

وَقُلْ رَبِّ زِدْنِي عِلْمًا



RESPIRATORY SYSTEM

HAYAT BATCH

SUBJECT : Pathology

LEC NO. : Lec 6

DONE BY : Raneem Azzam

Respiratory System

RS

*في البداية رح نبليش بموضوع جديد ، رح نحكي عن
pulmonary infection على محاضرتين

Dr. Ola Abu Al Karsaneh



Definition of Pneumonia :

□ Pathological : كيف منعرفها في الباثو

- Any infection of the lung parenchyma distal to the terminal bronchioles.

يعني في

alveoli ، alveoli ducts ، respiratory bronchioles

□ Clinical:

- A constellation of symptoms & signs with at least one opacity on chest x-ray.

Find a top doc

THE FACTS ABOUT PNEUMONIA

Pneumonia is the largest infectious cause of death in children around the world, being responsible for over 920,000 deaths in children under the age of 5 in 2015.

What is Pneumonia?

It is an infection of the lungs that inflames air sacs, which may fill with fluid. This can happen in one or both lungs.

Is Pneumonia fatal?

Yes, especially for children in developing countries where proper care is not available. It is always a threat despite age.

Visit your doctor if you notice the following symptoms:

Fever

No appetite

Coughing up bloody or yellow phlegm

بسبب وسائل الدفاع المناعية عنا؛ الlungs نورمالي بتضل sterile ما بتعمل infections كثير كبير ،،، طب متى بصير الinfection كبير؟ لما يكون عندي خلل بهذول وسائل الدفاع

- Normally, the lung parenchyma remains sterile because of the highly effective immune and nonimmune defense mechanisms.

Impairment of defense mechanisms leading to pulmonary infections :

- 1-Loss or suppression of cough reflex: coma, anesthesia, drugs بتصير بسبب اخذ دوا او عمل عملية، ...
- 2-Injury to mucociliary apparatus: smoke, viral infection بفايروس، التدخين صار عنا injury في ال cilia بسبب infection بفايروس، التدخين
- 3-Decrease in macrophage function: alcohol, smoking قلت المناعة بسبب التدخين و...
- 4- Impaired immune system: chronic diseases, immune deficiency diseases, aging. عندو امراض في المناعة، وراثه، عمر...
- 5-Existing pulmonary disease: atelectasis, COPD. هو يكون عند اصلا lung disease
- 6- Unusually virulent infecting organism ما يكون مصاب بس ال organism خطير ما بقدرلو جهاز المناعة

Classification of pneumonia (pneumonias syndromes)

Pneumonia is classified according to the specific etiologic agent or, if no pathogen can be isolated, by the clinical setting in which the infection occurs.



Classification according to clinical setting will considerably narrow the list of suspected pathogens for administering empirical antimicrobial therapy.

1. Community-Acquired Acute (typical) Pn.
2. Community- Acquired Atypical Pn.
3. Nosocomial Pneumonia
4. Aspiration Pneumonia
5. Lung Abscess
6. Chronic Pneumonia
7. Pneumonia in the Immunocompromised host

*في العادة **in general** احنا منصنف ال pneumonia او ال **infections** الي بصيب ال lung حسب شو ال **agent** الي سببها (**etiologic agent**)؛ بس احنا مش دانما منعرف شو هو ال **pathogen** الي عمل **infection**

مشان هيك صنفناهم في (**general**، **clinically**، **pathological**) تصنيفات حسب ال **syndrome** بعتمد على ال **clinical setting** حسب وين بصير ال **infections** في الكومينتي، المستشفى، هل نوعها **chronic** هل المريض **immunodeficiency**،...، طب ليه؟

لانو بسهل علينا العلاج بحيث لكل واحد من هدول ال **classification** في نوع معين من ال **organism** الي بسببه ف بضيق دائرة العلاج المناسب واختياري لل **antibiotic**

****احنا رح نحكي عن المايكرو الي بتخص هاي الامراض بس تنبيه من الدكتوراة !!! احنا رح ننسأل عن ال morphology & pathology**

1. Community-Acquired Acute Typical Pneumonia

نوع من ال lung function الي بصير بشكل acute بصيب البني ادم وهو عايش بالكومينتي مش المستشفى

□ **Aetiology:** **السببات**

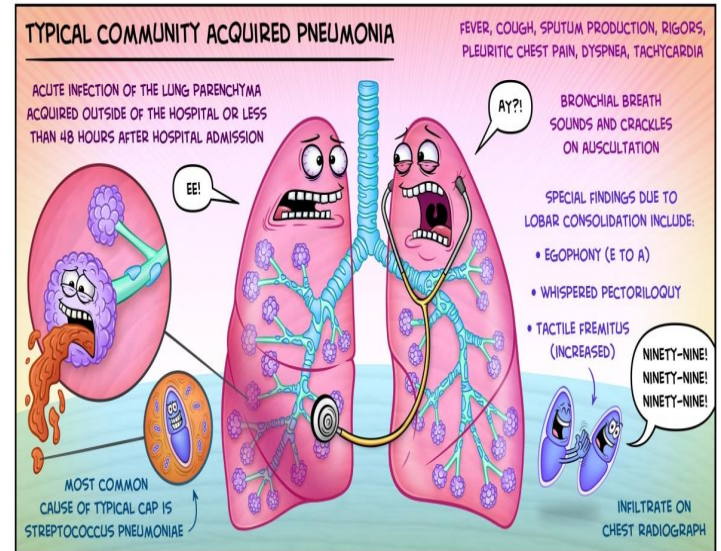
○ Bacteria, fungi, viruses, parasites.

Most common cause ←

Streptococcus pneumoniae

- The most common cause of community-acquired acute pneumonia

- The presence of numerous neutrophils in sputum containing the gram-positive, lancet-shaped diplococci supports the diagnosis.



Other common causes:

2 - Haemophilus influenzae and Moraxella catarrhalis:

→ Both are associated with acute exacerbations of COPD.

يكون مريض COPD ويتأزم وضعه ويصير
عنده superimposed infection

3 - Staphylococcus aureus:

- Usually secondary to viral respiratory infections.

- High incidence of lung abscess and empyema. الالتهاب بطلع ل plural space

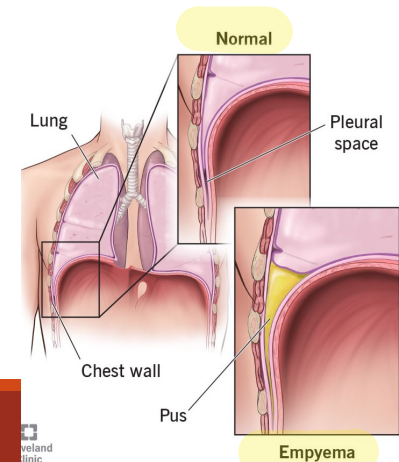
- Associated with intravenous drug abuse. بتصيب اكثر الناس الي بتعاطو أدوية بالوريد

بتيجي بعد viral infections ومعروفة انها بتعمل
complication in Lung

4 - Klebsiella pneumoniae

- Observed in patients who are chronic alcoholics. الناس الي بشربوا كحول كثير

- Thick and gelatinous sputum is characteristic. صفة ال sputum جيلاتيني وThick



بتصيب اكثر ايشي الي بالمستشفى ،بس سايل منقدر نشوفها بالكومينتي

5 - Pseudomonas aeruginosa

- **Most commonly seen in nosocomial settings.**
 - **Seen in persons with** cystic fibrosis, in burn victims, and patients with neutropenia.
 - Has a propensity to **invade blood vessels** at the site of infection, with consequent extrapulmonary spread.
- مشكلتها انو عندها **tends** عالية تهاجم ال **BV** بالتالي ممكن تعمل **necrosis** في المنطقة حولها
وبرضو ممكن تطلع من ال **lung** على ال **blood**

6 - Legionella pneumophila

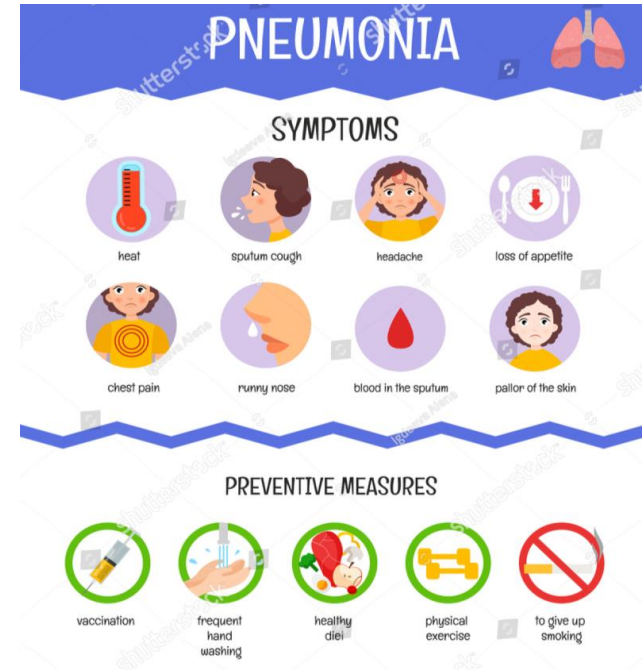
- Seen particularly in organ **transplant recipients**.
- بتصير اكثر عند الناس ال **immunocompromised**

Clinical Features كيف منشوف هذول الناس

□ An abrupt onset of: اعراض فجأة

- Fever, Chills, rigors
- SOB **Shortness of breath**
- Cough
- Expectoration of sputum
- Occasional patients have **hemoptysis** بقح دم
- Pleuritic chest pain (with pleuritis). بصير كل ما ياخذ نفس يصير صدره يوجعه

→ **plural** الالتهاب واصل ال



Morphology:

بصنفها لنوعين حسب توزيعها كيف بتعمل infection in lungs

Acute bacterial pneumonia has two patterns of anatomic distribution:

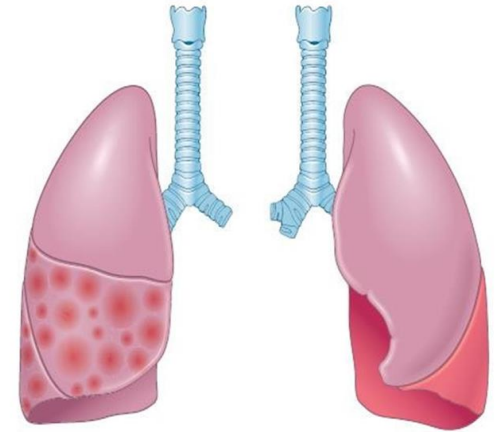
① Lobular bronchopneumonia.

② Lobar pneumonia.

تصلب في ال lung ، يعني بدل ما تكون ال alveoli
معبئة بال air بروح ال air وييجي exudat

- The term “**consolidation**” refers to the “**solidification**” of the lung due to the replacement of the air by an exudate in the alveoli.

بينا نتعرف على هذا المصطلح قبل



Bronchopneumonia

Lobar pneumonia

Figure 12-31 The anatomic distribution of bronchopneumonia and lobar pneumonia.

Ⓐ **Lobular Bronchopneumonia:** Patchy consolidation of the lung and generally involves **more than one lobe**.

Ⓑ **Lobar pneumonia:** Consolidation of **a large portion of a lobe** or of an **entire lobe**

✳ الفرق تحت

(B)

Lobar pneumonia

*بالمقابل ال **lobar pneumonia** = بتشوف
ال **consolidation** مغطي كل اللوب مافي جزء
نورمال وجزء **abnormal** ، او معيبة جزء من
ال **lobe** بطريقة **continuous** ، ، ، ، ، خلينا
مركزين بالفرق بليزرز لانو هاي مافيها
patchy

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١١
١٢

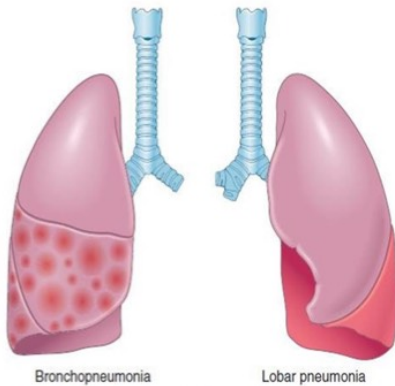


Figure 12-31 The anatomic distribution of bronchopneumonia and lobar pneumonia.

(A)

Lobular Bronchopneumonia

(١) هسا **Lobular** من اسمها بتصيب ال
Lobules اكثر ، ، ، ، ، وبتكون صايرة في ال
bronchial من اسمها
ال **bronchopneumonia** و **alveoli**

(٢) بتميز انها **patchy process** يعني بتشوف ال
exudate infiltrate بطريقة **patchy** ، شو يعني هاي
الطريقة ؟؟
يعني بتكون موزعة **infiltrate** و نورمال ، **infiltrate** و
نورمال بحيث ما بتكون مغطية كل ال **lobe** وموجودة بأكثر
من **lobe** زي الصورة موجودة في الوسط والي تحت ، ،

Microscopically

بمر ال inflammation ب 4 مراحل الي منشوفها بالعينة

There are 4 stages of inflammatory evolution in Lobar pneumonia

مرحلة 1

1- Congestion:

في ال BV بصير
congestion يكون
ال BV معي rbc

**مهم جدا نميز شو بصير بكل مرحلة

- Heavy red lungs
- Severe vascular congestion
- Intra alveolar exudate with few neutrophils

■ Bacteria +++ ↘

■ Watery sputum →

فا حكتو
ال دكتور

وين بشوف ال

inflammation

ال exudate يكون مليون بكتيريا مكونة
لهذا المرض + شوية neutrophils

بنتقل بعدها بأيام لمرحلة 2

2- Red hepatization

طبيعة ال Lung بتشبه طبيعة
ال Liver ويكون لونها احمر

- ❑ Firm, airless, red liver-like lung
- ❑ Fibrinopurulent pleuritis
- ❑ Intra alveolar exudate: organisms ++, cells:

وتزيد ال

→ Red cells

→ Neutrophils

بزيدهم

بتقل شوي
البكتيريا أو...

Fibrin

فا حكتو
ال دكتور

+ سبب اللون الاحمر

بعد يومين ثلاث بتصير مرحلة ٣

3- Grey hepatization :

- Dry grey-brown cut surface
- ↑ intra alveolar fibrin & macrophages
- Disintegrating neutrophils & ↓ RBC's

بتضل تشبه الـ liver بس لونها بقلب رمادي ،، طب ليه؟ لانو ال بقل ال RBC+neutrophil ،بسبس بتزيد ال fibrin +macrophages

اخر مرحلة عالجننا المريض وبدو يروح الالتهاب

4- Resolution:

- Exudate within the alveolar spaces is broken down by enzymatic digestion to produce granular, semifluid debris that is resorbed, ingested by macrophages, expectorated, or organized by fibroblasts growing into it.

أو or ← بتنظف المكان

عالم مشكل Organise pneumonia

له يعني بصير Fibrosis جوات ال alveoli

**كل التغيرات بتصير داخل ال alveoli ،أكدت الدكتورة

ال لobe
اللو فتايش

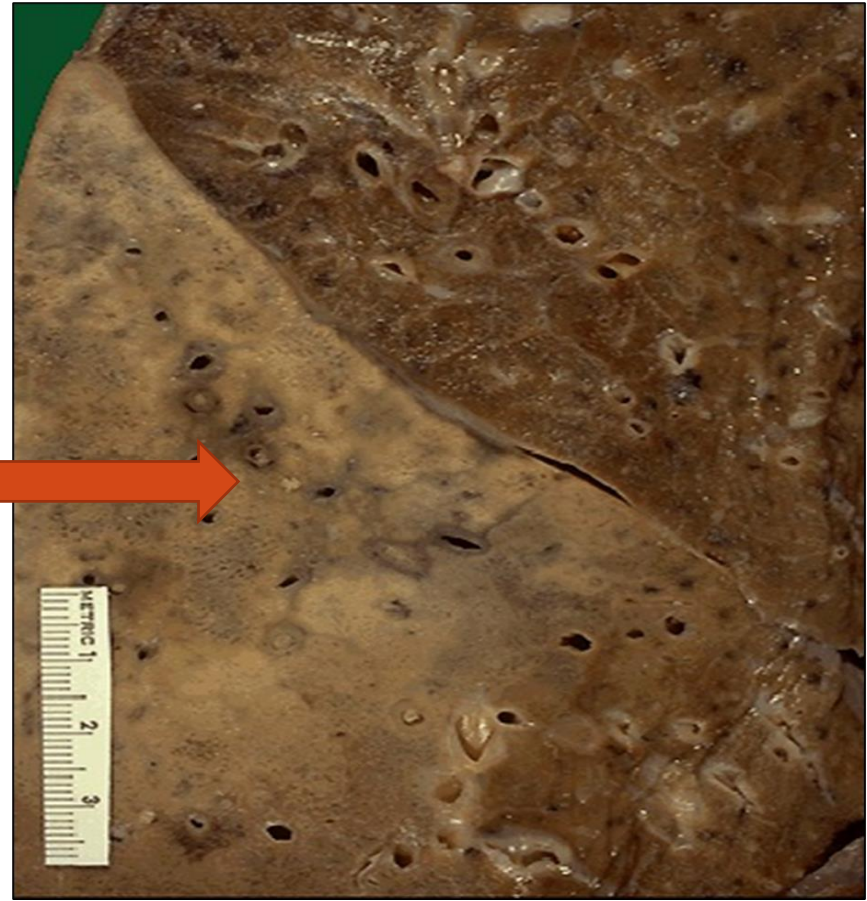
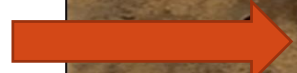
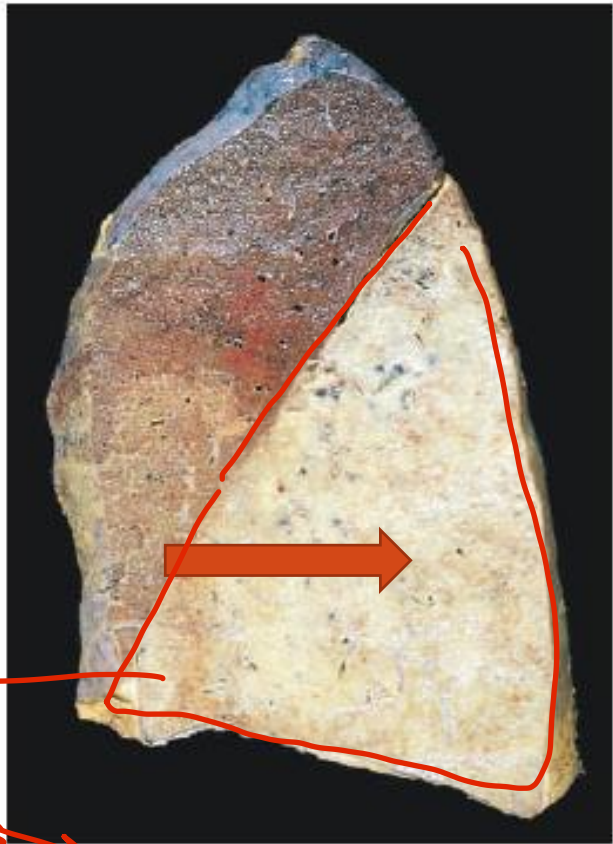
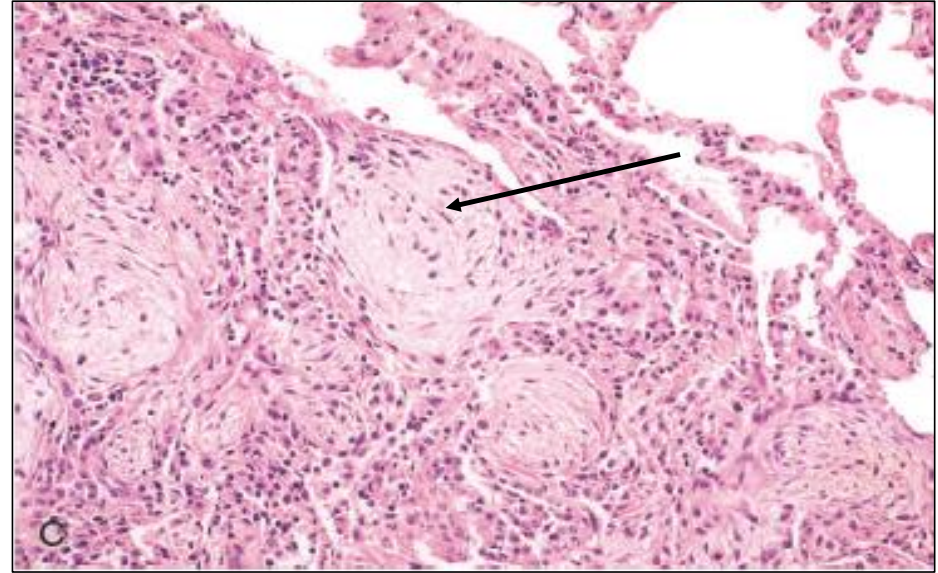
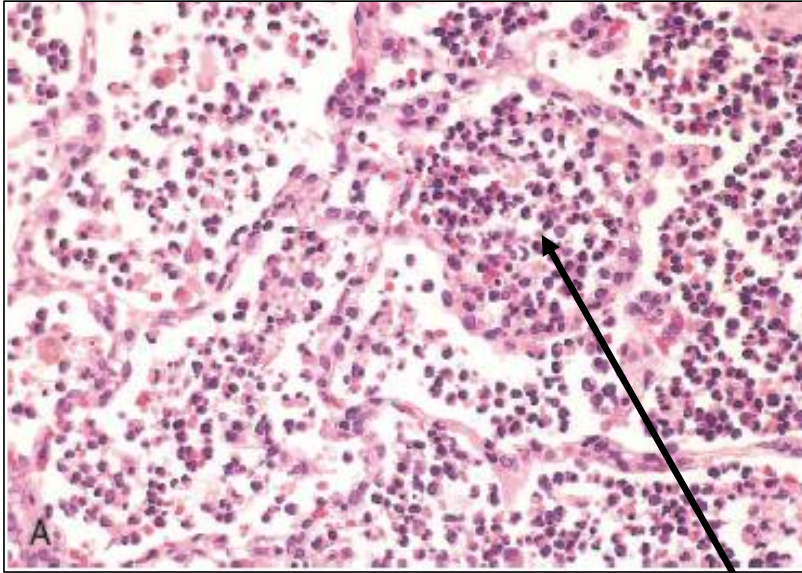


Fig. 13.30 Lobar pneumonia with gray hepatization. The lower lobe is uniformly consolidated.

داخل الالتهاب



(A) Acute pneumonia. Extensive neutrophil exudation into alveoli corresponds to early red hepatization.

(C) Advanced organizing pneumonia, featuring transformation of exudates to fibromyxoid masses richly infiltrated by macrophages and fibroblasts

*** على السريع انتذكر Patchy

ال 2 Lung تكون affected

Lobular Bronchopneumonia

- The consolidation may be confined to one lobe but is more often multilobar and frequently bilateral.
- The lesions are slightly elevated, dry, granular, gray-red to yellow
- The lung substance surrounding the areas of consolidation may be hyperemic, edematous or normal
- Pleural involvement is less common than in lobar pneumonia.
- **Histologically**, a neutrophil-rich exudate fills the bronchi, bronchioles, and adjacent alveolar spaces.

هون ال neutrophil بشوفها ب 3 اماكن بحيث ال inflammation بيلش من ال bronchial ويعدها بطلع على ال alveoli

Lobar pneumonia

→ ال neutrophil موجودة mainly جوا ال alveoli

*** مهم نتذكر الفرق



عش
نور جان

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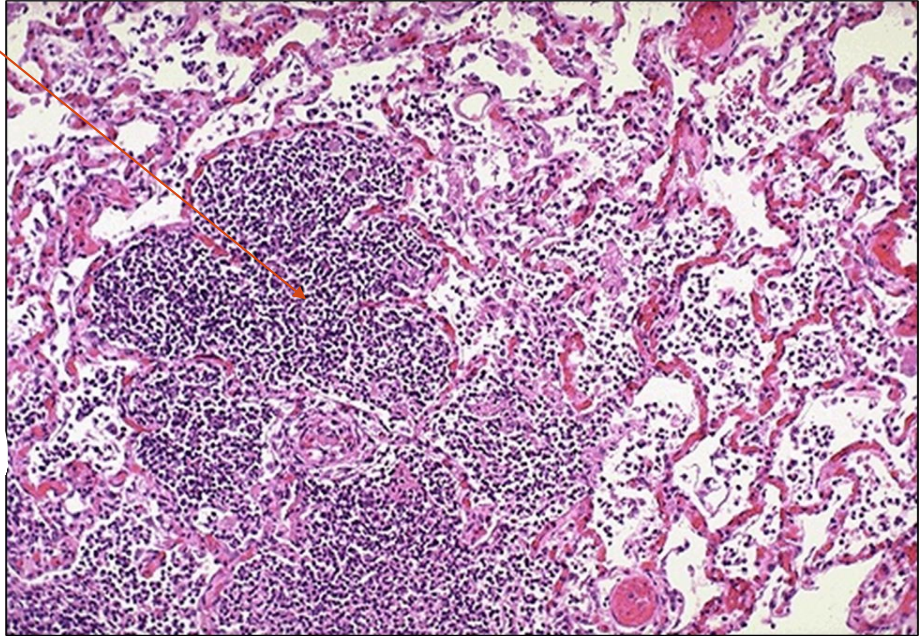
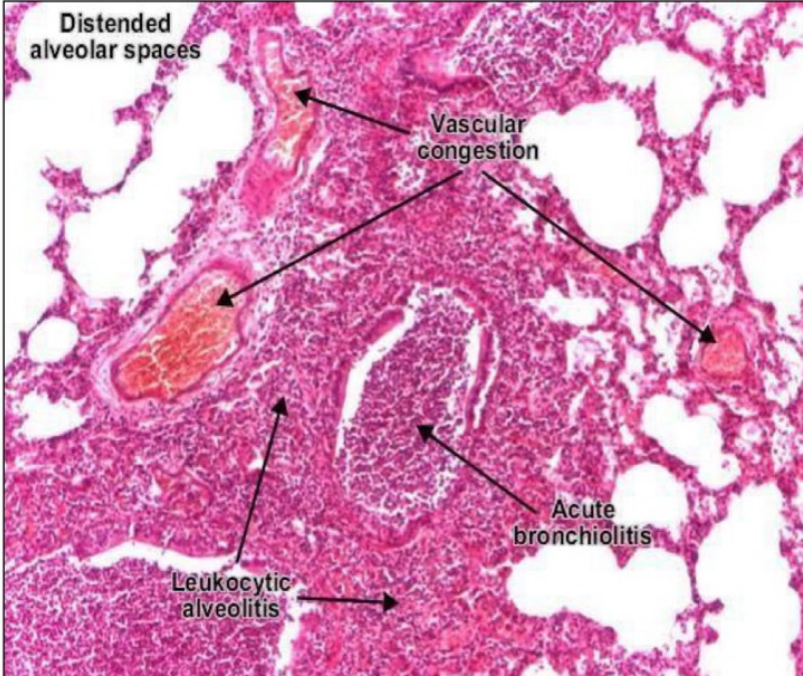
نور جان

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Figure 15-33 Bronchopneumonia. Section of lung showing patches of consolidation (arrows).



Broncho-pneumonia, **suppurative inflammation** of the bronchiole with the extension of the inflammation to the surrounding alveoli



هو نوع من lung infection سببها atypical تتعرض لها بالكومينتي طيب ليش
atypical ؟ لانها بتحمل صفات مش متعودين نشوفها in organism اللي متعودين عليه

2. Community-Acquired Atypical Pneumonia:

- An acute febrile respiratory disease characterized by patchy inflammatory changes in the lungs, largely confined to the alveolar septa & pulmonary interstitium.

- The term **atypical** denotes: طب شو الشغلات اللي بتفرق عن ال typical ؟

1. Cough with moderate amounts of sputum. عنده كحة بس ما بيطلع sputum زي اللي بتعملها typical

2. The absence of a physical finding of consolidation.

حتى بس يفحصه الدكتور physically ما بشوف
عنده signs على consolidation

3. Lack of alveolar exudate. ✖ ✖

4. Moderate elevation of WBC count.

تا بلون كثر
زي ما تعودنا على ال typical

□ Causes

- ✓ **Mycoplasma pneumonia** is the most common
- ✓ Other causes include viruses, such as influenza, SARS virus ...etc.
- ✓ Chlamydia – Psittacosis
- ✓ Rickettsiae

تفاهيد المايكروبا
بتفصيل

□ Clinically:

Upper respiratory tract

- It is variable and may simulate URT infection, called a chest cold.
- It may present as a fulminant life-threatening infection in immunocompromised individuals.
- The onset is that of acute illness with fever, headache & malaise, and later cough with minimal sputum, and alveolar-capillary block occurs due to edema causing respiratory distress.

□ Morphology:

❖ Grossly :

- May be patchy or involve whole lobes bilaterally or unilaterally.
- The areas are red-blue, congested & the pleura is smooth un-inflamed

❖ Microscopically : بصمات عشان نفوف

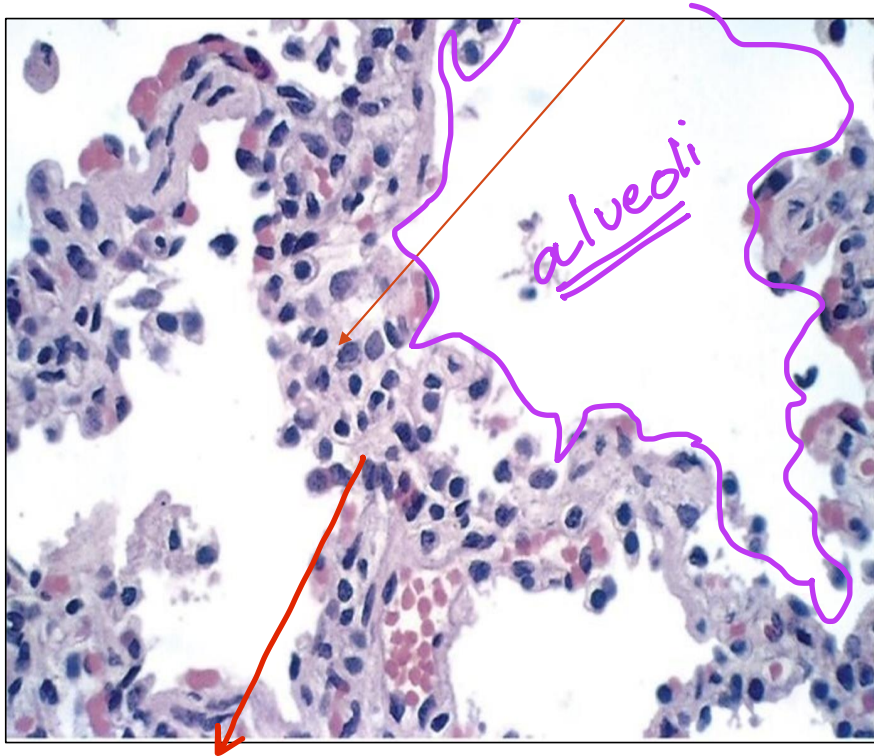
← نبتذكر ال typical كانت داخل ال alveoli

- **The inflammatory reaction is largely confined to the wall of the alveoli (interstitial).**

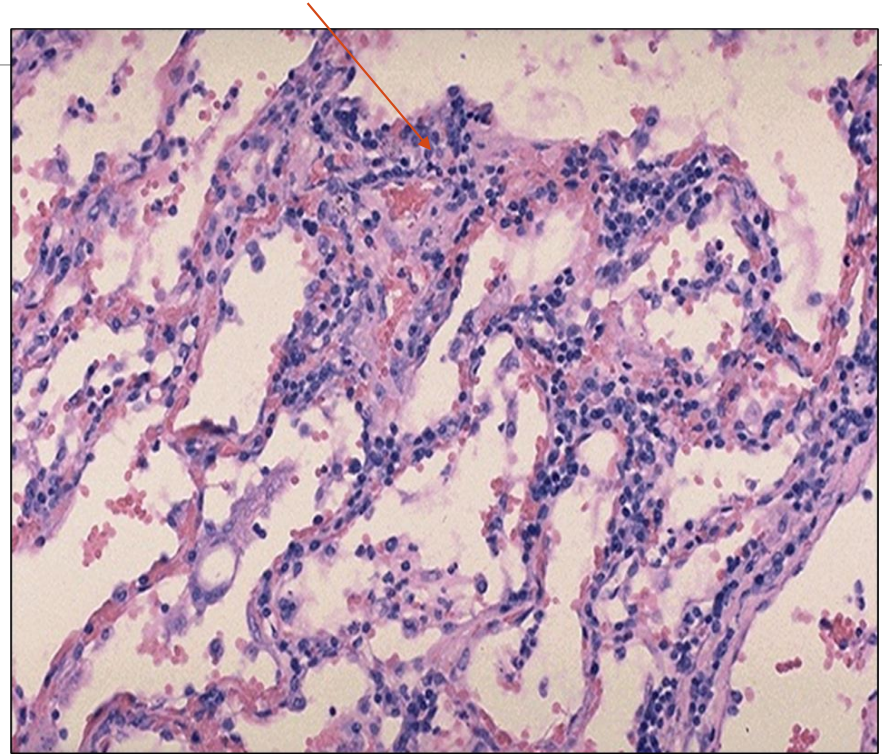
- The septa are widened & edematous; they usually contain **mononuclear inflammatory cells**, including lymphocytes, histiocytes & occasionally plasma cells. **
↳ chronic inflammatory cell

- **The alveolar spaces are FREE of cellular exudate in classic cases.**

Atypical pneumonia, showing widened thickened alveolar septa infiltrated by lymphocytes with proliferating pneumocytes type II & congested capillaries.



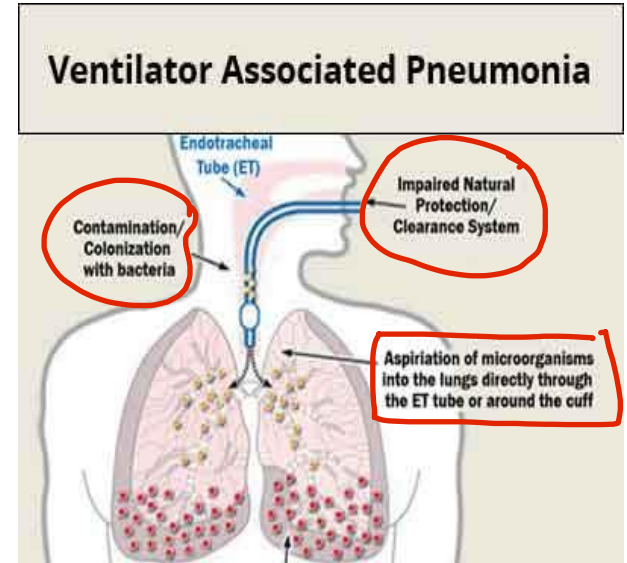
inflammation in wall



**بصيب المريض الداخل المستشفى بعد يومين من دخوله ،، اذا ظهرت الاعراض قبل يومين معاناتو هو باقي منصاب فيها من قبل مش من المستشفى

3- Nosocomial pneumonia (Hospital-acquired pneumonia):

- ❖ Is a pulmonary infection acquired during hospital stay (at least 48 hours after admission).
ليه طيب؟
- ❖ It is common among hospitalized patients with severe underlying disease, immune suppression, or prolonged antibiotic therapy.
خصوصا الناس اللي على التنفس الاصطناعي
- ❖ Those on mechanical ventilation represent a high-risk group.
- ❖ Gram-negative rods like enterobacteria & pseudomonas sp. & Gram-positive staph. Aureus are the most common isolates.



لما تصير ال gastric contact داخل الرئة تعمل عندي injury أو infection وطبعاً هذا ال injury بسبب chemical acidity ومرضه بيكون في بكتيريا في المعدة بتروح على الرئة وبتعمل infection

4- Aspiration pneumonia: لما بتشردق المريض بتطلع الشغلات الي بالمعدة لل lung

- Caused by aspiration of gastric contents either while the patient is unconscious (e.g. stroke) or during repeated vomiting.

- The resultant pneumonia is partly chemical, resulting from the irritating effect of gastric acid, and partly bacterial.

حش ايشي سعل خصوصاً الي عندهم stroke →

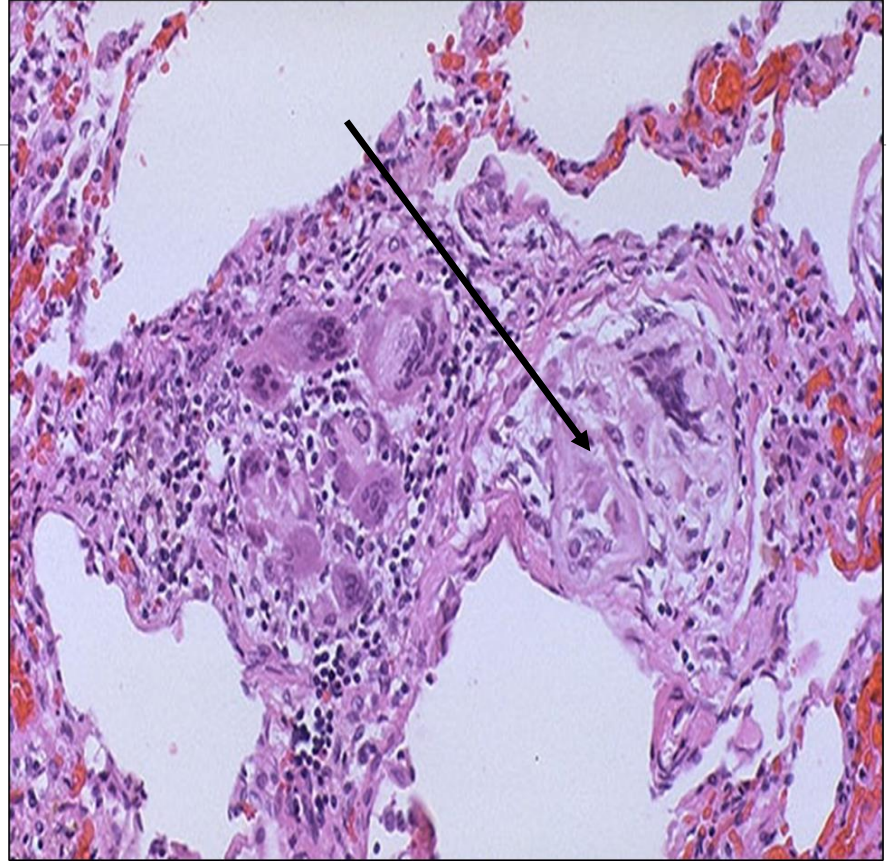
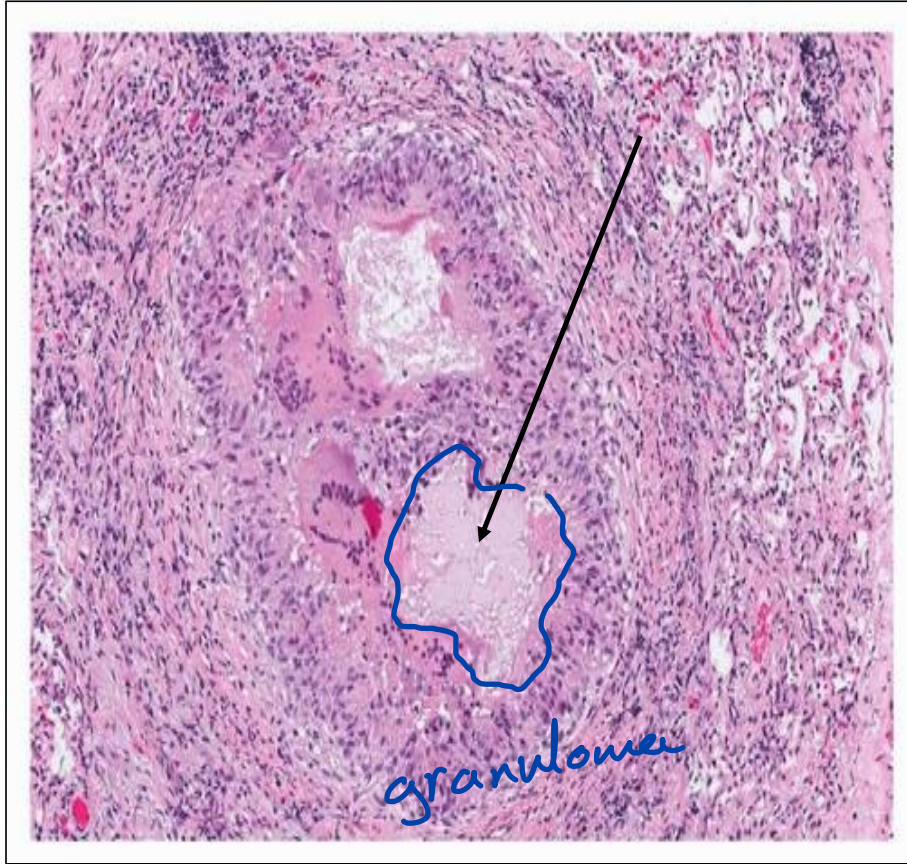
- It is **necrotizing pneumonia** that may be fatal, especially in debilitating patients, but in those who survive, complications like **abscess formation & foreign-body giant cell granulomas are common.**

- Typically, more than one organism is recovered on culture, aerobes being more common than anaerobes

البايين،
قوسيين ما حكتهم

* بس هون ال aspiration pneumonia بتكون جزء من البكتيريا و جزء من chemical infection،، طيب غير هيك شو بيصير عندهم؟ يصير عندهم نوع من ال necrotizing pneumonia منحيكه

مرات منشوف foreign material طلعت من المعدة إلى الرئة، لما نشوفها منلاقي حولها granuloma inflammation هاي granuloma داخلها gaint cell،، وصارت هاي ال granuloma ك reaction against this foreign material



5- Lung abscess:

داخلها منلاقي inflammation و necrosis

A localized area of suppurative necrosis within pulmonary parenchyma resulting in the formation of one or more large cavities.

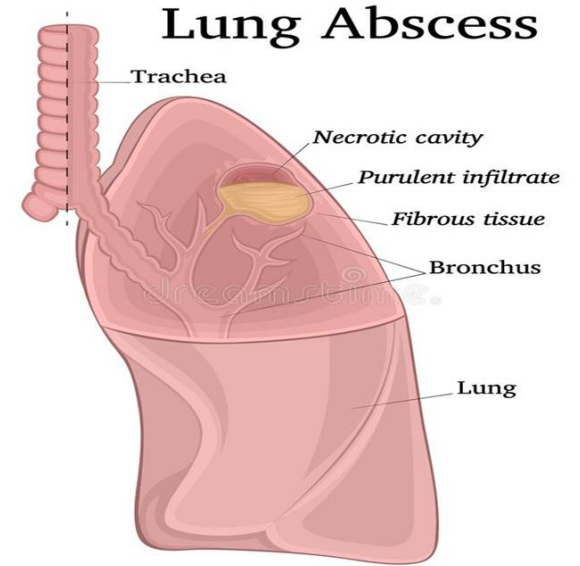
Mechanisms of the introduction of causative organisms :

- 1- Aspiration of infective material or gastric content.
- 2- As a complication of bacterial pneumonia & mycotic infections.
- 3- Bronchiectasis.
- 4- Following bronchial obstruction as in tumors.
- 5- Septic embolism from septic thrombophlebitis or infective endocarditis.
- 6- In bacteremia. → بكل الدم و بتوصله الى Lung

Clinically:

- Cough with foul-smelling sputum; hemoptysis may occur.
- Fever, malaise & clubbing of fingers.

بسبب ال infection / ريقته سيئة



معنى suppurative inflammation تجويف صغير معبي neutrophils

→ تصاویر



Morphology:

- Vary from a few mm to large **cavities**.

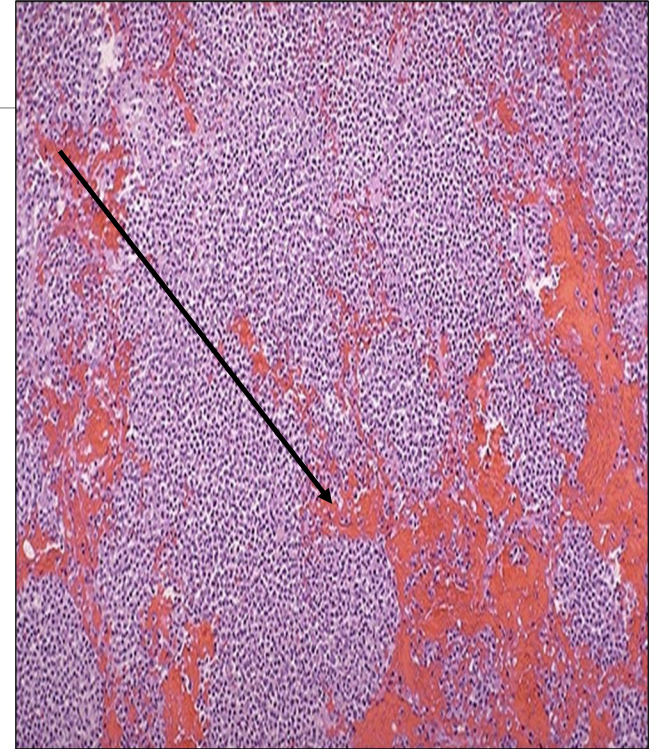
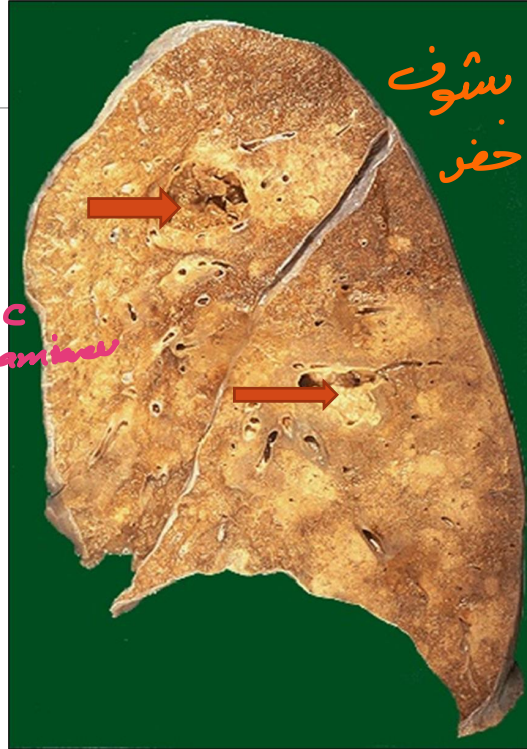
Microscopically:

There is **suppurative neutrophilic inflammation** surrounded by fibrous scarring & mononuclear cell infiltration, including lymphocytes, plasma cells & macrophages, depending on the chronicity of the lesion.

① chronic inflammation

المكون الاساسي

تحت نشوف ① و ②



Irregular-shaped cavities within lung parenchyma



Thank you

الموضوع	الفيديوهات المطلوبة 1	الفيديوهات المطلوبة 2	الفيديوهات المطلوبة 3
Upper Respiratory Tract Pathology lec1	Nasopharyngeal Carcinoma video 1 video 2	Vocal Cord Nodules and Polyps	neoplasia Laryngeal Papilloma and Carcinoma Of The Larynx
lower Respiratory Tract Pathology lec1	شوية هستو لازم تعرفوهم video	Atelectasis	Acute Respiratory distress syndrome 1. medicosis 2. osmosis
Obstructive Lung diseases 1 lec2	Emphysema video 1 video 2	Chronic Bronchitis Chronic Bronchitis VS Emphysema (Comparison)	Chronic Obstructive Pulmonary Diseases (COPD)
Obstructive Lung diseases 2 lec3	Asthma video 1 video 2	Bronchiectasis	
Restrictive Lung Diseases lec 4	1.Obstructive VS Restrictive Lung Disease	2. Introduction	
Restrictive Lung Diseases: 1.fibrosing diseases lec 4	1.Idiopathic Pulmonary Fibrosis 2.Nonspecific Interstitial Pneumonia (NSIP) 3 -Cryptogenic Organizing Pneumonia (COP)	4. Pneumoconiosis: 1. Coal- workers pneumoconiosis and Silicosis 2. Asbestosis and asbestos-related diseases	فيقول الموصي عن كل واحد منهم سياتي فيسطح مستاهل الجاهلهم فيديوهات "Collagen" Vascular Diseases 5. Drug- and Radiation-Induced Pulmonary Disease
Restrictive Lung Diseases: 2.Granulomatous diseases lec 5	1. Sarcoidosis: video1 video2	2.Hypersensitivity Pneumonitis	Hypersensitivity Pneumonitis VS Sarcoidosis
Restrictive Lung Diseases: 3.Smoking Related diseases lec 5	smoking related interstitial diseases	Pulmonary diseases of vascular origin: 1.Pulmonary Hypertension 2.Good pasture syndrome 3.Granulomatosis and polyangiitis (GPA)	

"ضفنا لكم على خانة ال Guidance
جداول بتحتوي على فيديوهات بتساعدكم
بفهم مواضيع الباثو بشكل أكبر ولتسهل
عليكم الحفظ بتلاقوهم من
(رفعة حياة ..Rs.. باثو.. Guidance)

