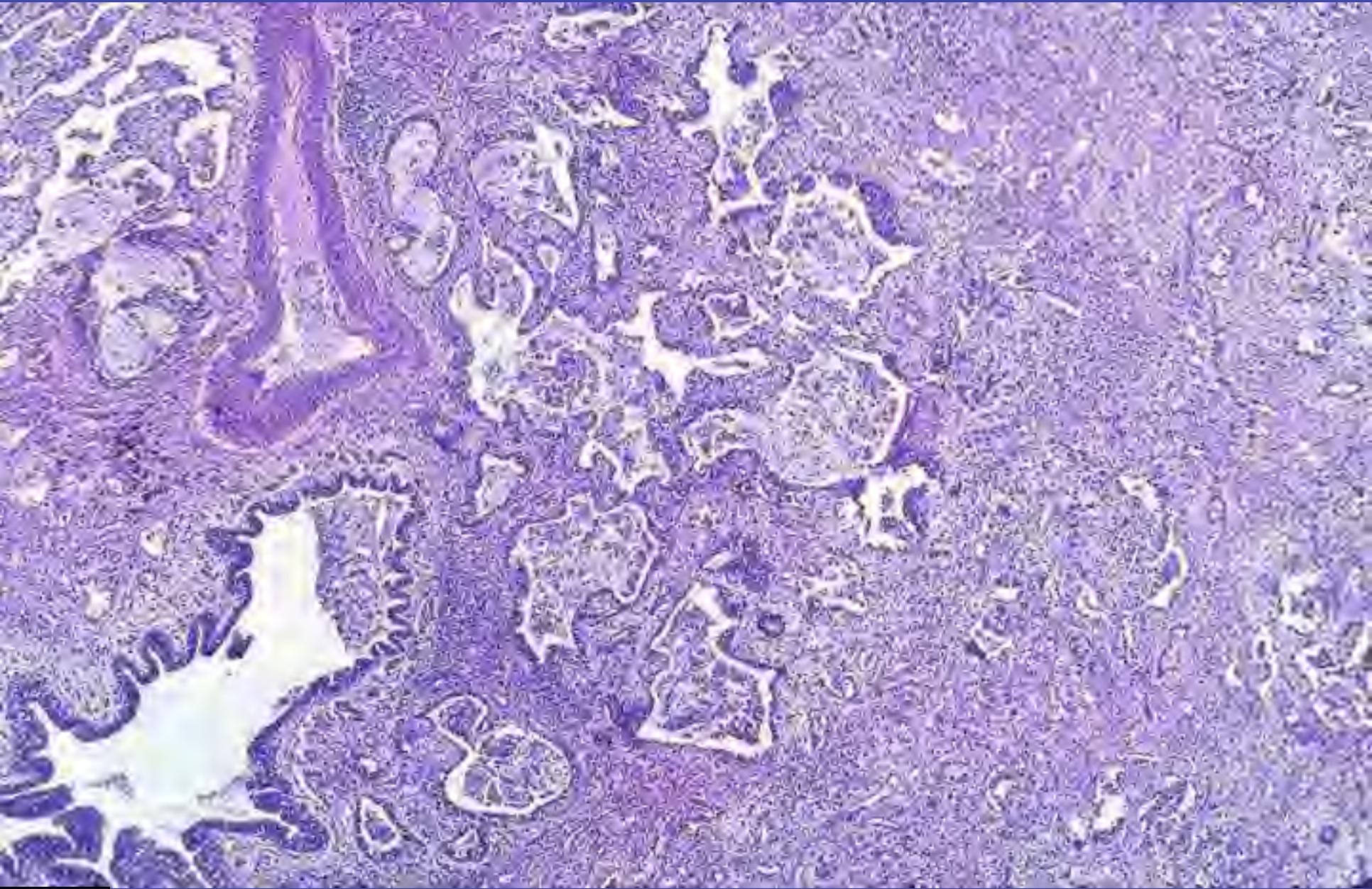


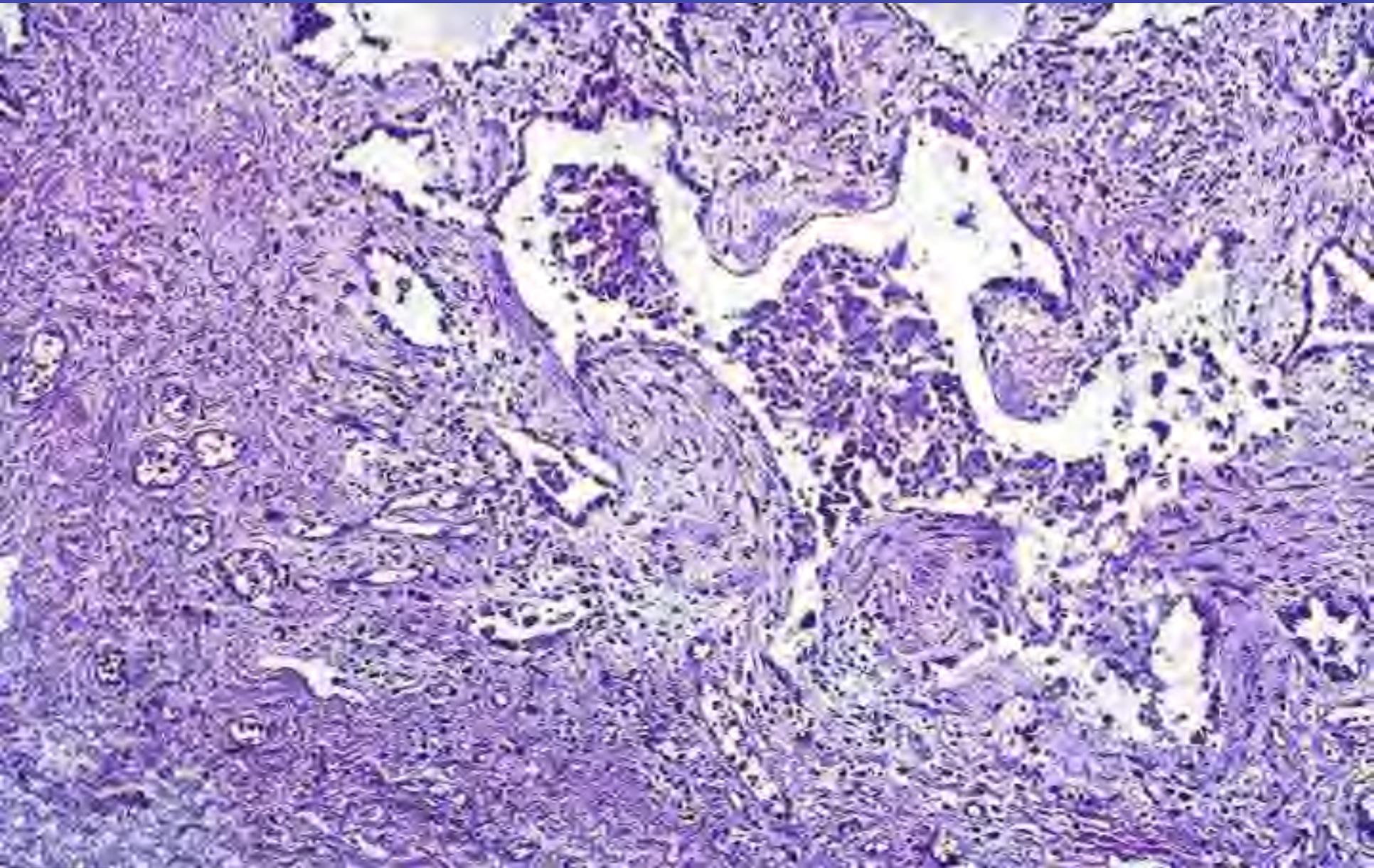


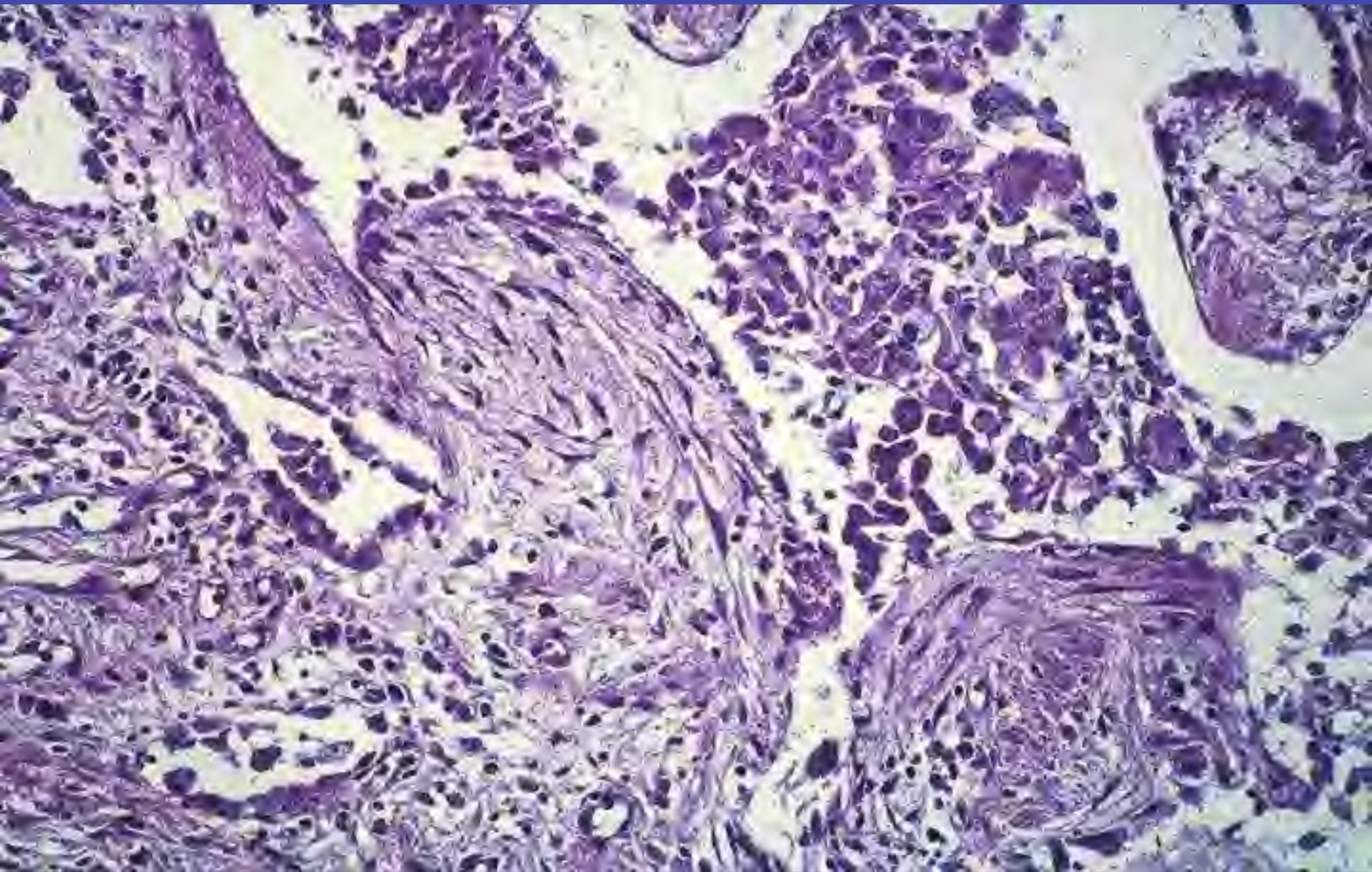












## **M-2 Respiratory Laboratory - 2**

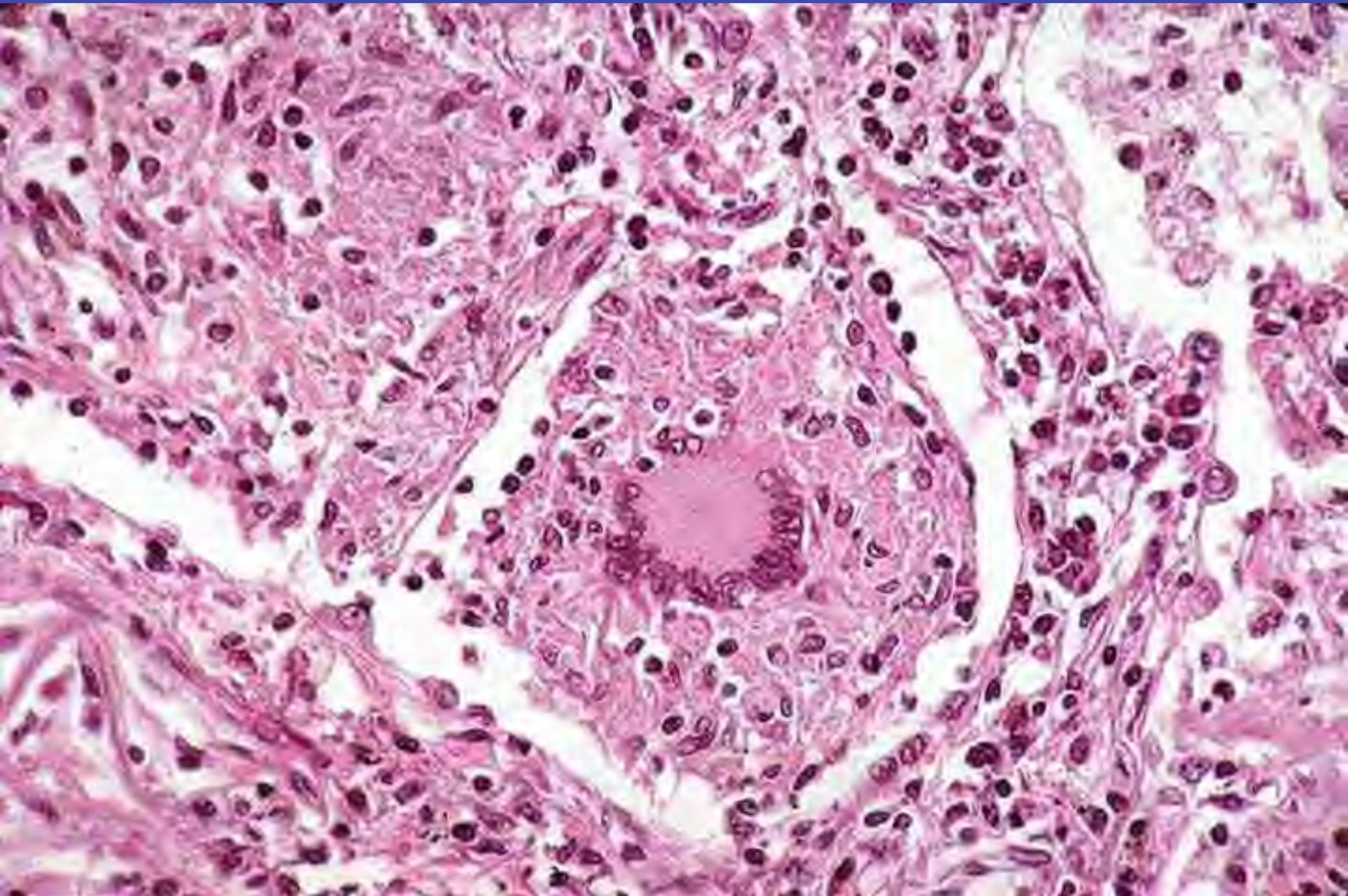
**59 Emphysema**

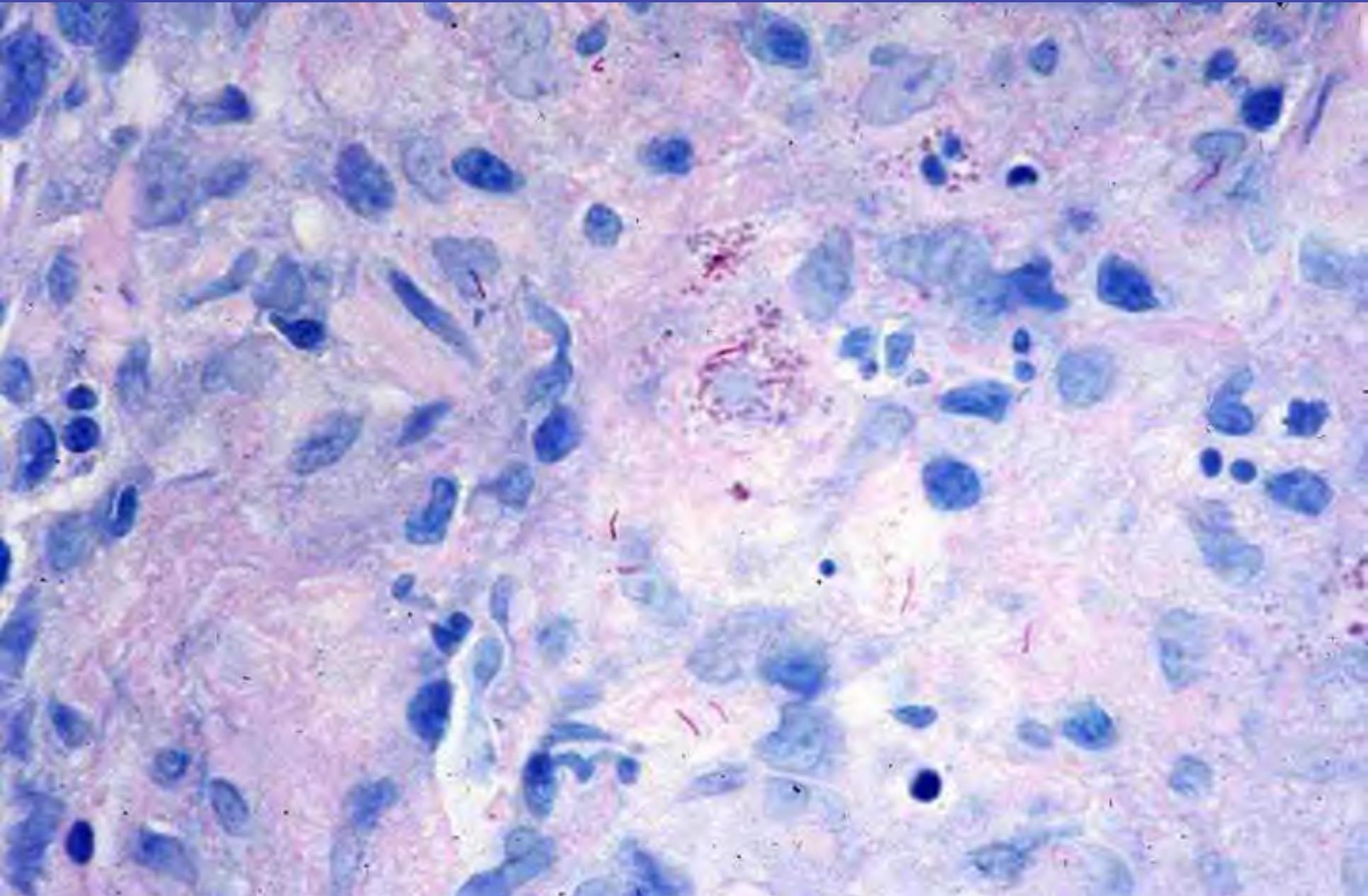
**67 Bronchiectasis**

**68 Asthma**

**60 Asbestosis**

**CPC**





## **M-2 Respiratory Laboratory - 3**

**74 Squamous cell carcinoma**

**75 Adenocarcinoma**

**28 Small cell carcinoma**

**73 Carcinoid tumor**

**CPC**

## **M-2 Respiratory Laboratory - 3**

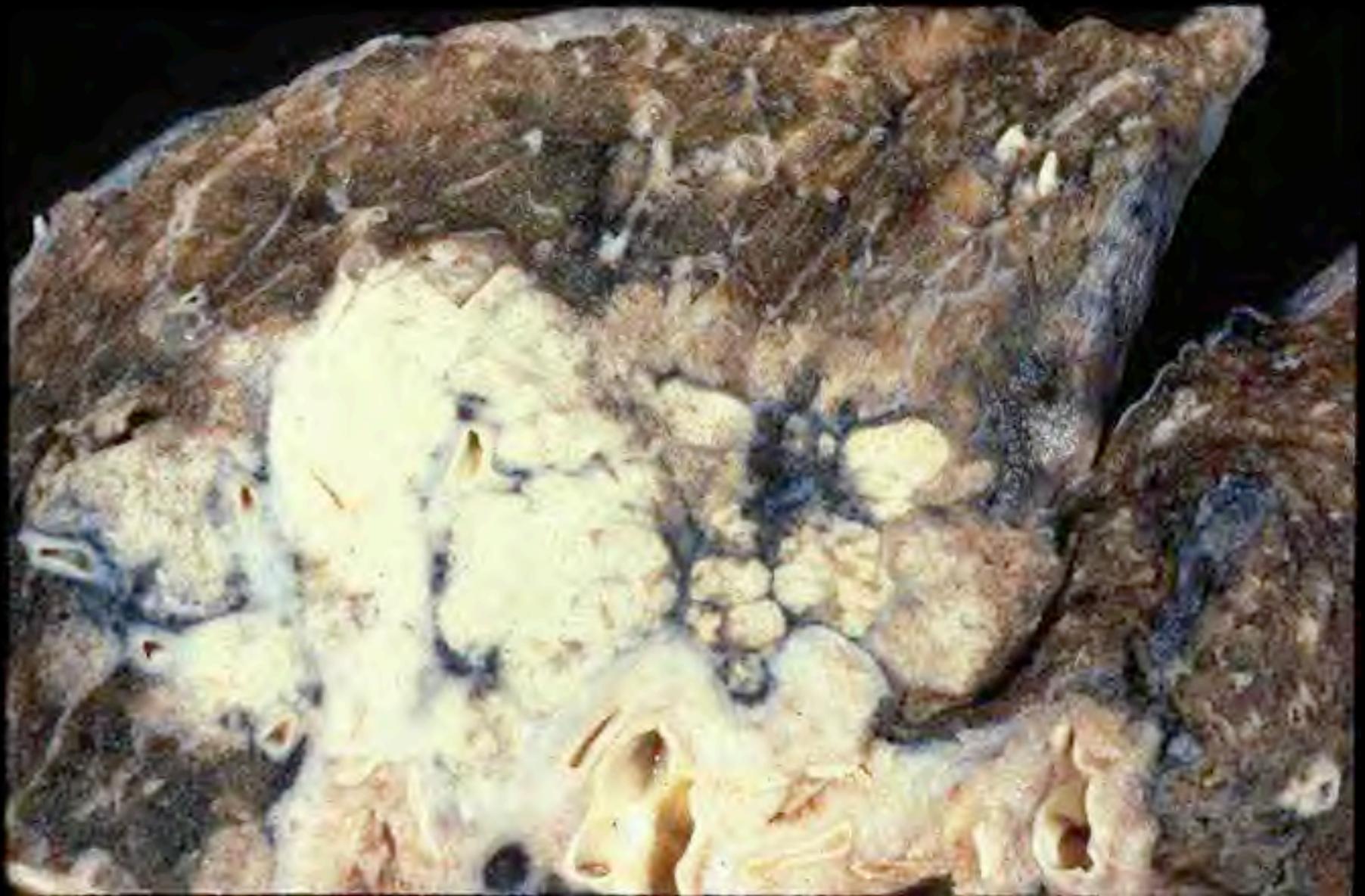
**74 Squamous cell carcinoma**

**75 Adenocarcinoma**

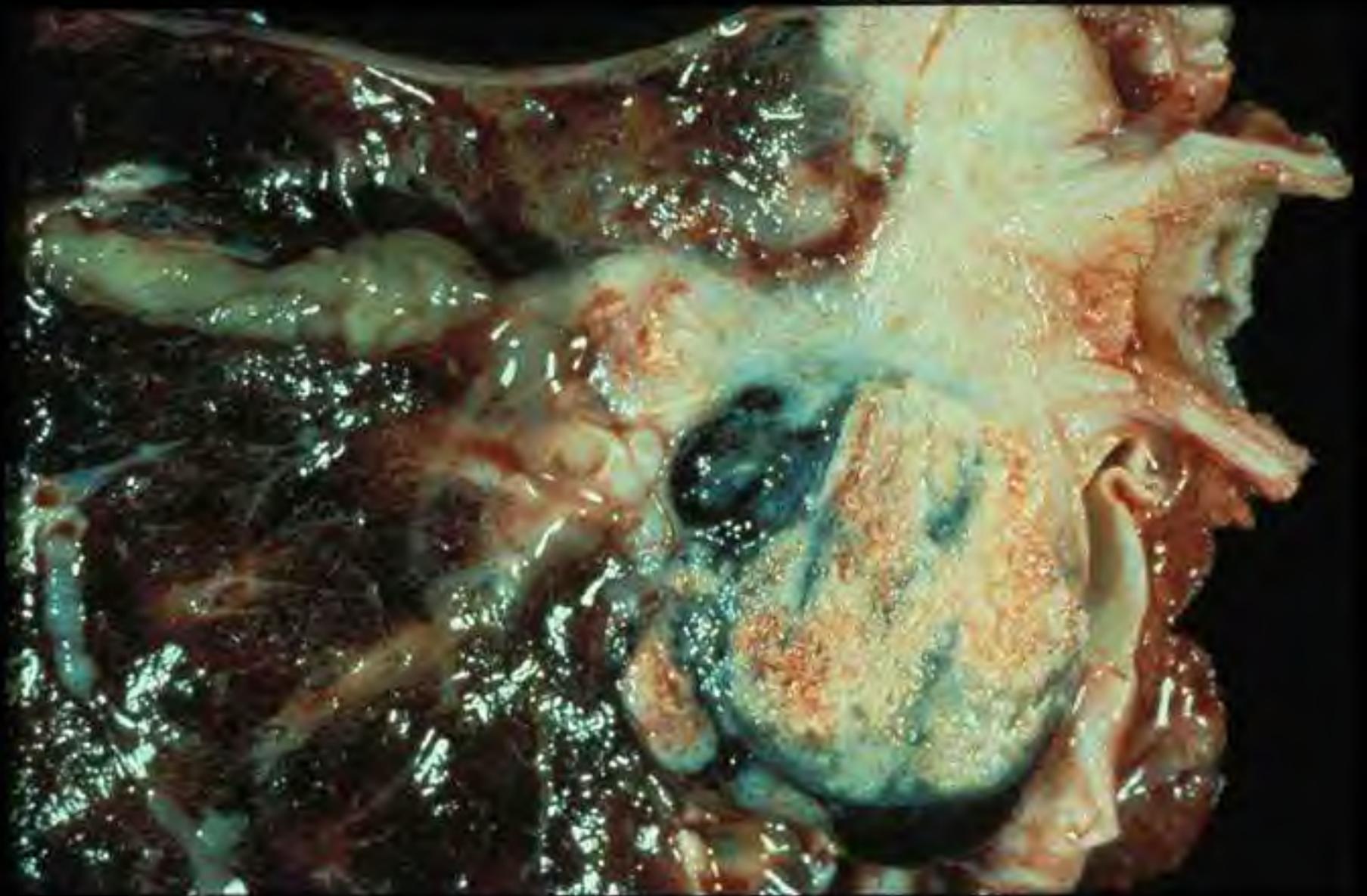
**28 Small cell carcinoma**

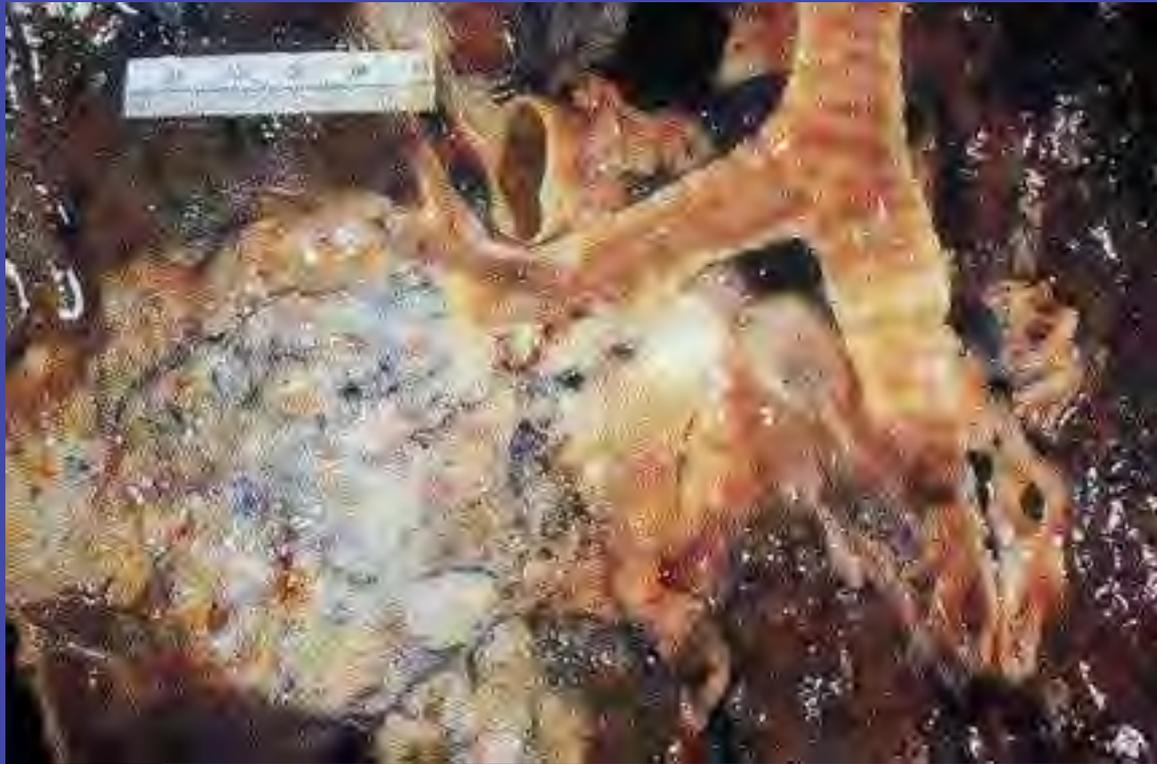
**73 Carcinoid tumor**

**CPC**





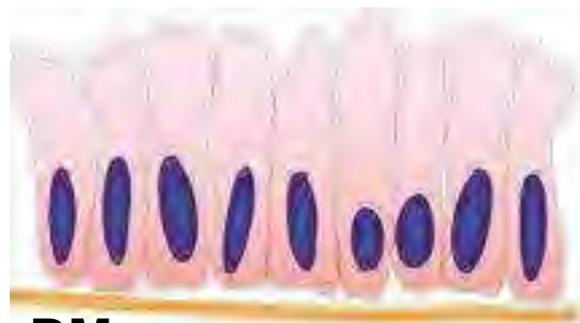




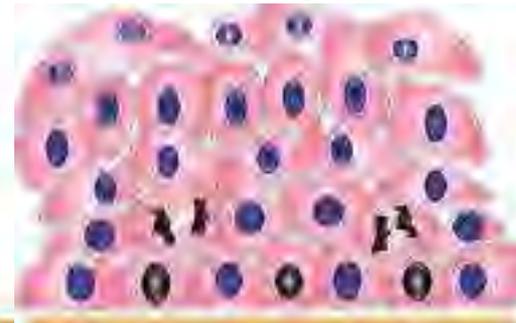
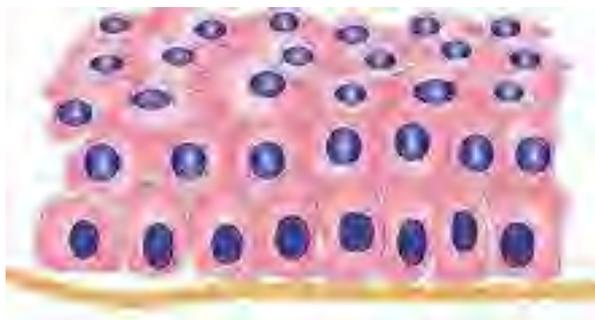
PD-TNCL

Source Undetermined

Respiratory Epithelium ← Squamous Metaplasia ← LG Dysplasia



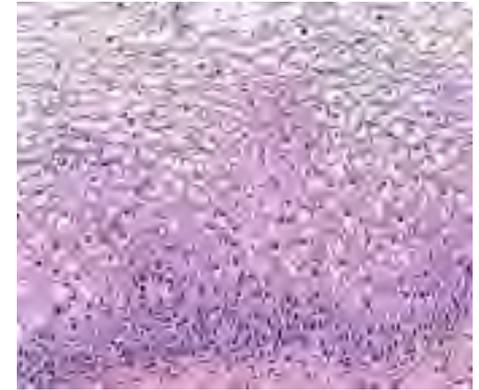
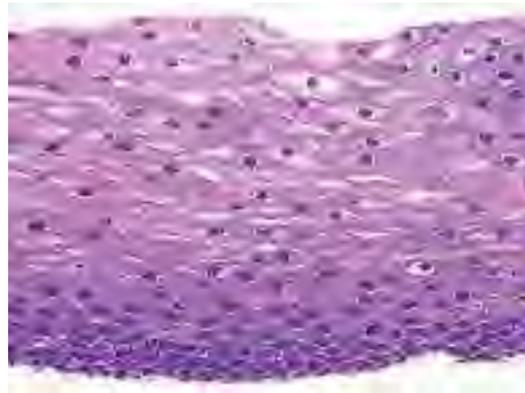
BM



Invasive Carcinoma ← Carcinoma in situ HG Dysplasia ← MG Dysplasia

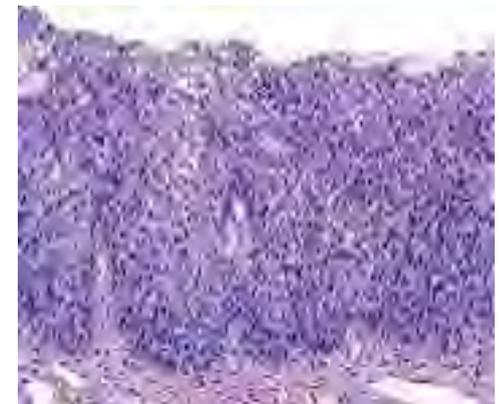


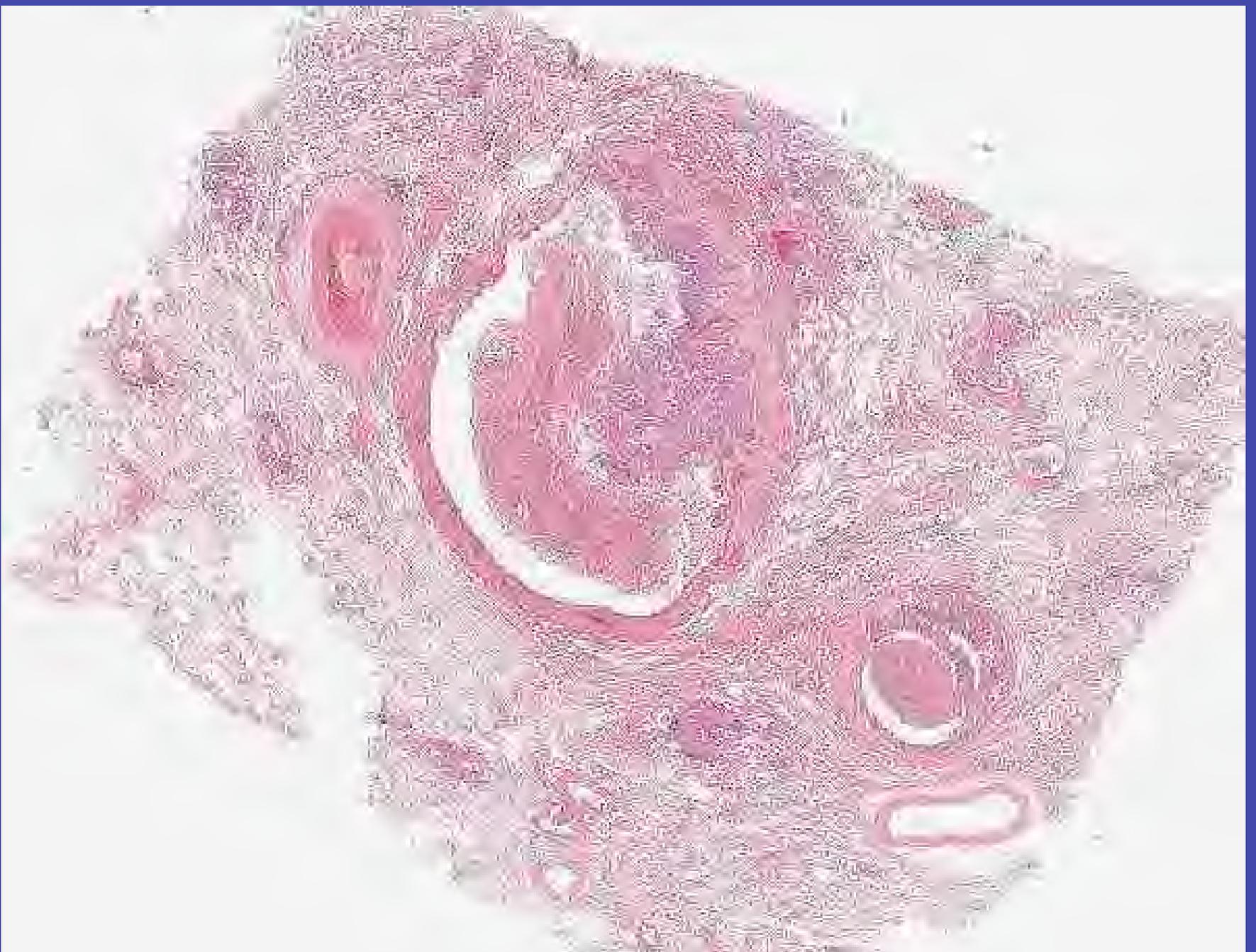
Respiratory Epithelium → Squamous Metaplasia <sup>?</sup> ←→ LG Dysplasia

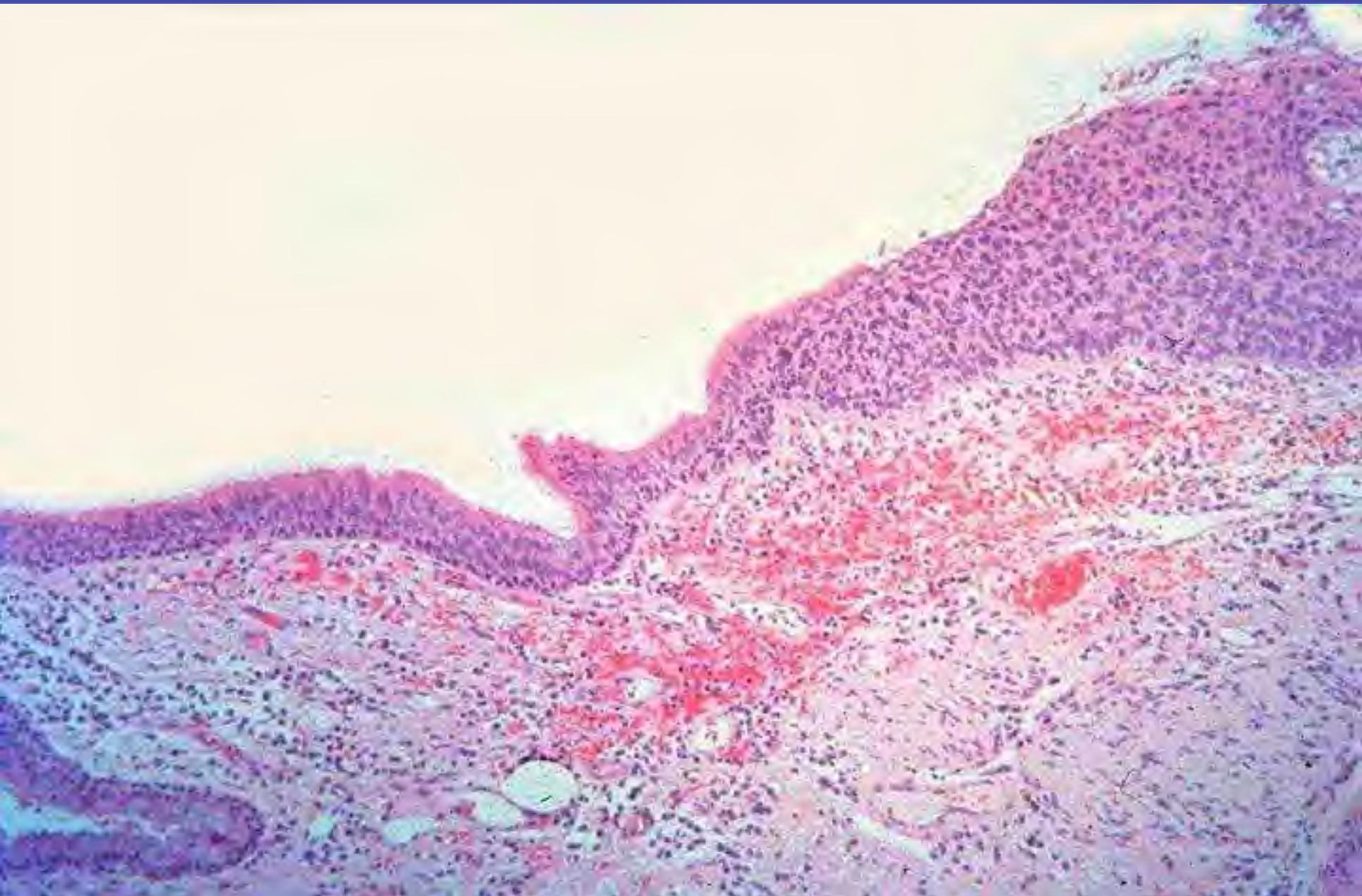


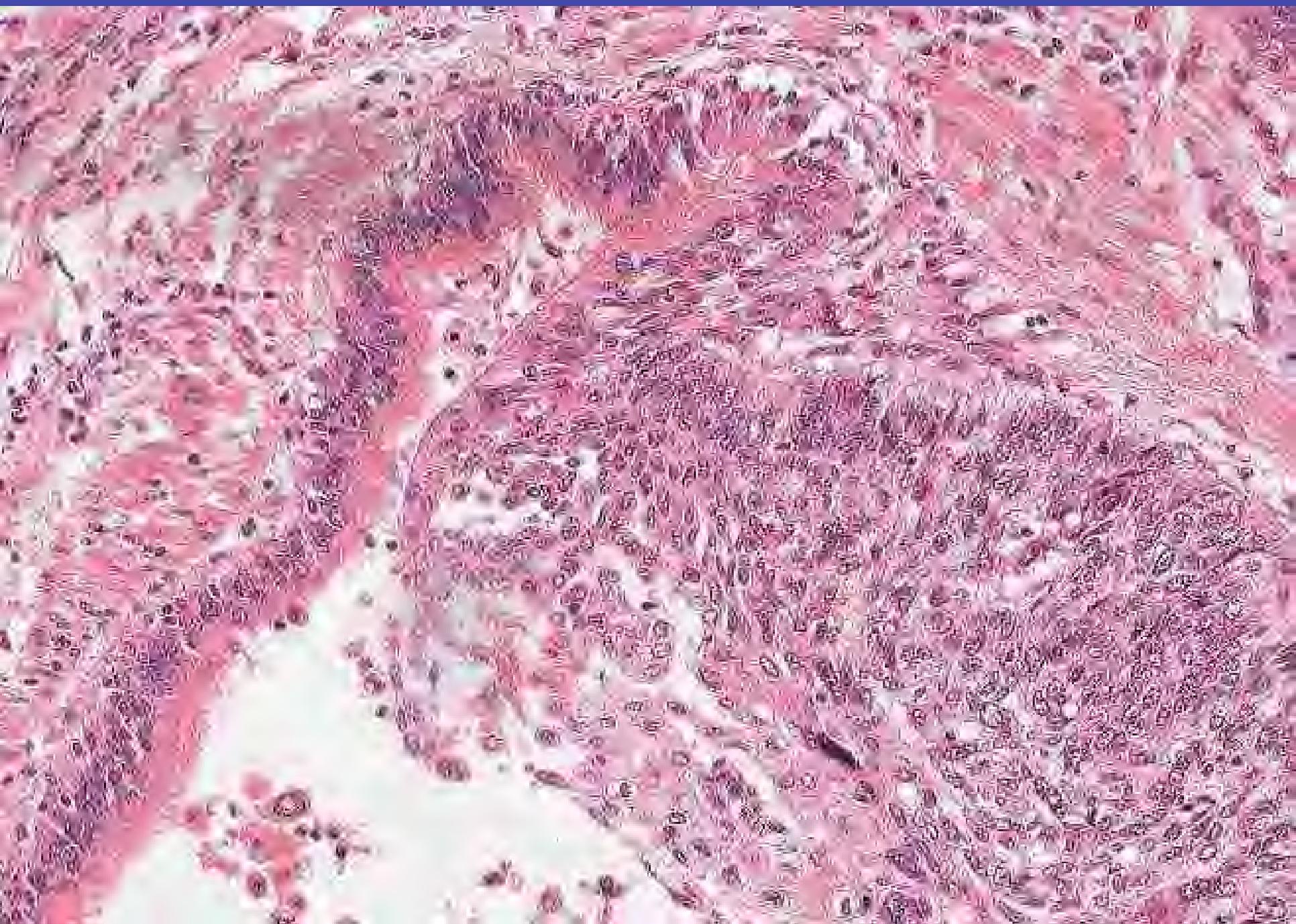
Invasive Carcinoma ← HG Dysplasia (Carcinoma in situ)

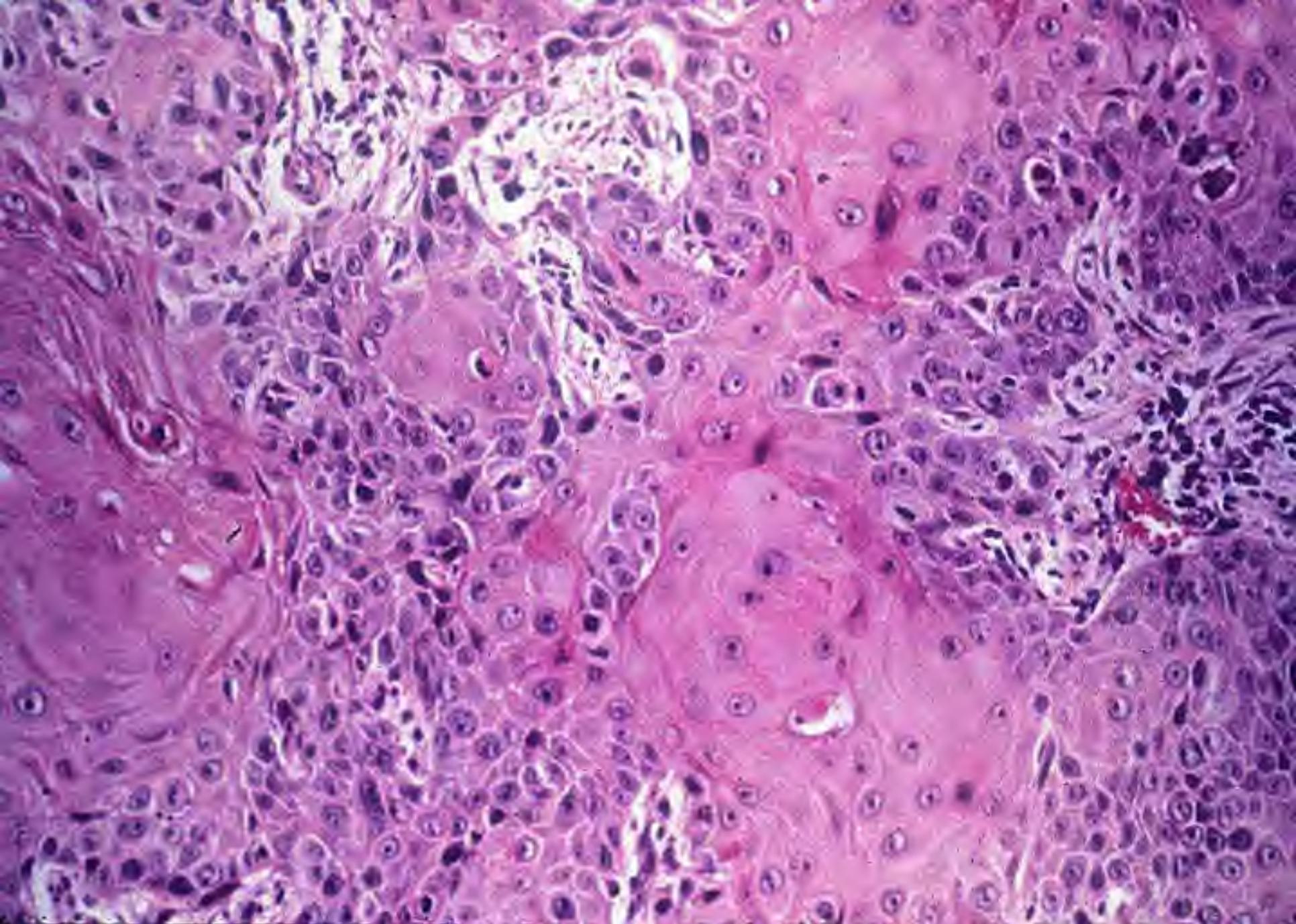
MG Dysplasia ←

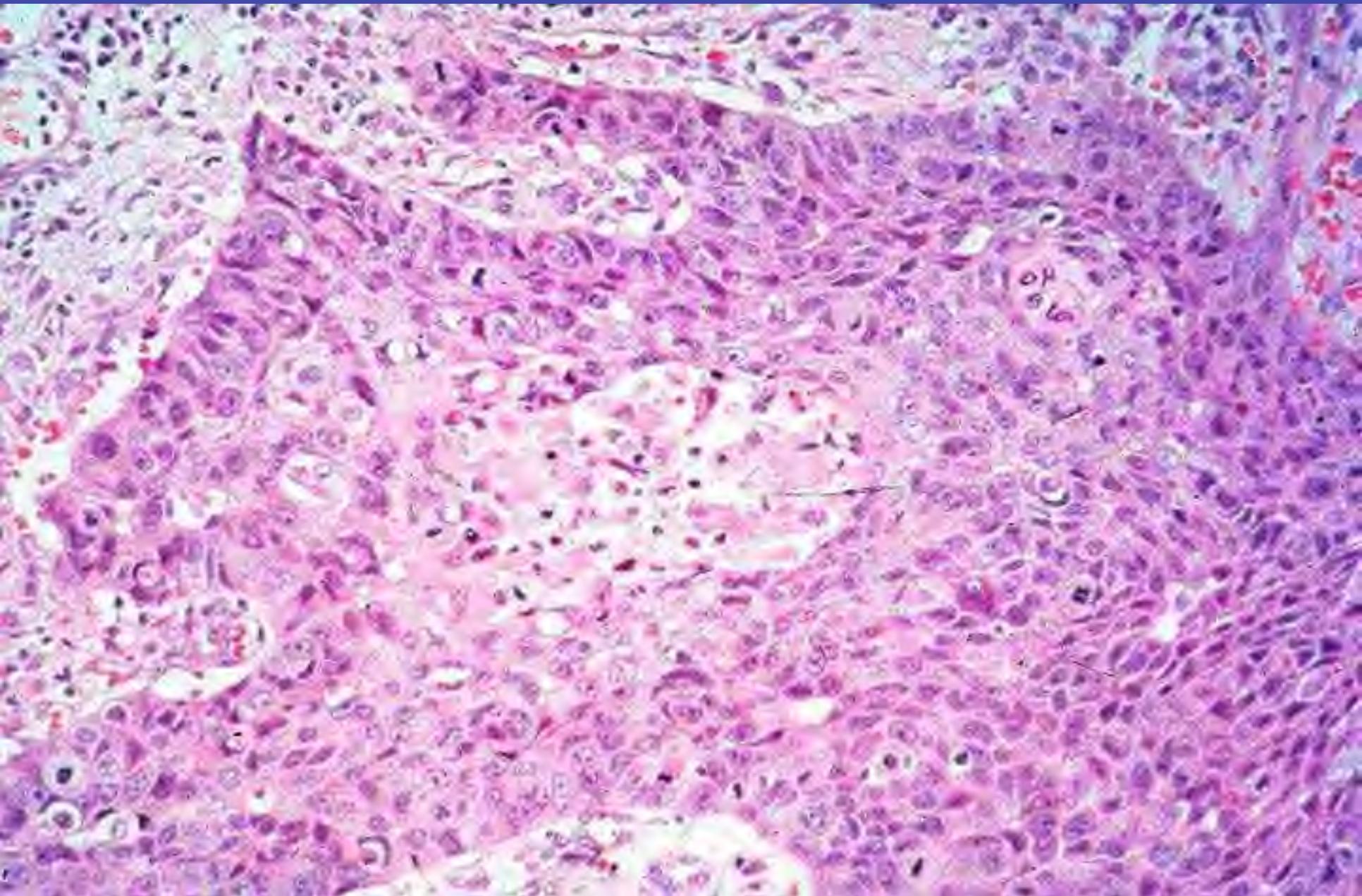


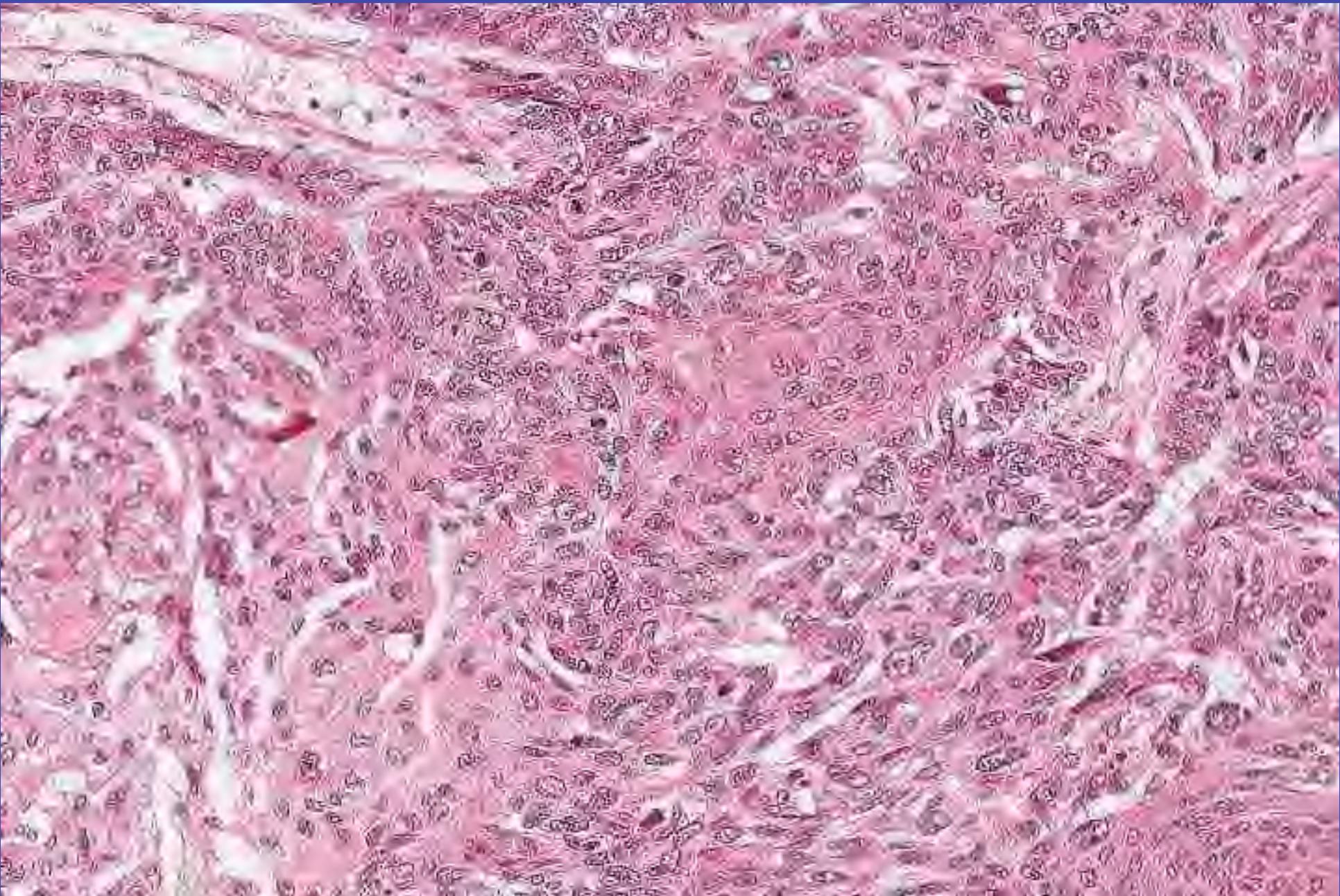


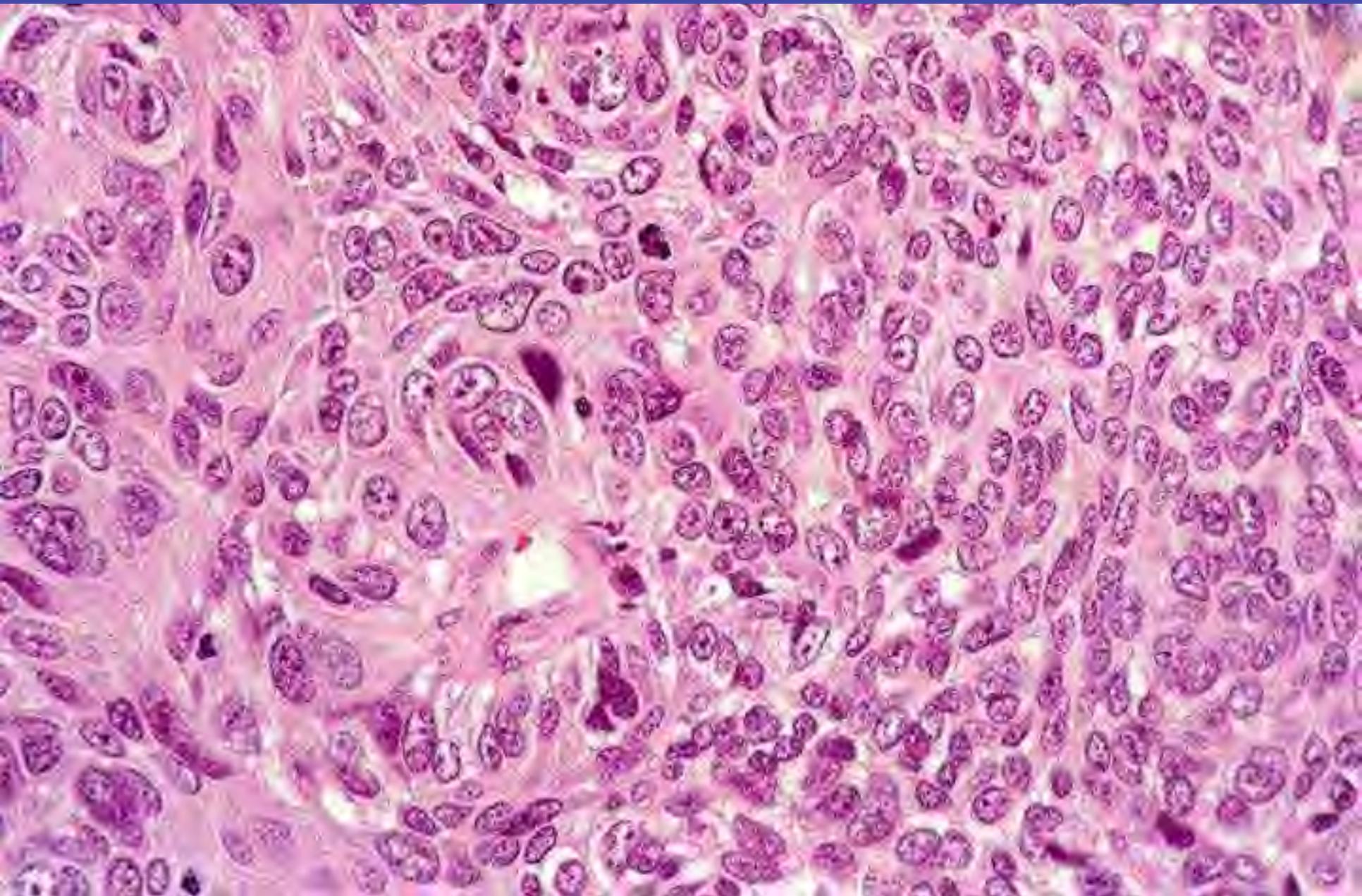


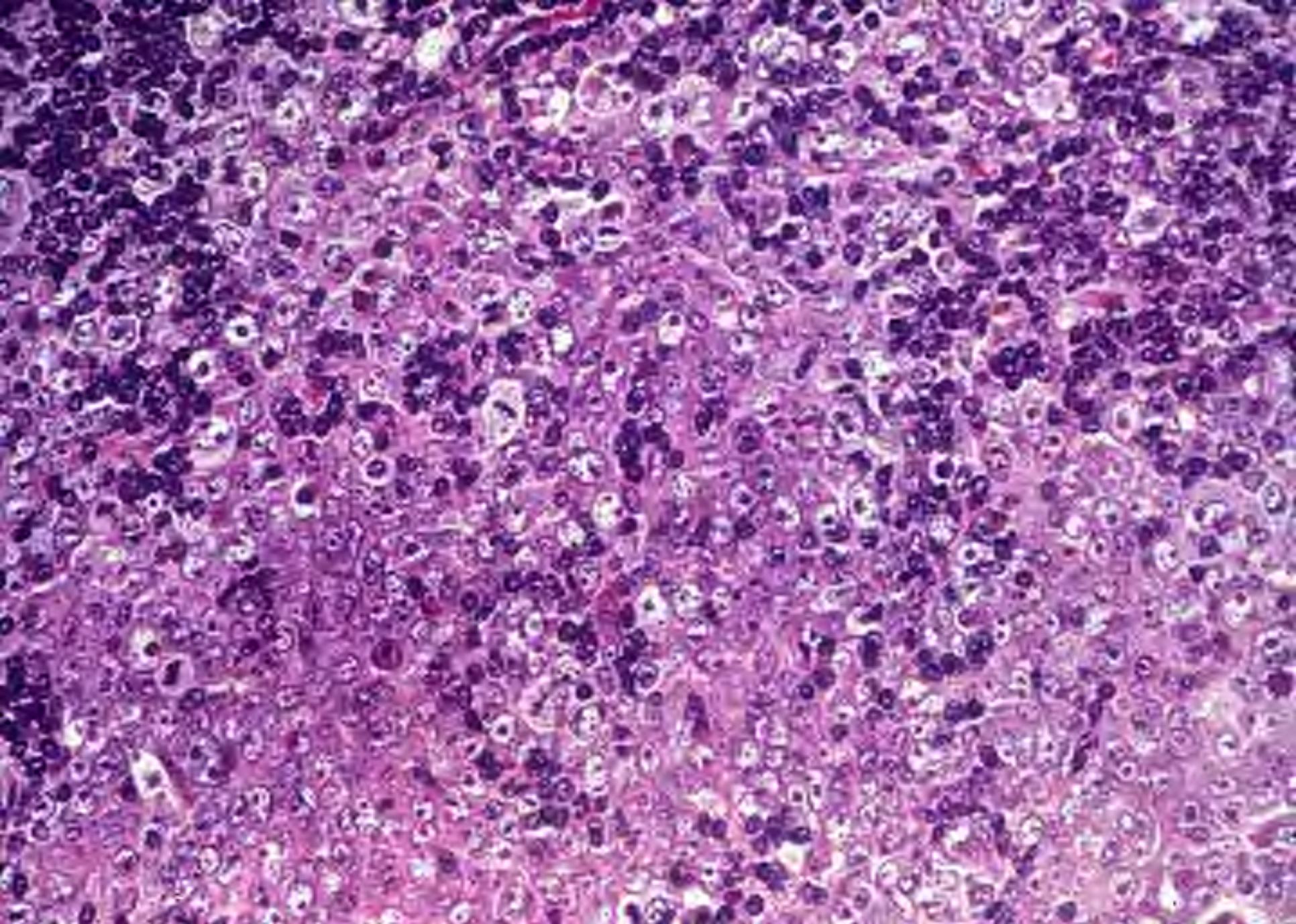


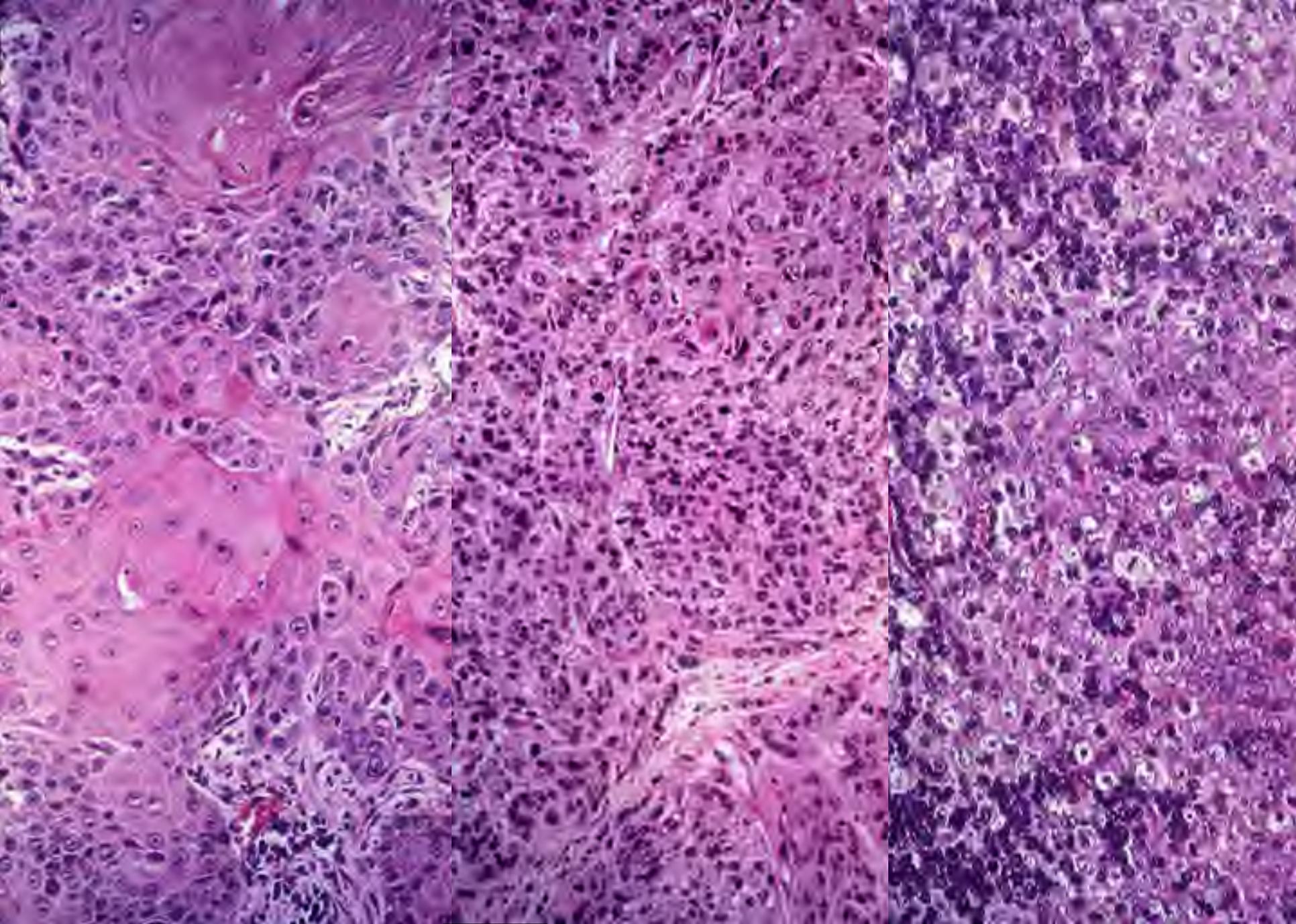












## **M-2 Respiratory Laboratory - 3**

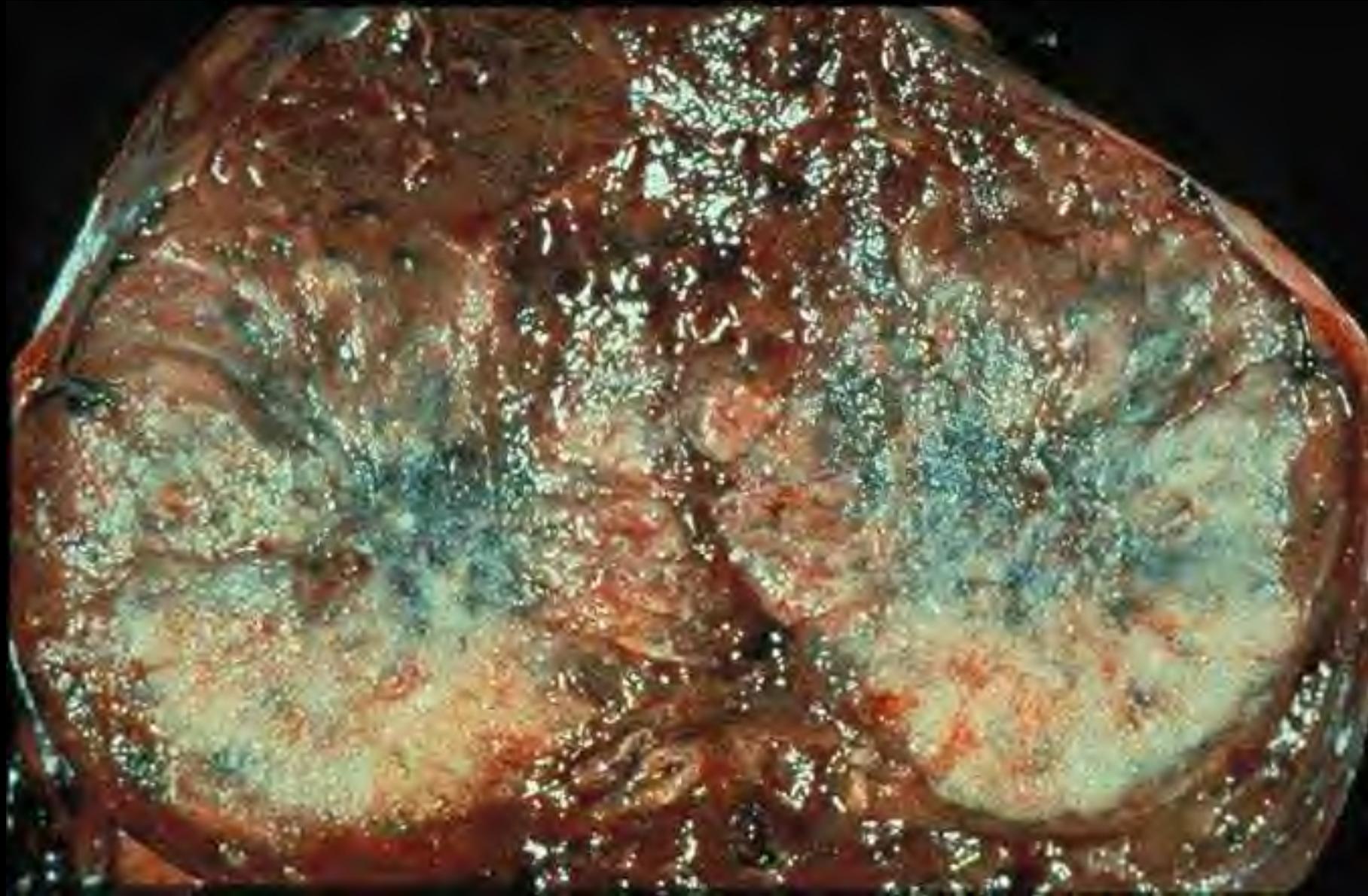
**74 Squamous cell carcinoma**

**75 Adenocarcinoma**

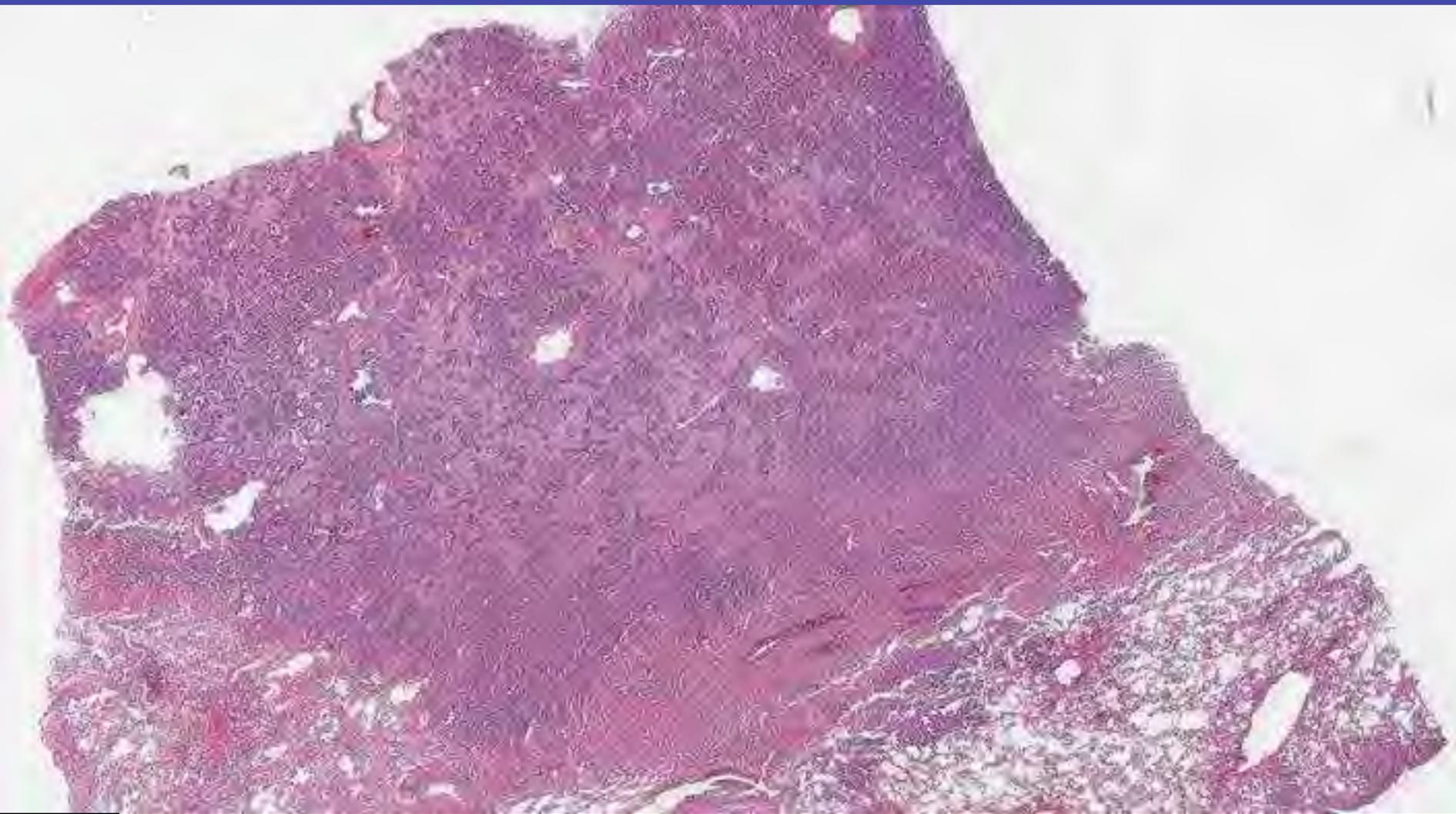
**28 Small cell carcinoma**

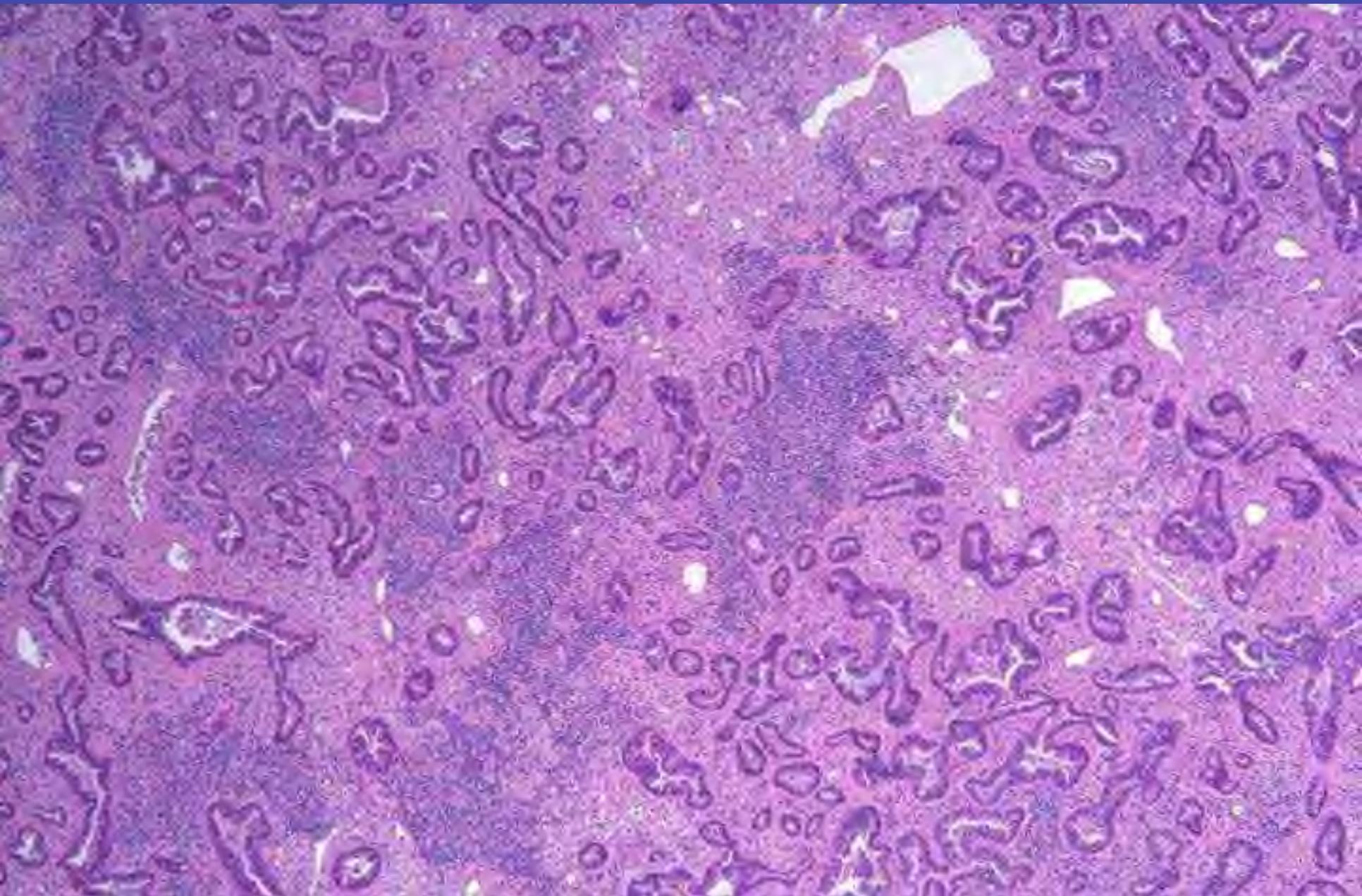
**73 Carcinoid tumor**

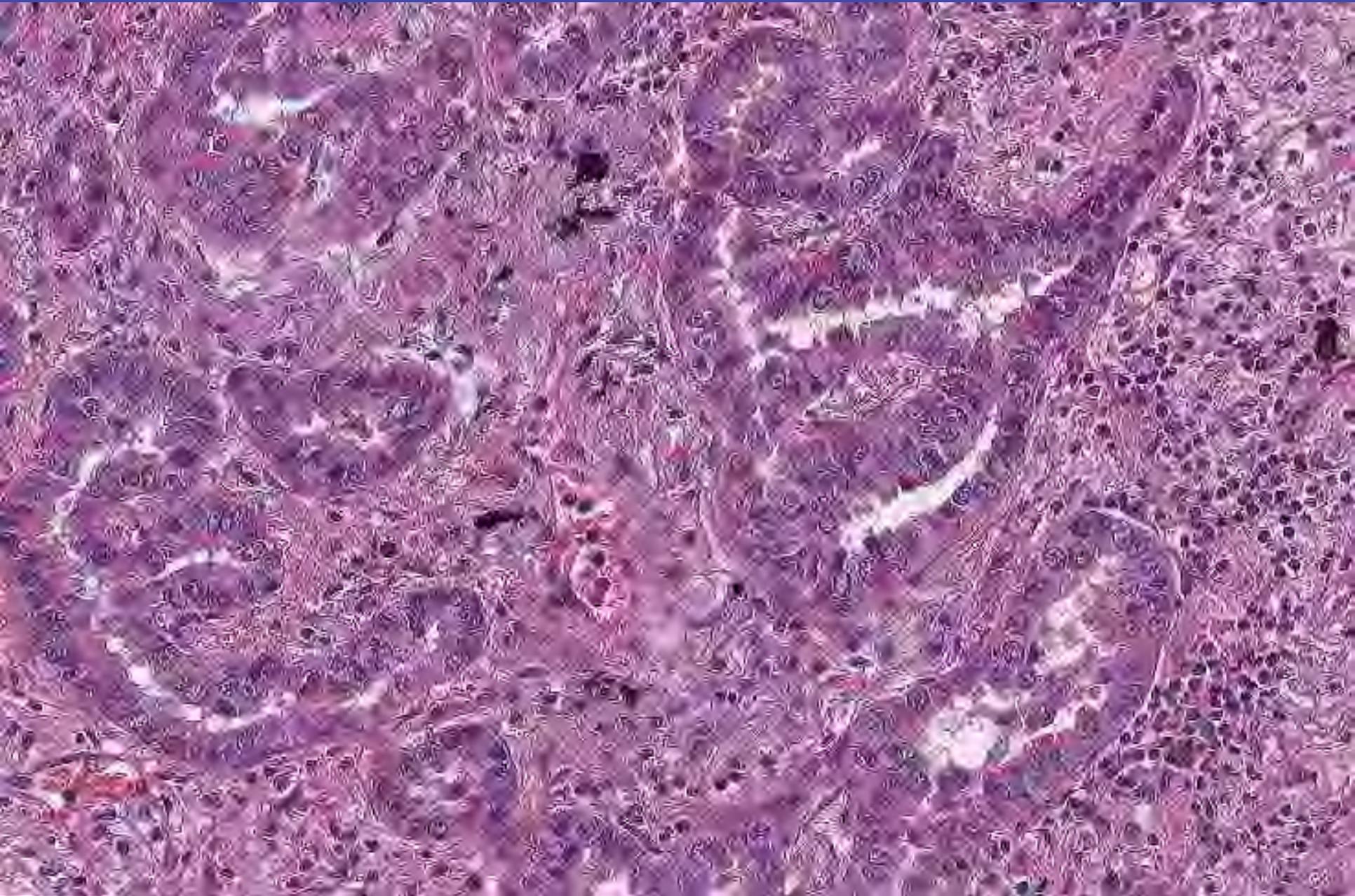
**CPC**

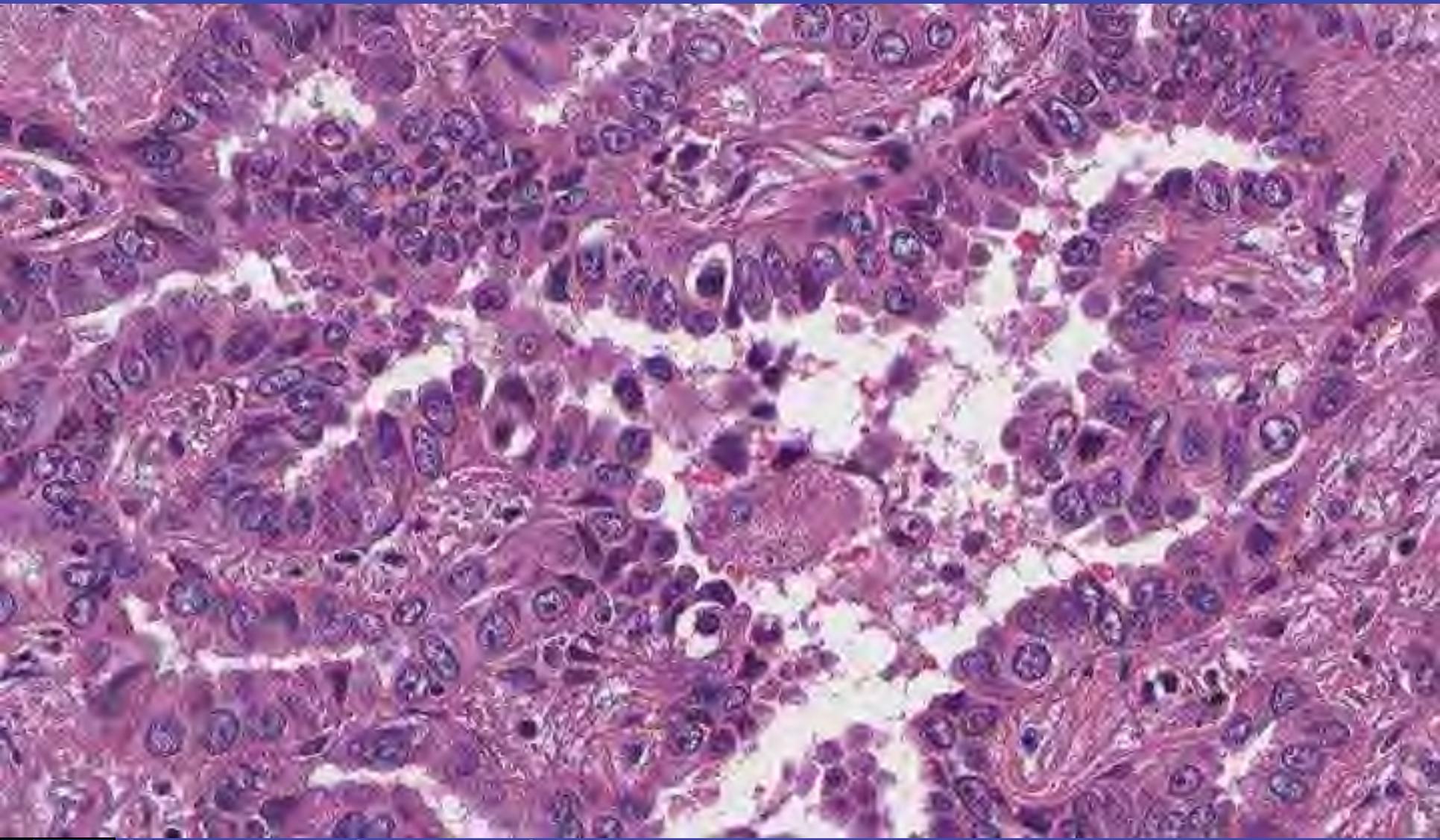


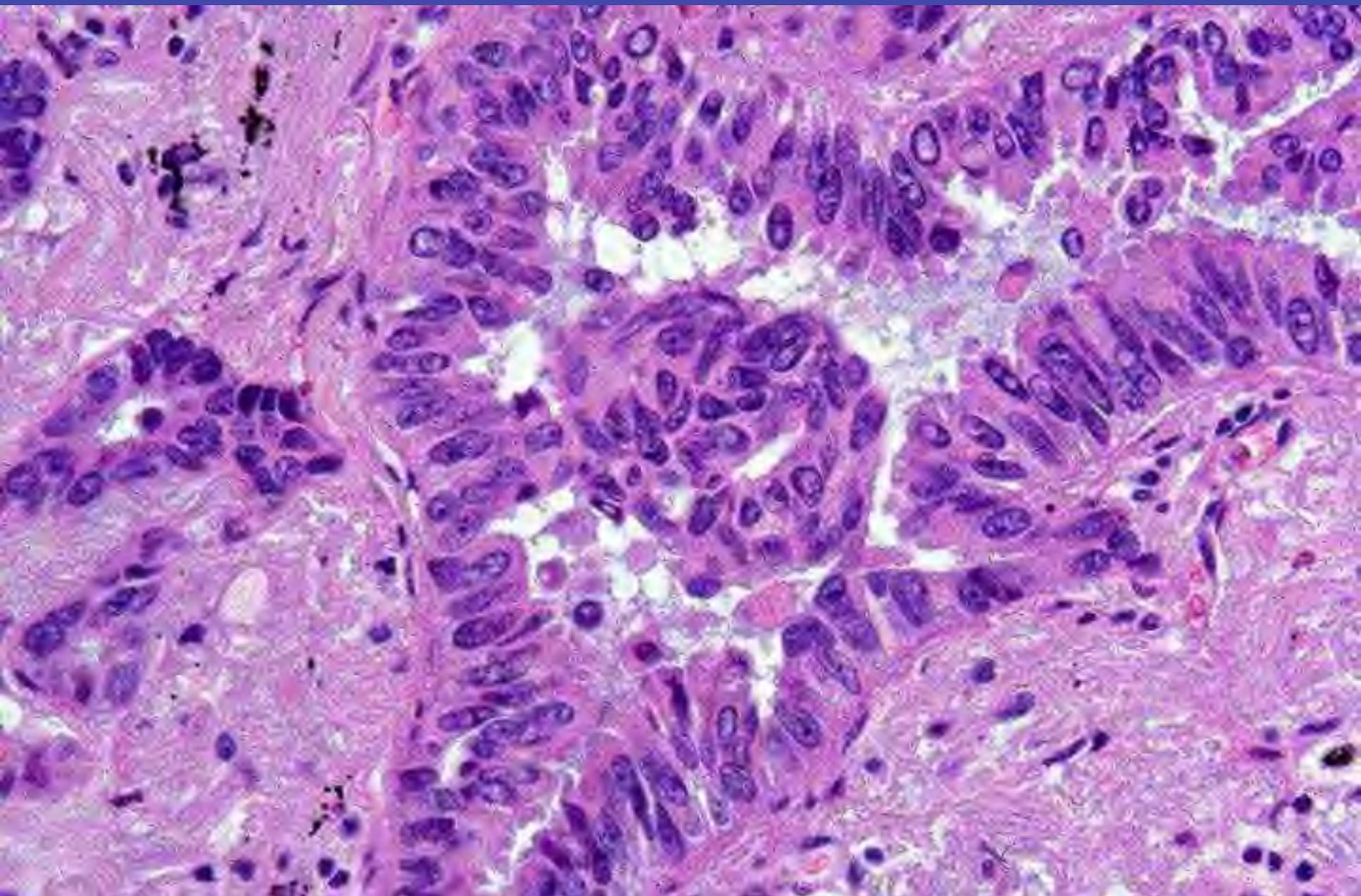


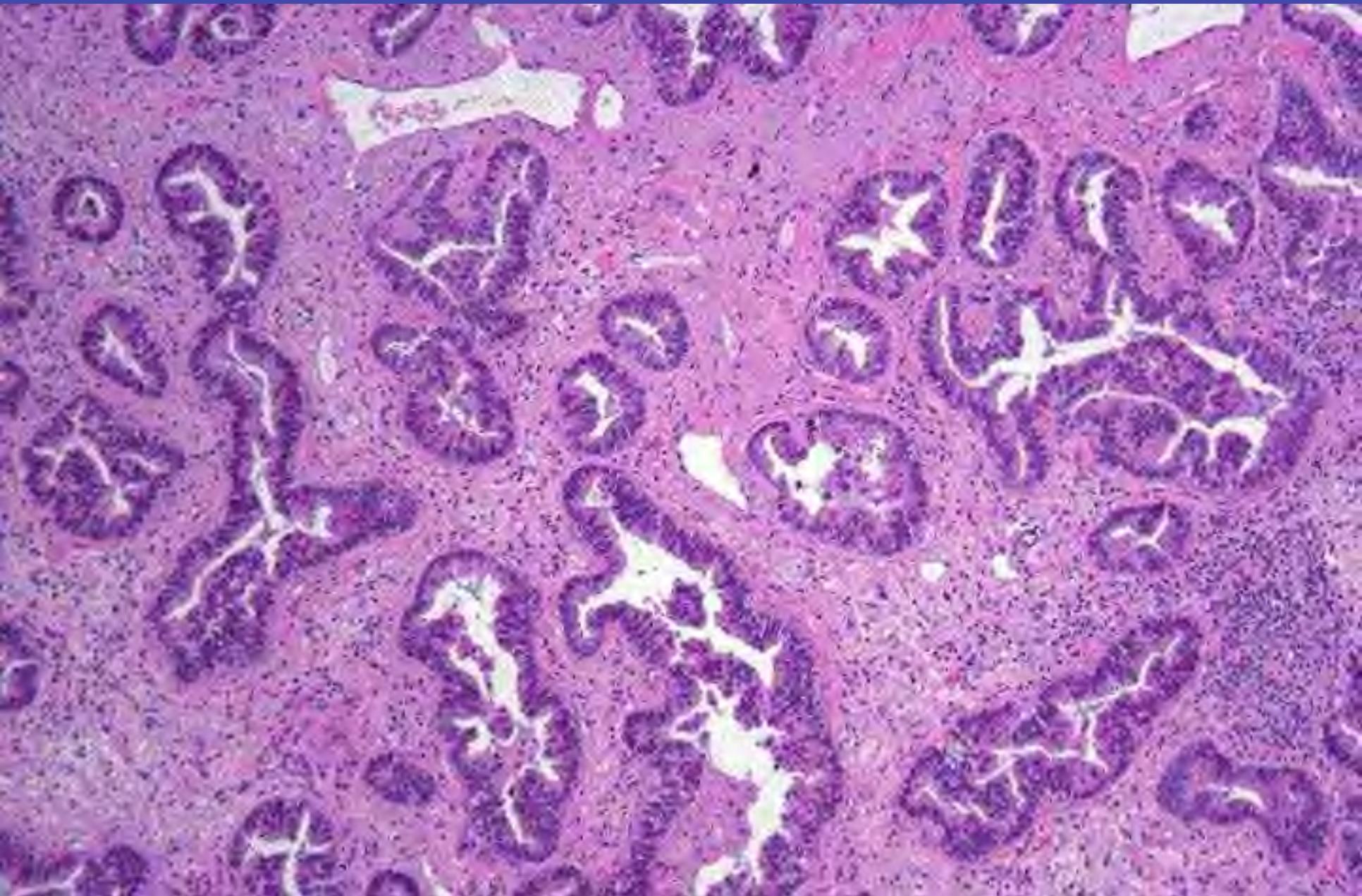


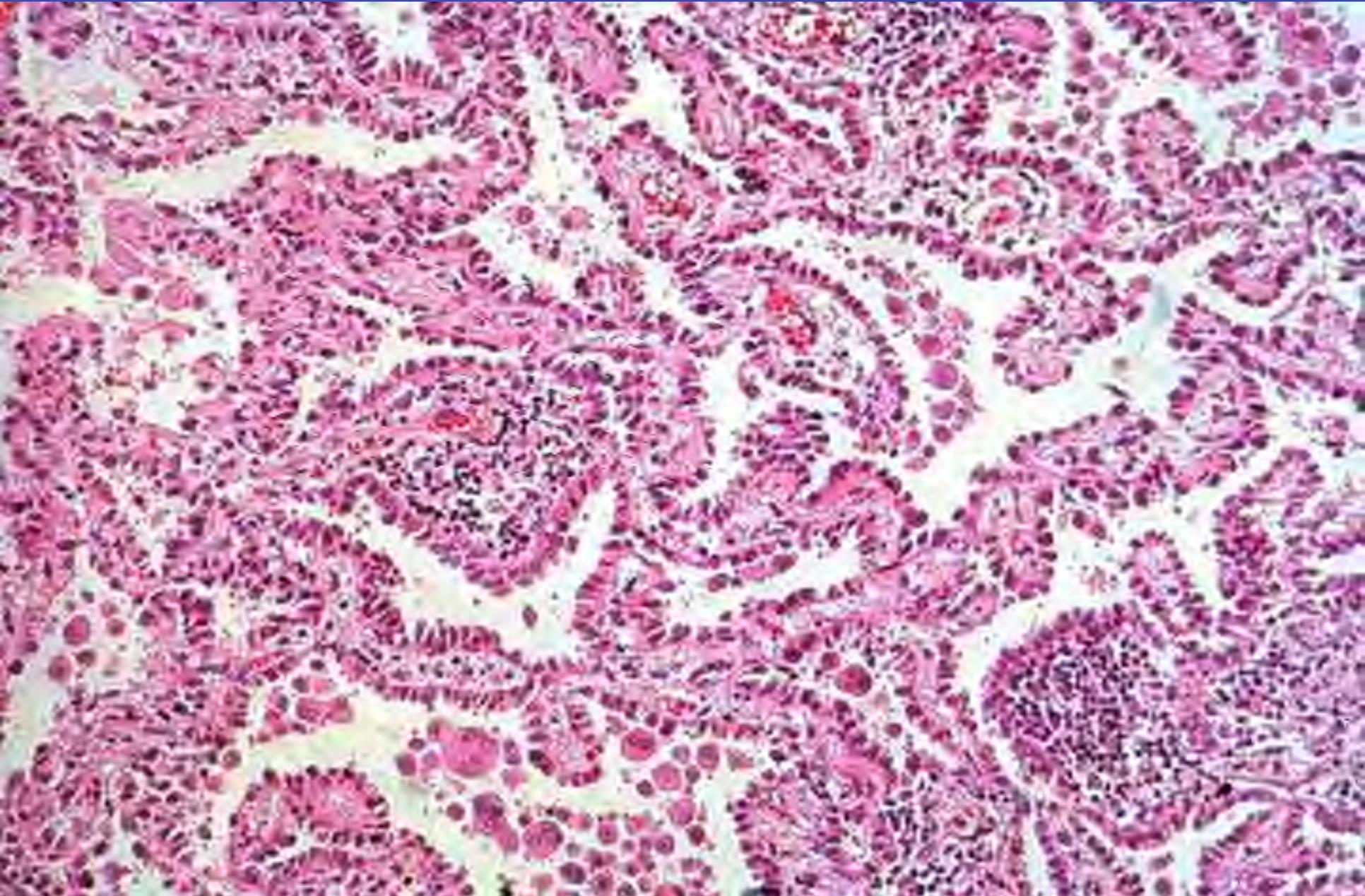


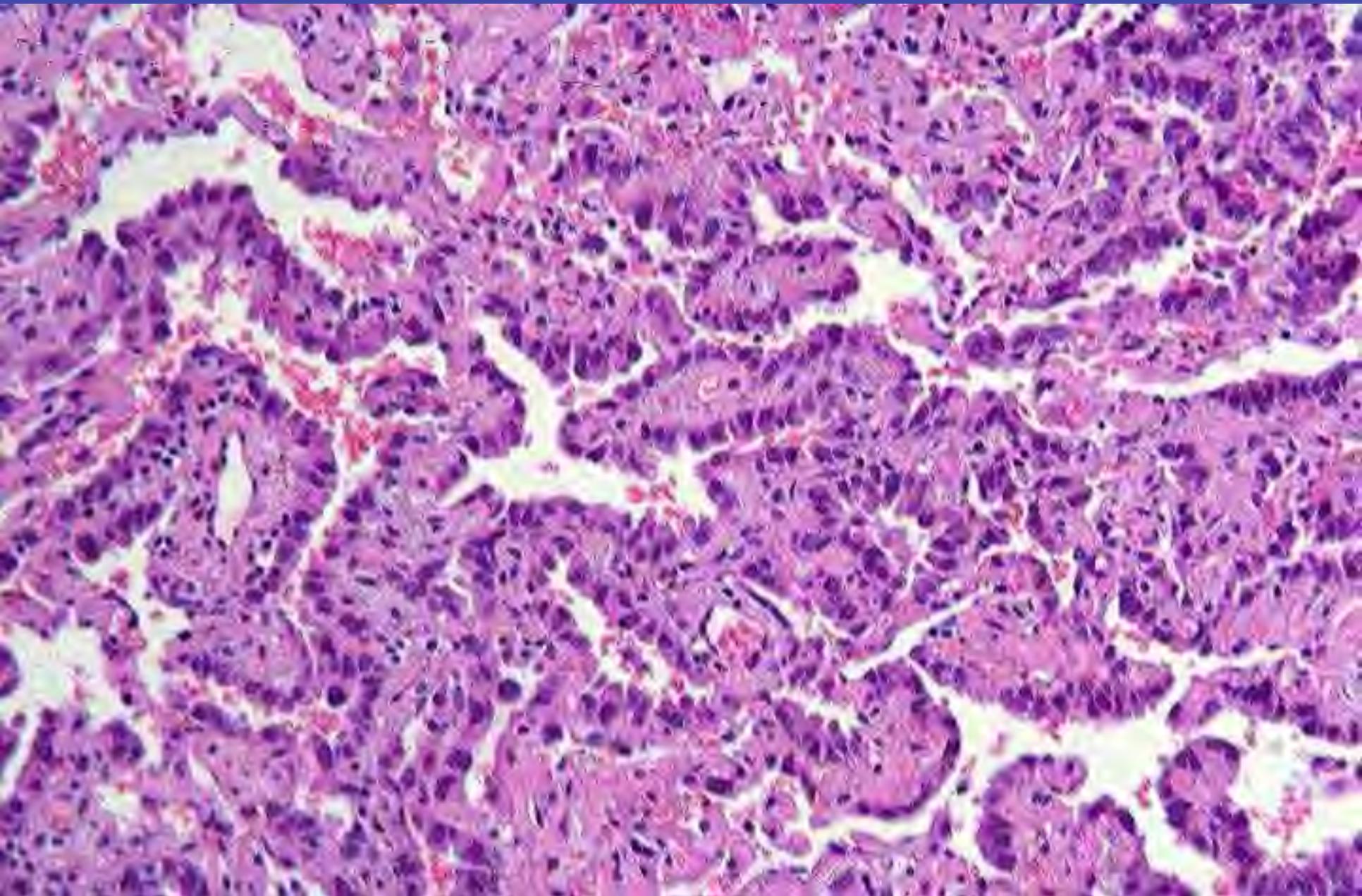


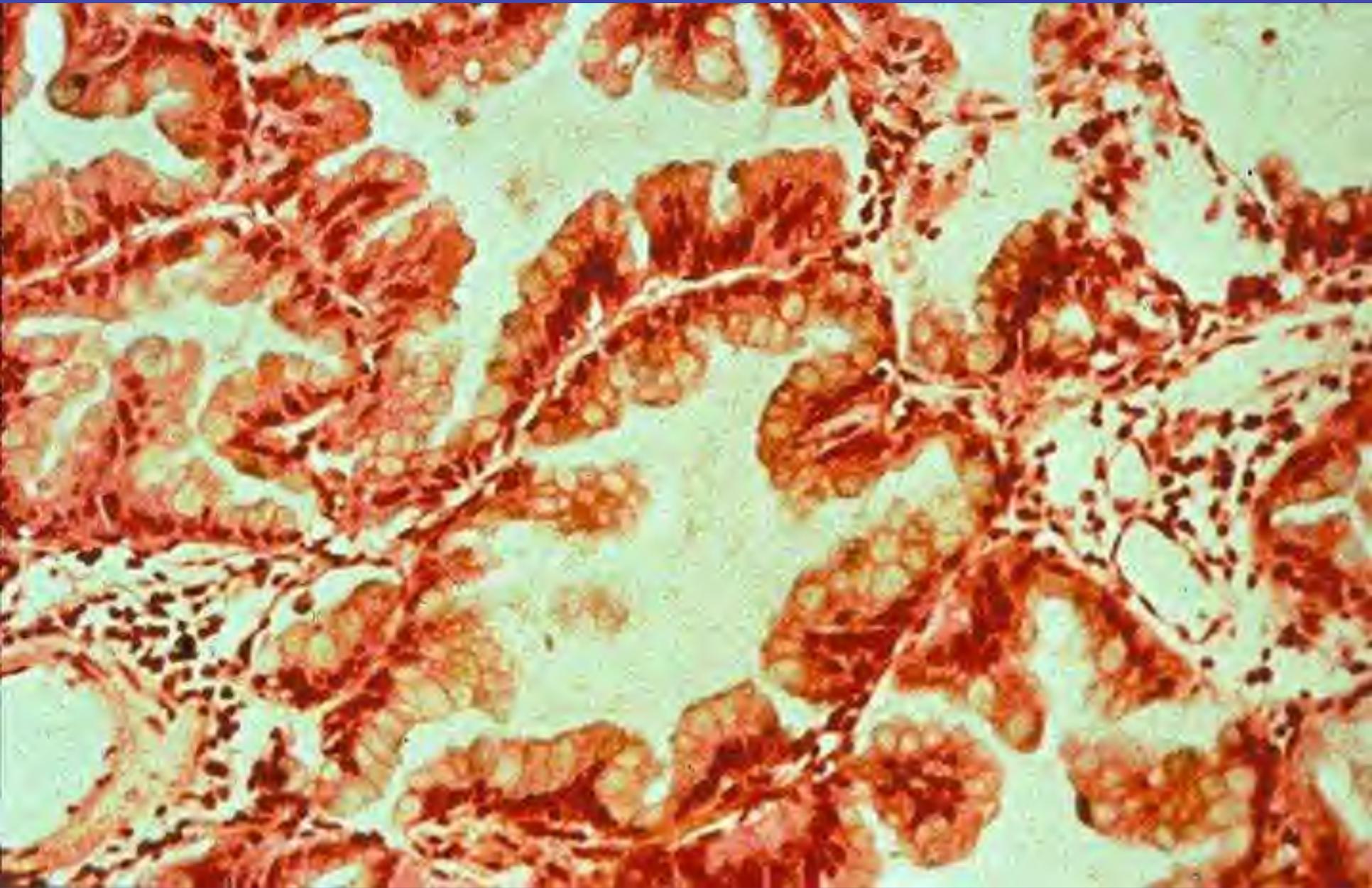


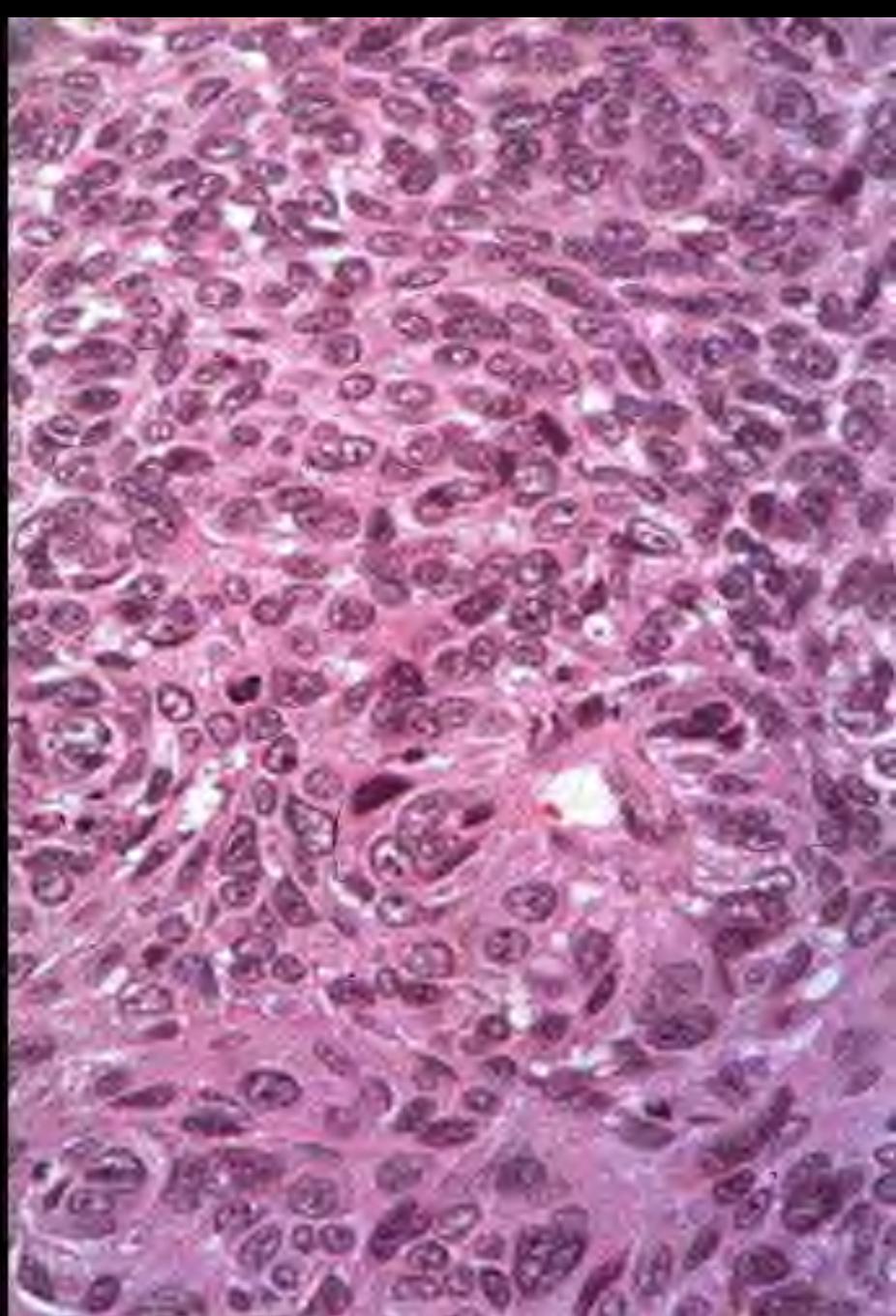
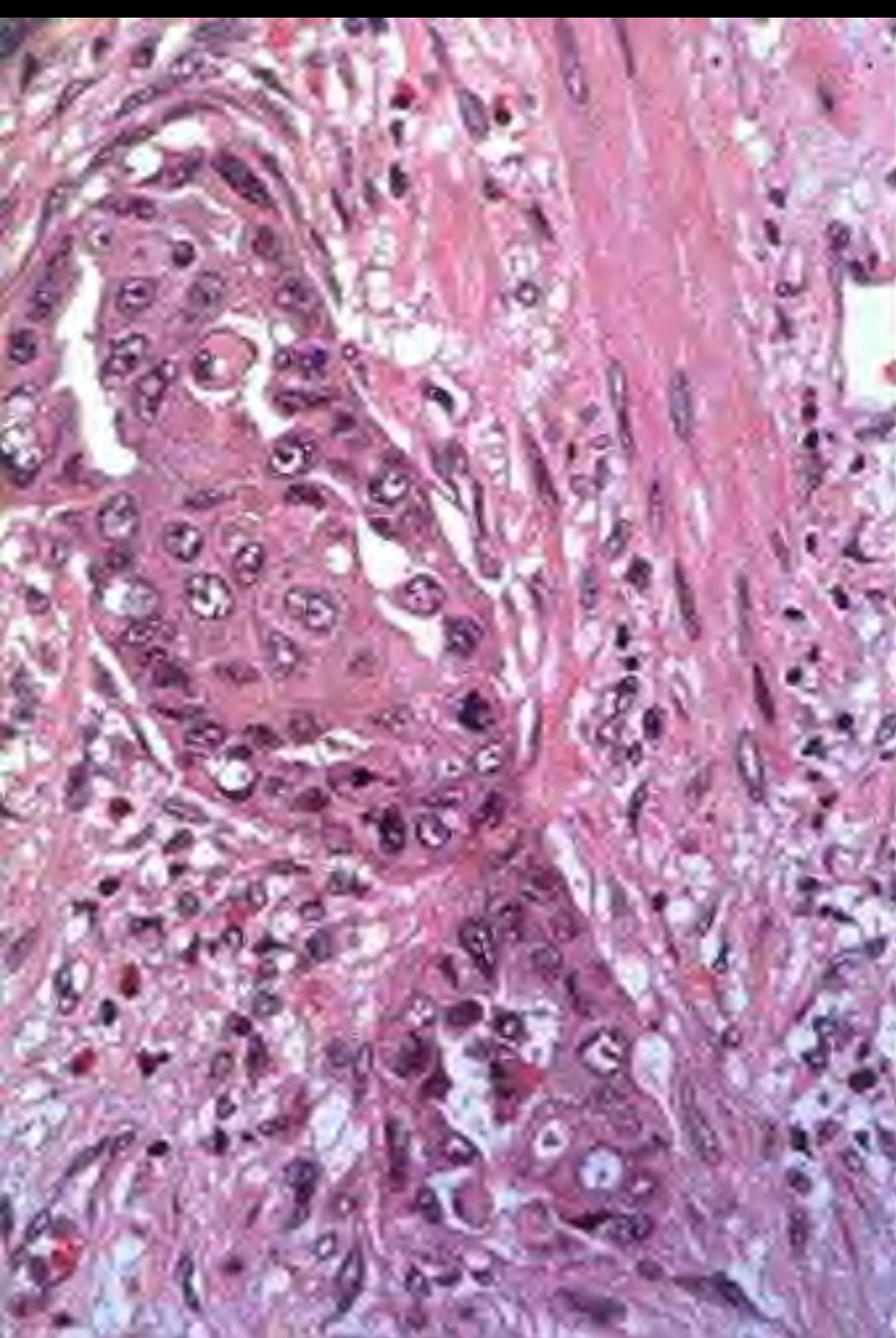












## **M-2 Respiratory Laboratory - 3**

**74 Squamous cell carcinoma**

**75 Adenocarcinoma**

**28 Small cell carcinoma**

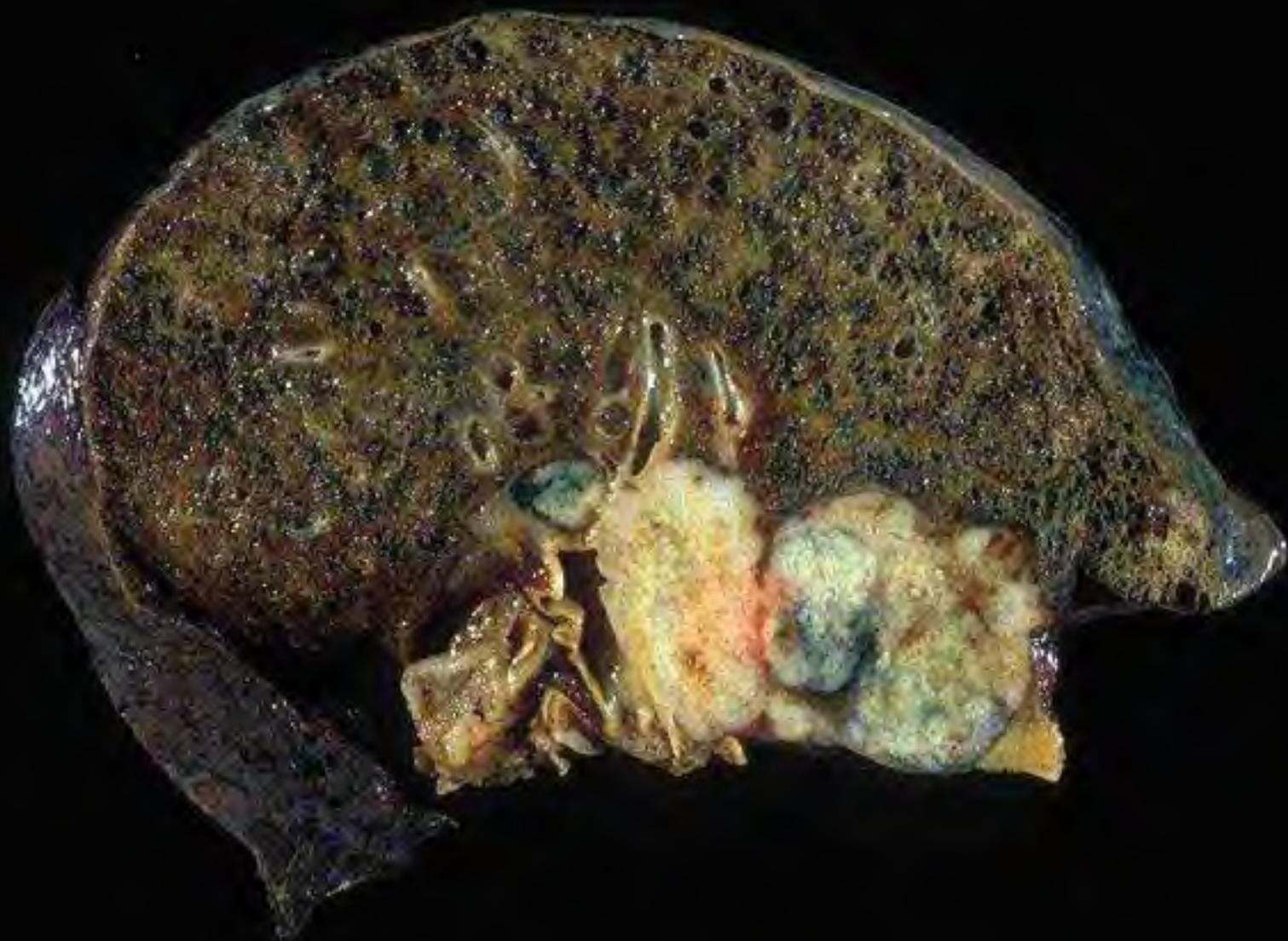
**73 Carcinoid tumor**

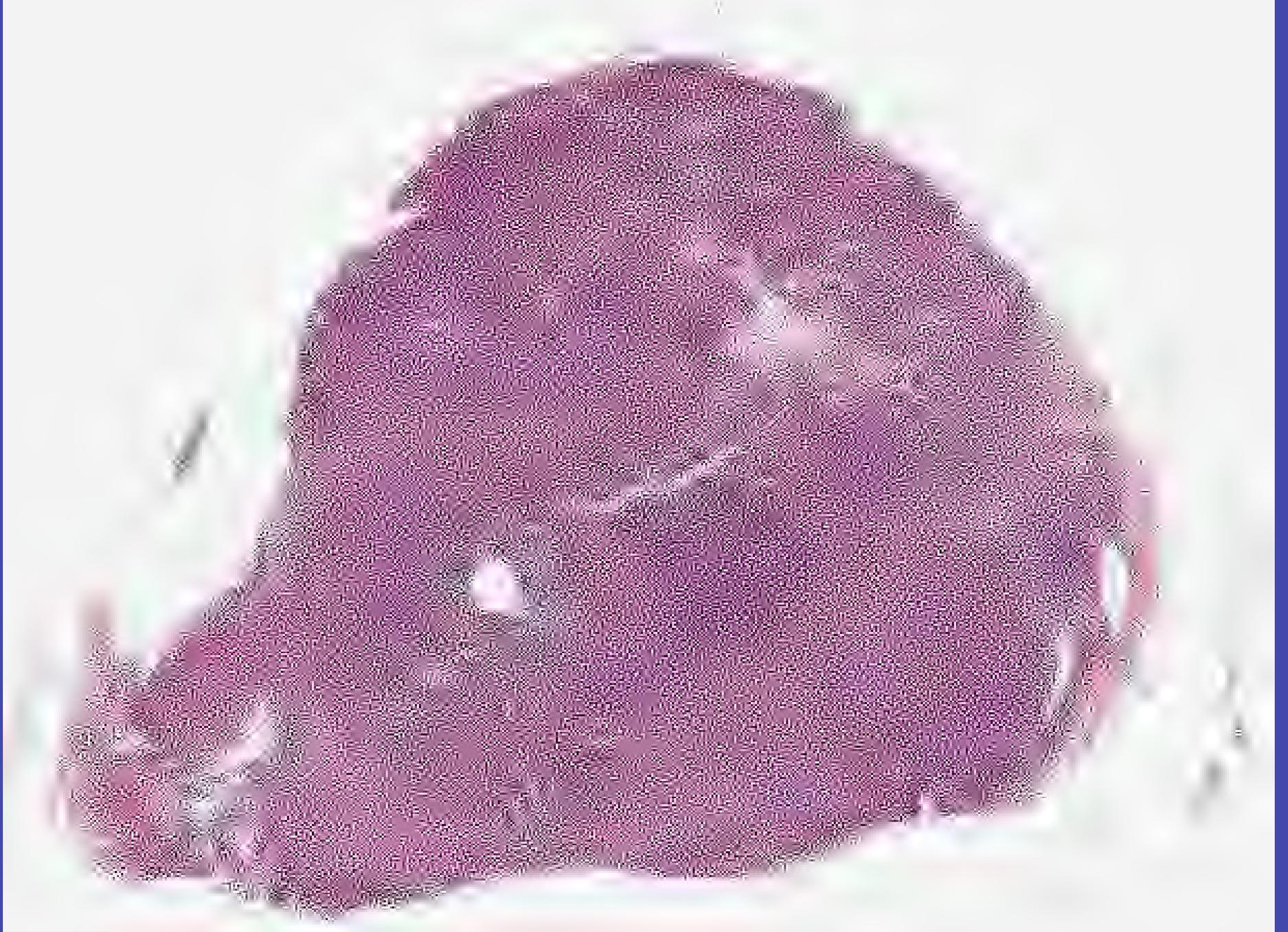
**CPC**



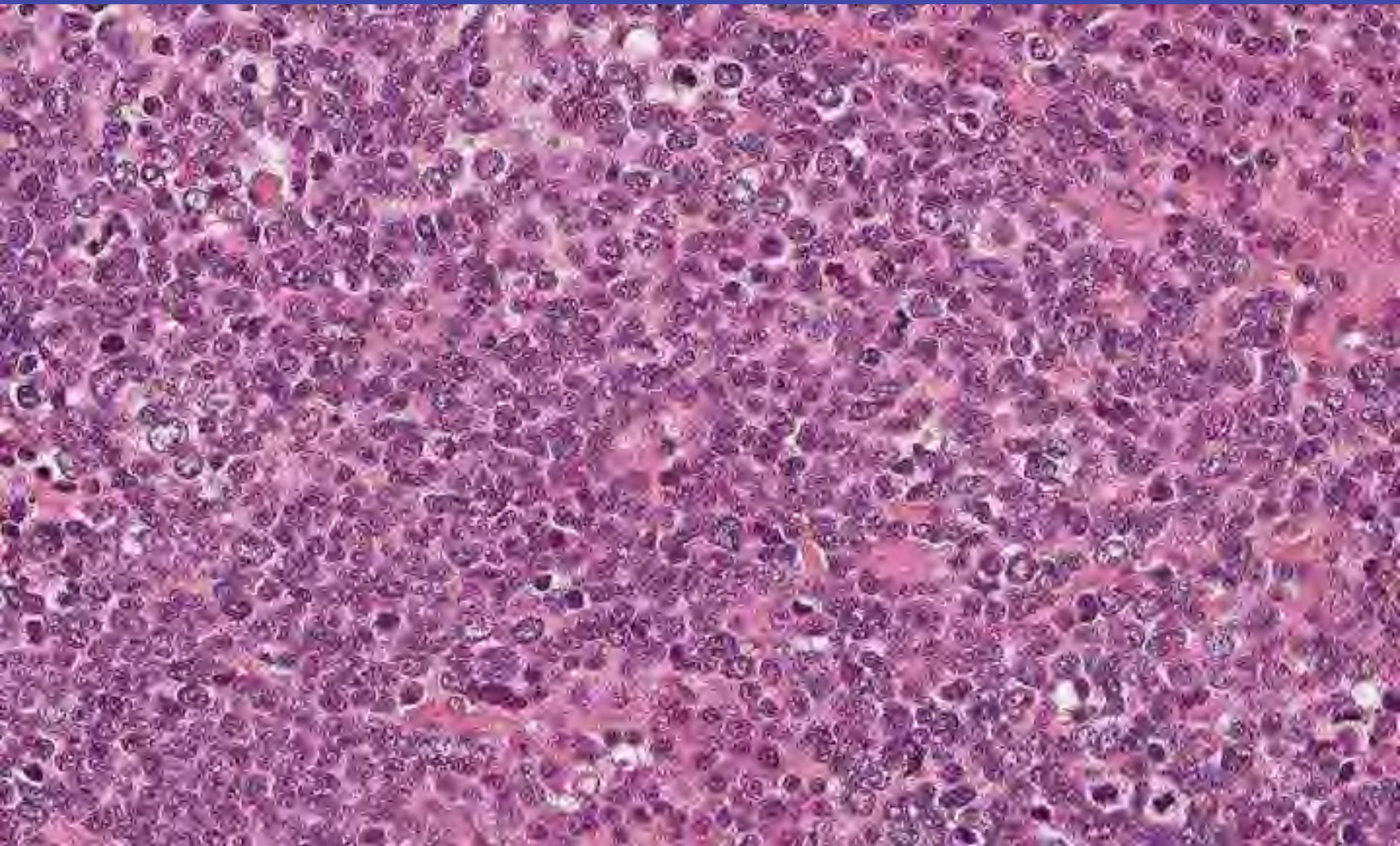


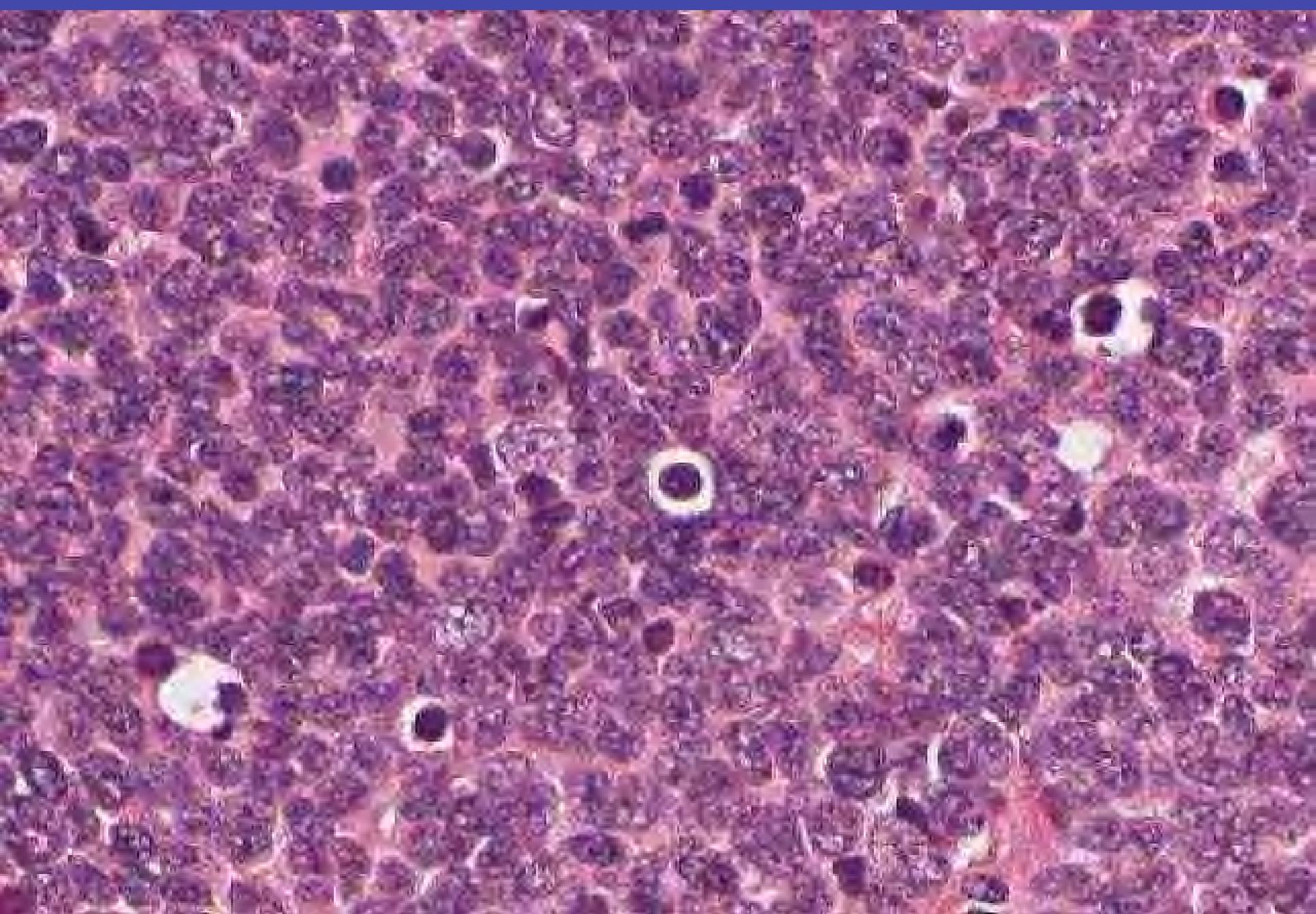


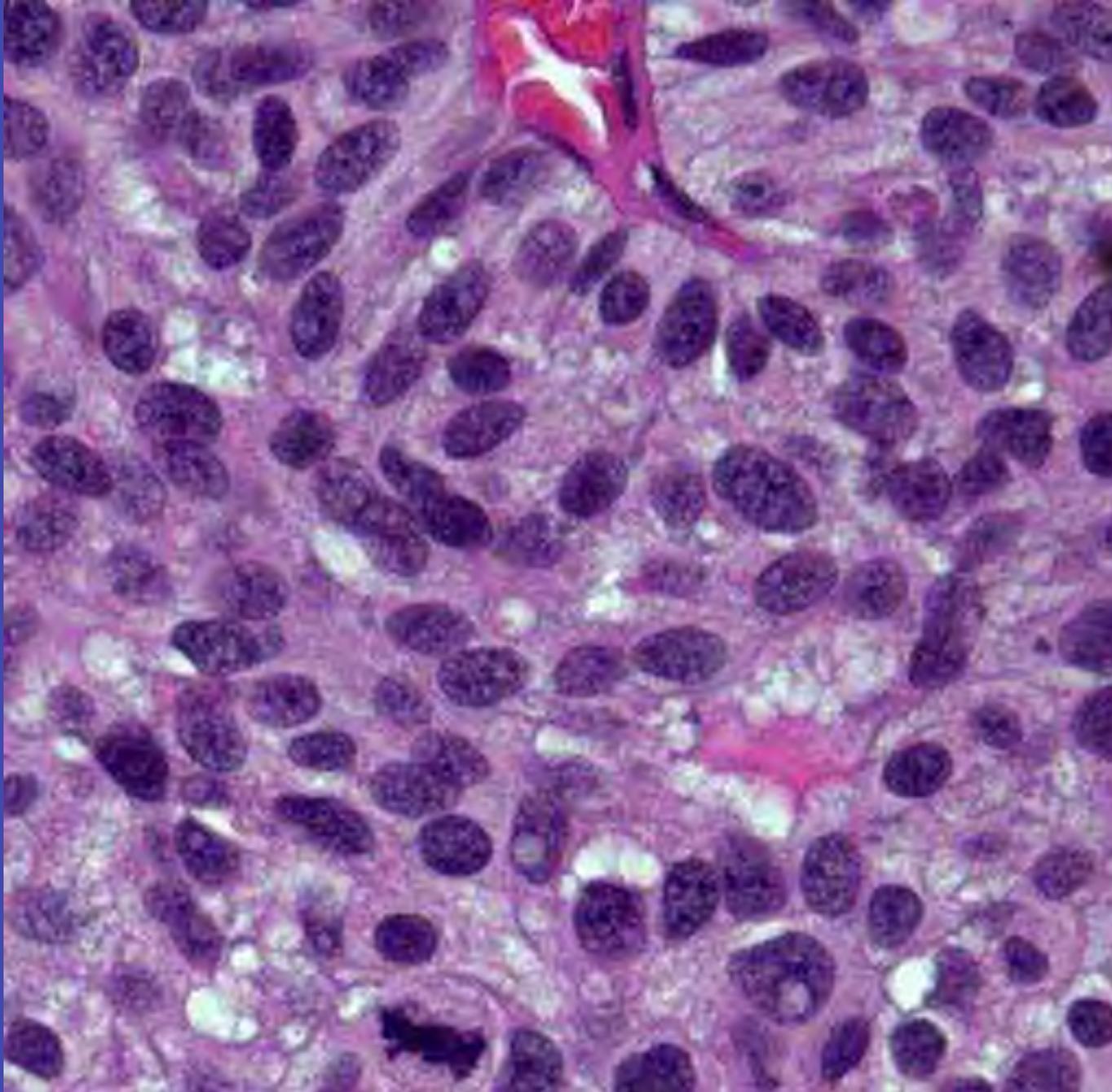


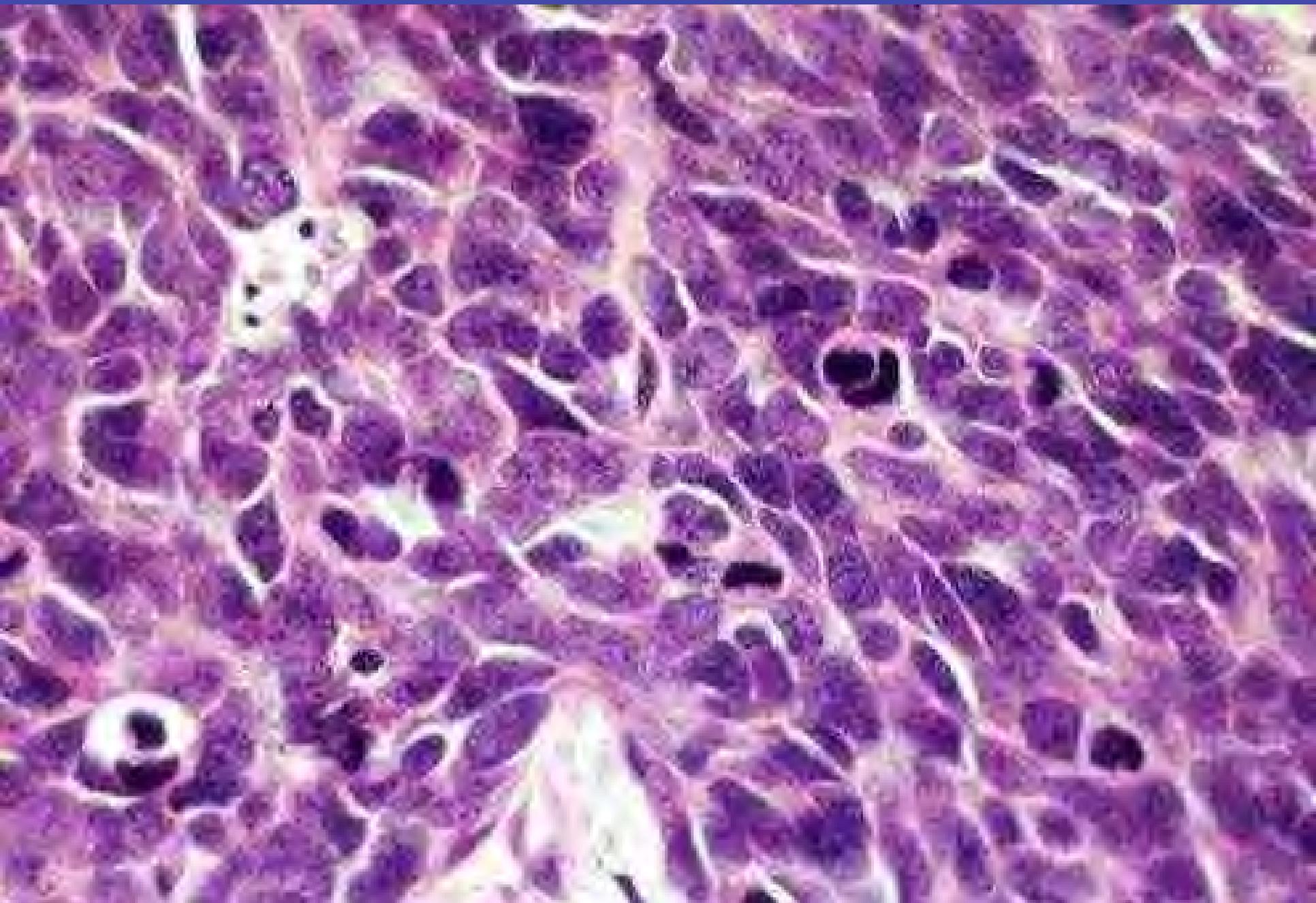












## **M-2 Respiratory Laboratory - 3**

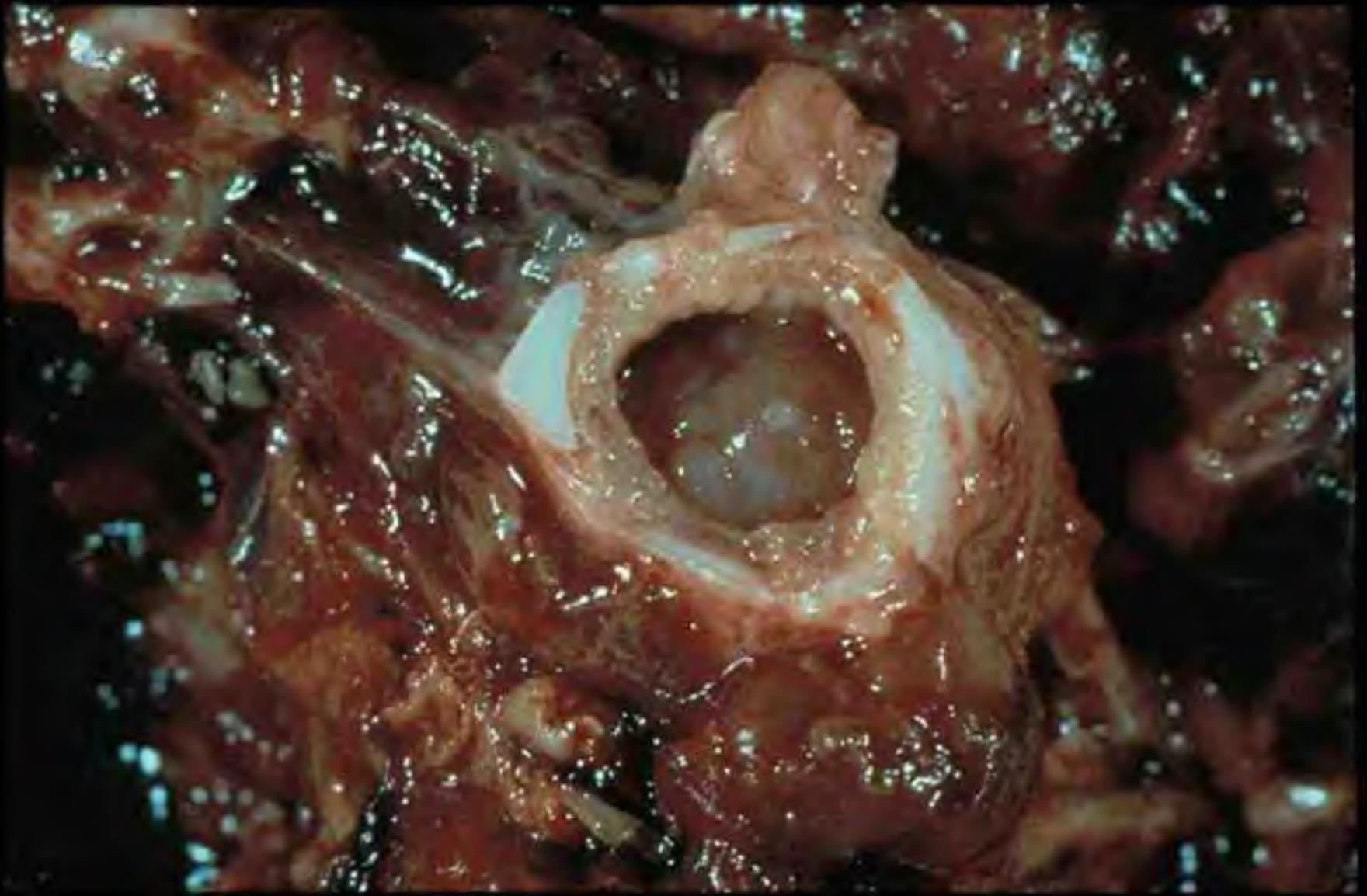
**74 Squamous cell carcinoma**

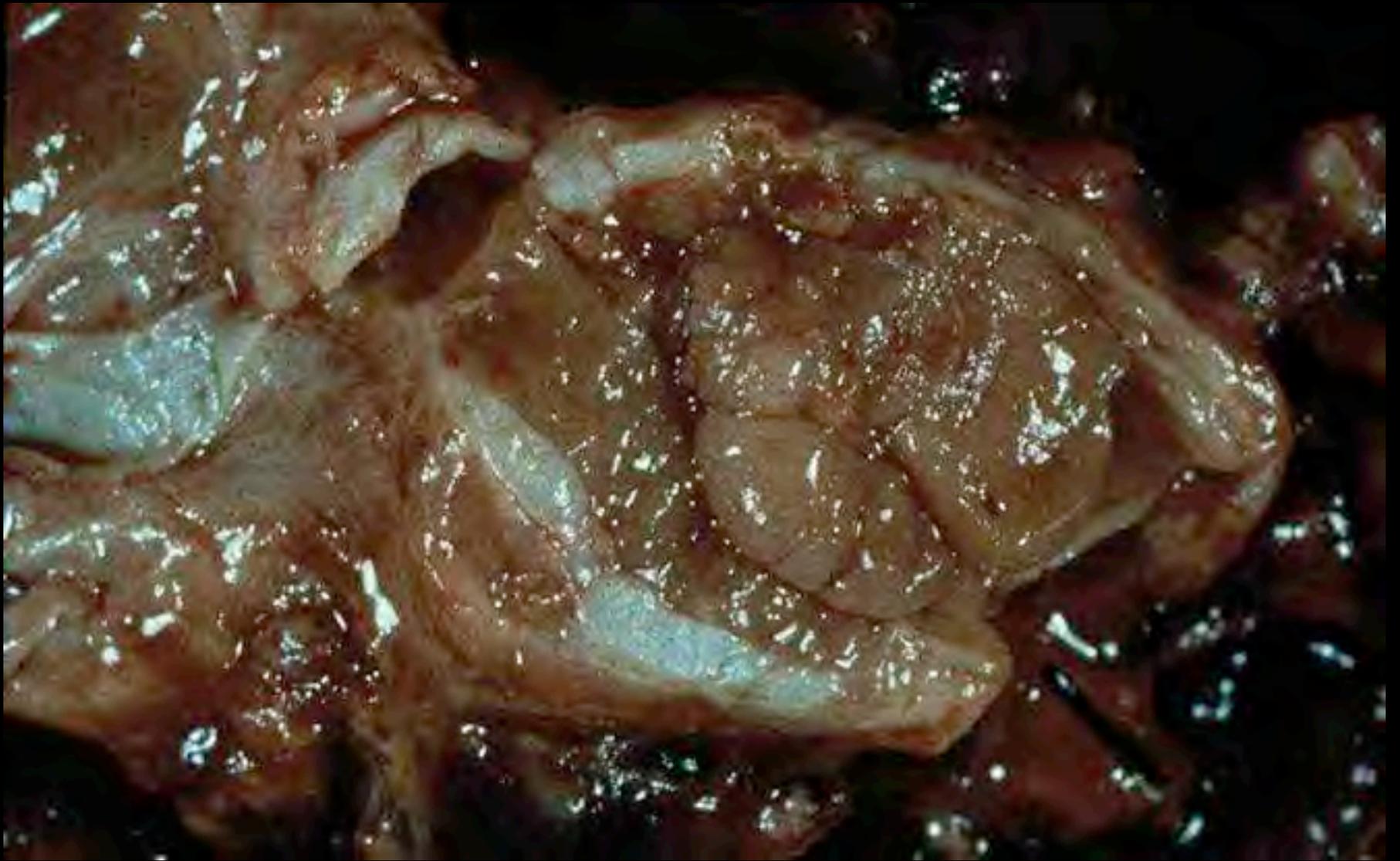
**75 Adenocarcinoma**

**28 Small cell carcinoma**

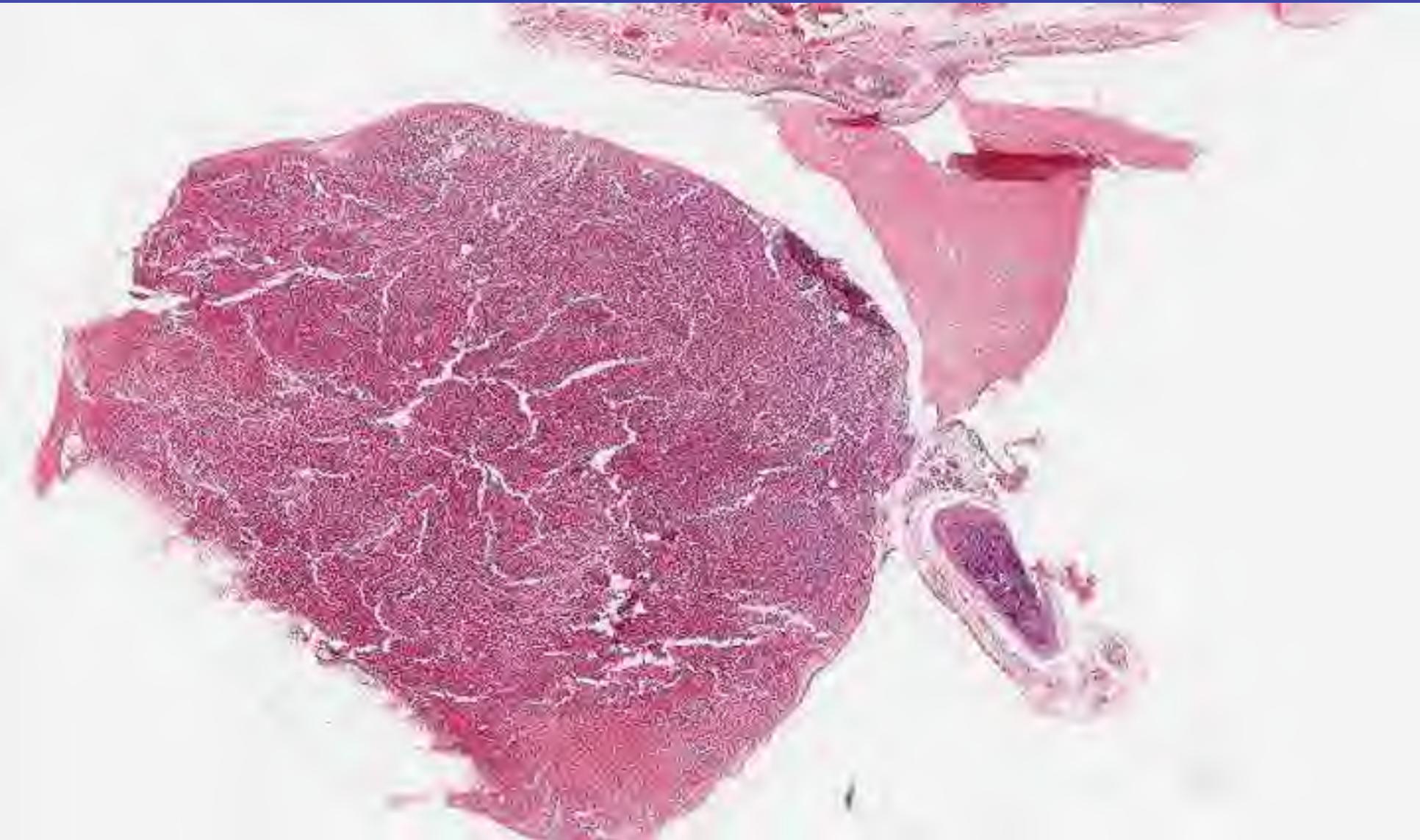
**73 Carcinoid tumor**

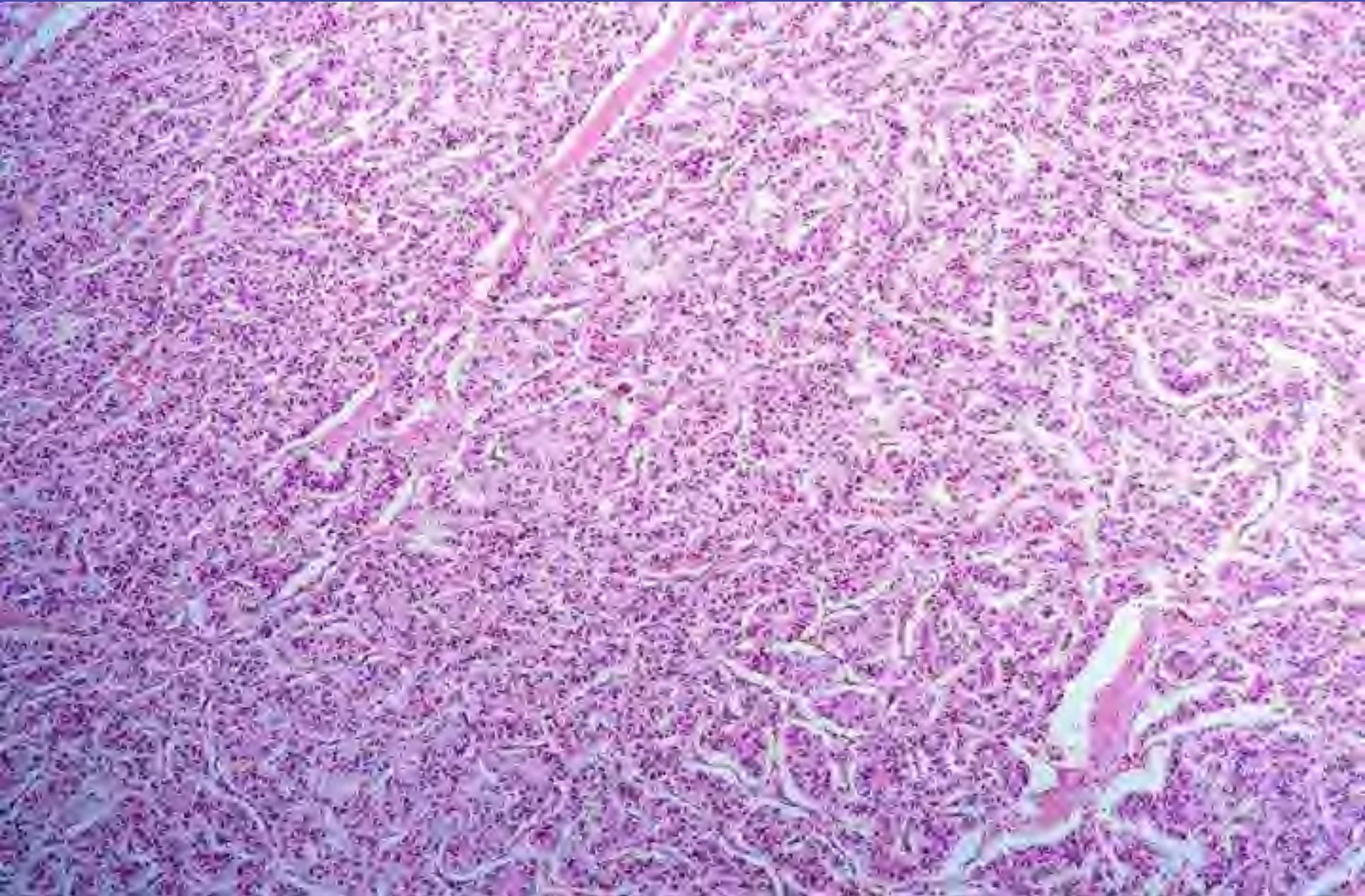
**CPC**

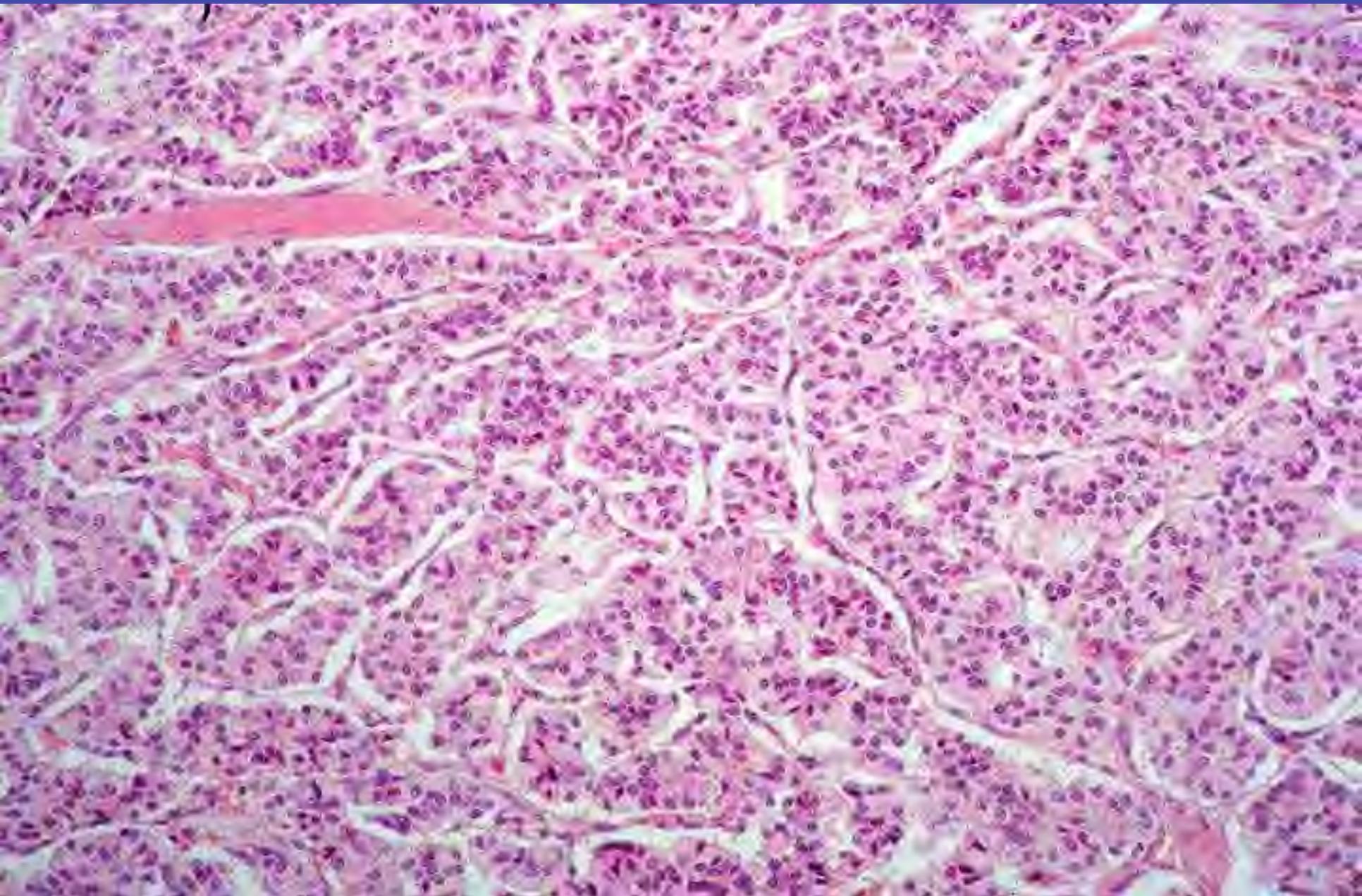


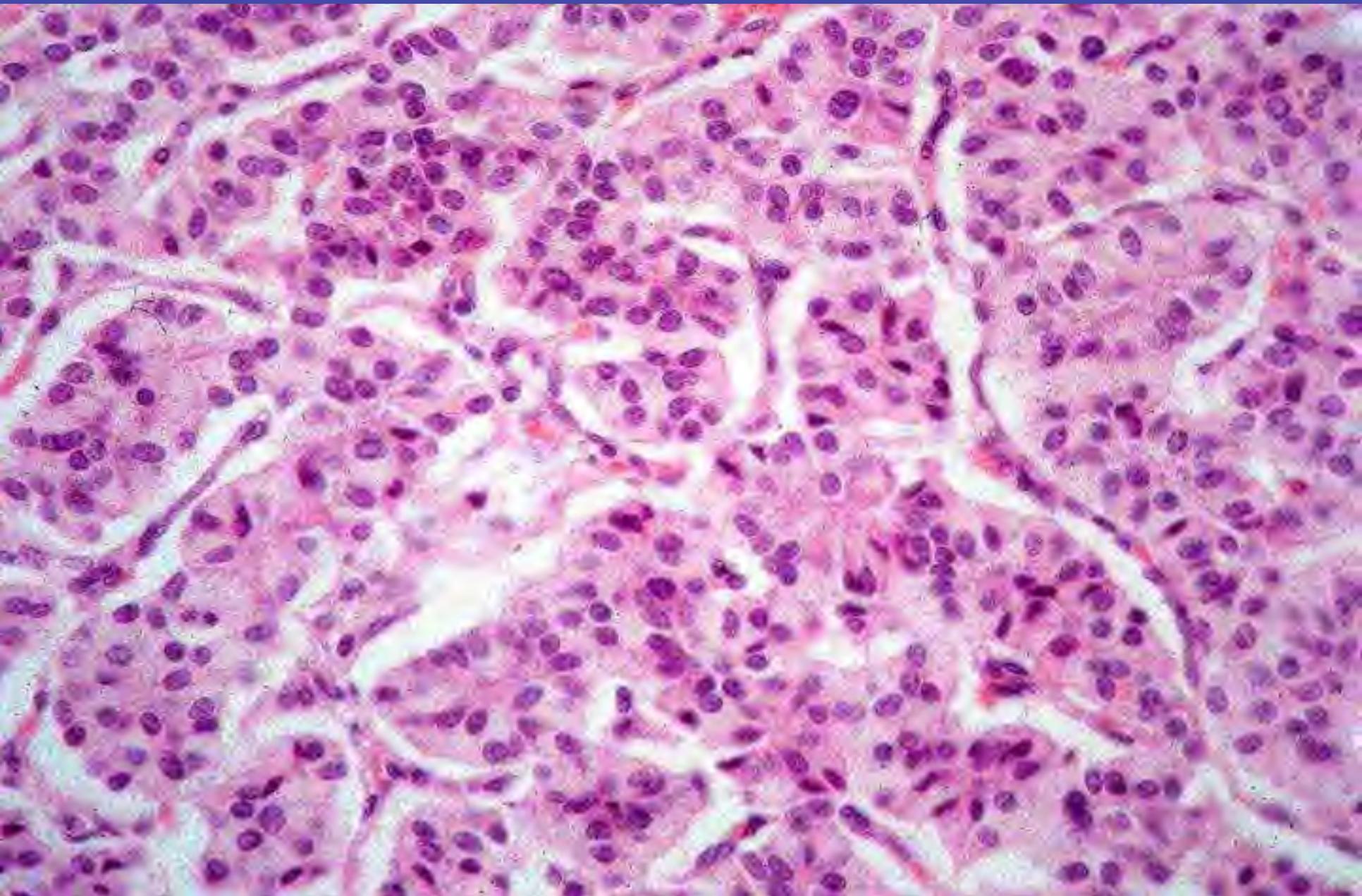


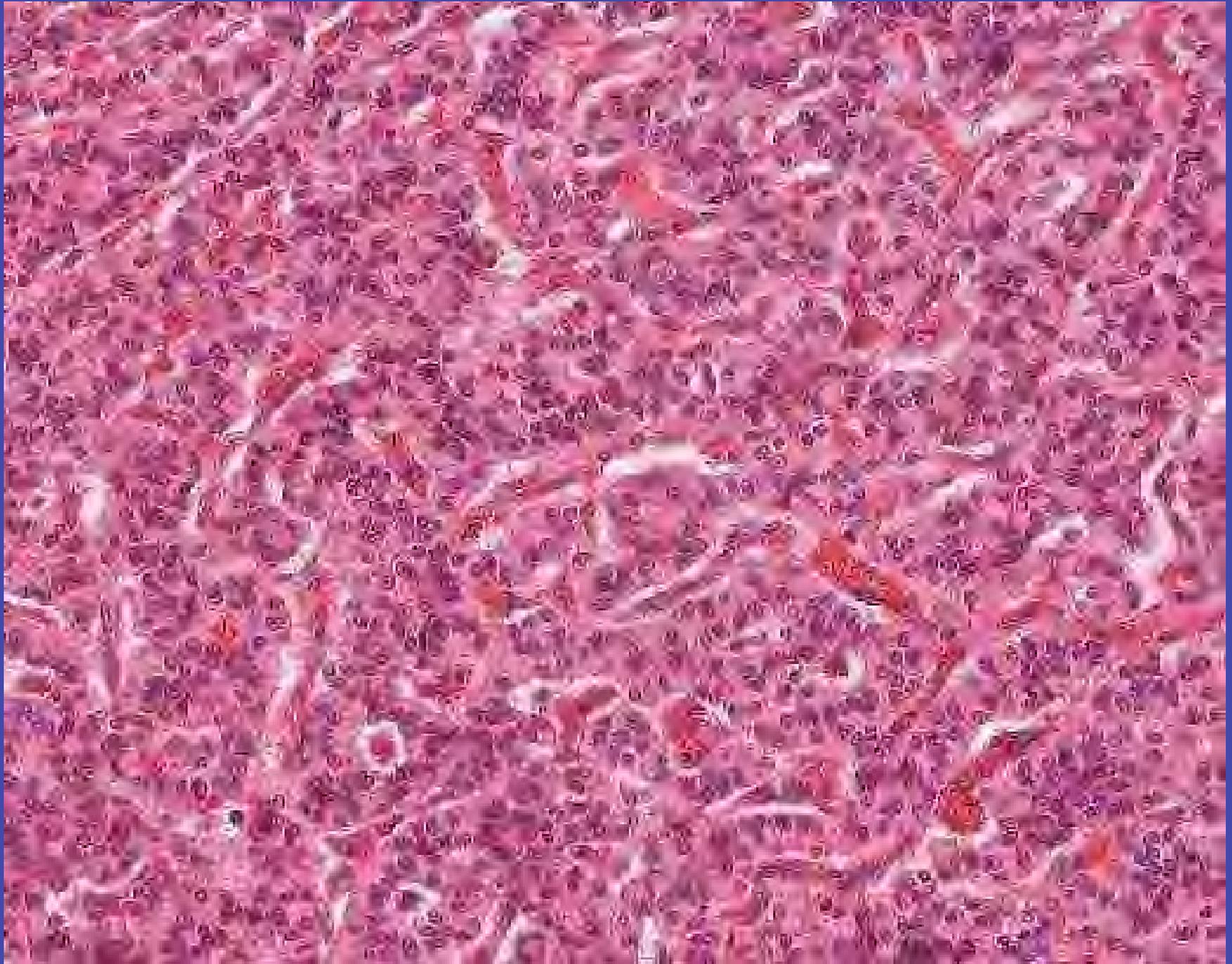


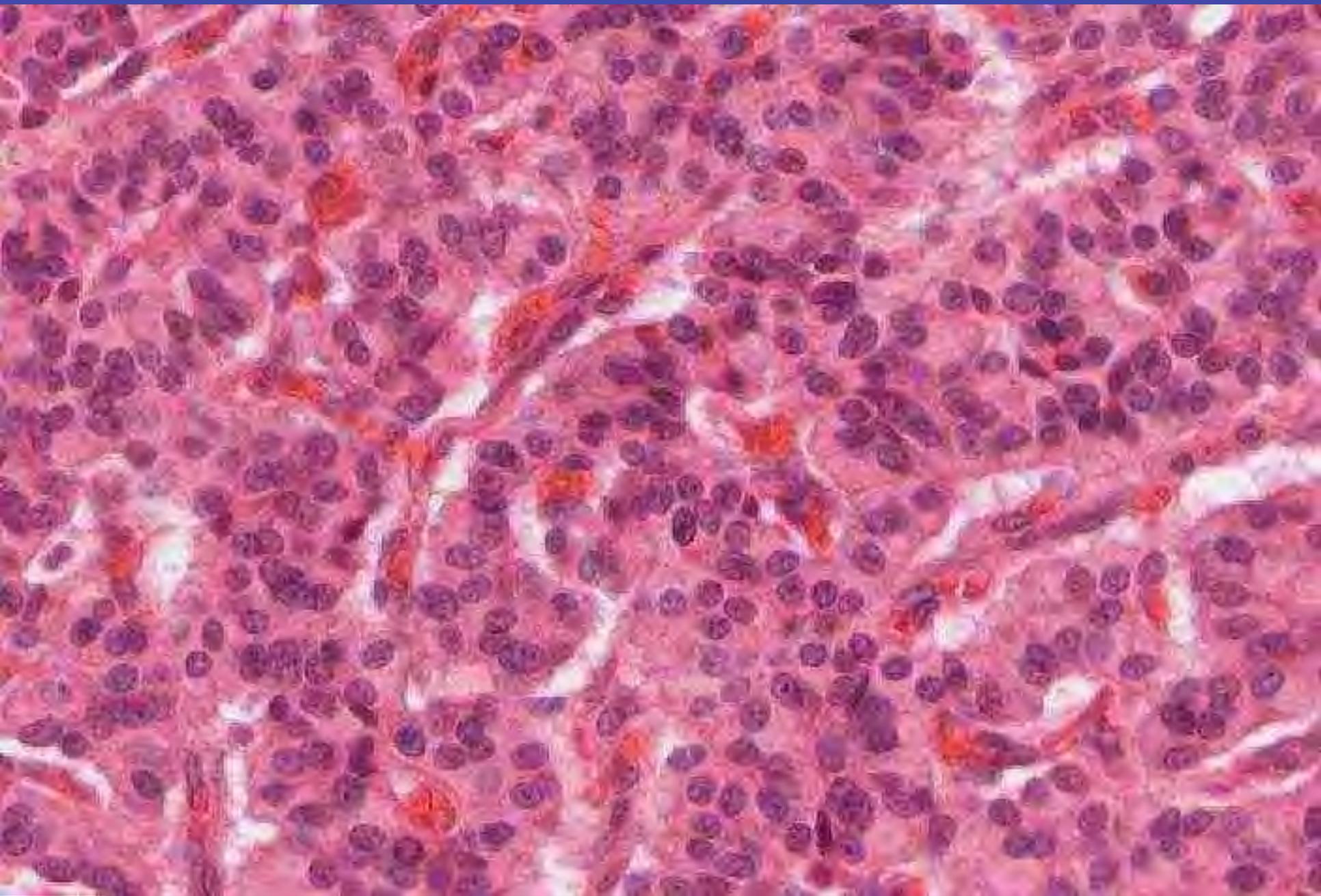


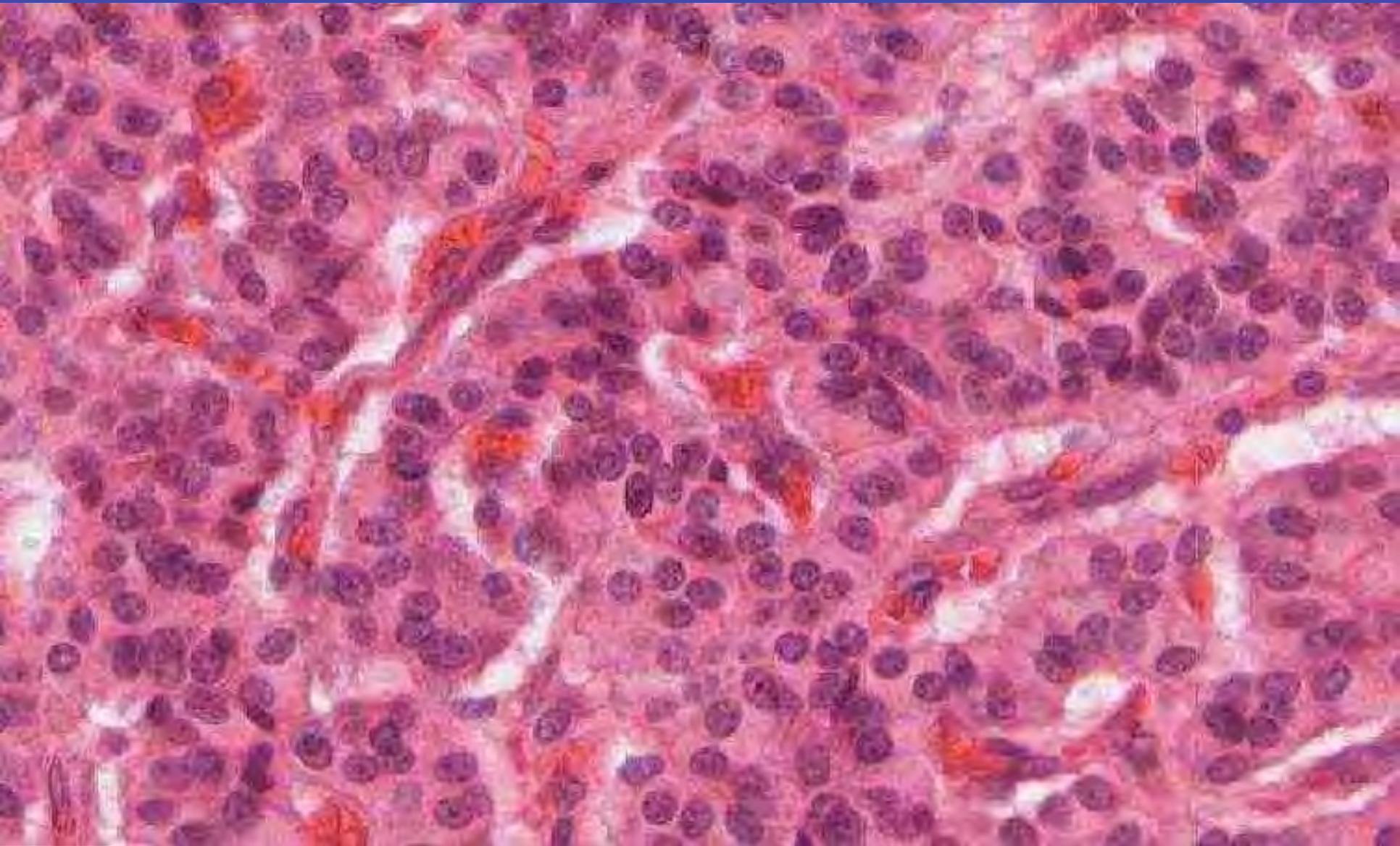












## **M-2 Respiratory Laboratory - 3**

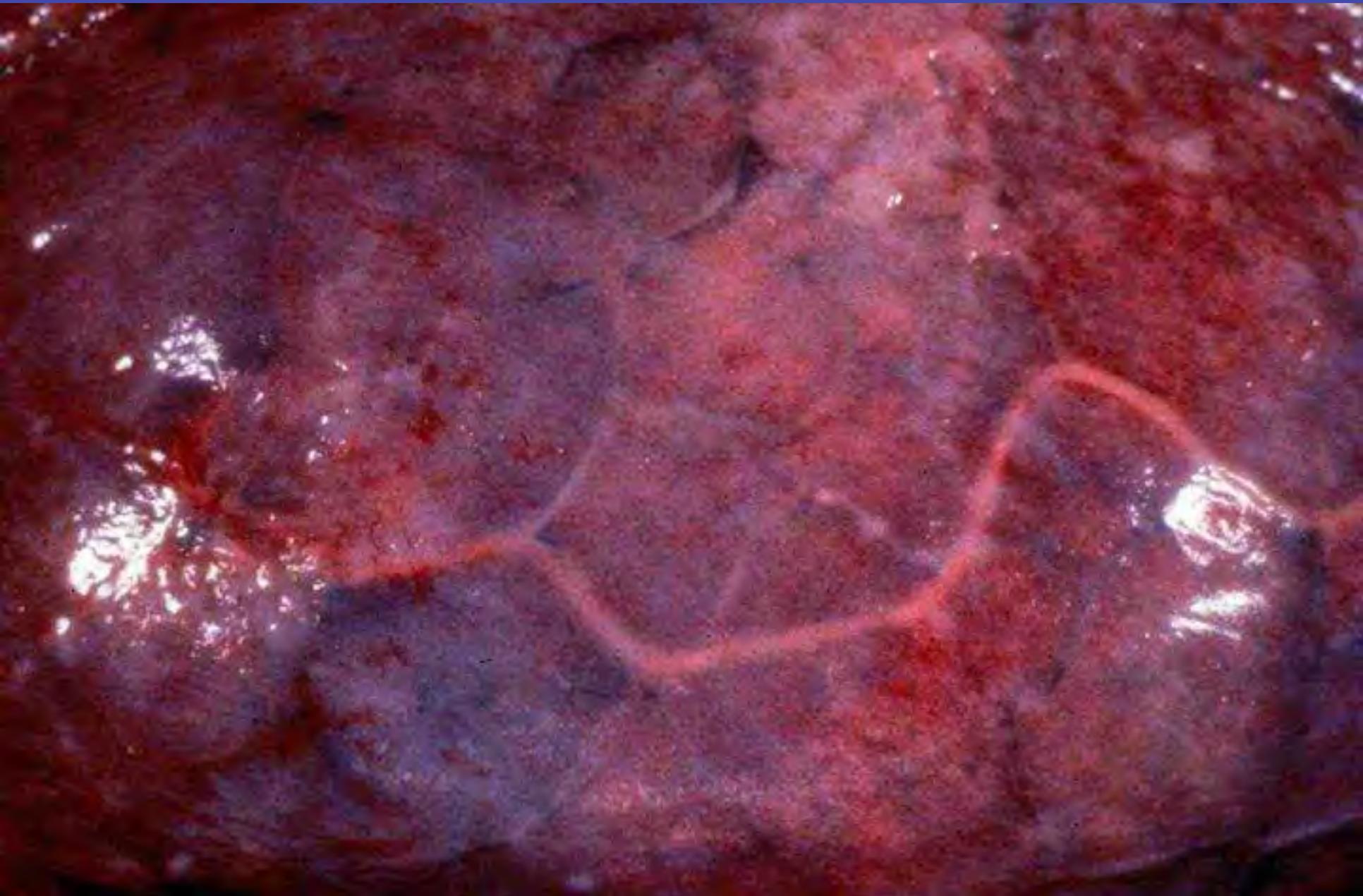
**74 Squamous cell carcinoma**

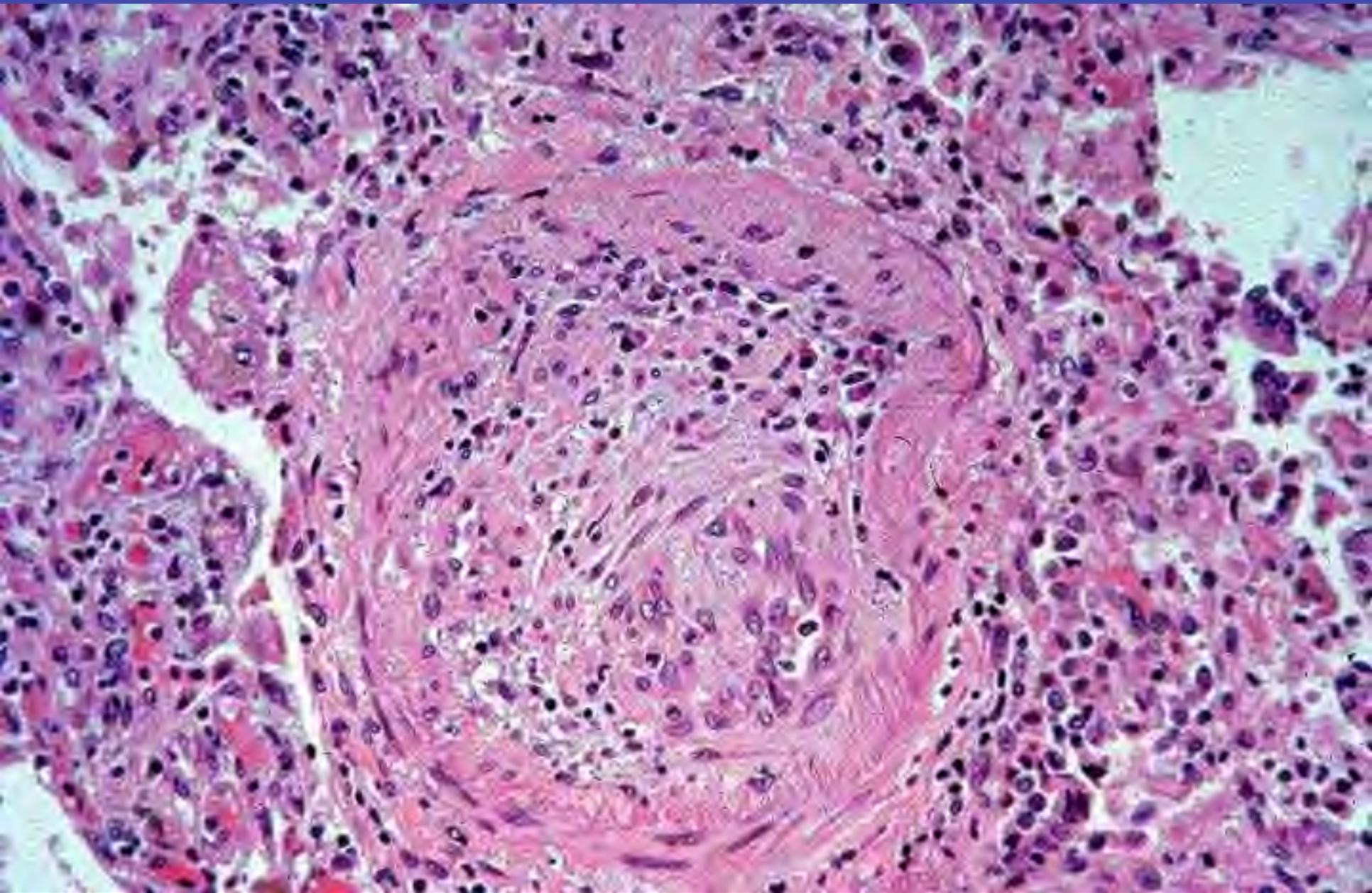
**75 Adenocarcinoma**

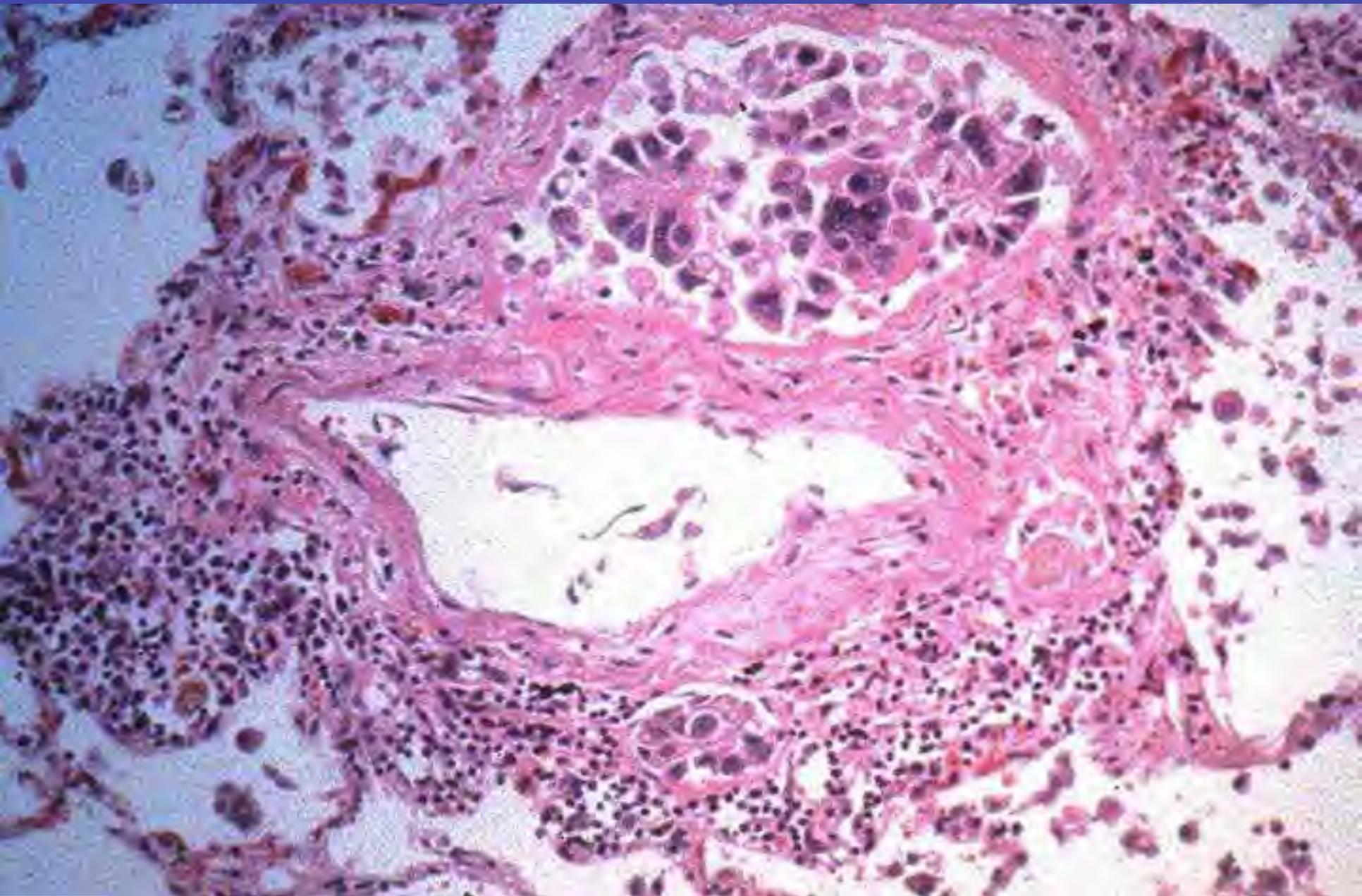
**28 Small cell carcinoma**

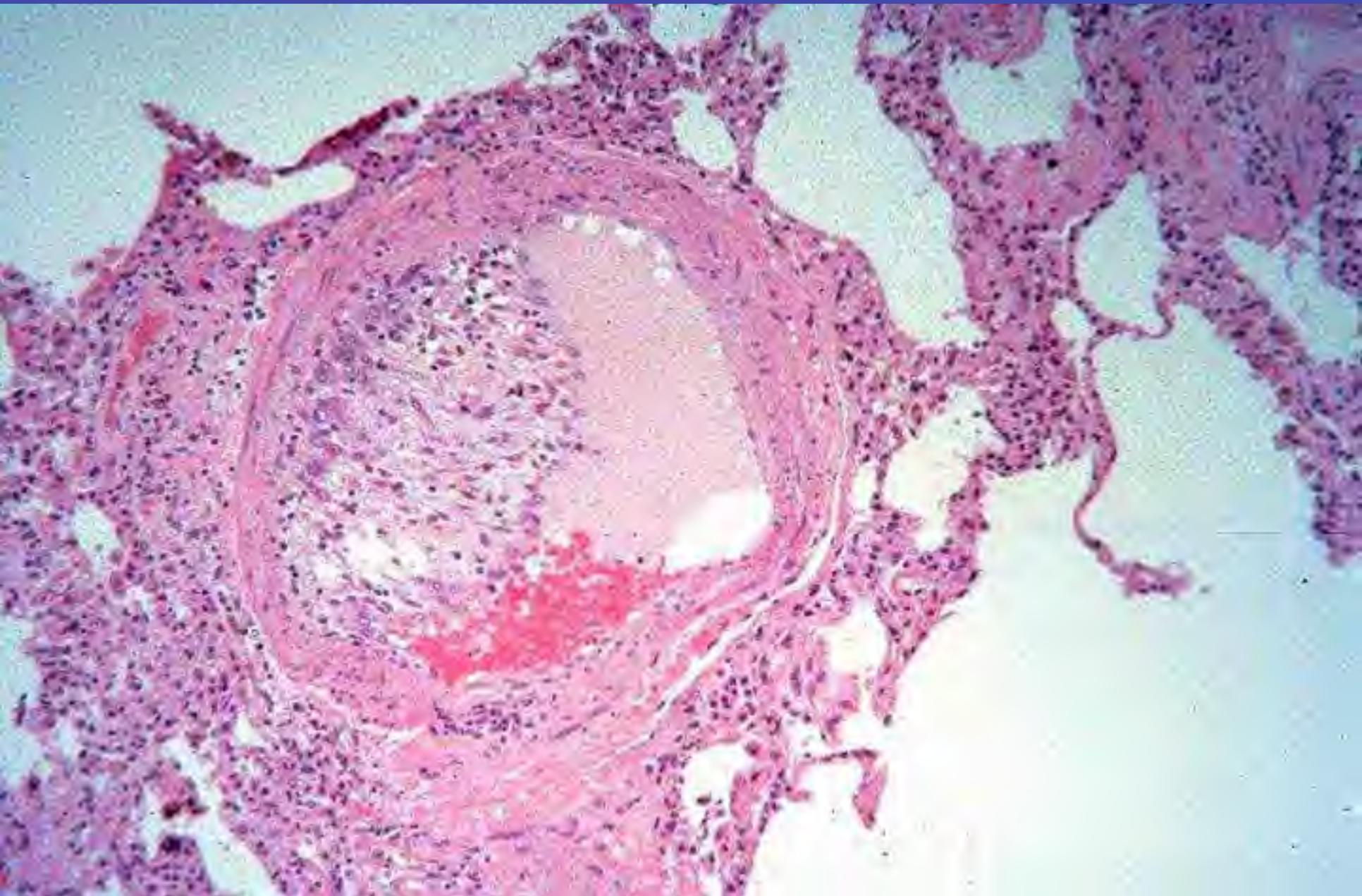
**73 Carcinoid tumor**

**CPC**



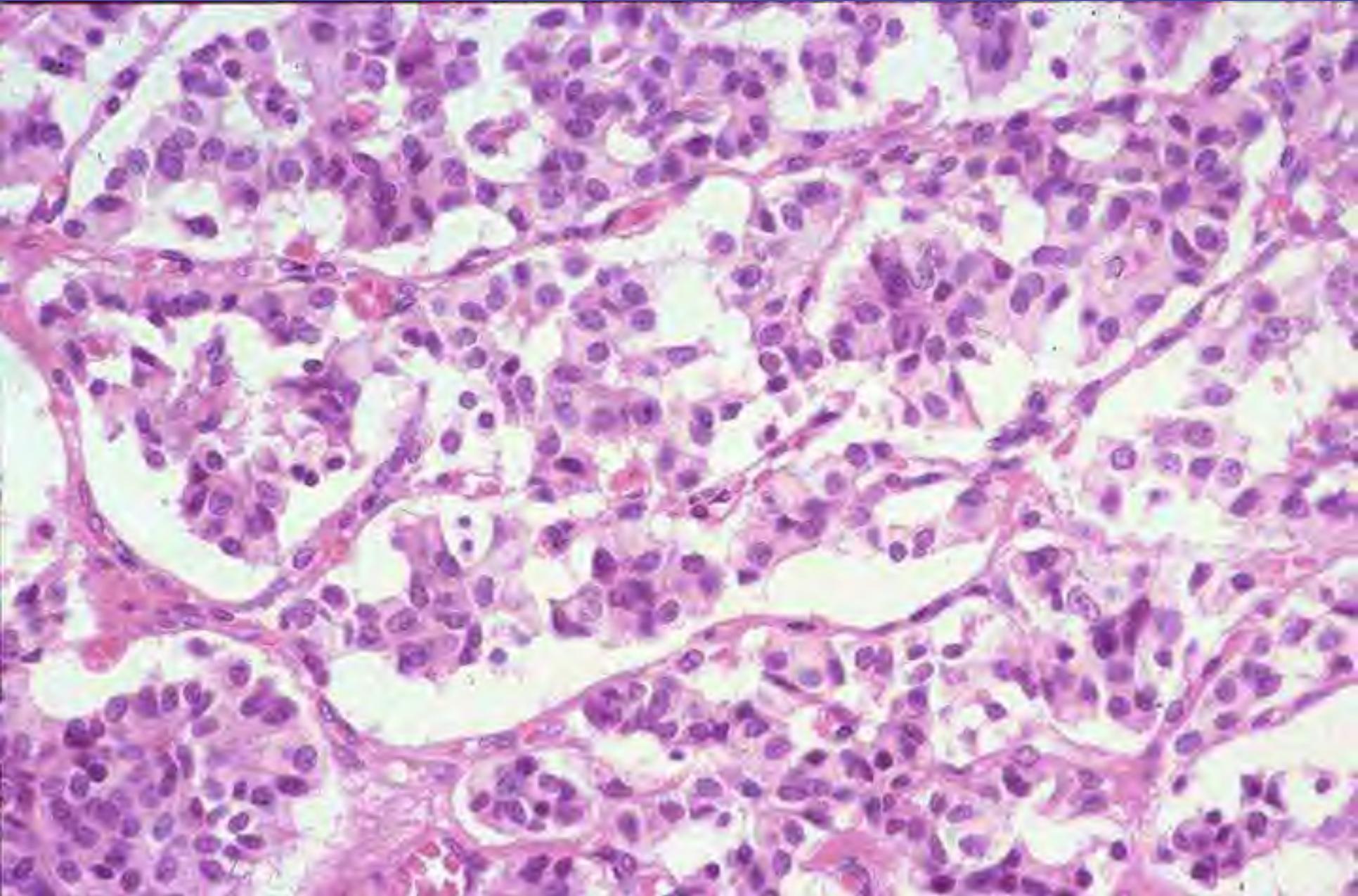


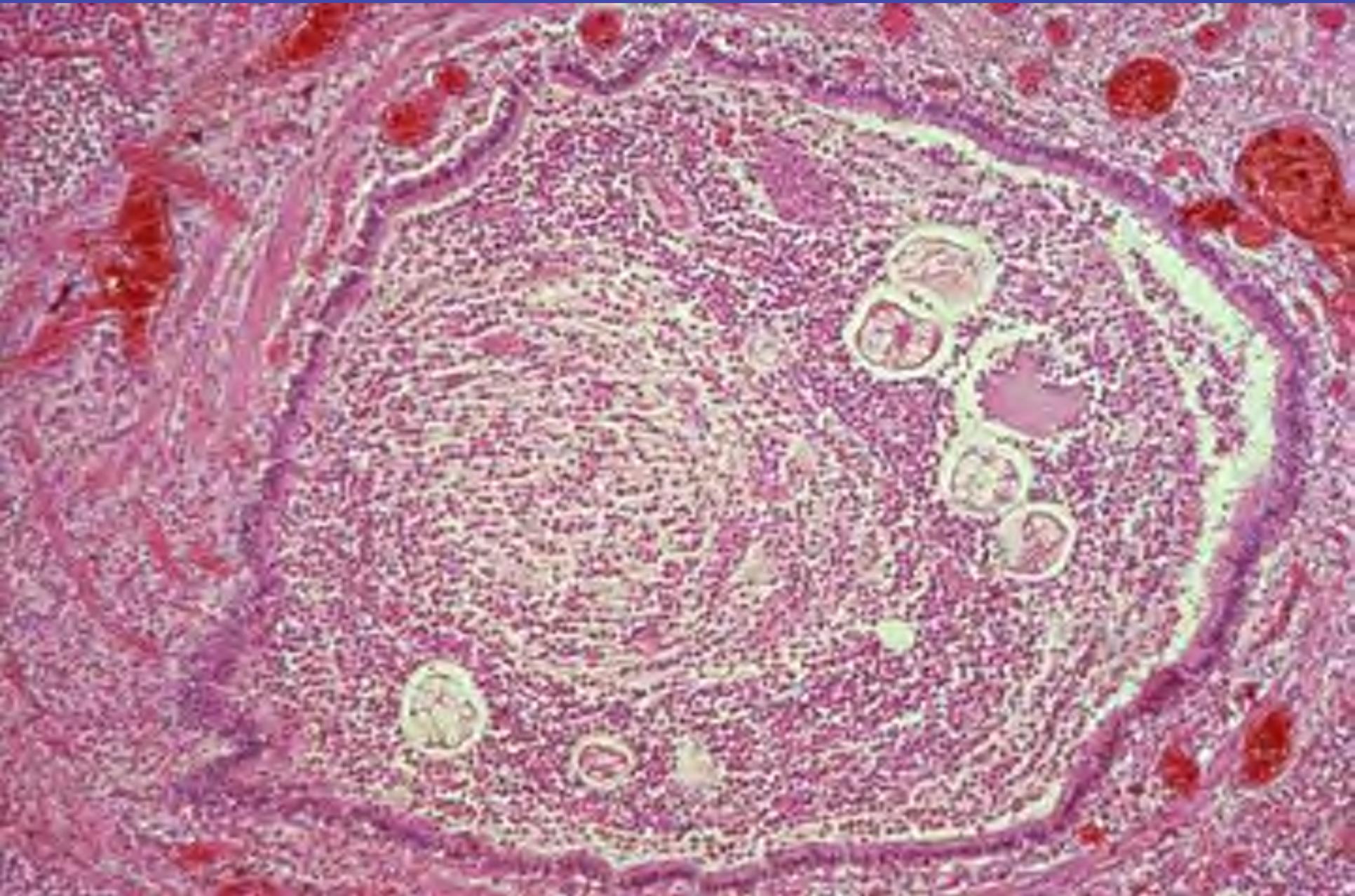


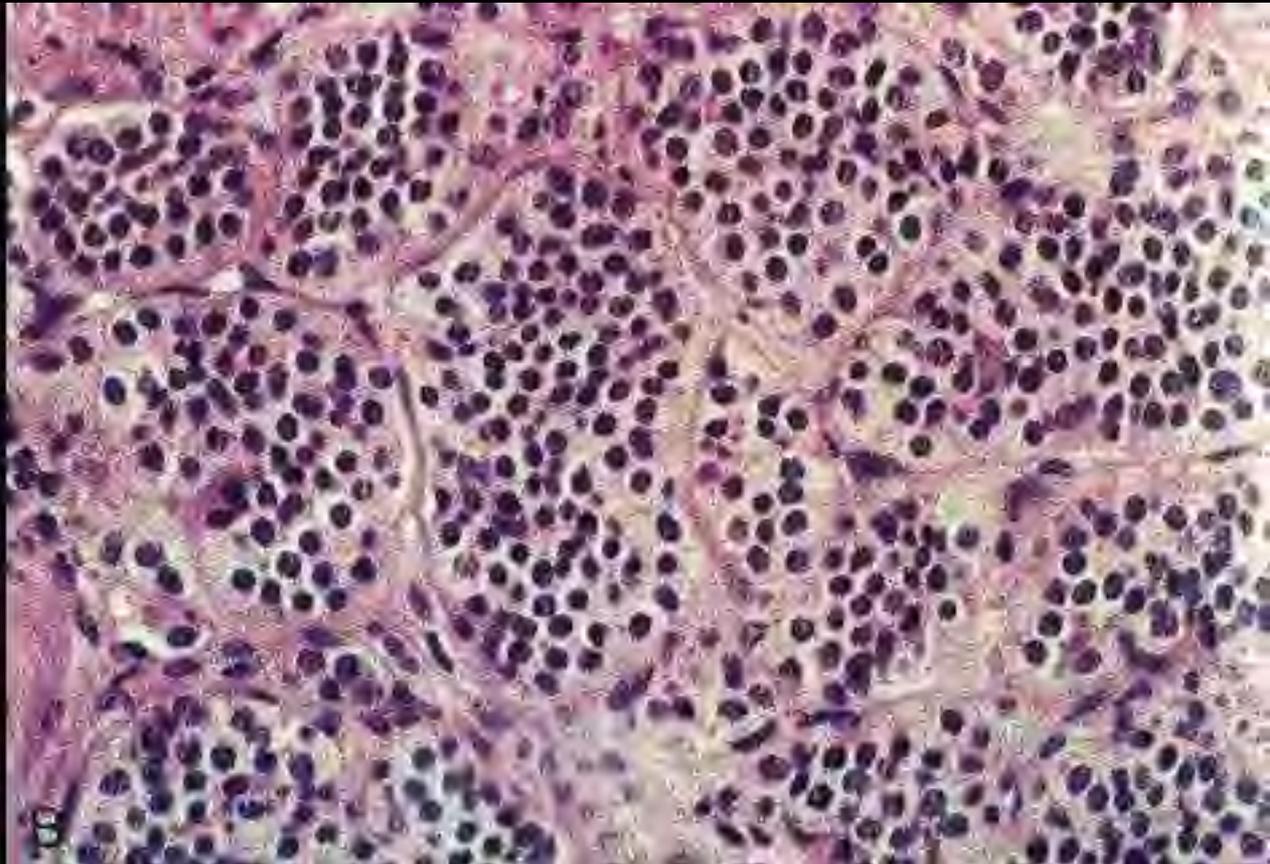


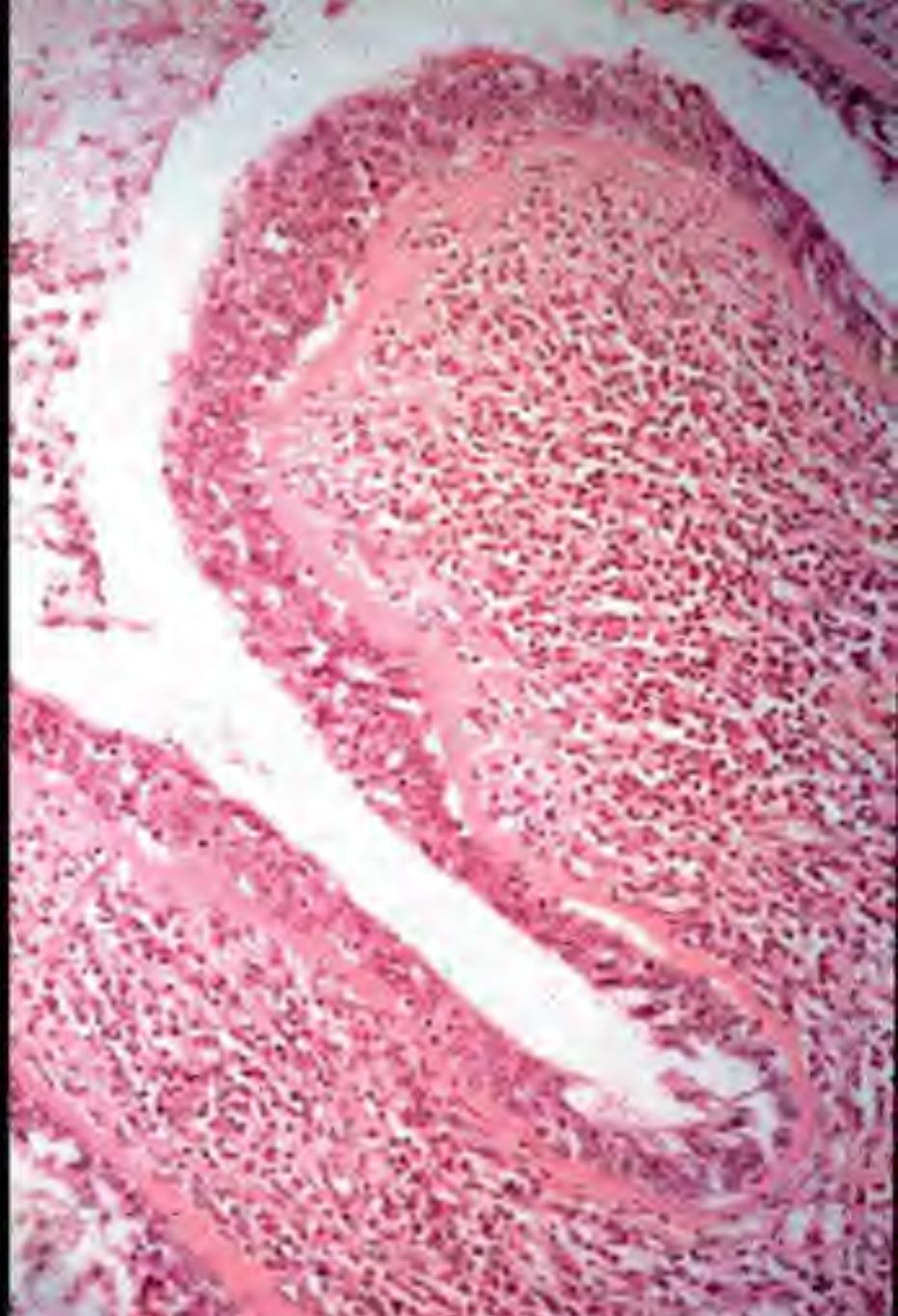
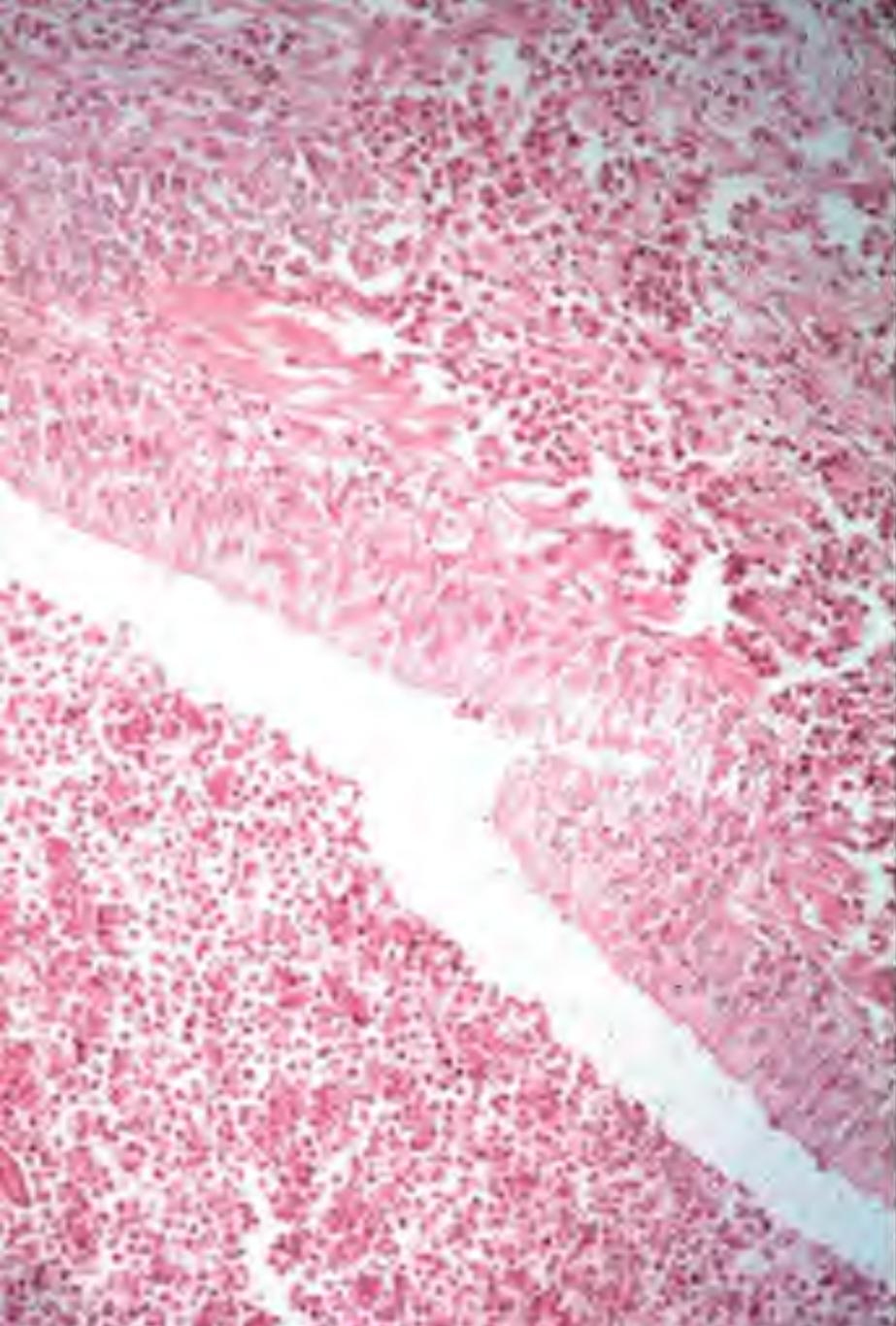


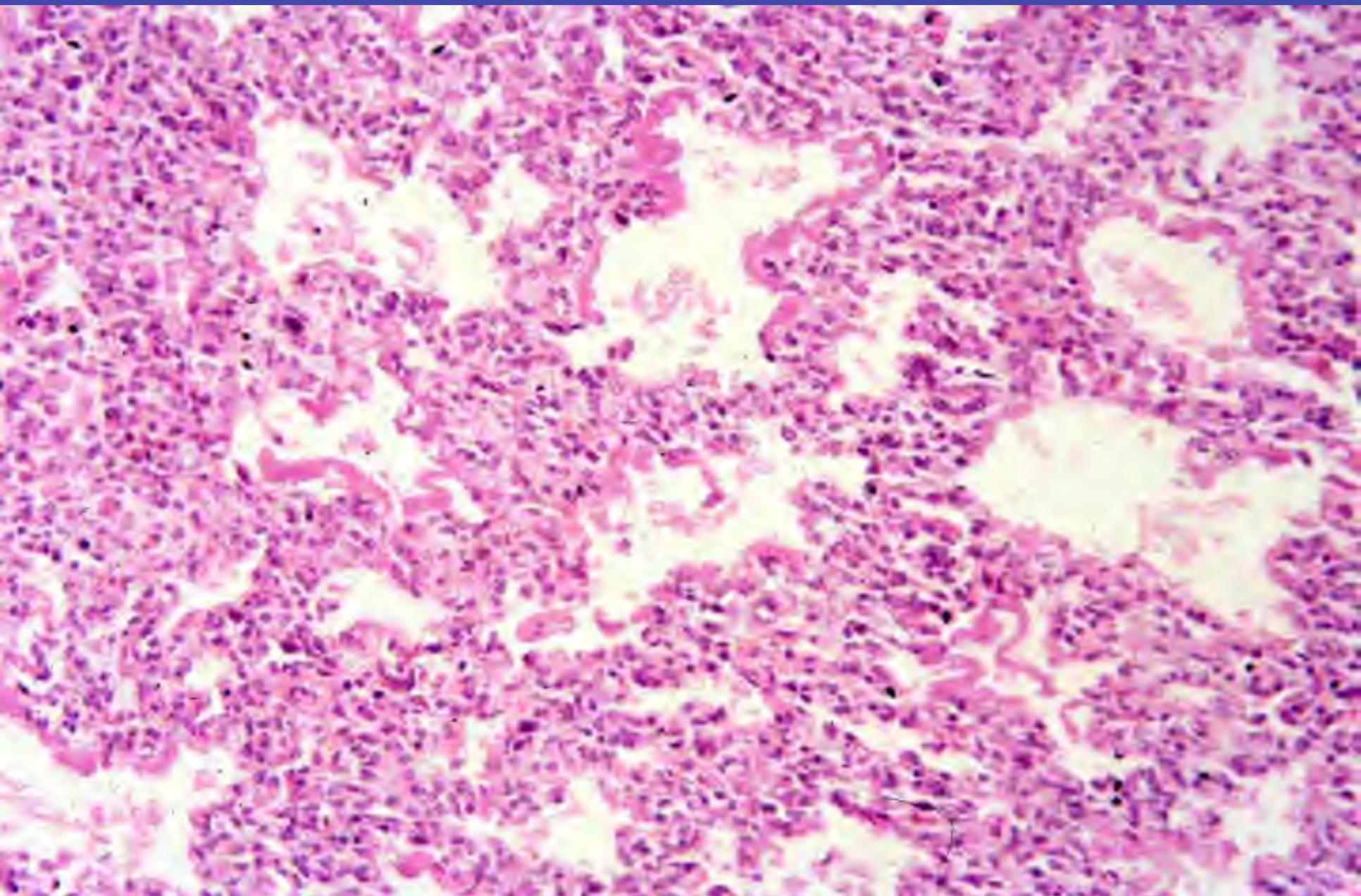
Following slides are intended for review

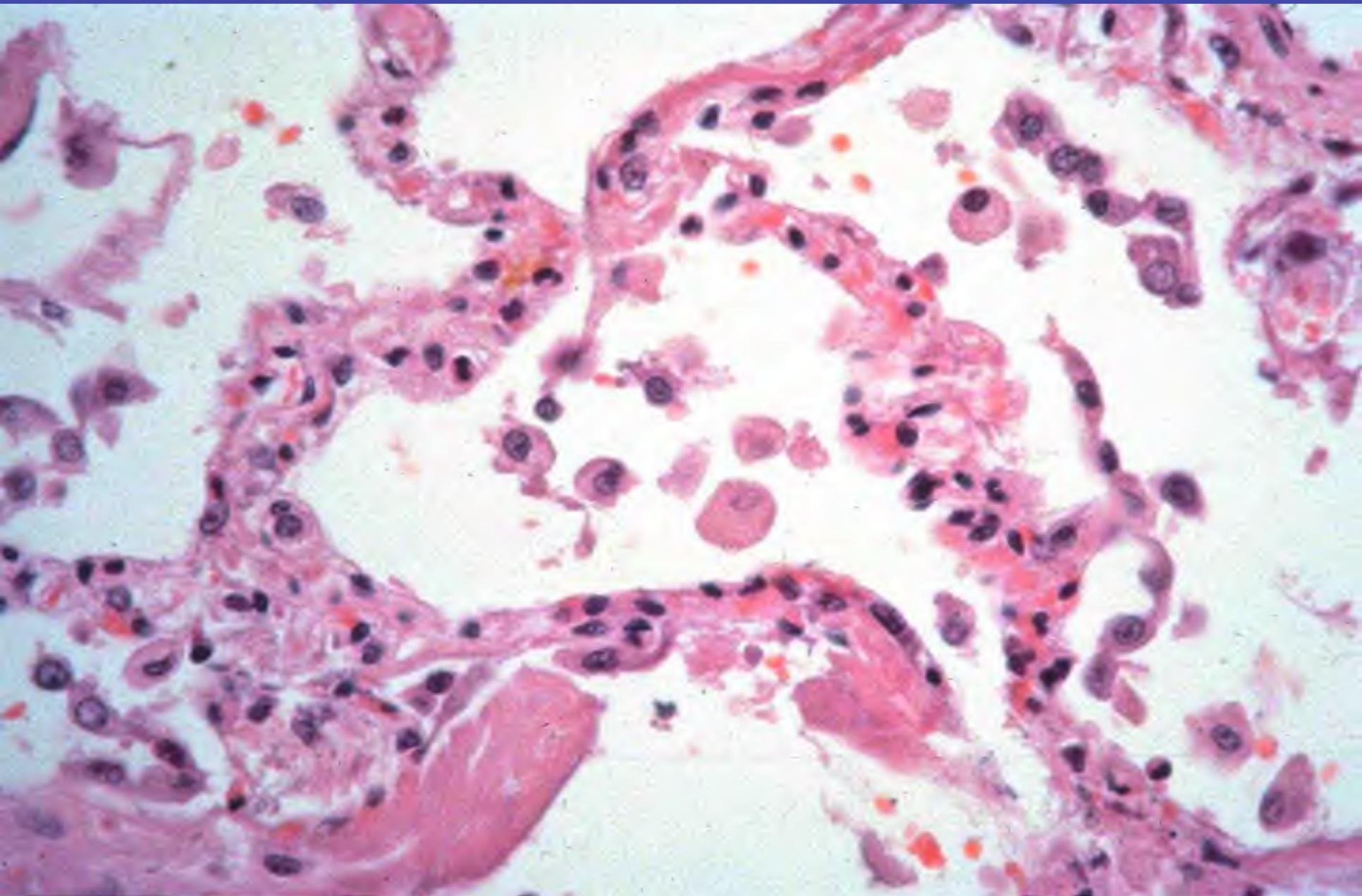


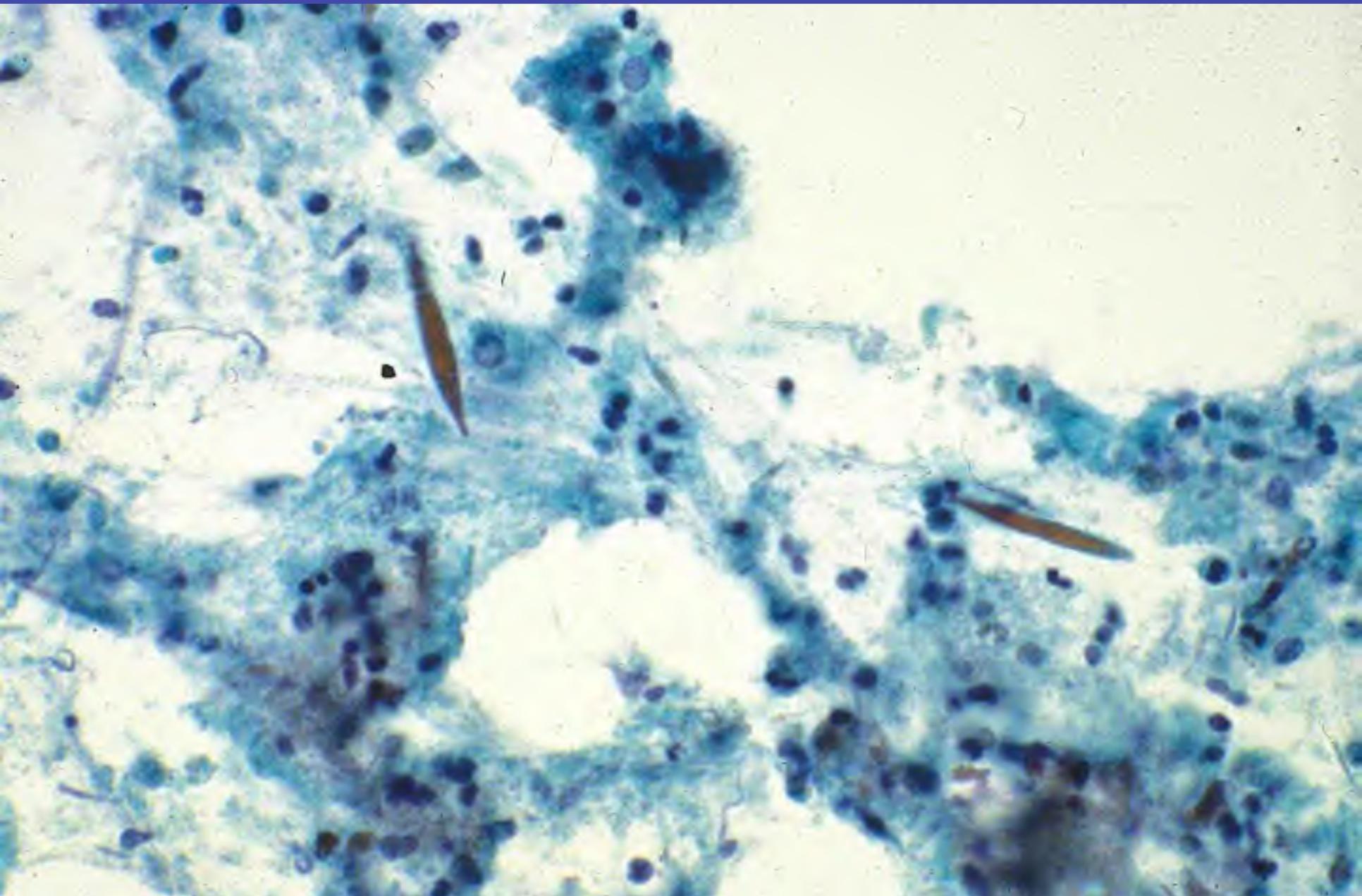


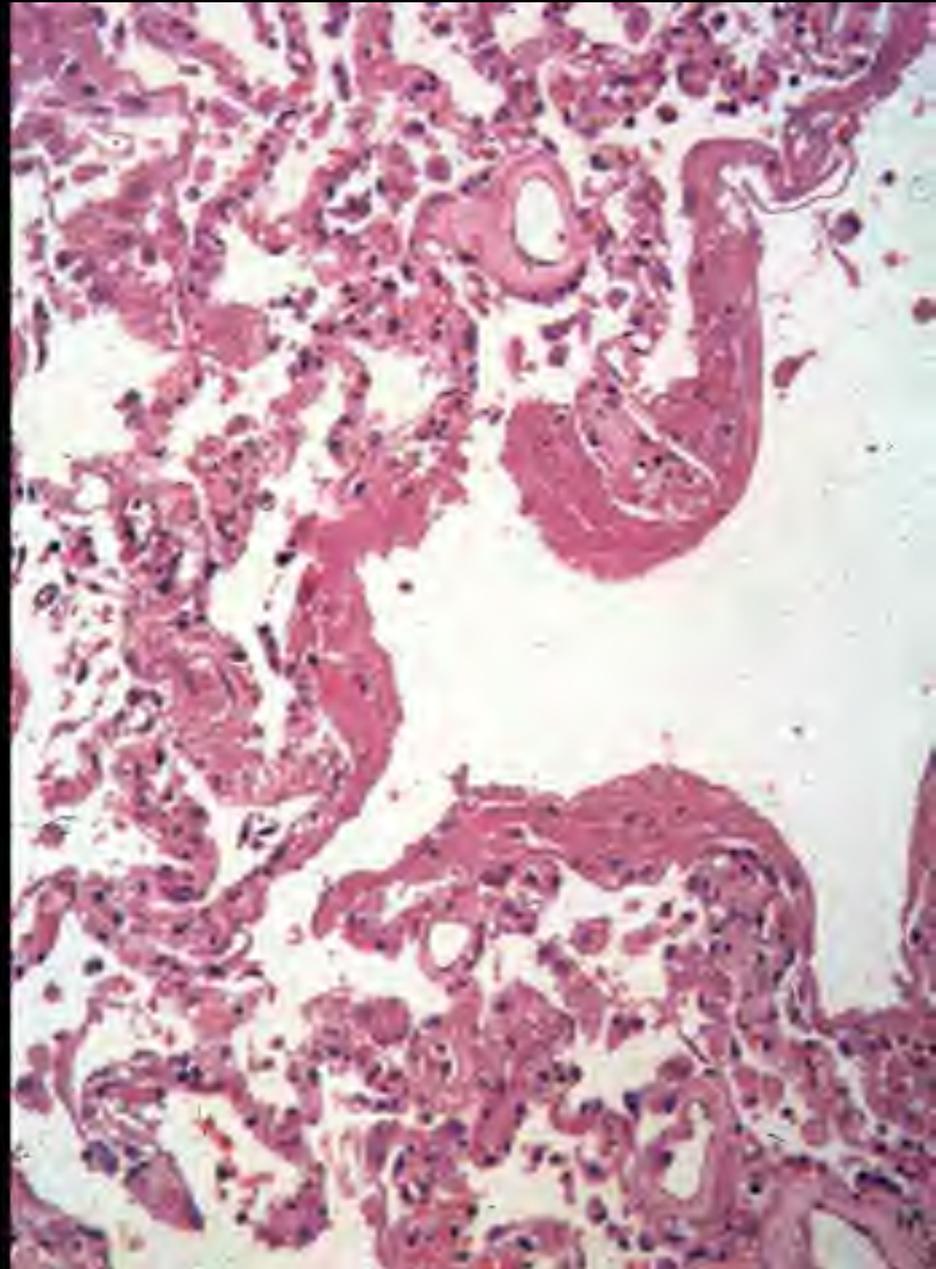
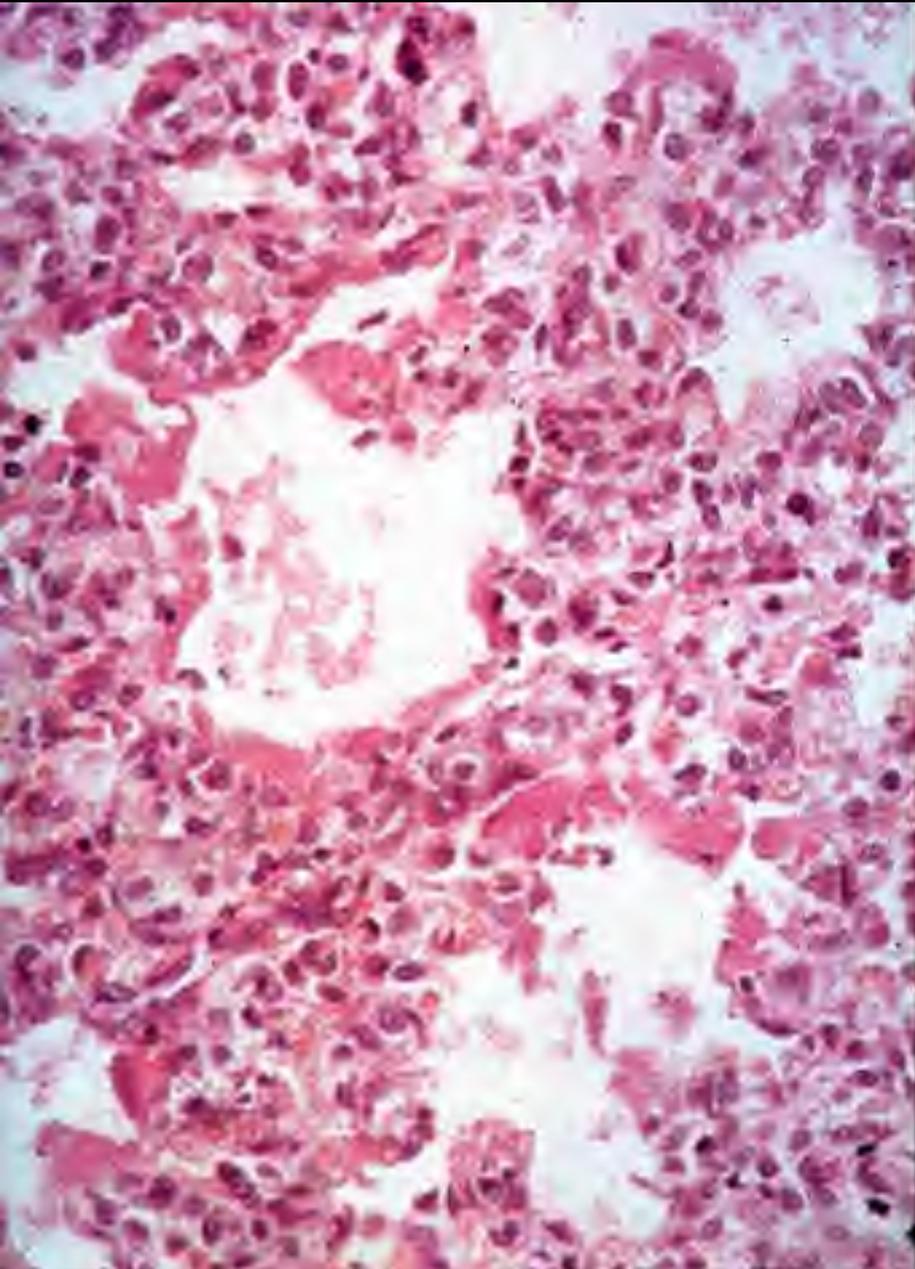


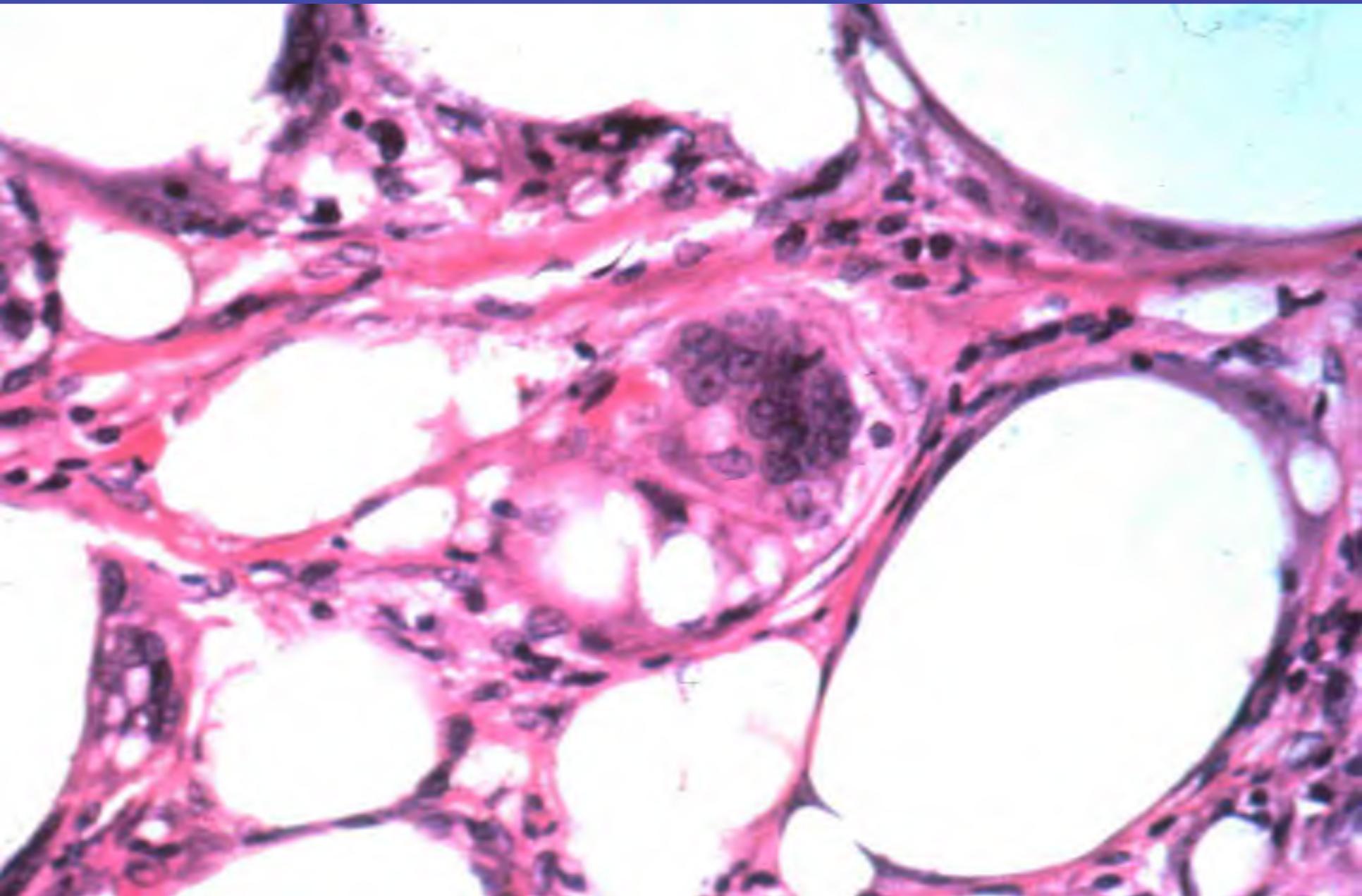


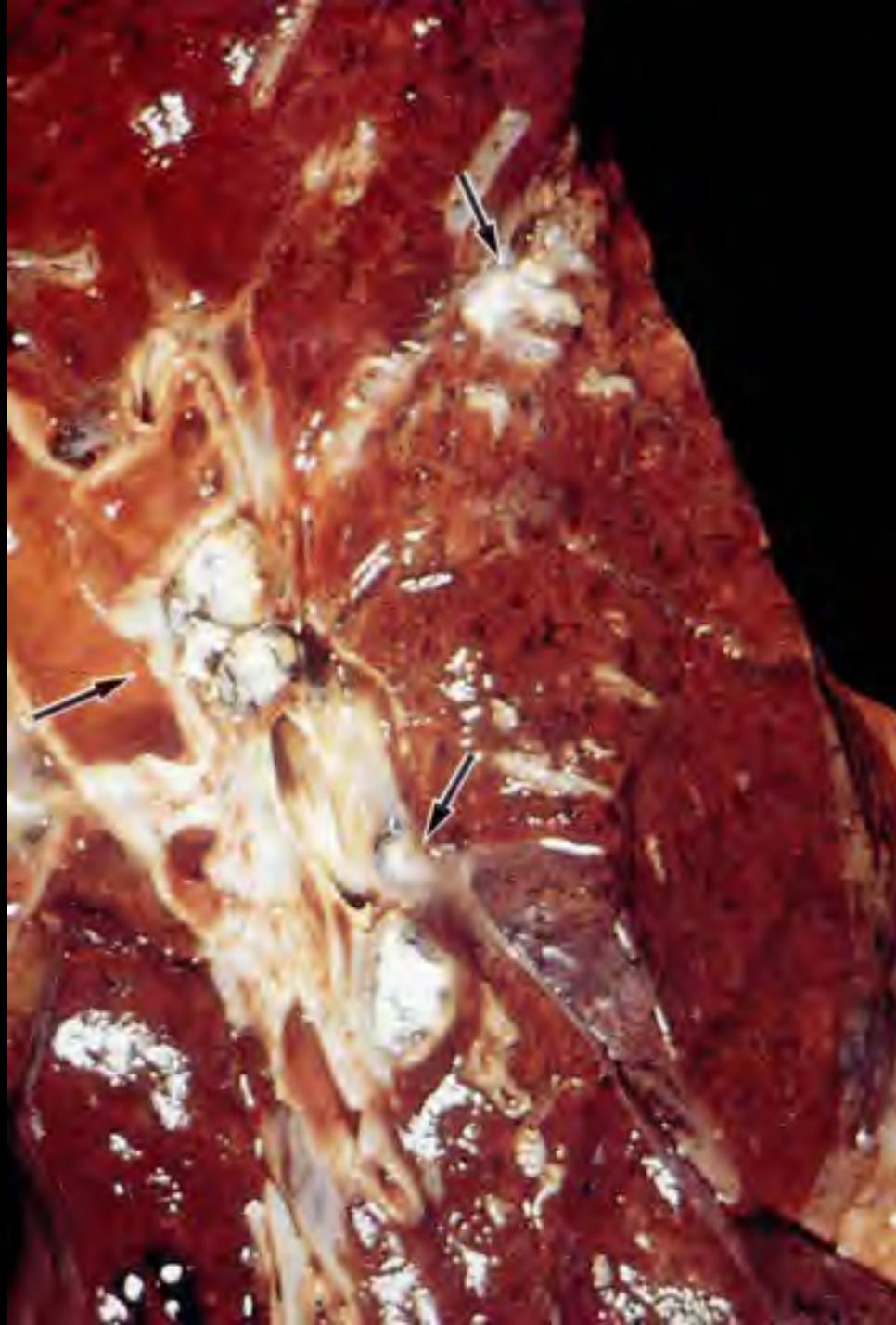


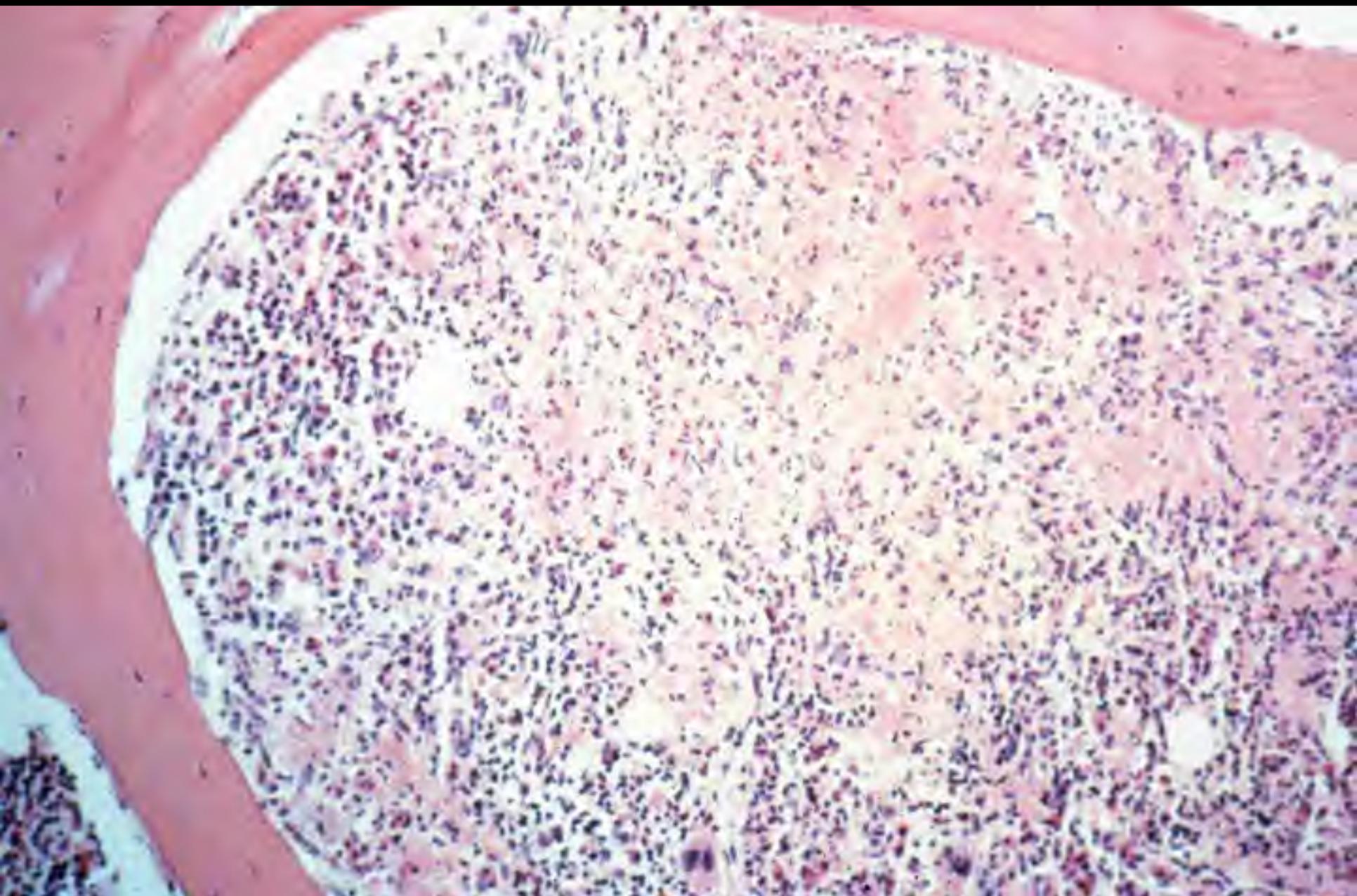


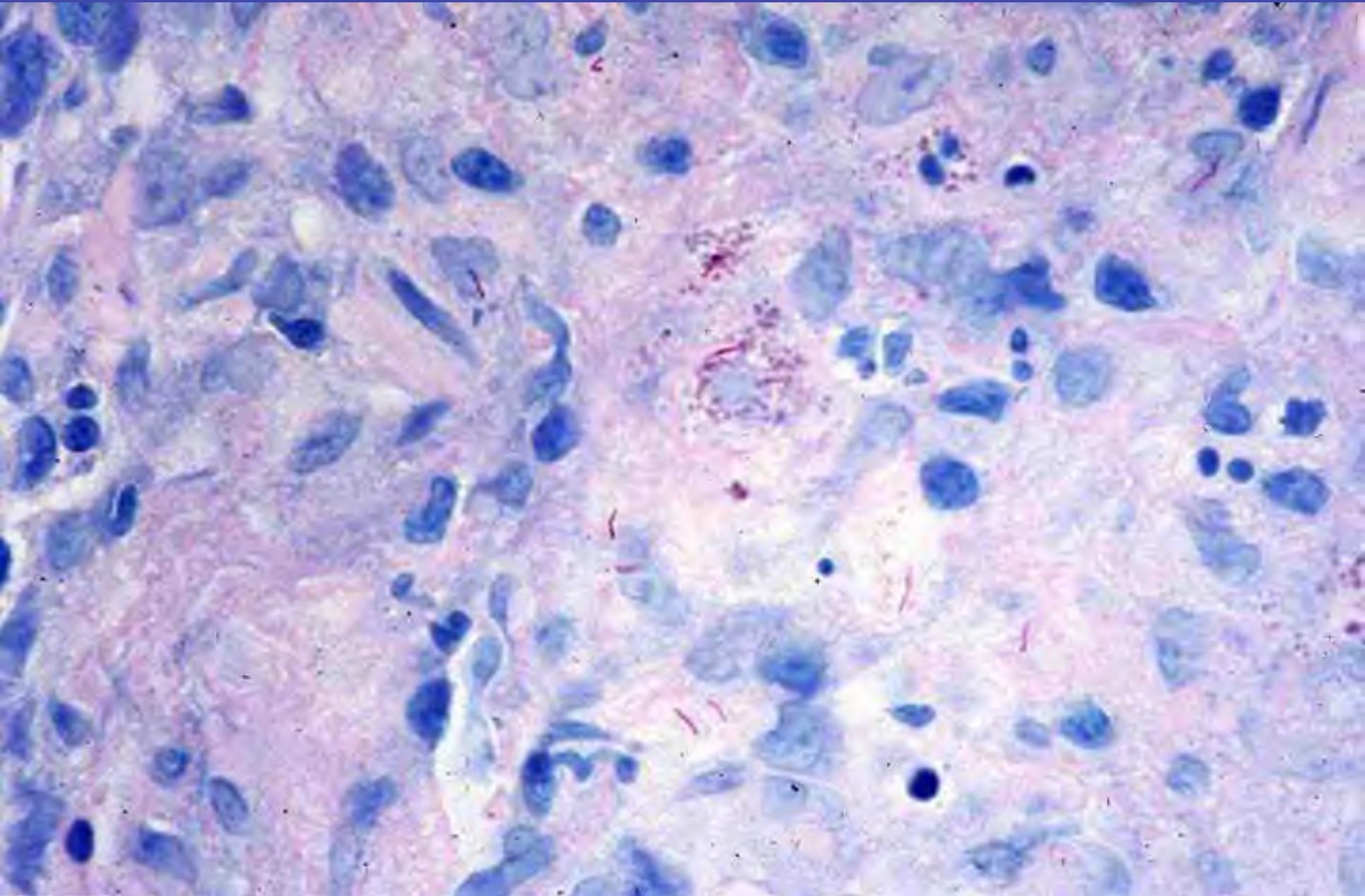


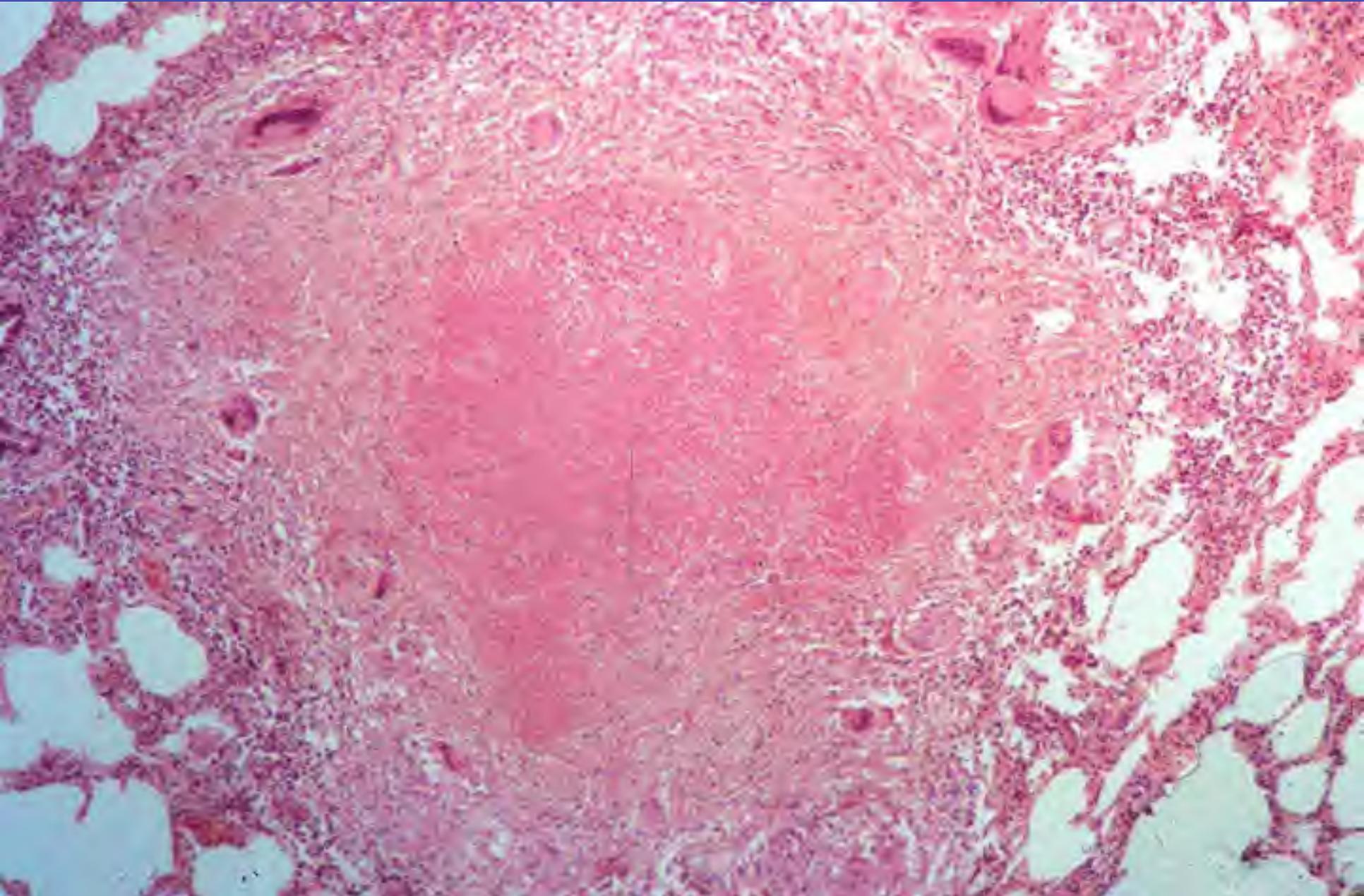


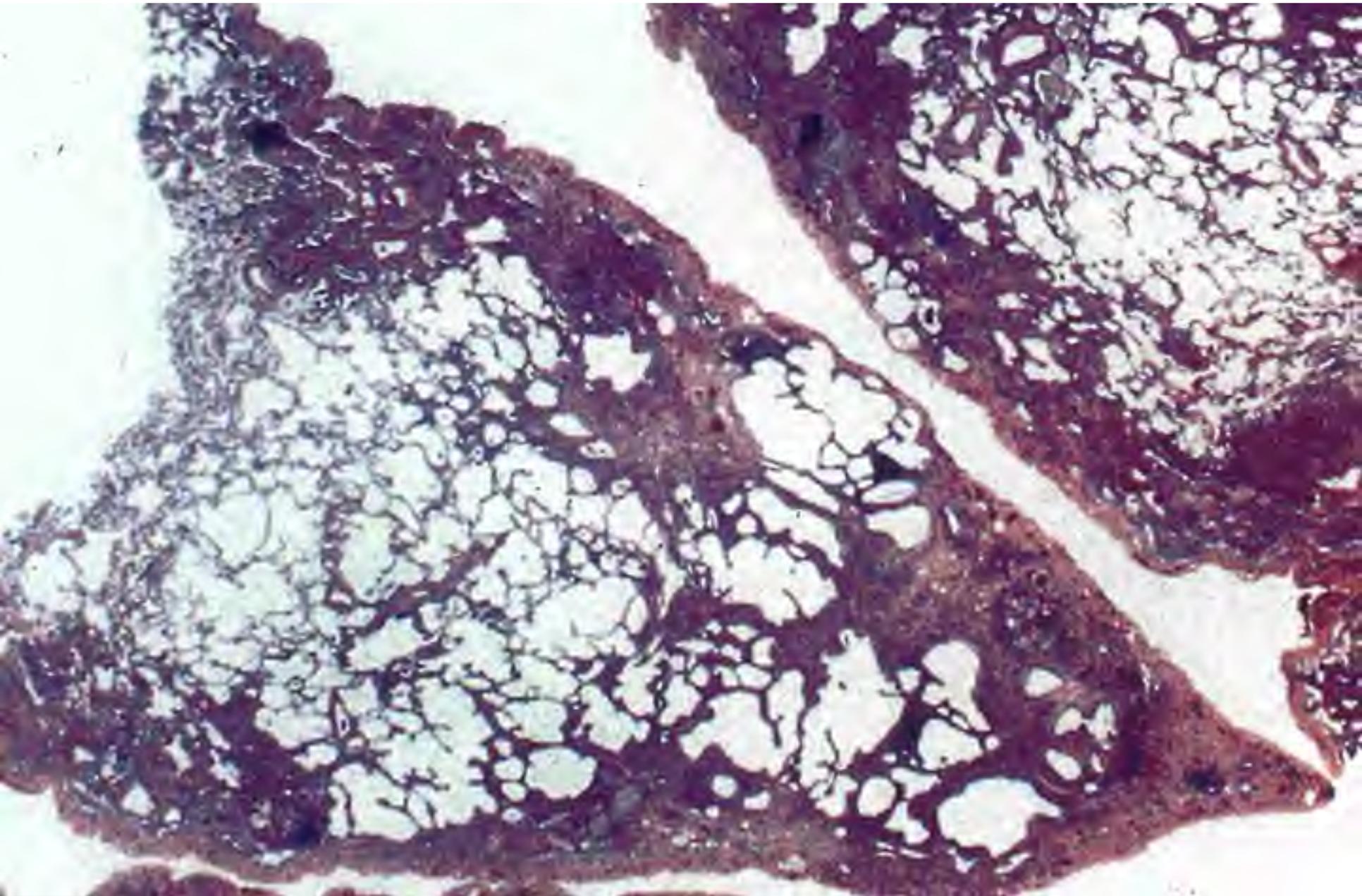


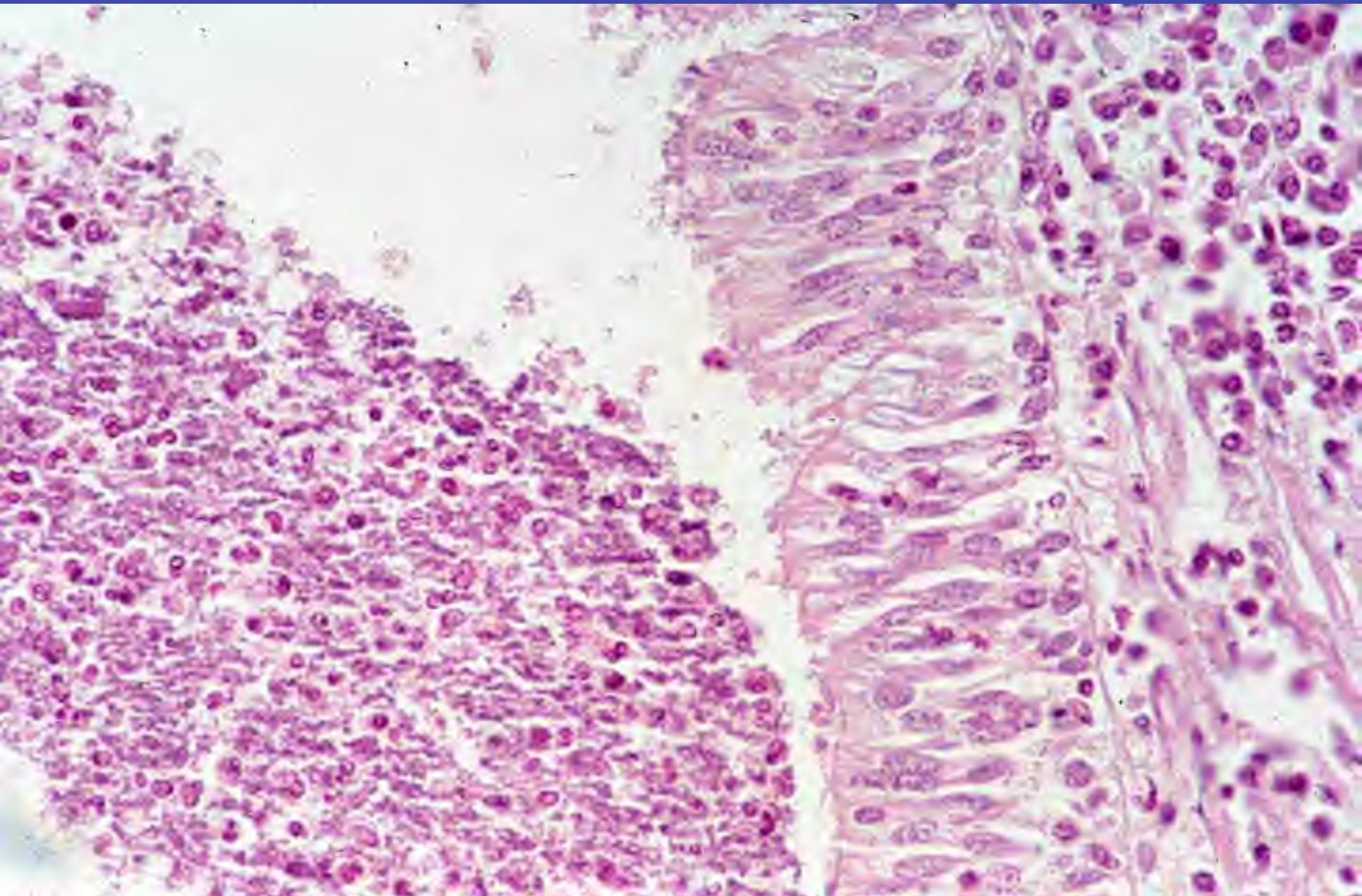


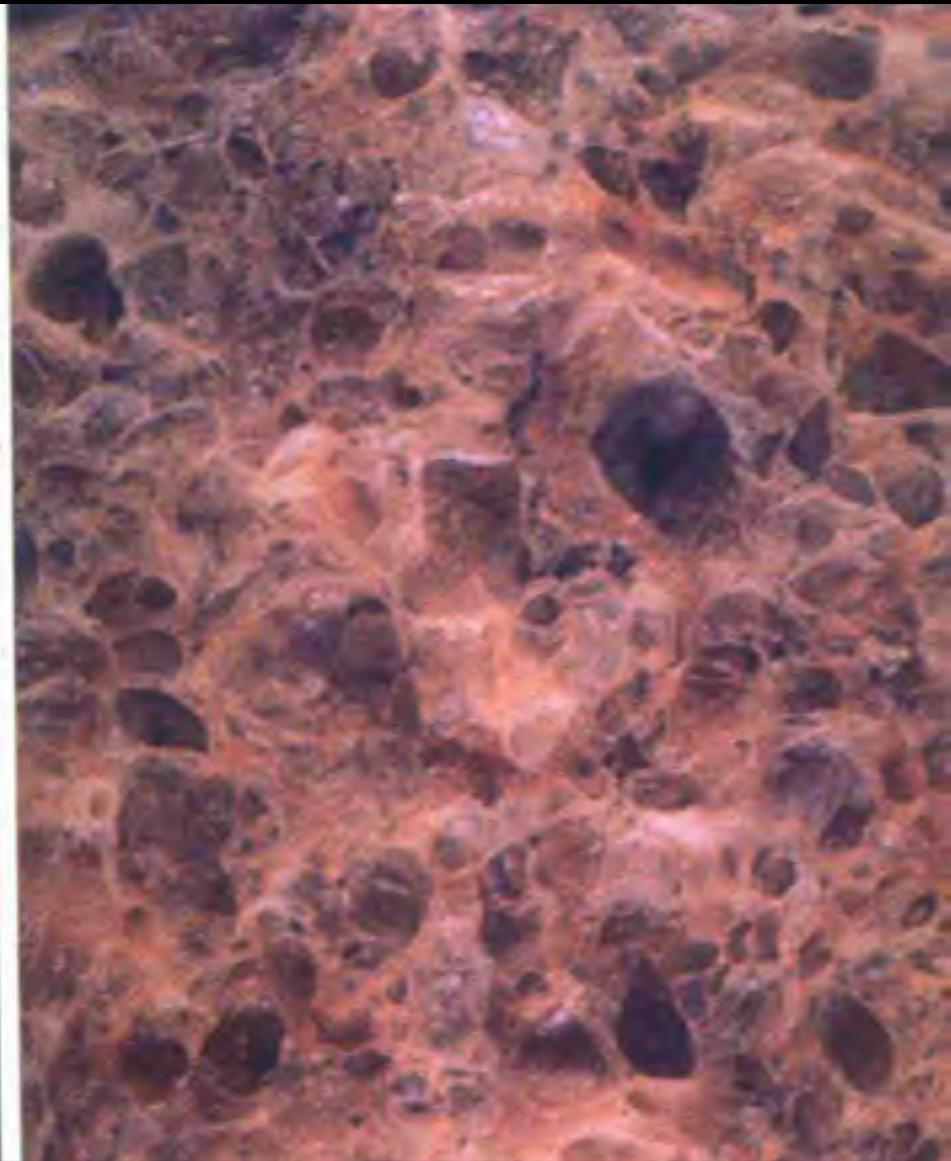
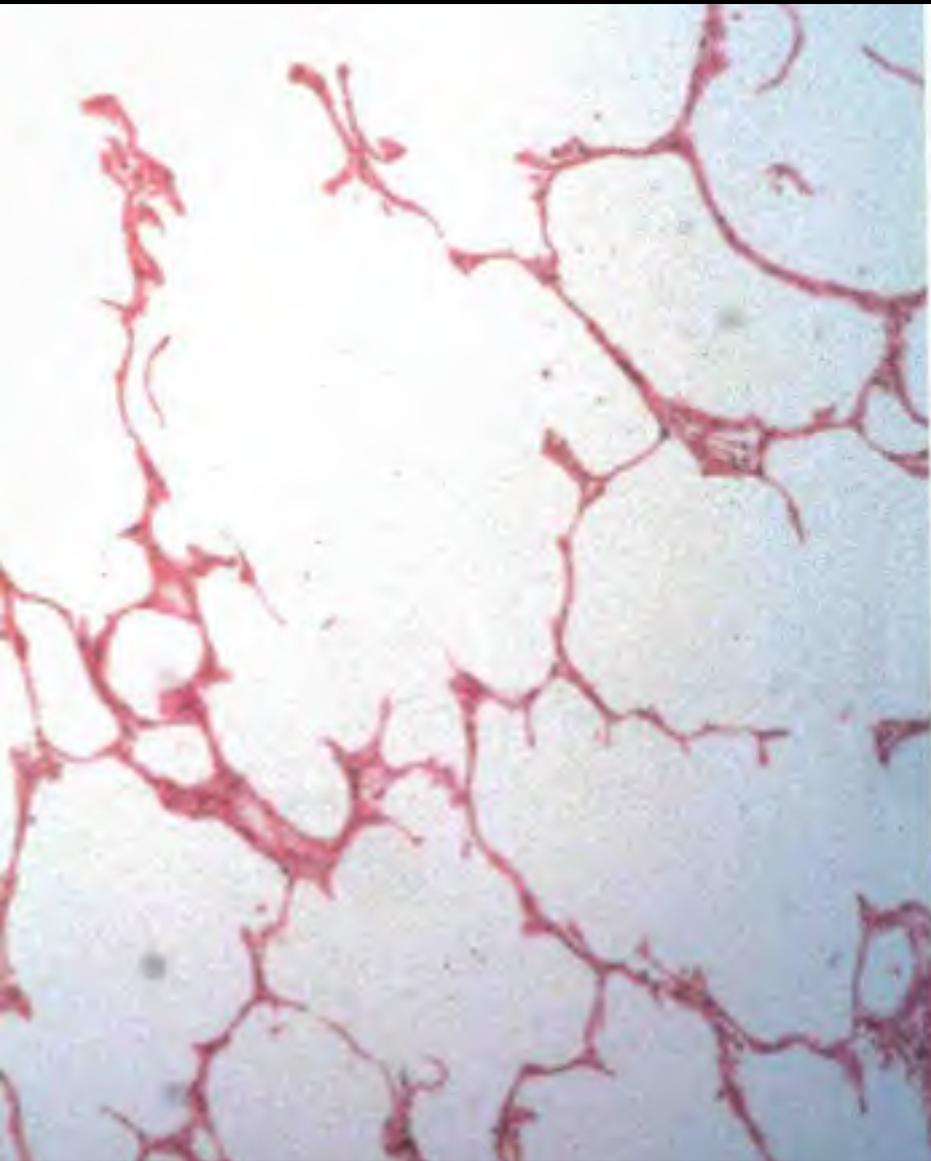


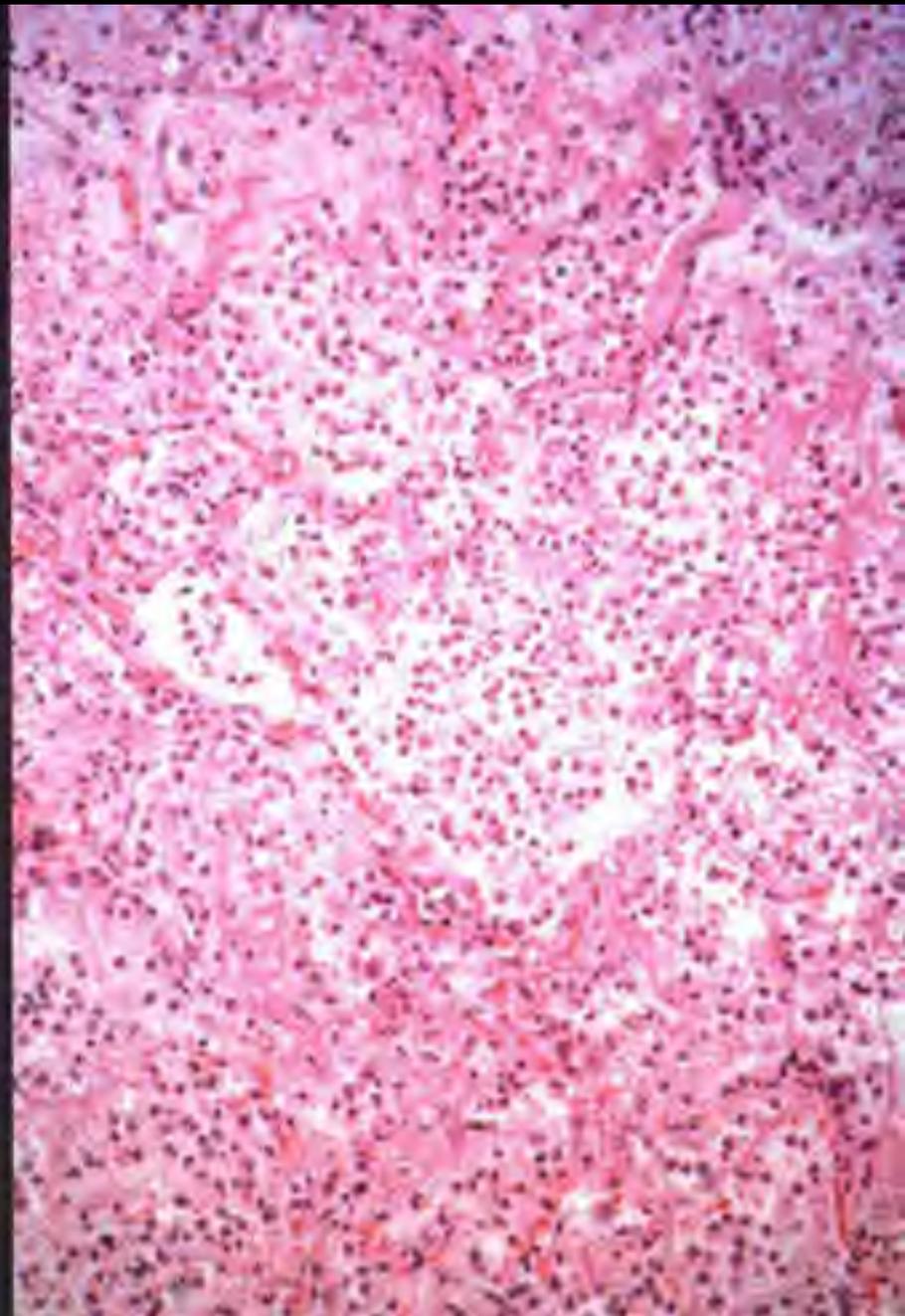
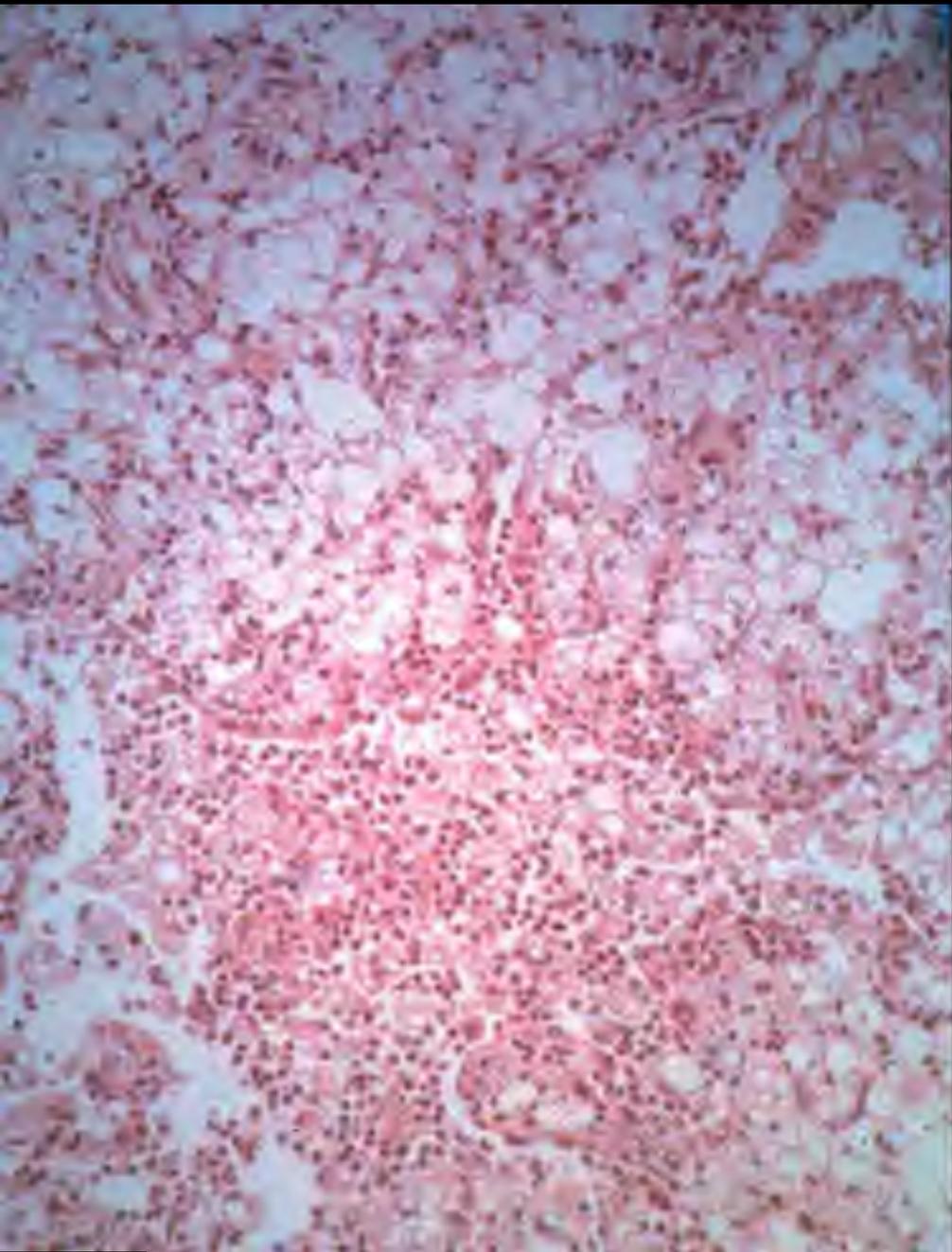


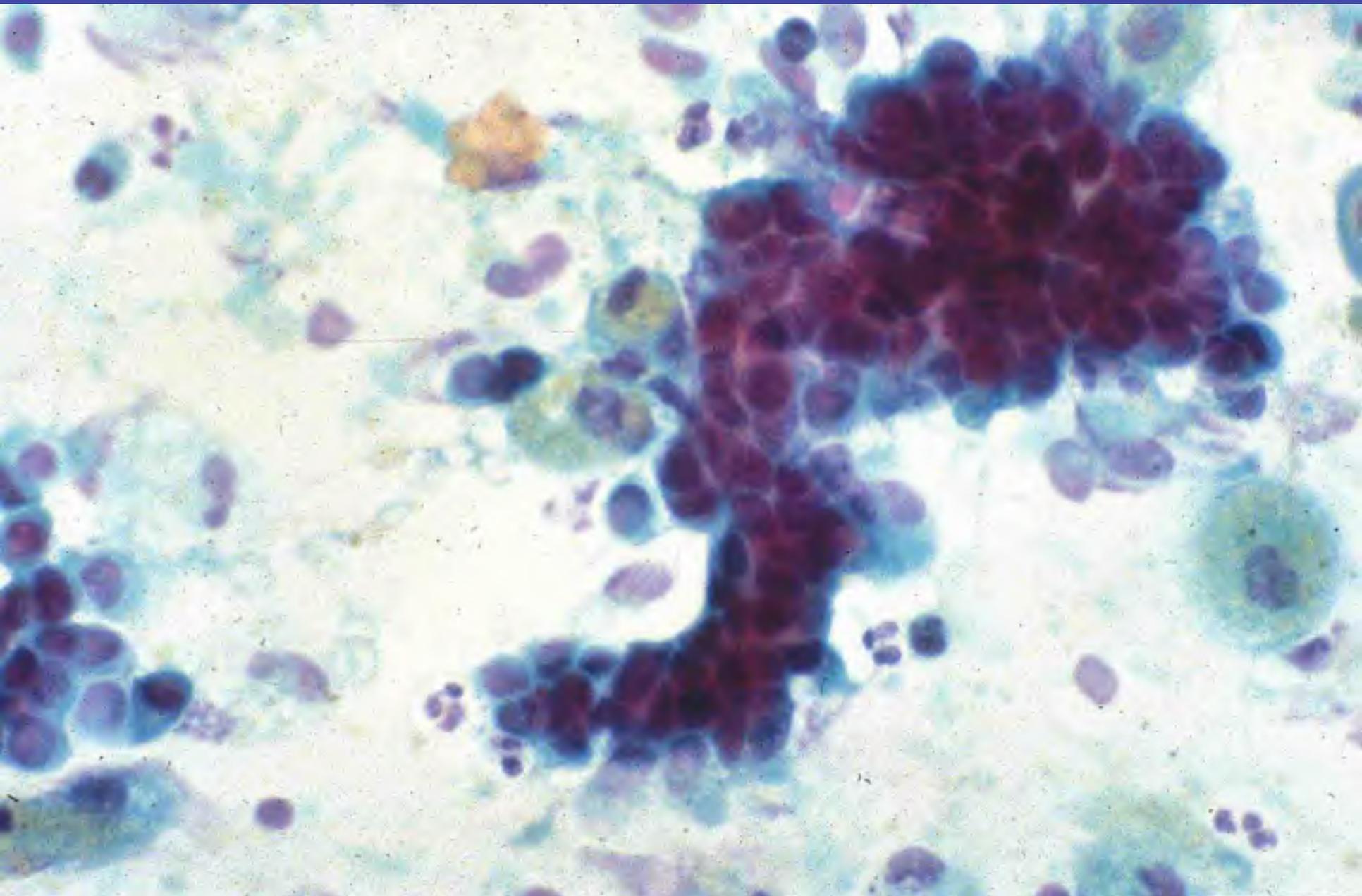


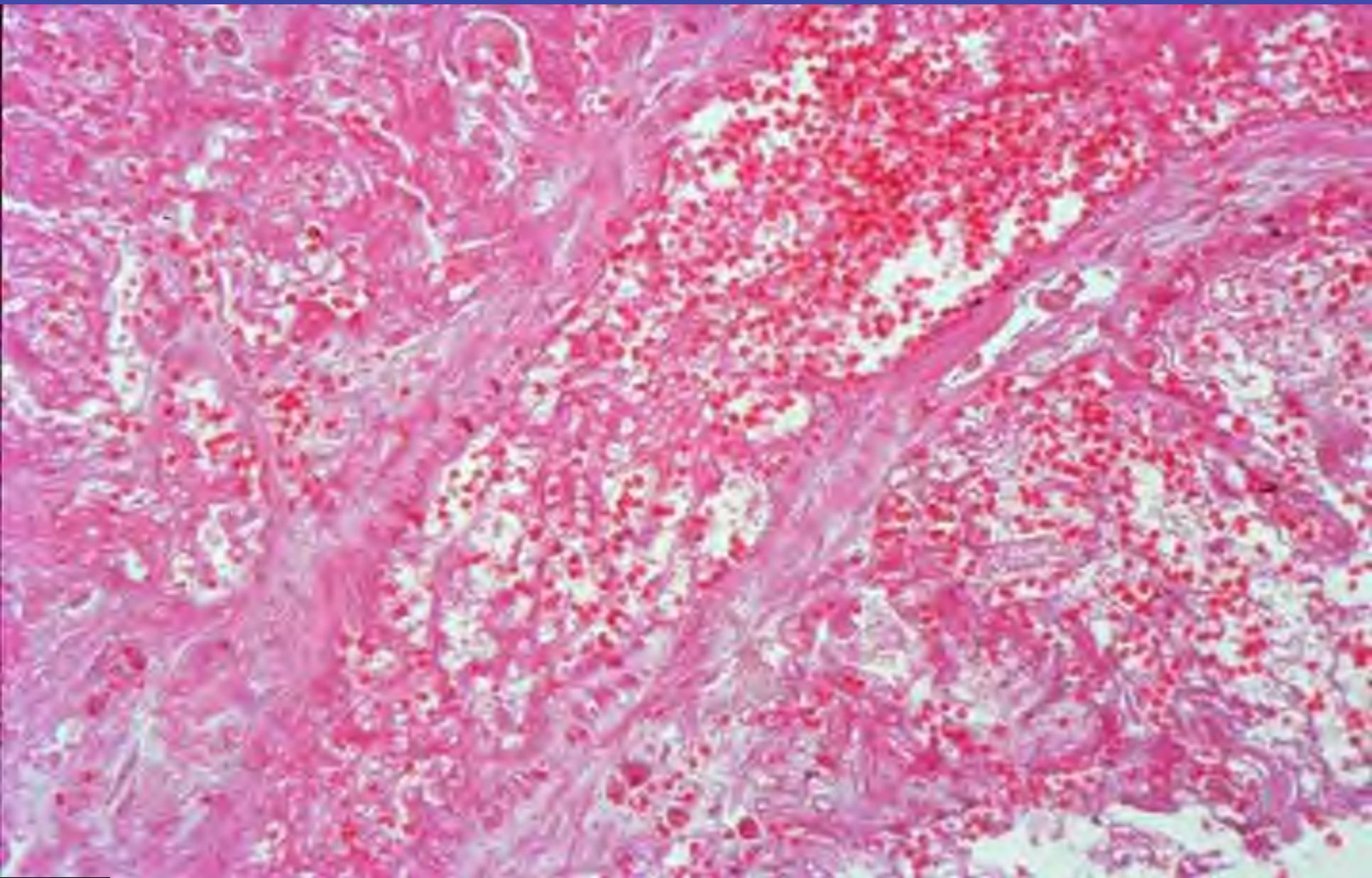


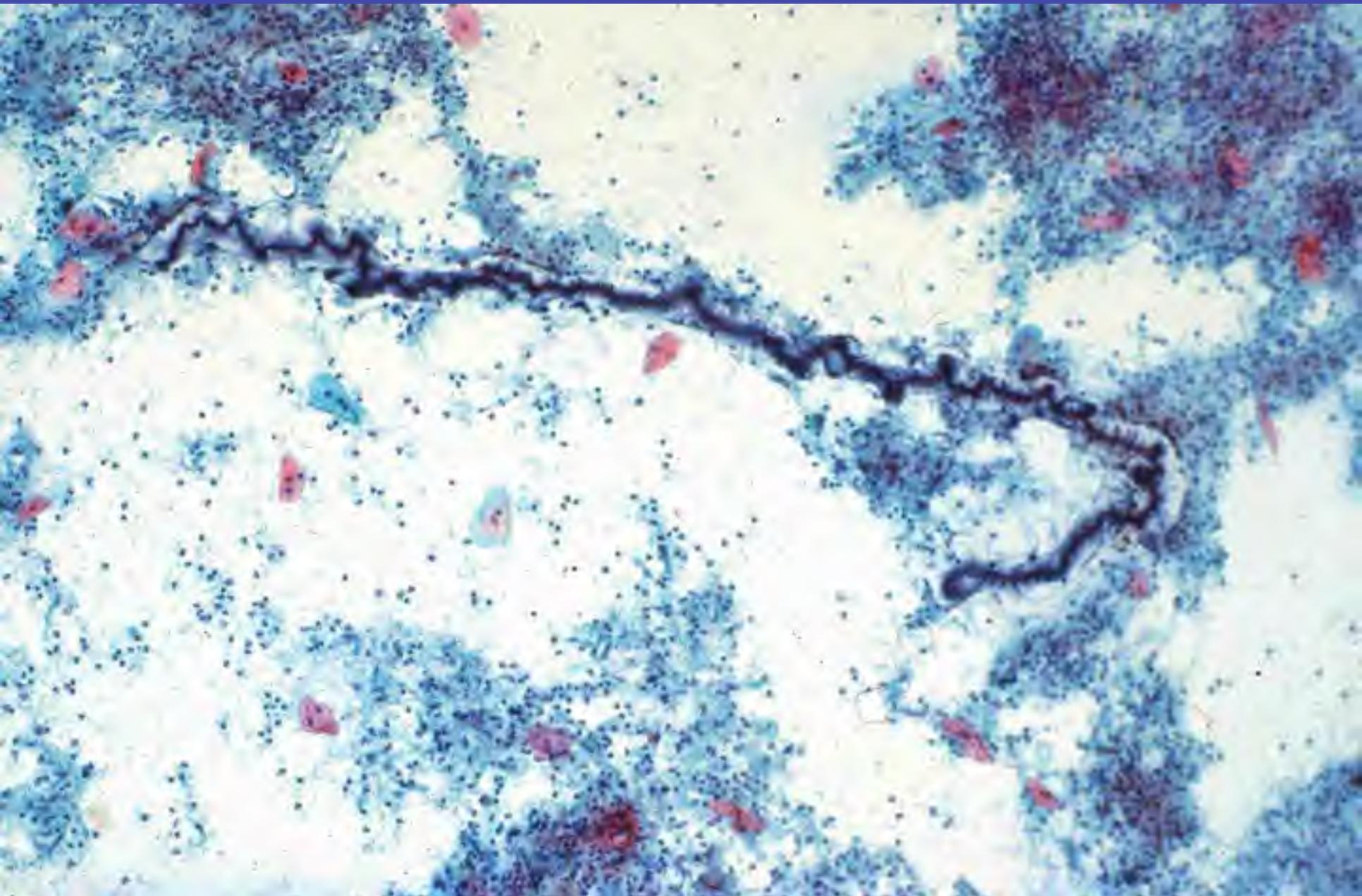


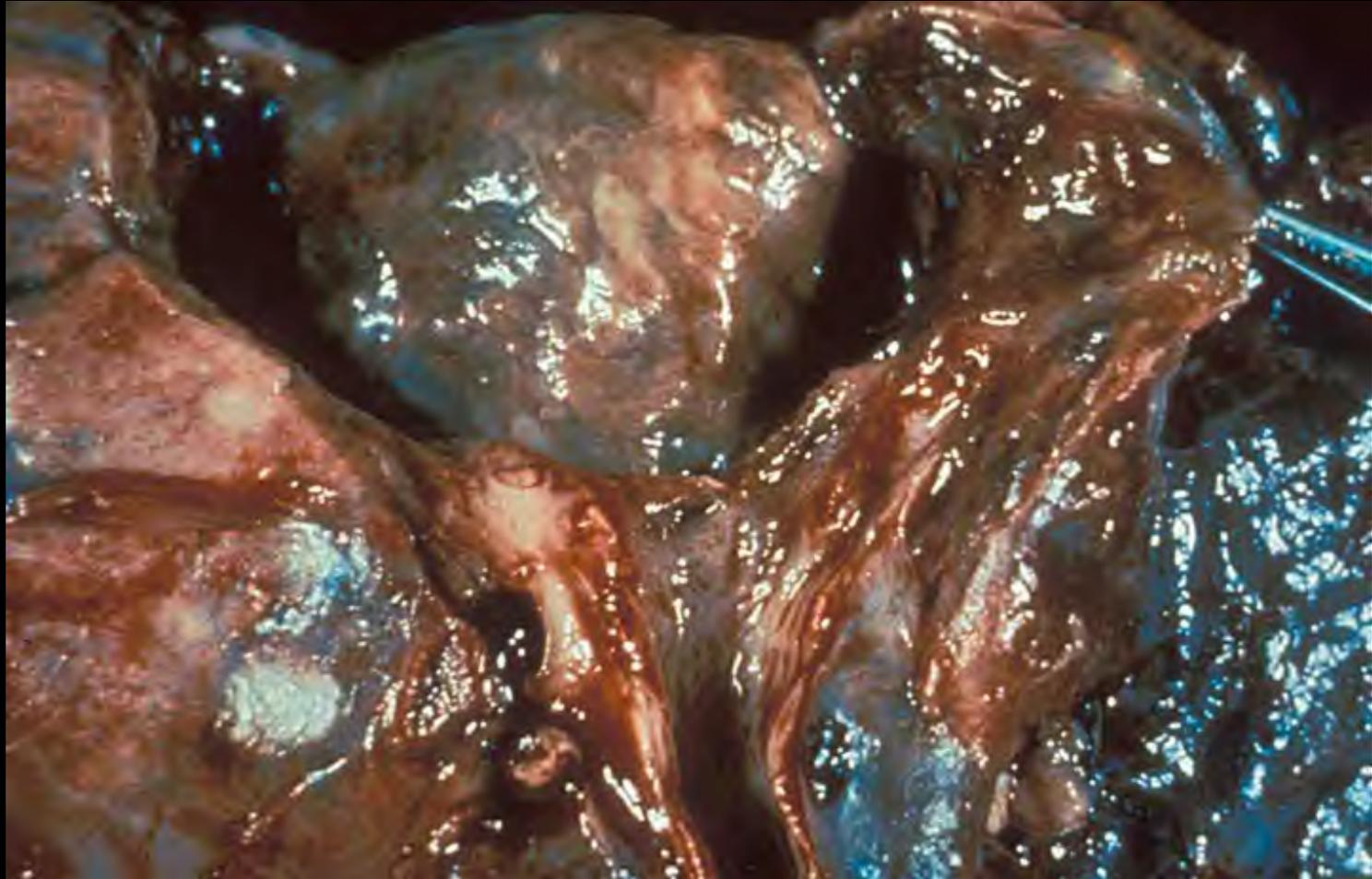








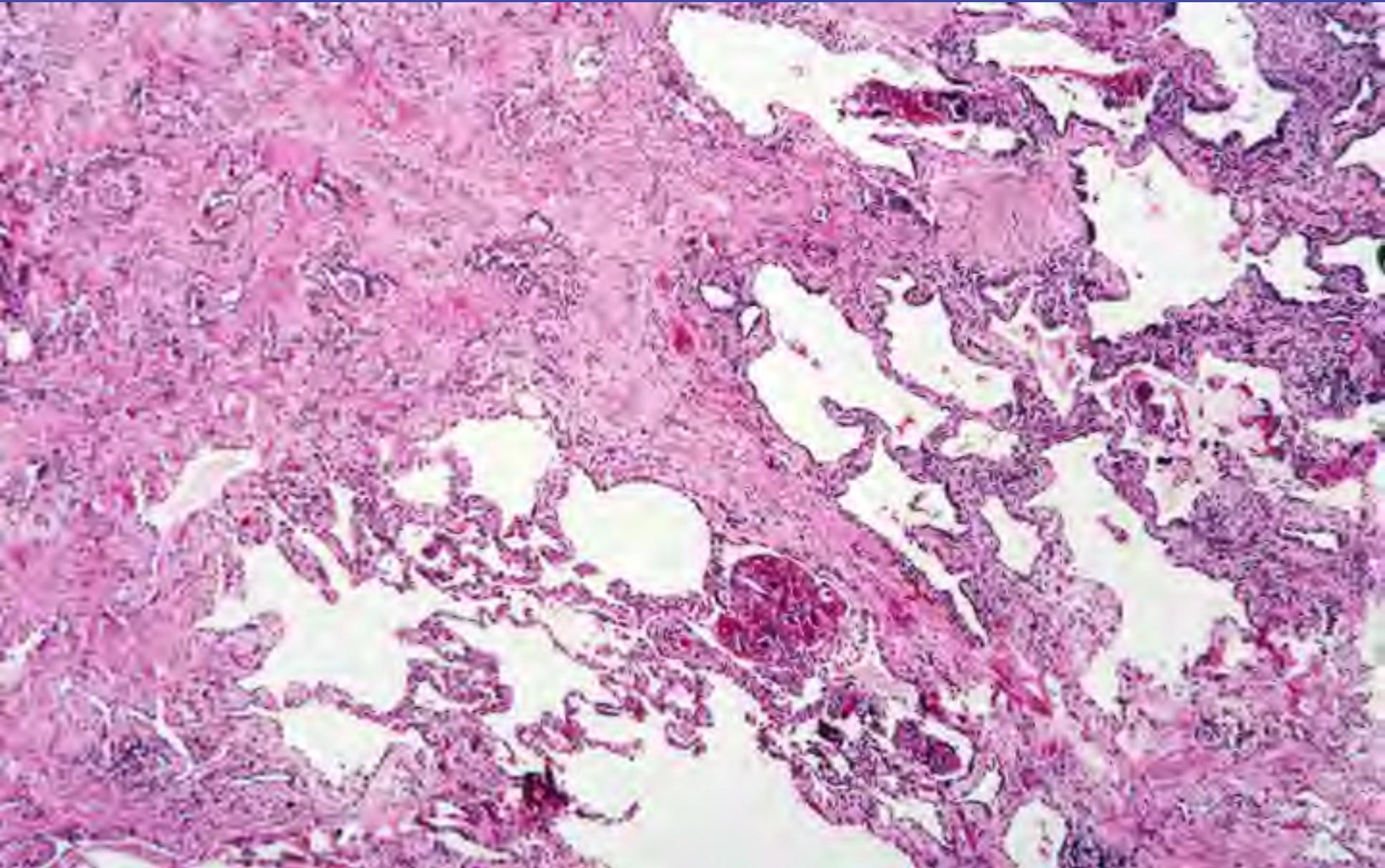




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# Additional Source Information

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