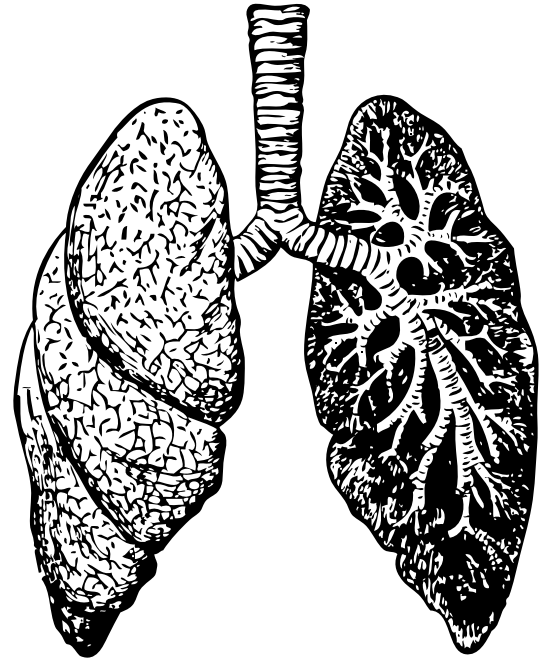


RS- pathology Lab



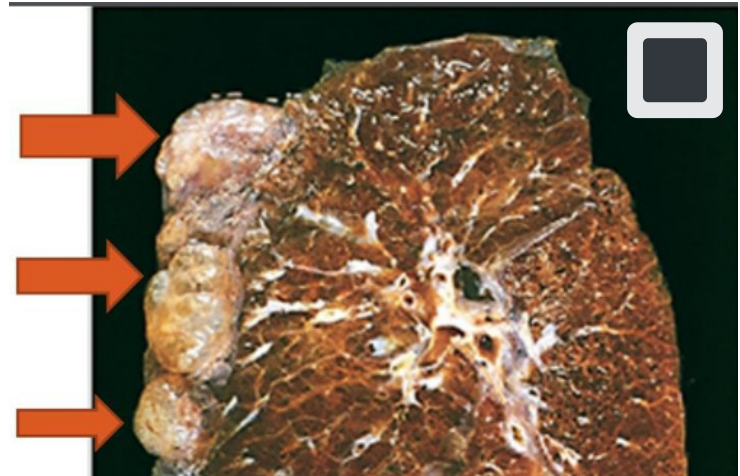
Corrected By :

نُور المِمارمة
سارة الفرجات
محمد الدهامشة

ملاحظة : ملف الدكتور سري ما وضعت كل الصور ، بس
للأحتياط وضعنا كل الصور والي موجود عند ملف
الدكتور عليه (■)

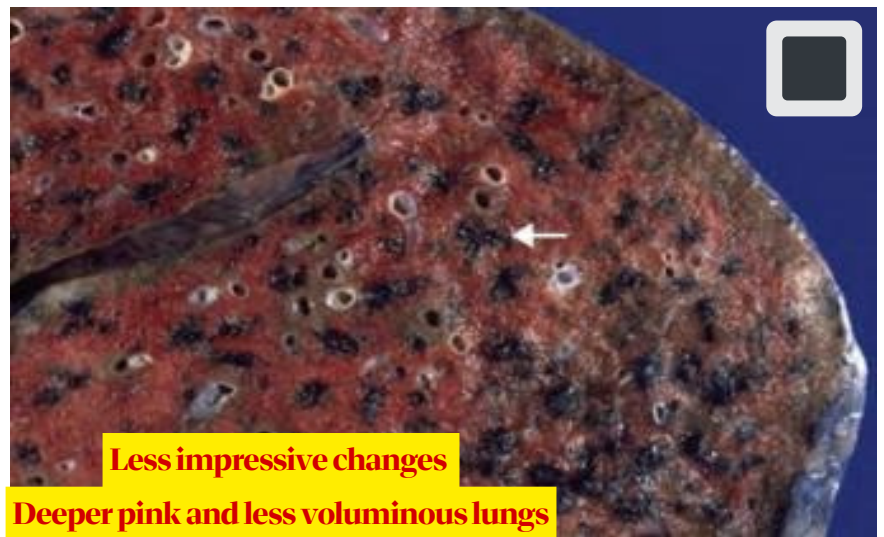
Lecture 1

Bullous **emphysema** with large subpleural bullae



The central lobular **emphysema**

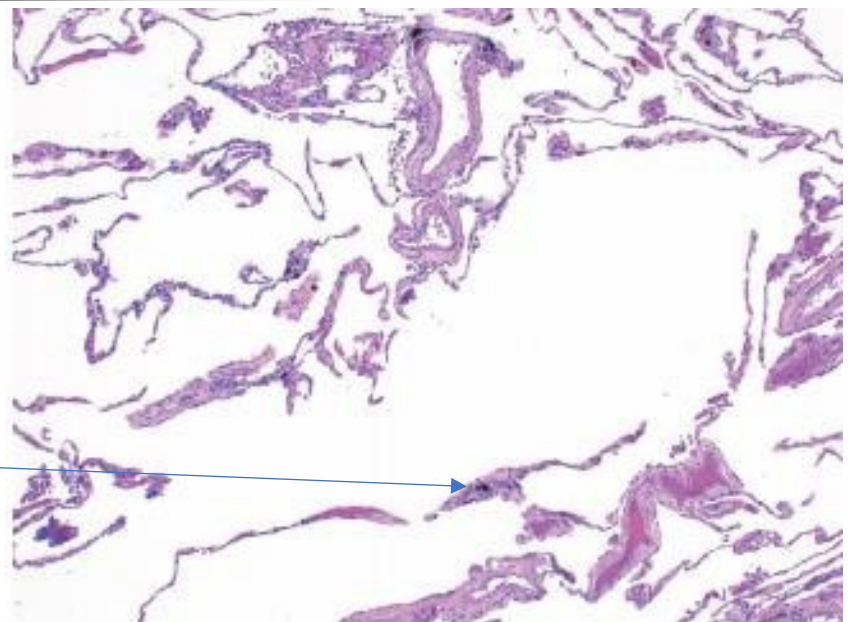
- * loss of lung tissue with intense black anthracotic pigmentation
- * (arrow) is apparent here
- * With alveolar space enlargement .
- * There is no fibrosis.



emphysema

Pulmonary **emphysema**.

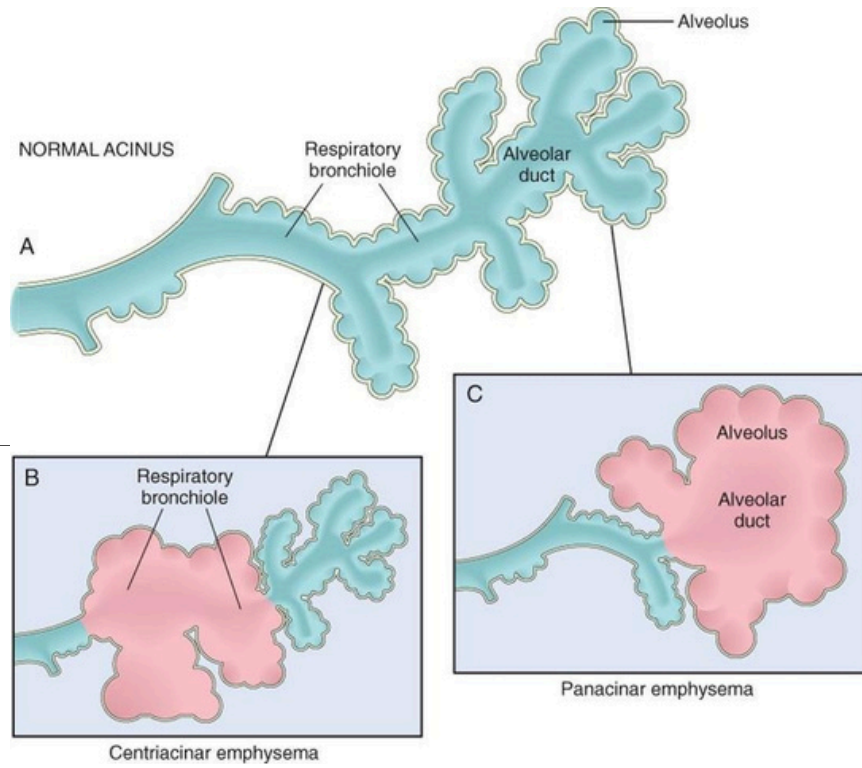
There is marked **enlargement** of the air spaces, with **destruction** of alveolar septa but **without fibrosis**. Note the presence of black anthracotic pigment



Distal acinar emphysema



TYPES OF EMPHYSEMA

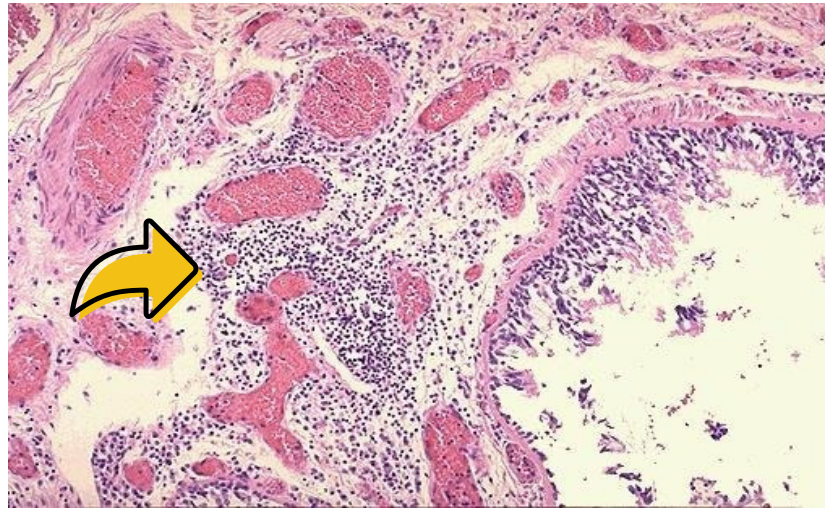


MEDICAL STUDENTS BRAIN



Chronic bronchitis

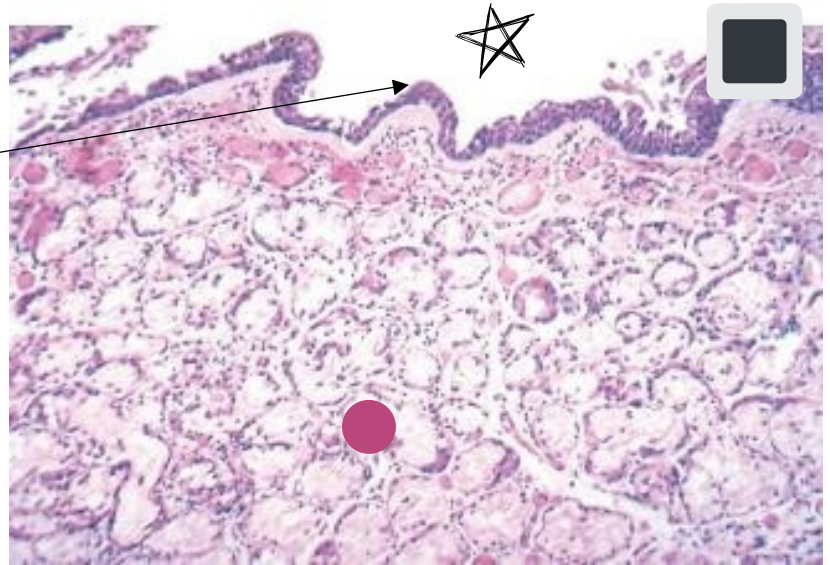
Inflammatory cells



☆ Lumen of bronchi.

Focal squamous metaplasia
Which is one of the adaptive mechanisms to protect the respiratory epithelium in smokers.

● Enlarged mucus gland
approximately twice normal
(diagnostic feature in the trachea and large bronchi).



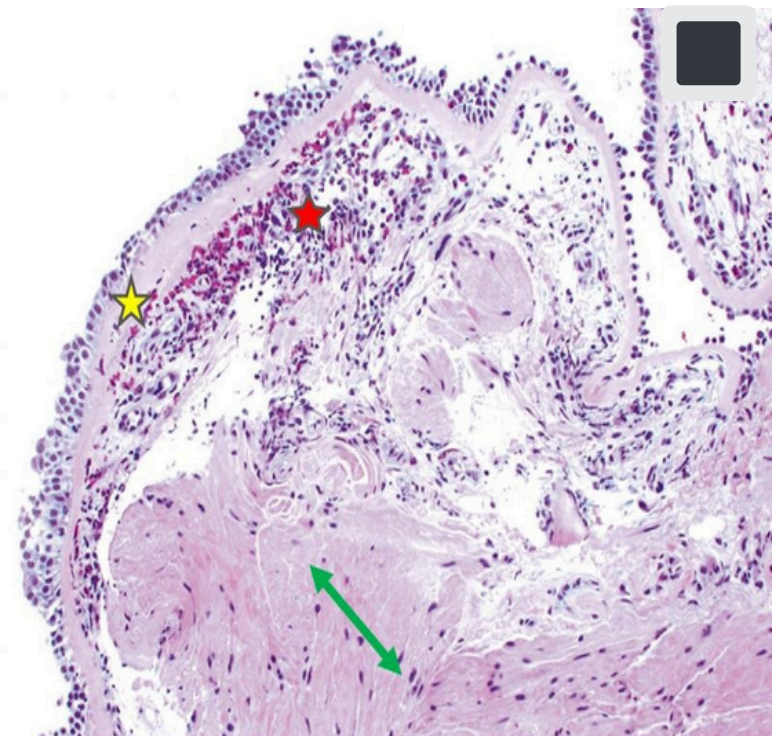
Lecture 2

Asthma

★ Sub-basement membrane fibrosis.

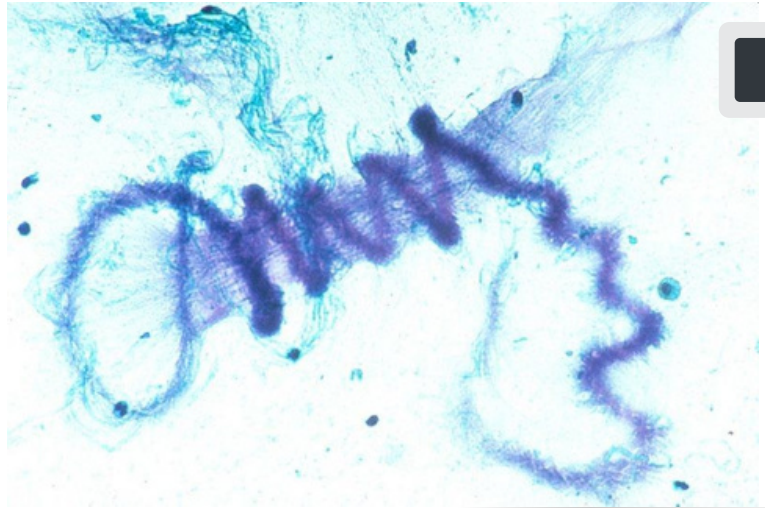
★ Eosinophilic inflammation.

↕ Smooth muscle hypertrophy and hyperplasia.



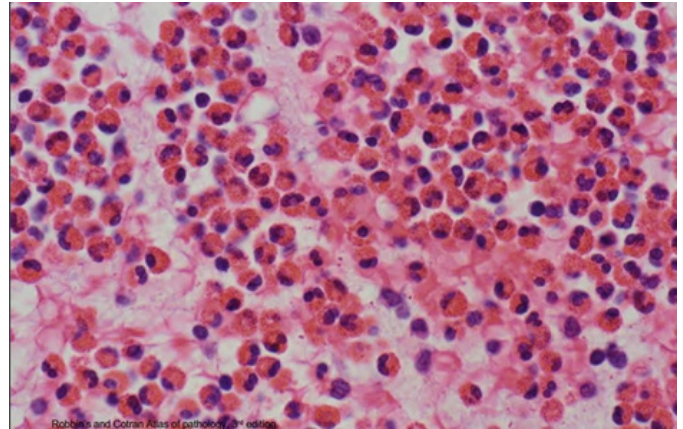
Asthma

mucous plugs contain whorls of shed epithelium called **Curschmann spirals**.



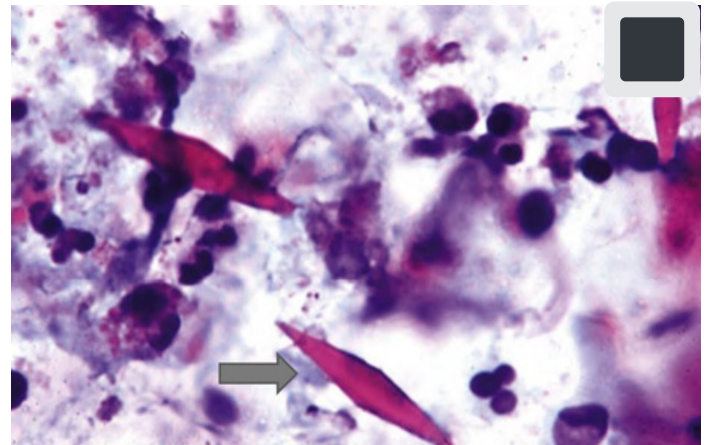
Asthma

Eosinophils are the characteristic cells in asthma



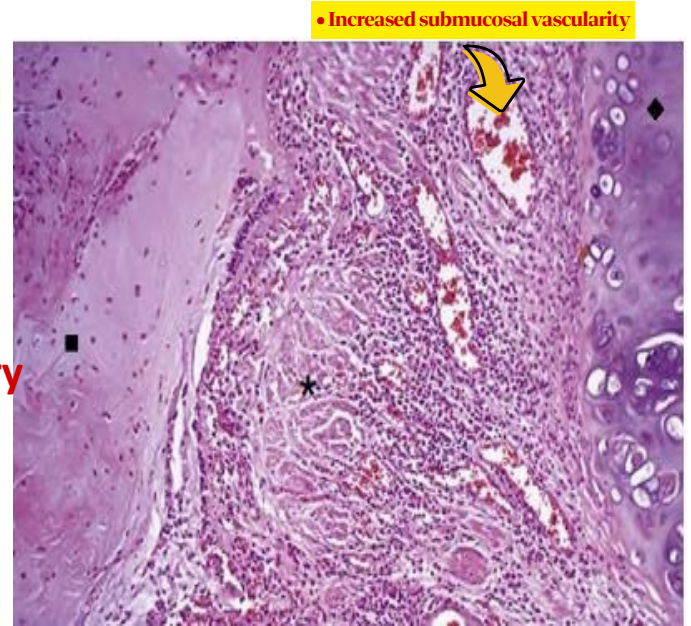
Asthma

Charcot-Leyden crystals: crystalloids made up of the eosinophil protein **galectin-10**.



Asthma

Between the bronchial cartilage on the right (■) and the bronchial lumen filled with mucus on the left(◆) is a submucosa widened by smooth muscle hypertrophy, edema, and an inflammatory infiltrate with many eosinophils(★).

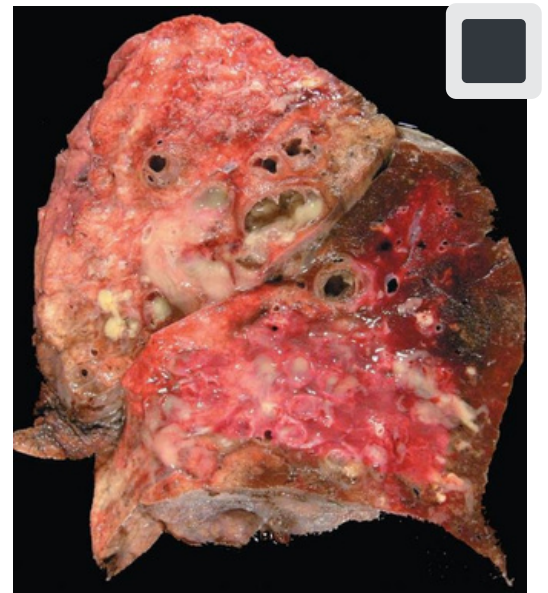


BRONCHIECTASIS

Cut surface of lung shows markedly dilated bronchi filled with purulent mucus that extend to subpleural regions (this patient has cystic fibrosis).

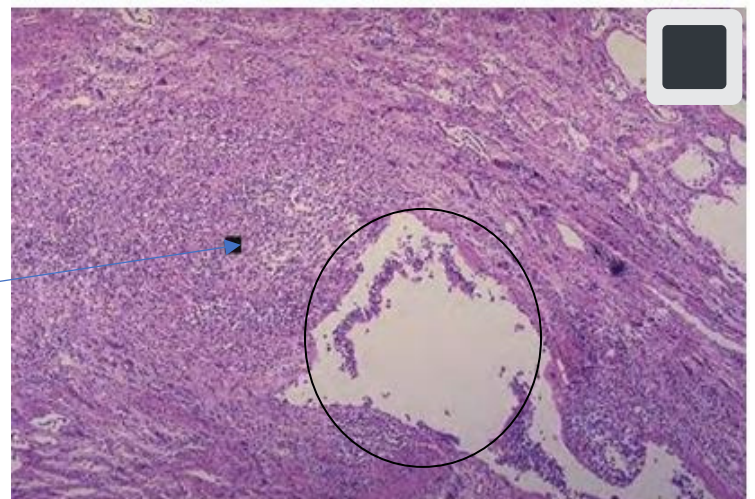
Mainly cause by infection

Staphylococcus aureus or Klebsiella spp أكثر بكتيريا بتسببها



BRONCHIECTASIS

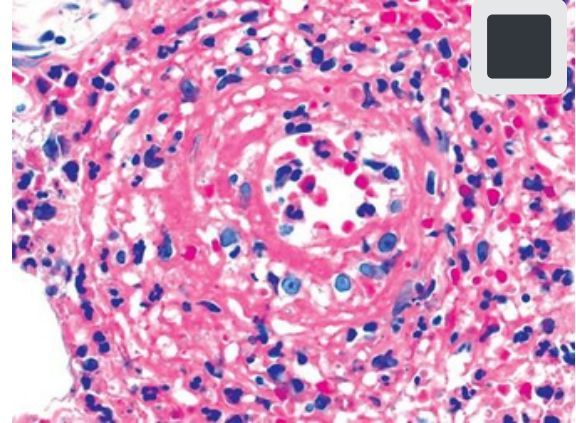
The mid and lower portion of this photomicrograph shows a dilated bronchus in which the mucosa and bronchial wall are not seen clearly because of the necrotizing inflammation with tissue destruction and mostly it's desquamated.



Lecture 3

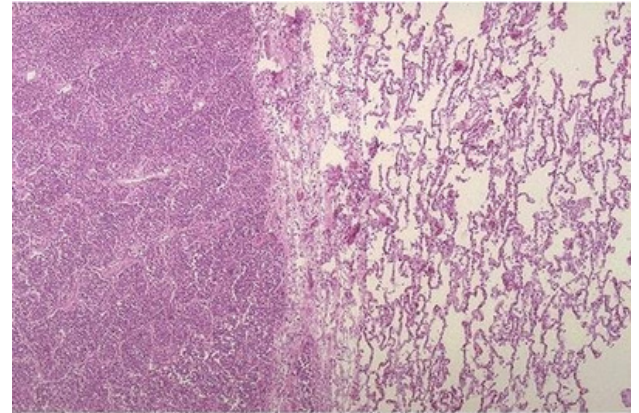
G. Pseudomonas aeruginosa:

is most commonly seen in: nosocomial settings. cystic fibrosis.
Neutropenic patient, usually secondary to chemotherapy. in victims of extensive burns. in patients requiring mechanical ventilation. has a propensity to invade blood vessels at the site of infection, with consequent extrapulmonary spread.
Histologic examination: Pseudomonas vasculitis*



pneumonia

consolidation,” refers to “solidification” of the lung due to replacement of the air by exudate in the alveoli



Lobar pneumonia

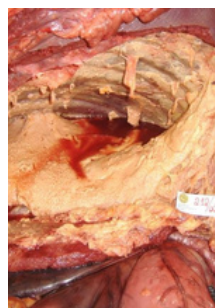
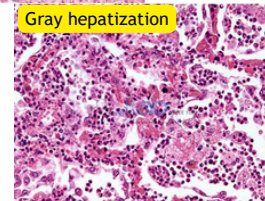
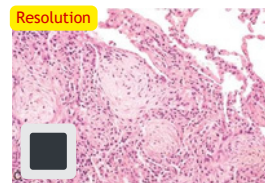
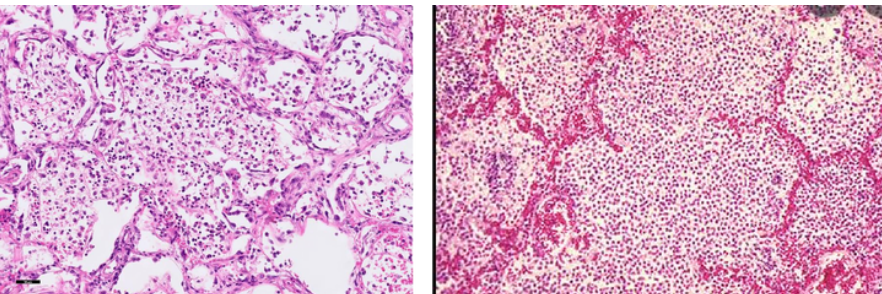
four stages of the inflammatory response

A. congestion:
characterized by vascular engorgement, intraalveolar fluid with few neutrophils, and numerous bacteria.

B. Red hepatization:
characterized by massive confluent exudation, as neutrophils, red cells, and fibrin fill the alveolar spaces.

C. Gray hepatization : marked by progressive disintegration of red cells and the persistence of a fibrinosuppurative exudate.

D. Resolution:
the exudate within the alveolar spaces is broken down by enzymatic digestion to produce granular, semifluid debris that is resorbed, ingested by macrophages, or organized by fibroblasts growing into it.

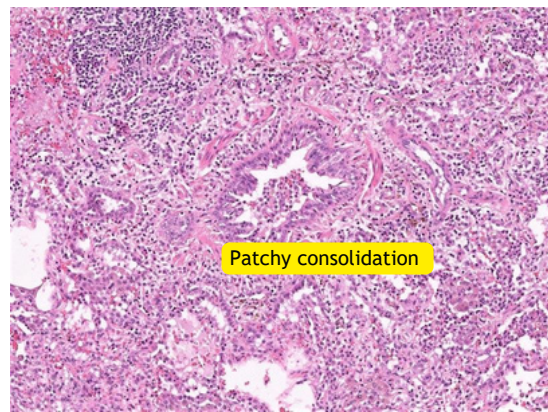
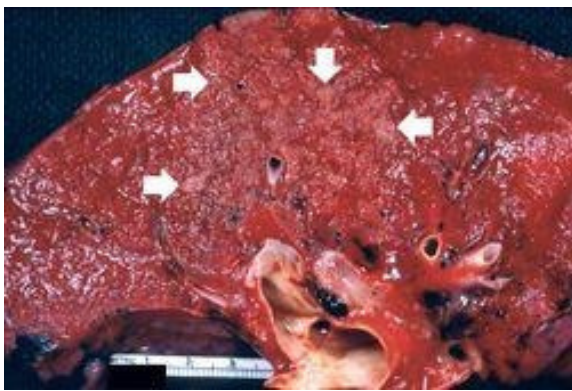


Bronchopneumonia (lobular)

Foci of bronchopneumonia are consolidated areas of acute suppurative inflammation.

The consolidation frequently bilateral and basal because of the tendency of secretions to gravitate to the lower lobes.

Histologically, a neutrophil-rich exudate fills the bronchi, bronchioles, and adjacent alveolar space

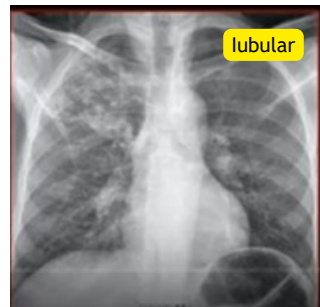
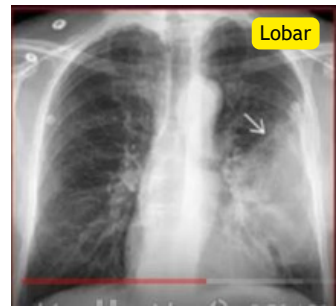


The major symptoms of typical community-acquired acute bacterial pneumonia are: abrupt onset of high fever and shaking chills. cough producing mucopurulent sputum.

When pleuritis is present, it is accompanied by pleuritic pain. Radiology: lobar pneumonia : whole lobe is radiopaque .

bronchopneumonia: focal opacities .

Treatment: antibiotics.

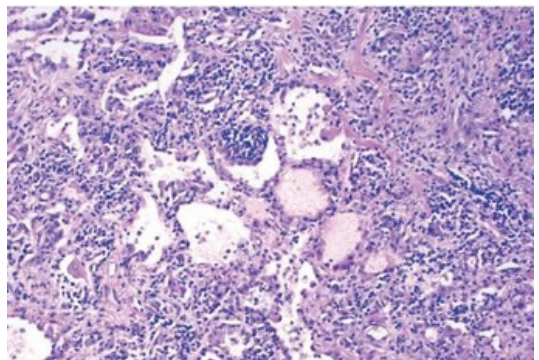


Community-Acquired Viral Pneumonias.

The septa are widened and edematous; they usually contain a mononuclear inflammatory infiltrate of lymphocytes, macrophages and, occasionally, plasma cells.

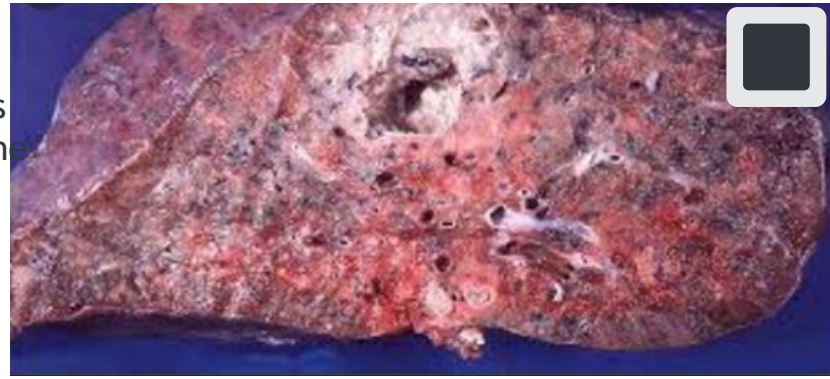
In the classic case, alveolar spaces in viral pneumonias are free of cellular exudate
In the classic case, alveolar spaces in viral pneumonias are free of cellular exudate

There is no neutrophils in viral pneumonia



Lung abscess

refers to a localized area of suppurative necrosis within the pulmonary parenchyma, resulting in the formation of one or more large cavities.

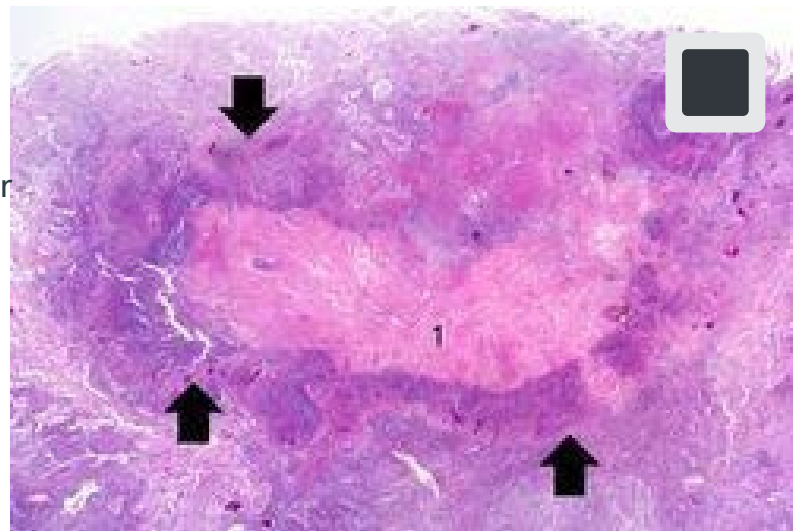


Abscesses range in diameter from a few millimeters to large cavities 5 to 6 cm across.

On histologic examination: The suppurative focus is surrounded by variable amounts of fibrous scarring and mononuclear infiltration (lymphocytes, plasma cells, macrophages), depending on the chronicity of the lesion.

..The causative organism

1. Aspiration of infective material from carious teeth or infected sinuses or tonsils
2. Aspiration of gastric contents.
3. As a complication of necrotizing bacterial pneumonias.
4. Bronchial obstruction.
5. Septic embolism.



Clubbing of the fingers..lung absse or lung tumar

Prominent cough that usually yields copious amounts of foul-smelling, purulent, or sanguineous sputum.

Spiking fever and malaise.

Clubbing of the fingers, weight loss, and anemia.

Abscesses occur in 10% to 15% of patients with bronchogenic carcinoma.



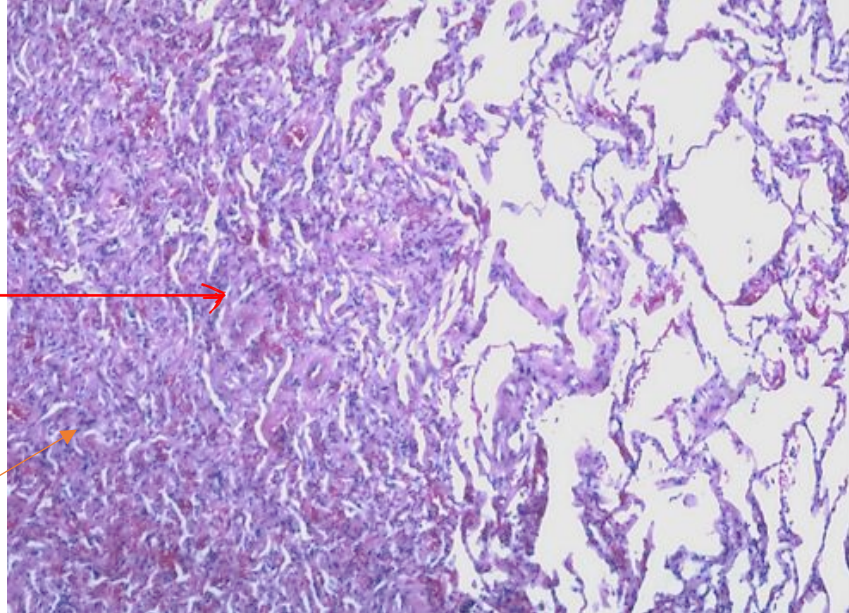
آستغفر الله

Lecture 4

Atelectasis

Macrophages
(Adequate lung biopsy
should contain
macrophages)

Notice air way
collapse

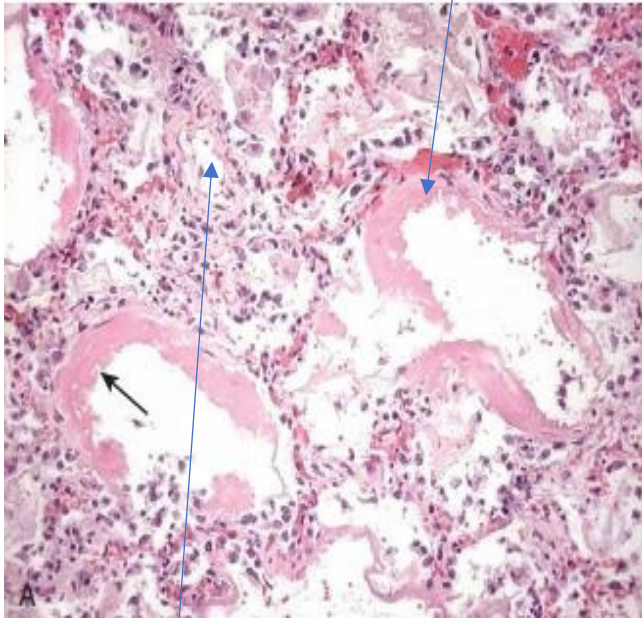


ARDS

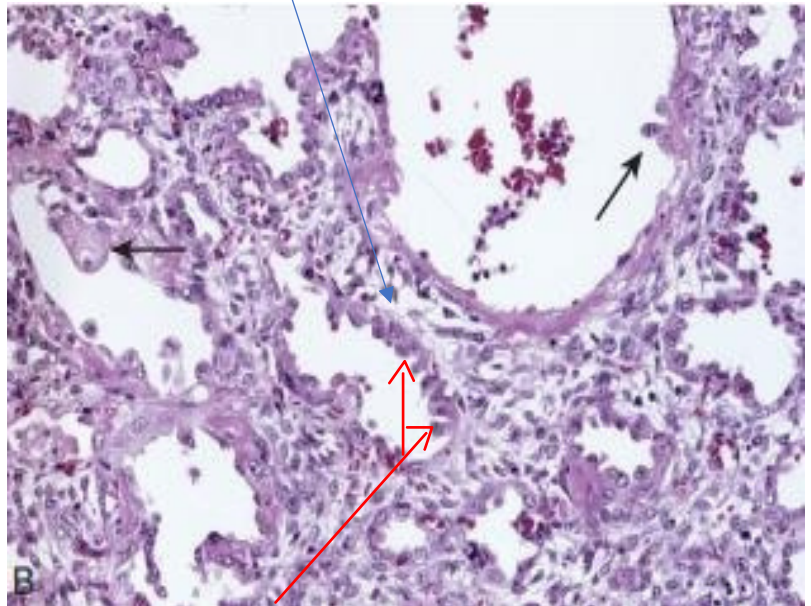
Hyaline membrane

Diagnostic for ARDS

The **healing stage** is marked by resorption of hyaline membranes and thickening of alveolar septa by inflammatory cells, fibroblasts, and collagen.



Collapsed alveoli

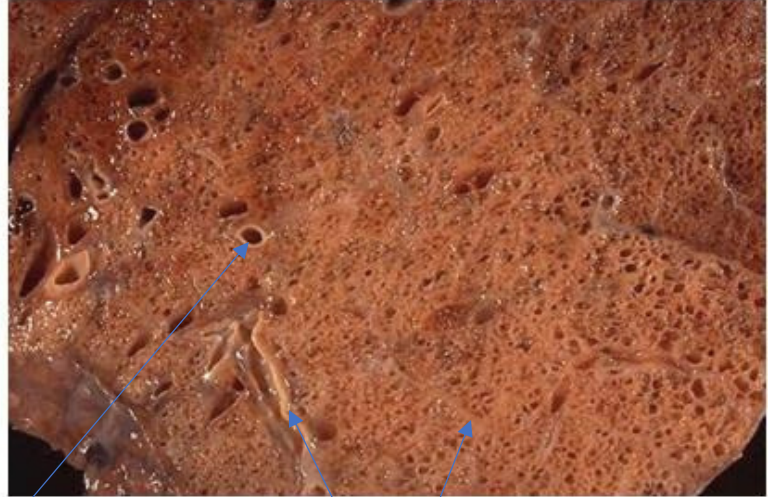


Numerous reactive type II pneumocytes also are seen at this stage (arrows), associated with regeneration and repair.

Lecture 4

HONEYCOMB LUNG (End-stage lung) 'Gross appearance'

Regardless of the cause of restrictive lung diseases, the majority of cases show the same **gross and microscopic finding** (you can't differentiate between the underlying etiology) many eventually lead to extensive pulmonary interstitial fibrosis.

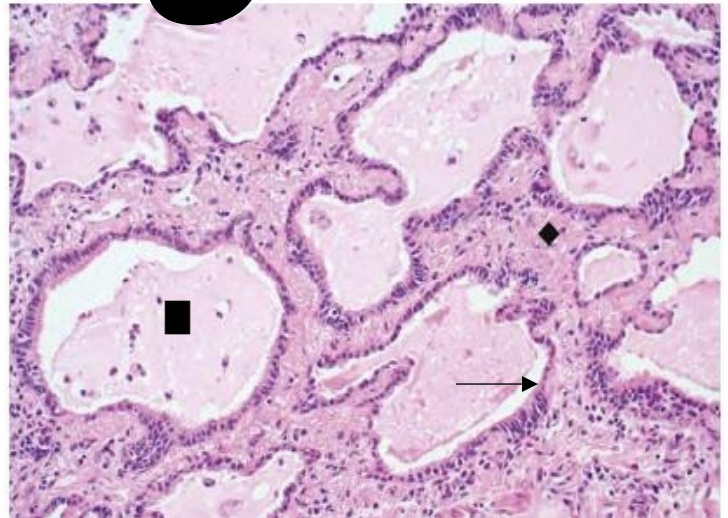


Irregular residual small dilated airspaces between bands of dense fibrous interstitial connective tissue.

مش مطلوب

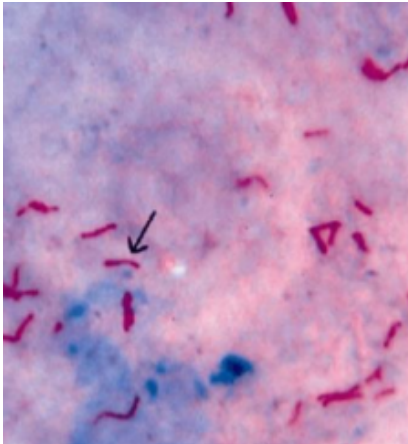
HONEYCOMB LUNG 'Microscopic'

There is dense fibrous connective tissue (◆) surrounding residual airspaces filled with pink proteinaceous fluid (■) These remaining airspaces have become dilated and lined with metaplastic bronchiolar epithelium (→), This produces marked diffusion block to gas exchange, resulting in abnormal ventilation-perfusion ratio and hypoxia.



Lecture 5

TB

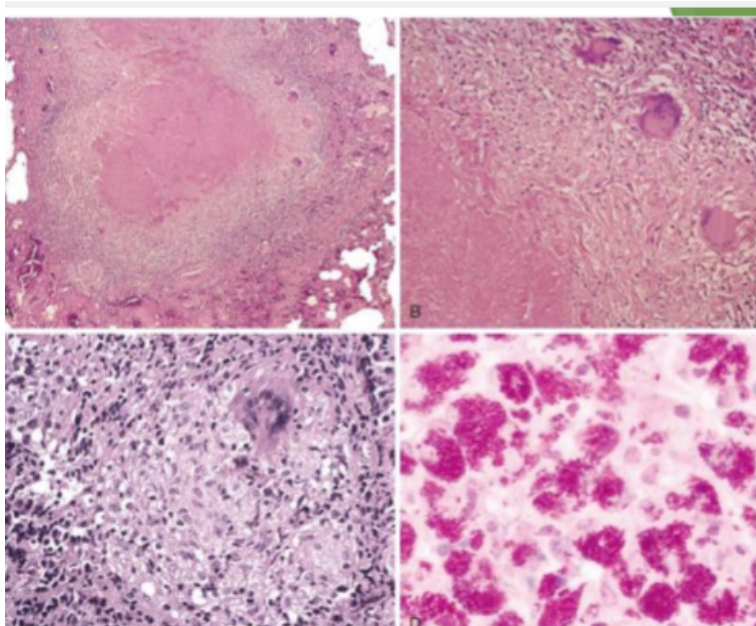


Mycobacteria are slender rods that are acid-fast (i.e., they have a high content of complex lipids that readily bind the Ziehl-Neelsen stain)



A 1-cm to 1.5-cm area of gray-white inflammatory consolidation emerges. This is called the Ghon focus, with caseous necrosis in the center

- Tubercle bacilli, either free or within phagocytes, travel via the lymphatic vessels to the regional lymph nodes
- This combination of parenchymal and nodal lesions is called the Ghon complex



Histologically:

- sites of infection are involved by a characteristic inflammatory reaction :marked by
 - the presence of caseating and noncaseating granulomas, which consist of epithelioid .histiocytes and multinucleate giant cells

Lecture 6

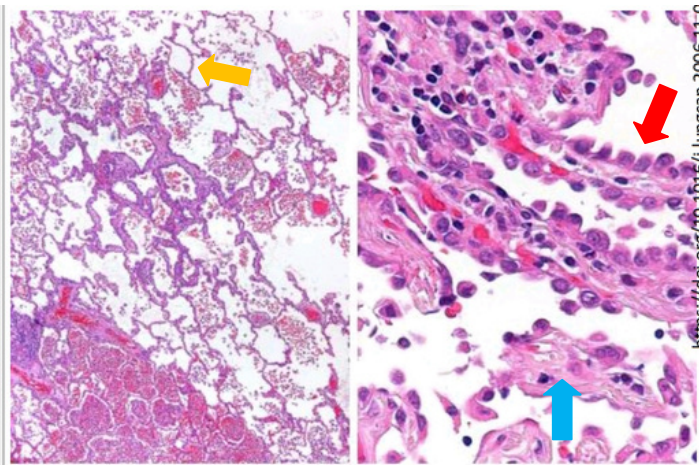


TTF_1 stain is used to distinguish poorly differentiated adenocarcinoma.

Adenocarcinoma

- ➔ Many proliferating gland like structures, these glands (acini) are surrounded by desmoplastic reaction.
- The small box at the right corner shows thyroid transcription factor 1(TTF-1) positivity(brown nuclear staining)

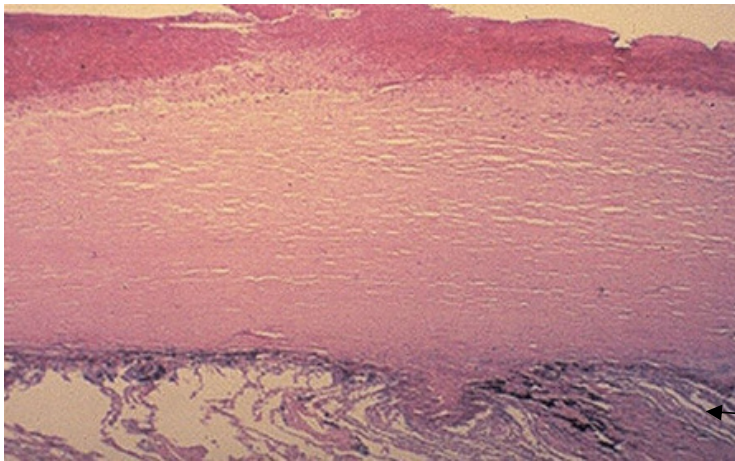
Usually we use TTF-1 immune stain in histopathology lab to highlight tumors of lung origin , and it shows positive expression in the majority of pulmonary adenocarcinoma.



Atypical adenomatous hyperplasia (AAH)

(AAH)

- Precursor lesion for ADENOCARCINOMA
- ➔ Almost normal alveolar walls (look how thin it is)
- Proliferation of hyperchromatic cuboidal epithelium lining with some degree of cytologic atypia, this epithelia lining lines up the alveolar walls.
- ➔ Mild interstitial fibrosis.



Asbestosis

Pleural plaques (most common manifestation of asbestos exposure) (gross appearance)

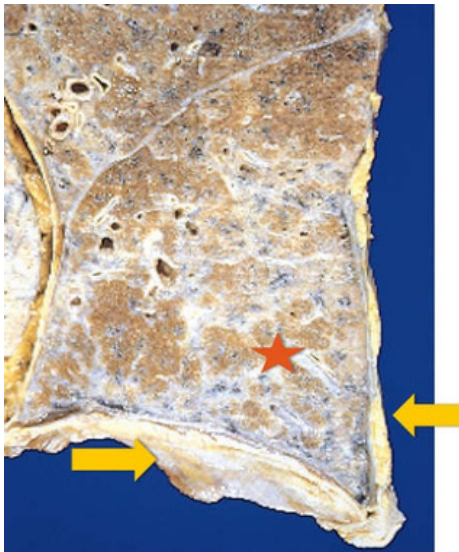
tan-white multiple pleural plaques on the **pleural aspects of the diaphragm**, they develop most frequently on the anterior and posterolateral aspects of the parietal pleura and over the domes of the diaphragm.

Multiple fibrotic nodules commonly indicate asbestosis (not always).

Asbestosis

Pleural plaques (histologically)

pleural plaque is composed of dense laminated layers of collagen. (A cellular fibrosis)

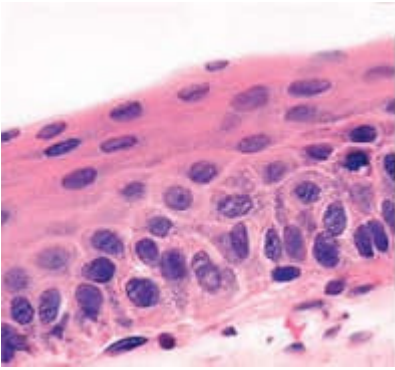


Asbestosis

Gross appearance of two important findings:

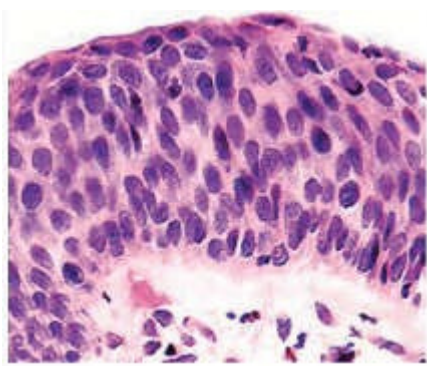
1- markedly thickened area of the visceral pleura covering the lateral and diaphragmatic surface of the lung.

2- the area under the red star shows severe interstitial fibrosis diffusely affecting the lower lobe of the lung



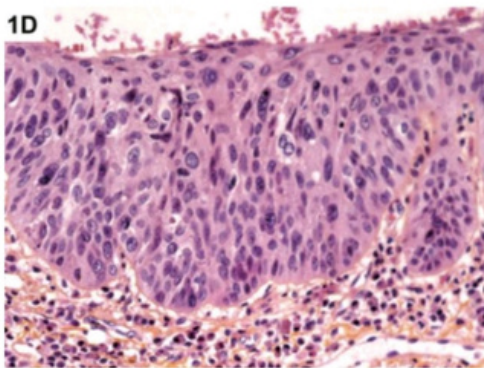
□ Squamous metaplasia

- The normal respiratory epithelium (ciliated, pseudostratified columnar epithelium) is replaced by squamous epithelium.
- can be mild, moderate or sever.



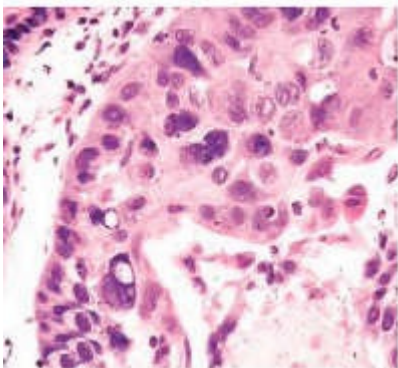
□ Squamous dysplasia.

- Characteristic by the presence of disorder squamous epithelium , with loss of nuclear polarity ,nuclear hyperchromasia ,pleomorphism and mitotic figures.



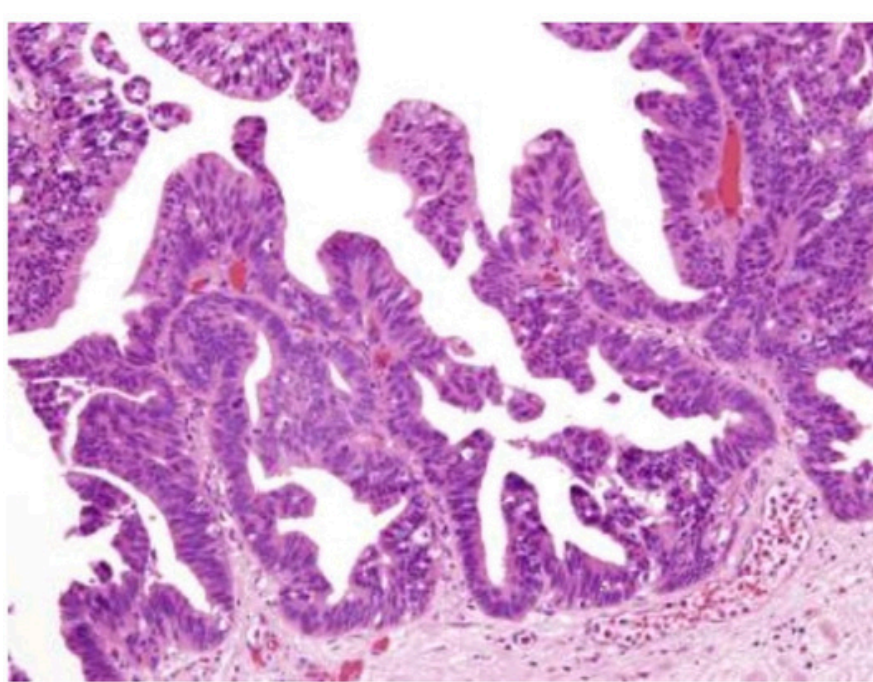
□ Carcinoma in situ (CIS)

- Full thickness of Squamous epithelium showing cytologic atypia an lacking the basement membrane destruction , happened immediately before invasive squamous cell carcinoma



□ Invasive squamous cell carcinoma

- Invasive squamous cell carcinoma lesions show cytologic atypia and basement membrane invasion.**
- And these lesions can be classified into well-differentiated, moderately differentiated and poorly differentiated according to the cytologic feature and the squamous cell differentiation in each type.**



Adenocarcinoma in situ

(AIS) -mucinous subtype.

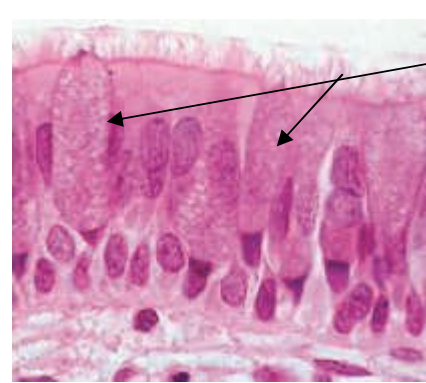
- Atypical adenomatous hyperplasia (AAH) progress into adenocarcinoma in situ (AIS) in a stepwise fashion
- □ Monolayer proliferation of atypical cells, these atypical cells are proliferation along the alveolar septa with (- no destruction, no desmoplasia, no invasion-) of the preexisting alveolar septa.

→ □ The preexisting alveolar septa.

□ Atypical cells (nuclear enlargement, hyperchromasia)

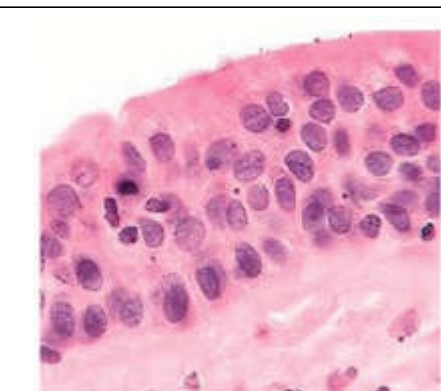
→ □ Apical mucin

□ So if you see this slide in the exam the first thing you can notice is the (★ alveolar spaces) but the alveolar septa in this section is somehow abnormal (you can notice hyperchromasia and nuclear enlargement) so you are looking at atypical cells that is only of one layer (Monolayer proliferation) and the alveolar septa is not destroyed (no invasion). SO it is adenocarcinoma in situ, and as you can see **apical mucin** it is mucinous subtype.



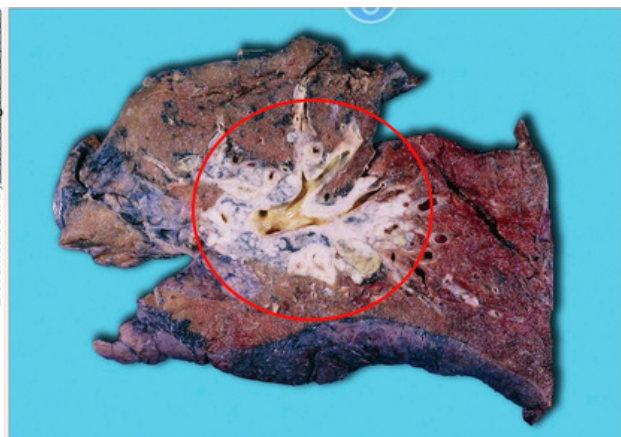
Goblet cell hyperplasia

- One of the earliest and mild change in **smoking-damaged respiratory epithelium**.



Basal cell (or reserve) hyperplasia

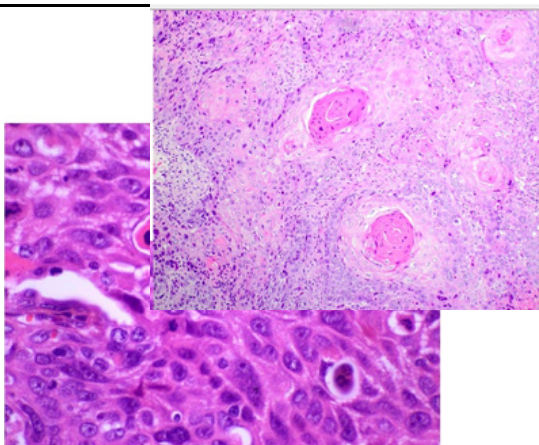
- Another **smoking related** adaptive response



☐ **squamous cell carcinoma (gross appearance)**

➔ ☐ Pale yellow white central area accounting for lung carcinoma, that start centrally and then grows to peripheral lung parenchyma.

Any large cavitation of lungs : 1) abscess
2) squamous cell carcinoma.



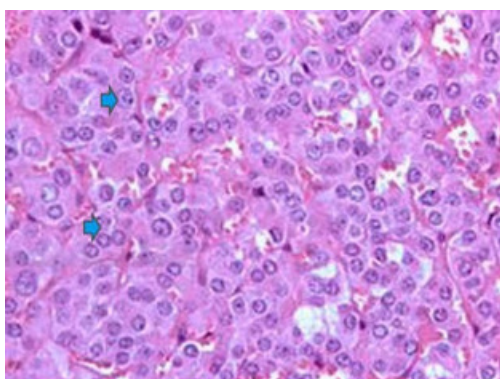
☐ Well differentiated **squamous cell carcinoma**

showing keratin pearls and intercellular bridges.

➔ Keratin pearls.

(Seen only in squamous differentiation).

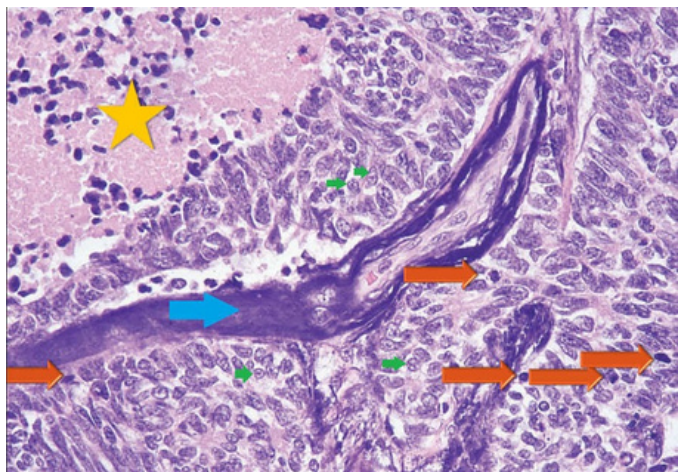
➔ Intercellular bridges (desmosomes)



Lecture 8

☐ **Small Cell Carcinoma.**

➔ Monomorphic proliferation of a relatively small cells with finely granular chromatin with salt and pepper appearance.



☐ **Small Cell Carcinoma**

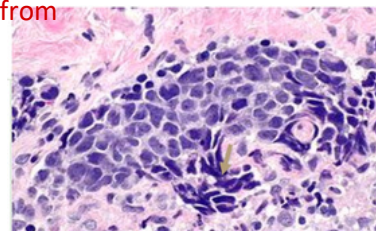
➔ Small round to oval blue cell with salt and pepper nuclei.

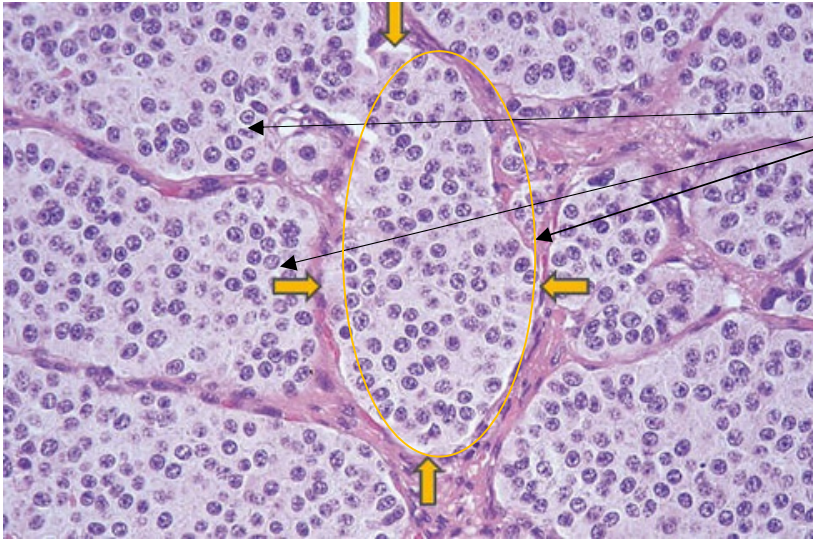
➔ Mitotic figures.

★ Area of extensive necrosis

➔ Azzopardi effect: **Crushing artifact**: basophilic staining of

vascular walls due to encrustation by and from necrotic tumor cells.





□ **Typical CARCINOID**

□ Multiple nests: **each** contain uniform cells that have regular round nuclei with "salt and pepper" chromatin, no increase mitotic activity and no necrosis

→ □ One nest.

Grading of carcinoid tumors depends on :

- 1) mitosis
- 2) necrosis.



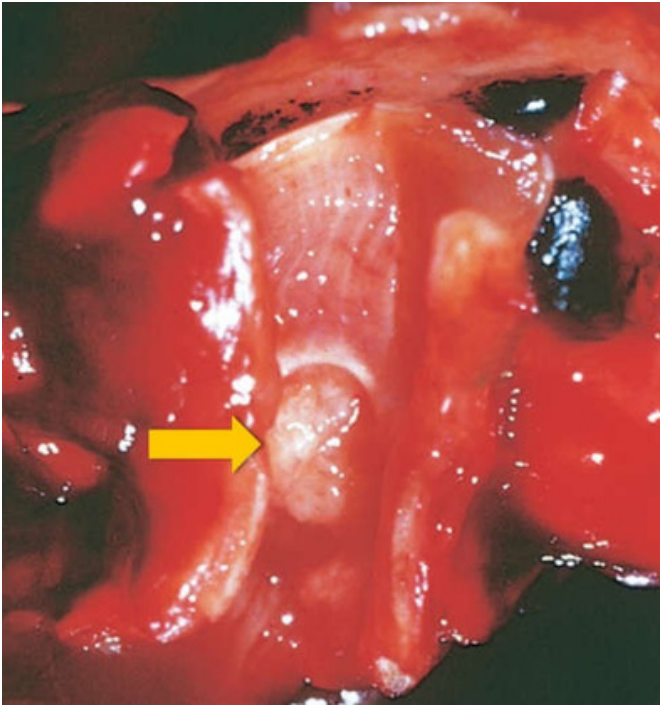
→ □ **obstructing polypoid tumor with the lumen of a bronchus .**

□ **It is a growth pattern of CARCINOID tumors.**

CARCINOID TUMOR

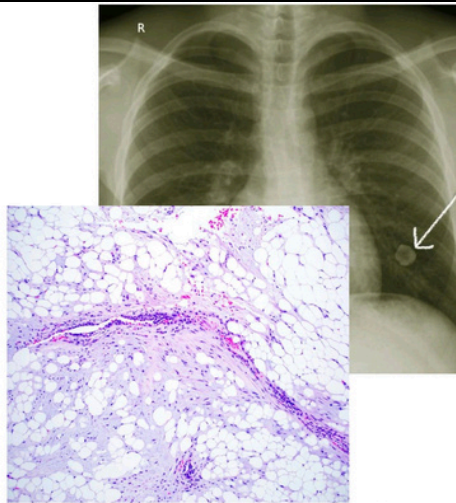
(Bronchial carcinoid)

- □ Carcinoid tumor growing as a spherical mass protruding into the lumen of the bronchus.



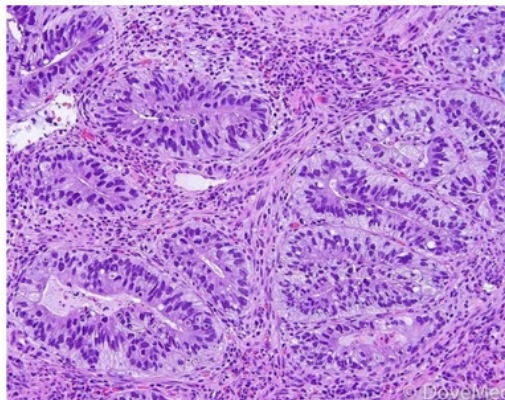
Hamartoma

- The most common benign tumor.
- A spherical, small (1-4 cm), discrete lesion often shows up as a so-called "coin lesion" on chest imaging.
- It consists mainly of mature cartilage admixed with fat, fibrous tissue, and blood vessels in various proportions.



Invasive adenocarcinoma

- A tumor of any size with an area of invasion >5 mm.
- Destruction of alveolar architecture or Stromal invasion with desmoplasia



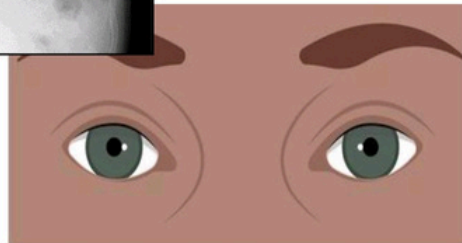
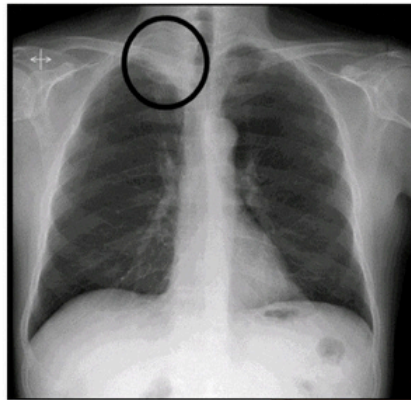
Morphology - Squamous cell carcinomas

- Large lesions may undergo central necrosis, giving rise to **cavitation**



Pancoast tumors

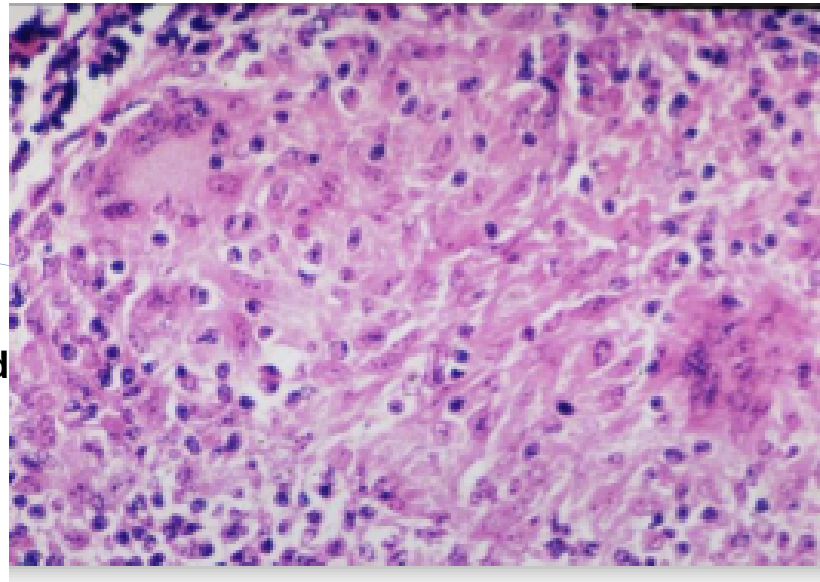
- Apical neoplasms may invade the brachial or cervical sympathetic plexus, causing severe pain in the distribution of the ulnar nerve or **Horner syndrome** (ipsilateral enophthalmos, ptosis, miosis, and anhidrosis).
- The combination of clinical findings is known as **Pancoast syndrome**.
- Pancoast tumor is often accompanied by destruction of the first and second ribs and sometimes the thoracic vertebra



Lecture 7

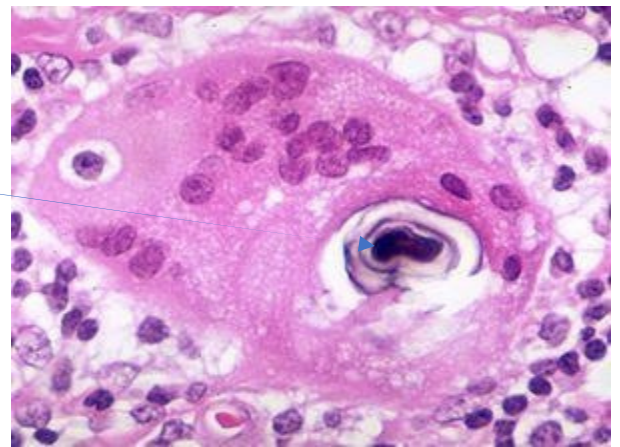
sarcoidosis

The cardinal histopathologic feature of sarcoidosis, irrespective of the organ involved, is the **nonnecrotizing epithelioid granuloma**.

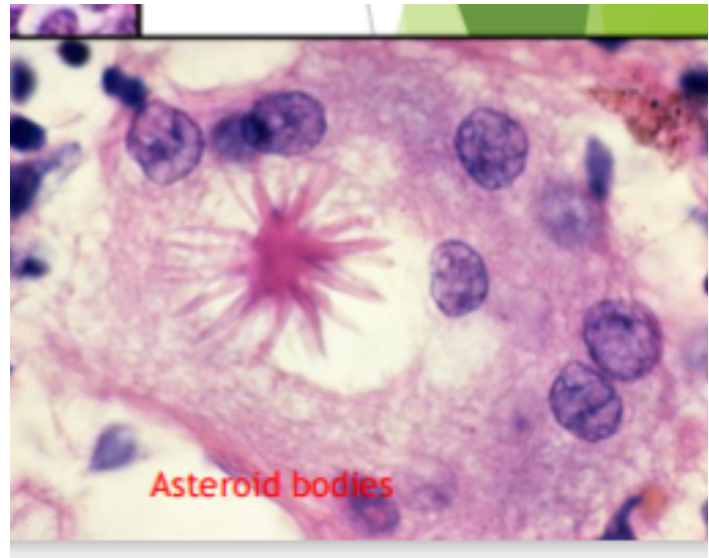


Multinucleated giant cell is engulfing (**Schaumann body**: laminated concretions composed of calcium and proteins).

*Note: This laminated appearance looks like the **onion skin**.

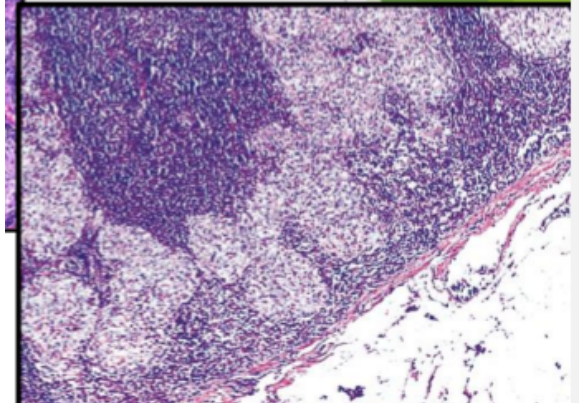
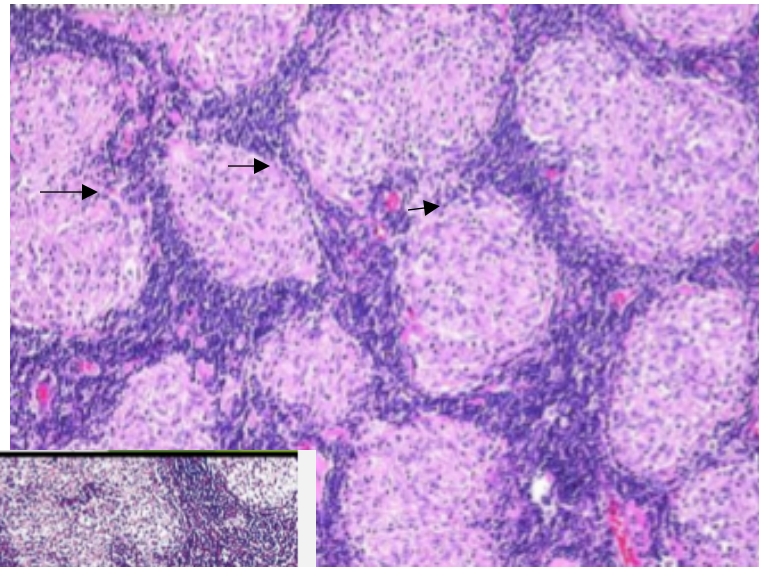


asteroid bodies: stellate inclusions enclosed within giant cells



Intrathoracic hilar and paratracheal lymph nodes:

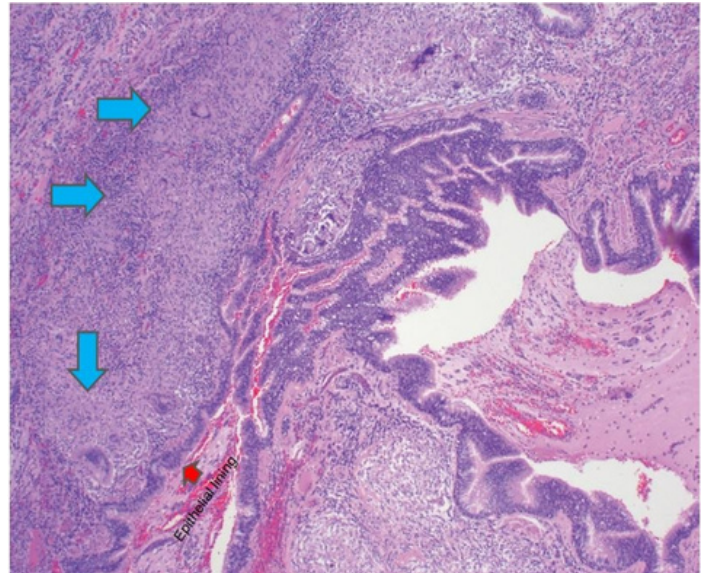
- They are enlarged, painless and .have a firm, rubbery texture



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➔ **Peribronchial noncaseating granulomas** with many giant cells are present beneath the epithelial lining ➔

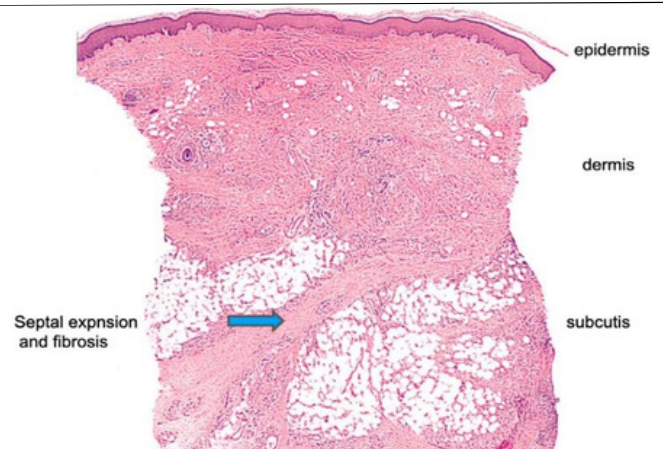
Note: these lesions have some tendency to be localized in the connective tissue around the bronchiole.



Erythema nodosum

by **septal expansion and fibrosis** inflammation in subcutaneous tissue (**Septal panniculitis**).

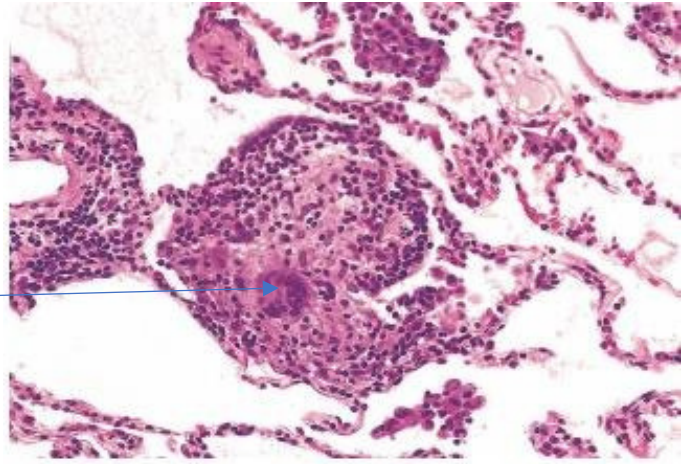
No histopathological finding in dermis and epidermis.



Hypersensitivity pneumonitis

Loosely formed interstitial granulomas surrounded by chronic inflammation and one multinucleated giant cell.

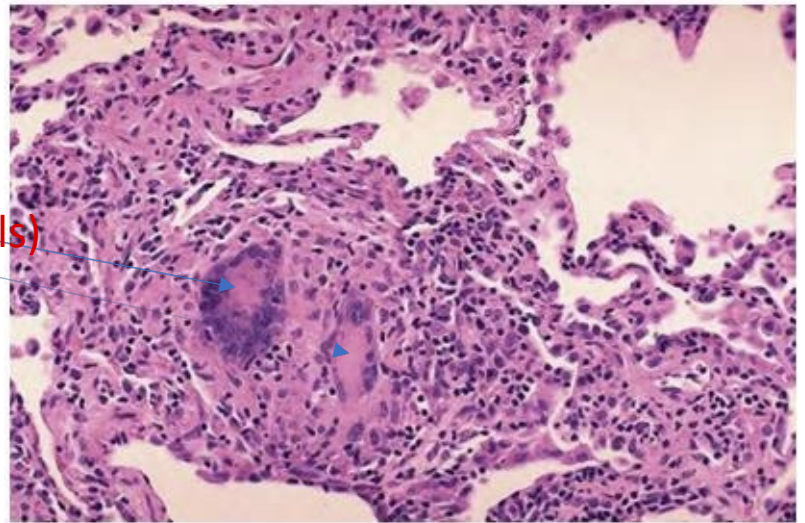
(alveolar spaces still patent) **مش متنا**



Loosely formed interstitial granulomas

2 Giant cells surrounded by chronic inflammation (CD8+ T_cells)

(alveolar spaces still patent)



* T₀ differentiate between granuloma of sarcoidosis & hypersensitivity pneumonitis depending on type of T₀ cell present and site of inflammation .

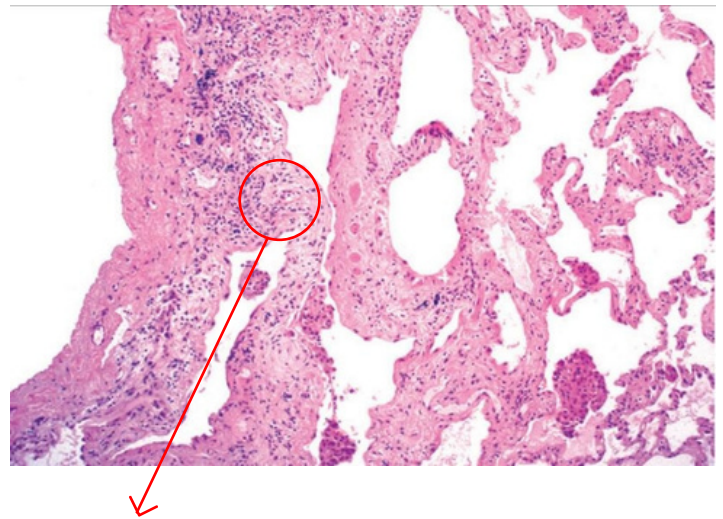
Idopathic pulmonary fibrosis

1. The earliest lesions demonstrate exuberant fibroblastic proliferation 1.

(fibroblastic foci) ,Over time

Radiology: (subpleural and basilar

fibrosis, reticular abnormalities, and



Cellular fibrosis
(collagen deposits + fibroblasts)

There are sites of cellular &
A cellular fibrosis in the same slide

Idiopathic Pulmonary Fib

The dense fibrosis causes collapse of alveolar walls

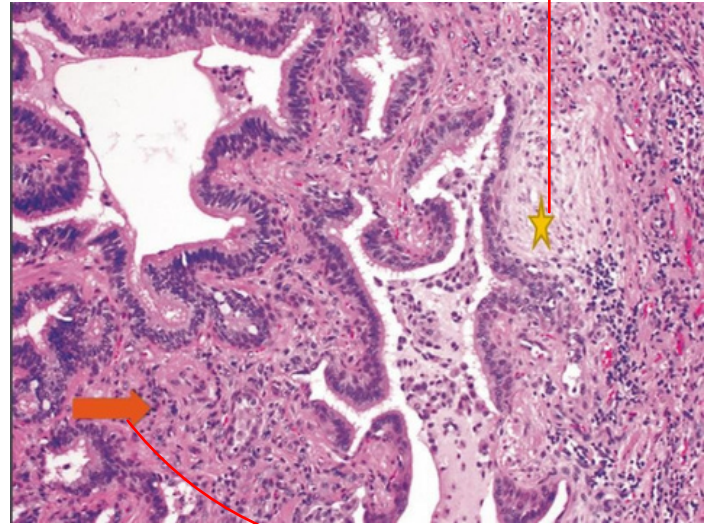


and formation of cystic spaces lined by hyperplastic type II pneumocytes or bronchiolar epithelium (honeycomb fibrosis).



The interstitial inflammation usually is patchy and consists of an alveolar septal infiltrate of mostly

A cellular fibrosis



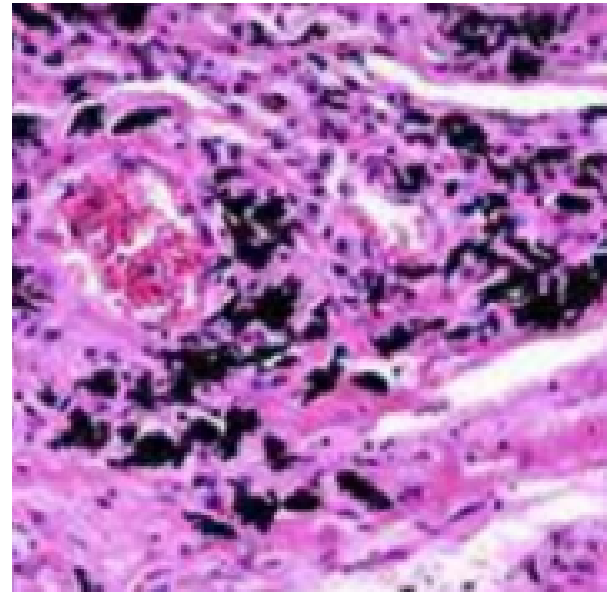
Cells fibrosis

Coal Worker's Pneumoconiosis

Pulmonary

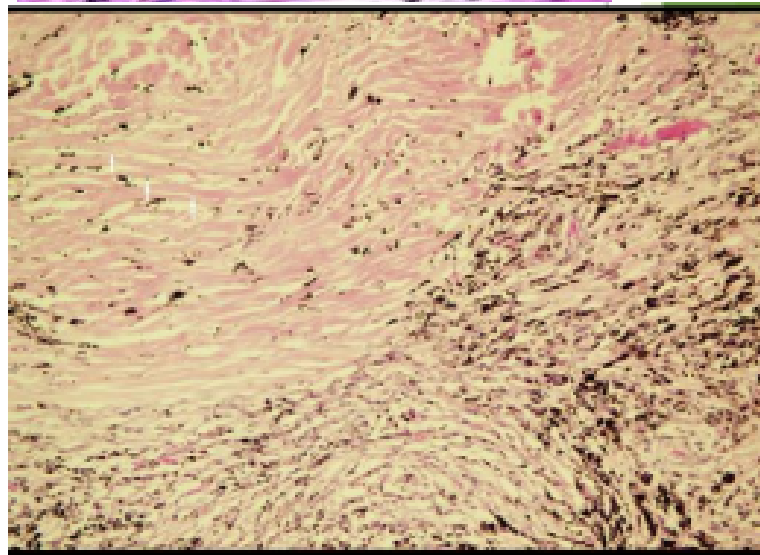
anthracosis:

Inhaled carbon pigment is engulfed by alveolar or interstitial macrophages, which then accumulate in the connective tissue along the pulmonary and pleural lymphatics and in draining lymph nodes

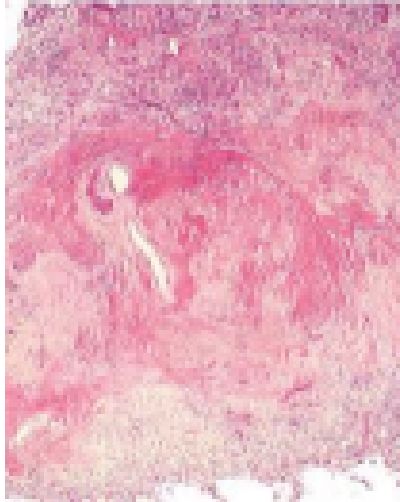


Complicated CWP (PMF)

Caused by coalescence of coal nodules. consist of dense collagen and pigment



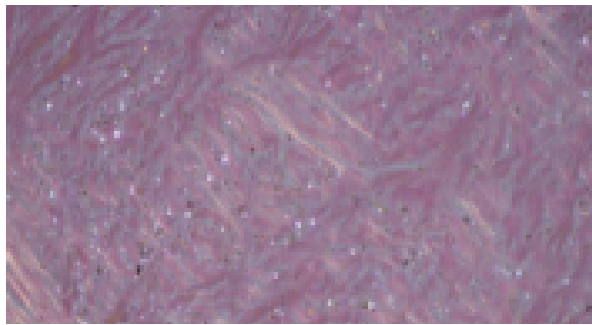
Silicosis



The silicotic nodule demonstrates concentrically arranged hyalinized collagen fibers surrounding an amorphous center

The "whorled" appearance of the collagen fibers is quite distinctive for silicosis.

- Examination of the nodules by polarized microscopy reveals weakly birefringent silica particles

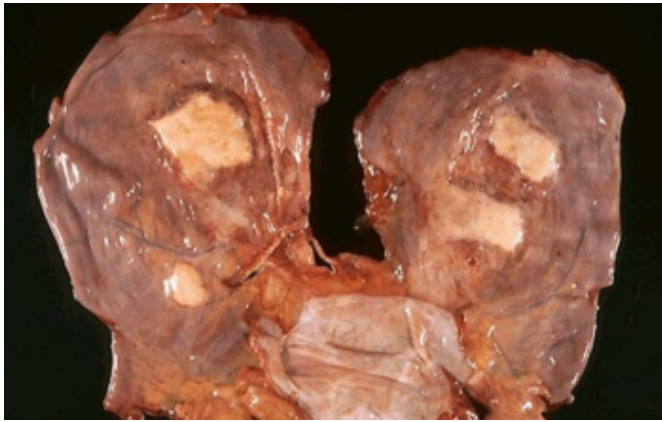


Asbestos

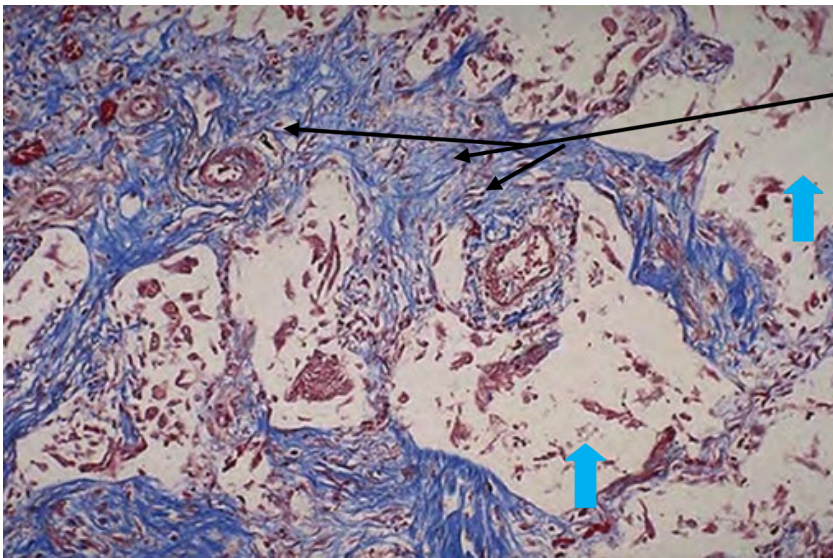
asbestosis begins in the lower lobes and subpleurally, spreading to the middle and upper lobes of the lungs as the fibrosis progresses

u Contraction of the fibrous tissue distorts the normal architecture, creating enlarged air spaces enclosed within thick fibrous walls; eventually, the affected regions become honeycombed



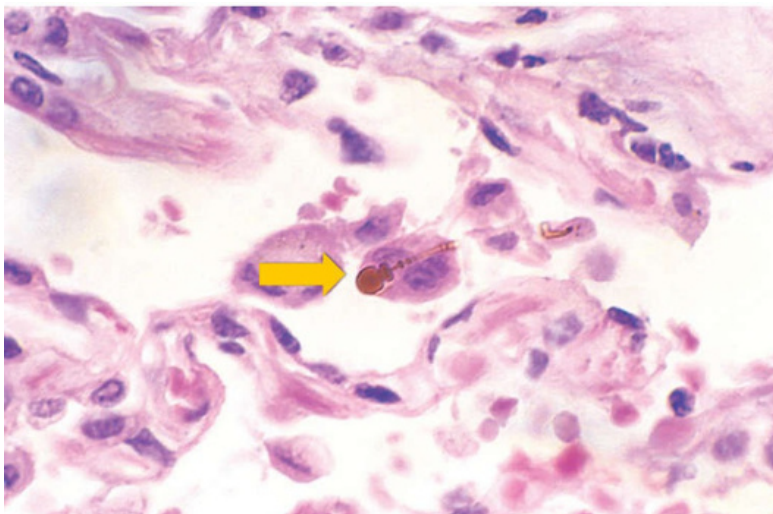


Pleural plaques are the most common manifestation of asbestos exposure and are well-circumscribed plaques of dense collagen often containing calcium



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- **Asbestosis**
- diffuse pulmonary interstitial fibrosis (which is the first characteristic feature of asbestosis)
- The tissue section in this figure is stained by **trichrome stain** which highlights collagen in **blue**, so all the blue areas of the Interstitium are expanded and distorted by **fibroblast proliferation and collagen** deposition which is called pulmonary interstitial fibrosis.
- ▶ Normal alveolar spaces.



- **Asbestosis**
- ▶ Asbestos body with beading and knobbed ends, engulfed by pulmonary macrophage (characteristic feature of asbestosis)
- Asbestos bodies are seen as **golden brown**, fusiform or beaded rods with translucent center.