

Brainstorming session

What did you learn yesterday ? ?

Quiz-1:(5%)

given time; 7 minutes

1. List Common disorders of the upper respiratory system (2 pt)
2. List six cardinal symptoms of chest diseases(2pt)
3. *List the five cardinal signs of inflammation in any upper respiratory tract infections(1pt)*

MANAGEMENT OF PATIENTS WITH CHEST AND LOWER RESPIRATORY TRACT DISORDERS

PREPARED BY EBISA

LEARNING OBJECTIVES

- ❑ On completion of this chapter, the learner will be able to:
 - ✓ Compare the various pulmonary infections with regard to causes, clinical manifestations, nursing management, complications, and prevention.
 - ✓ Use the nursing process as a framework for care of the patient with lower respiratory tract infections.

Disorder of the lower respiratory tract ...

Some of the lower respiratory disorders includes:

- ♠ Bronchitis

- ♠ Pneumonia

- ♠ COPD

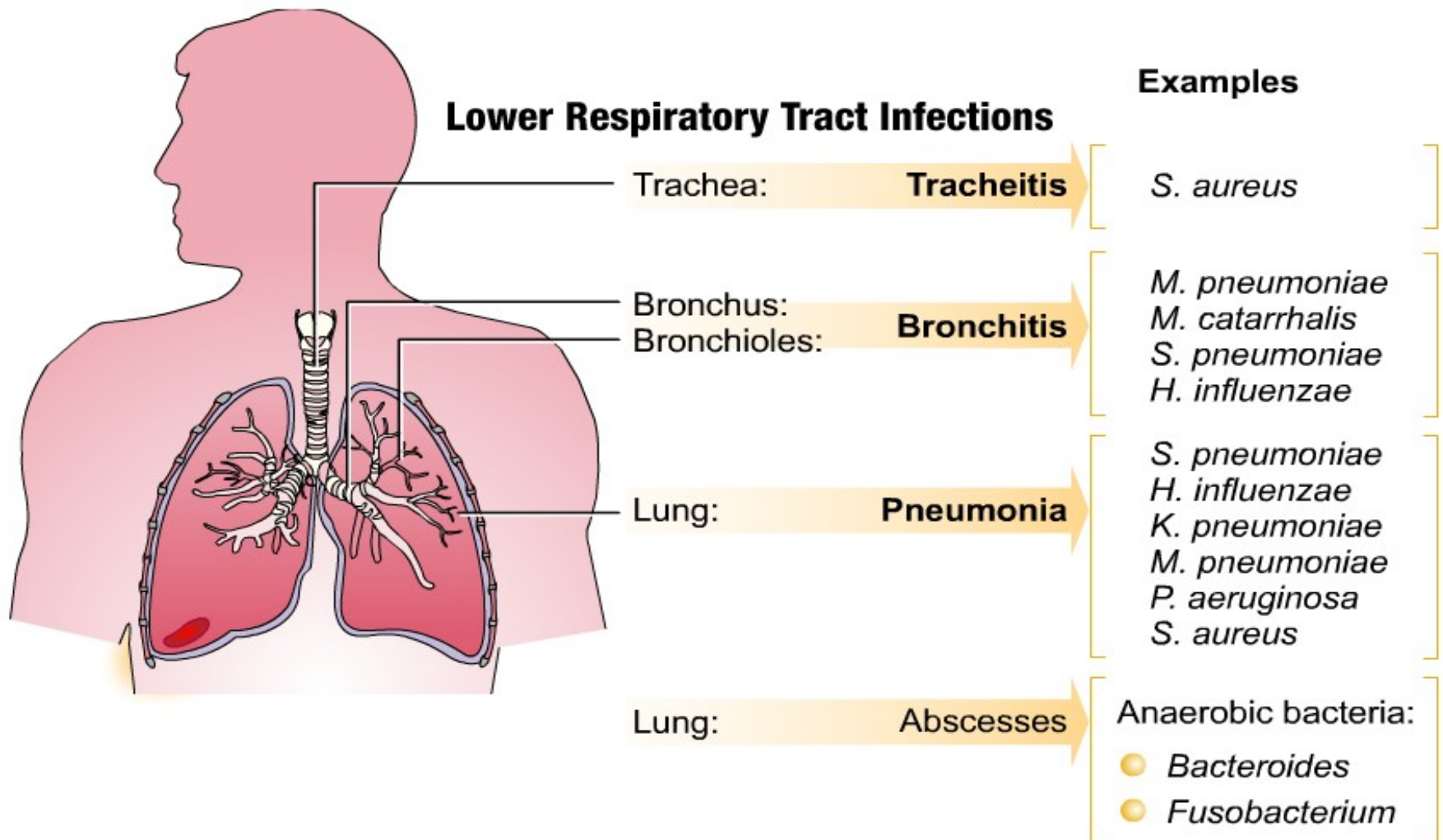
- ♠ Bronchial Asthma

- ♠ Pulmonary Tuberculosis (PTB)

- ♠ Atelectasis

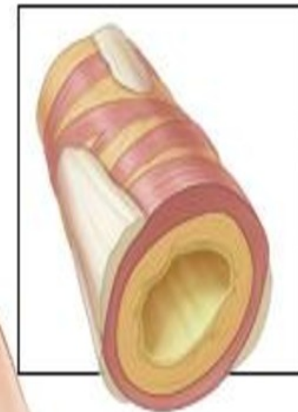
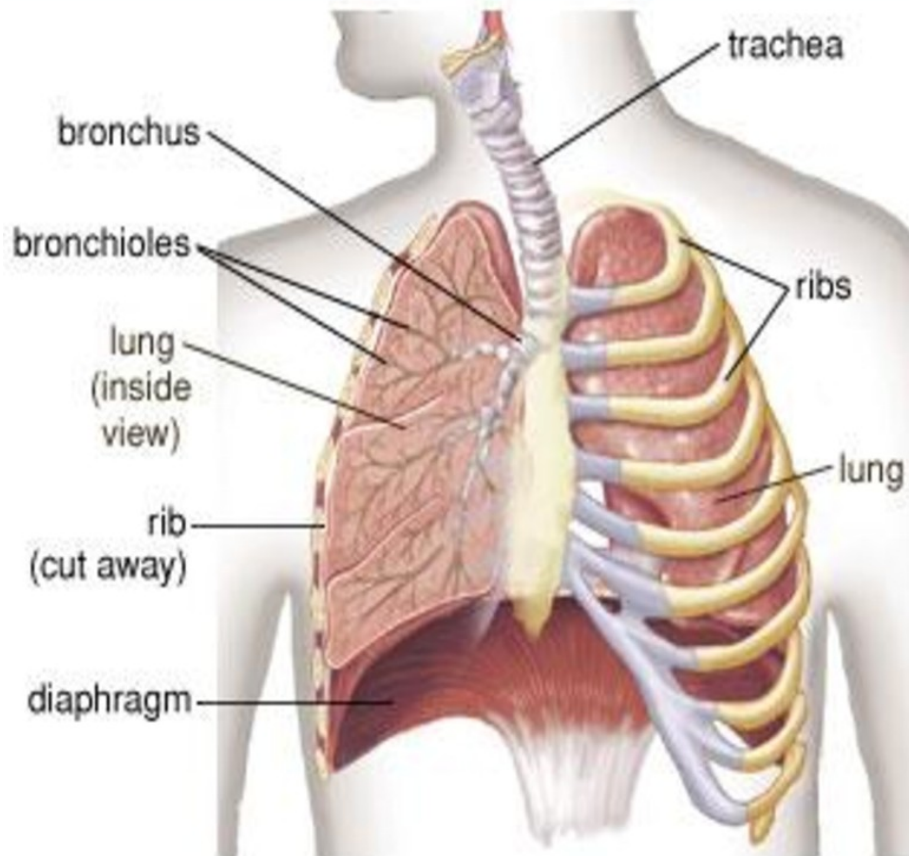
- ♠ Pulmonary oedema

Common chest and lower respiratory tract disorders



Acute Bronchitis

ACUTE BRONCHITIS



Normal
bronchial
tube



Inflamed
bronchial
tube

Acute Bronchitis

- Acute inflammation of the tracheobronchial tree
- Self-limiting
- Caused by infections or irritants

Etiology:

- **Acute infectious** bronchitis often part an acute (URTI or with secondary bacterial infection
- **Acute irritative** bronchitis - various mineral and vegetable dusts, volatile solvents, tobacco or other smoke.

Acute Bronchitis cont...

Clinical presentation

- **Acute infectious** bronchitis is often preceded by symptoms of URTI, coryza, malaise, chilliness, slight fever, back and muscle pain and sore throat.
- Onset of cough usually signals onset of bronchitis- **initially dry** but progresses to be **productive**.
- Fever to 38.80c may be present up to 3-5 days
- Persistent fever may suggest complication like pneumonia.
- Few pulmonary signs: scattered **rhonchi and wheezes**

Acute Bronchitis cont...

Treatment:

➤ General management

- Often symptomatic.
- Rest until fever subsides.
- Oral fluids should be taken more:- this facilitates sputum expectoration

Acute Bronchitis cont...

- **Anti-microbial treatment** is indicated:

- High-grade fever and
- Purulent sputum

For cough: Drug treatment should not be routinely employed

- **Dextromethorphan hydrobromide**, 15 – 30 mg p.o. 3 to 4 times a day.
- For children: 6-12 yrs, 7.5-15 mg; 2-6 yrs, 7.5 mg 3-4 times a day.
- **Codeine phosphate**, 10 - 20 mg p.o. 3 – 4 times a day. For children: 0.5 mg/kg p.o. qid.

Acute Bronchitis cont...

- For **productive cough**
 - Guaifenesin, 200- 400 mg P.O. QID; for children: 6-12 yrs, 100-200 mg; 2 years, 50-100 mg P.O. QID.
 - Antibiotic treatment is indicated when bronchitis is **complicated by bacterial infections and choice of antibiotics should be based on gram stain result.**

Acute Bronchitis cont...

First line:

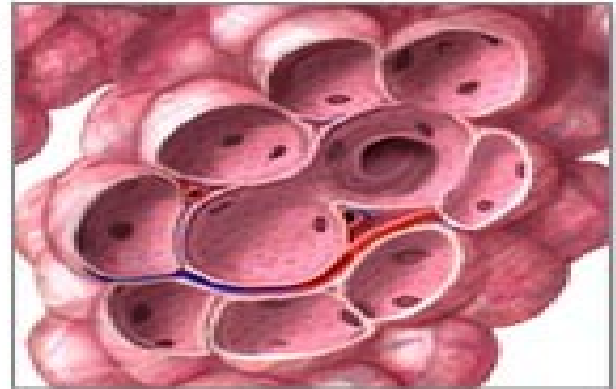
- **Amoxicillin**, 500 mg P.O. TID, for children: 20 – 40 mg/kg/day P.O. in 3 divided doses or
- **Ampicillin**, 500 mg P.O. BID/TID for 5-7 days

Alternative:

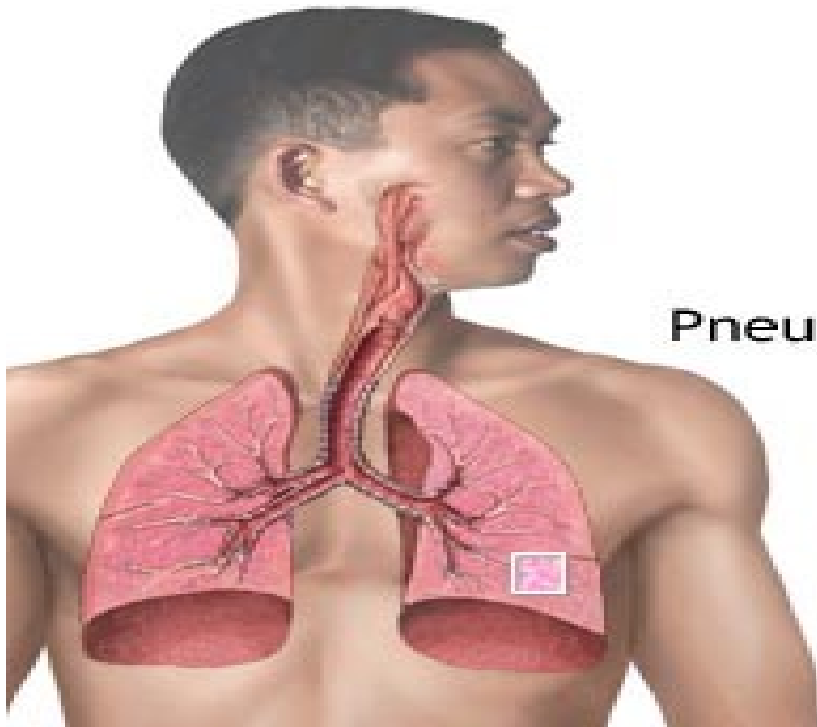
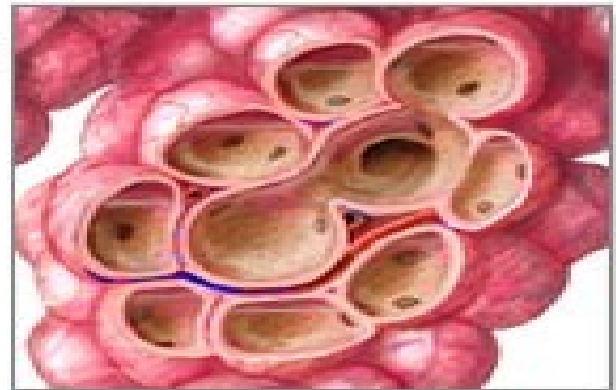
- **Erythromycin**, 250-500 mg qid p.o. for 7 days. For children: 30-50 mg/kg/day p.o. in 4 divided doses; 15-20 mg/kg/day i.v over 5 minutes in 3-4 divided doses. or
- **Tetracycline**, 250-500 mg qid, for 5-7 days or
- **Sulfamethoxazole + trimethoprim**, 800mg/160 mg. p.o. bid for 7 days. For children 6 weeks – 5 months, 100/20 mg; 6 months – 5 yrs, 200/40 mg; 6 – 12 yrs, 400/80 mg bid.

Pneumonia

Normal
alveoli



Pneumonia



ADAM.

Pneumonia

- + An inflammation and infection of **lung parenchyma**
- + Inflammatory infiltrate in alveoli (consolidation)
- + Common illness which occurs in all age group
- + Leading cause of Morbidity & Mortality in:
 - + Infants
 - + Older People &
 - + people who are chronically & terminal ill.

Predisposing factors for pneumonia include:

- Preceding respiratory viral infections
- Alcoholism , Cigarette smoking
- Underlying diseases such as Heart failure, COPD, Asthma, anemia etc
- Age extremes, Malnutrition
- Immunosuppressive therapy and disorders
- Decreased consciousness, comma , seizure etc
- Surgery and aspiration of secretions. Tracheal intubation etc

Pneumonia cont'd...

Cause

- Pneumonia can result from a variety of causes:
 - Bacterial (Gram-positive bacteria, Gram-negative bacteria, "Atypical" bacteria)
 - Virus
 - Fungi
 - Parasites
 - Chemical or physical injury to the lungs

Pneumonia cont'd...

Classification

► Based on causative agent

- ◆ Bacterial or typical pneumonia,

- ◆ Atypical pneumonia

✓ Streptococcus pneumoniae

- Most common cause of uncomplicated in all age groups

✓ Atypical Bacteria

- Mycoplasma

- Chlamydia

- Legionella

Pneumonia cont'd...

▶ According to the X-ray appearance

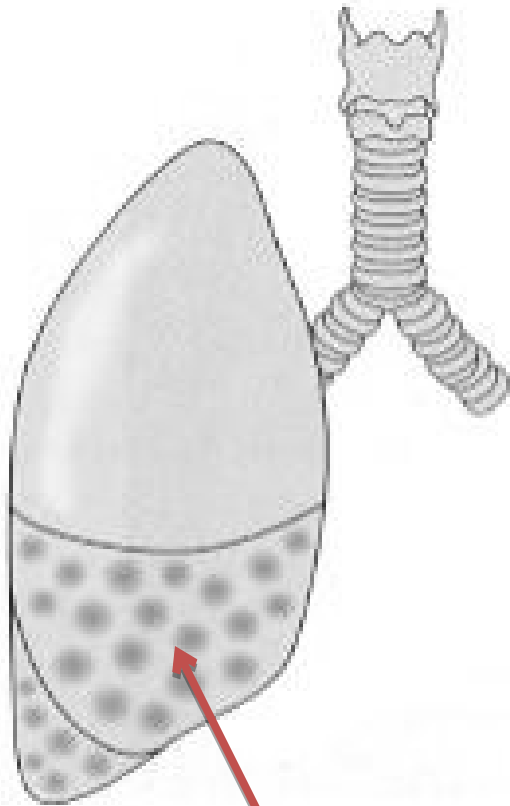
- ◆ Lobar pneumonia-

- ◆ homogeneous consolidation of one or more lung lobes

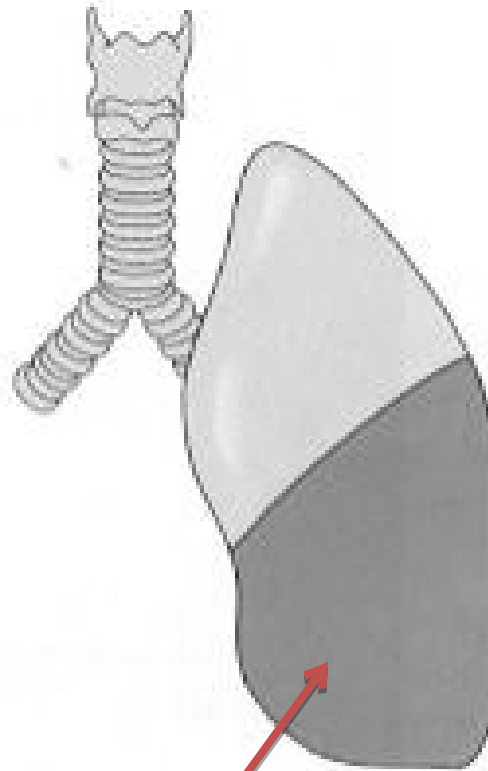
- ◆ Broncho- pneumonia-

- ◆ multiple patchy shadows in a localized or segmental area.

Pneumonia cont'd...

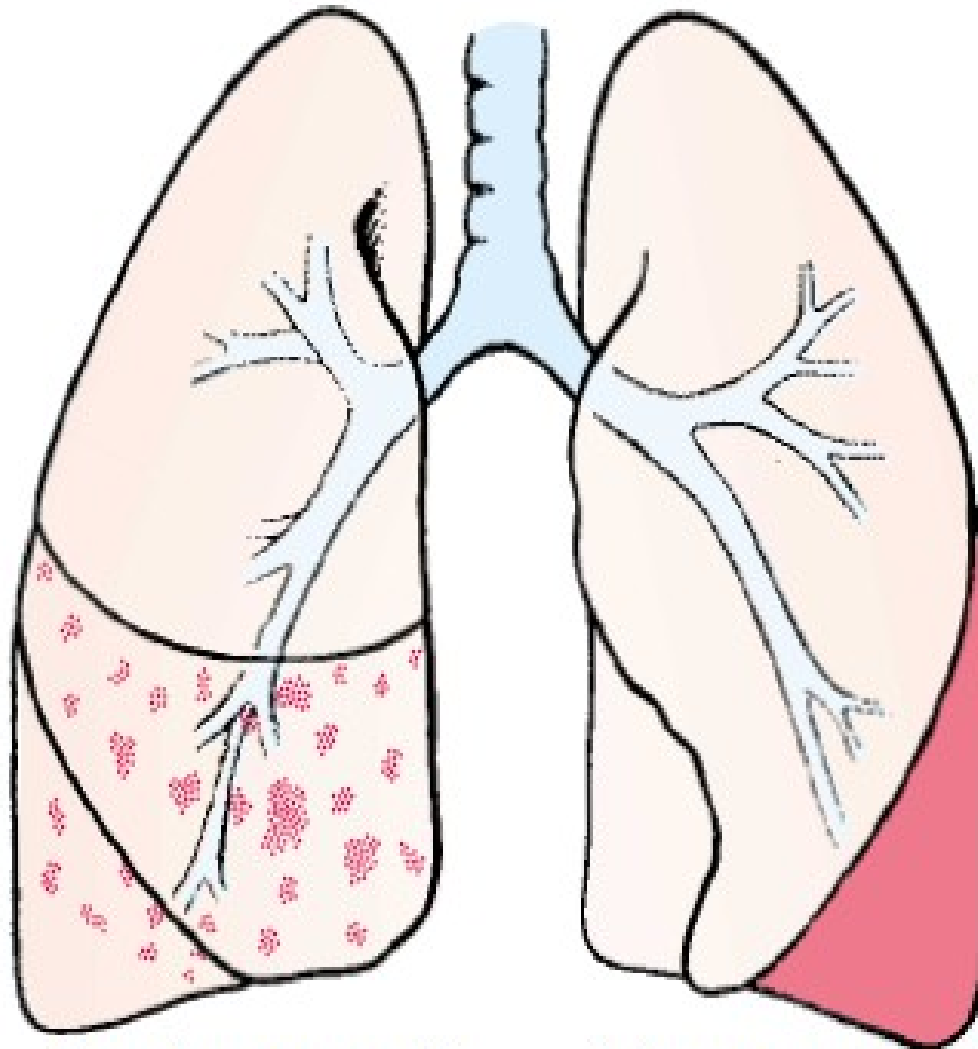


Bronchopneumonia



Lobar pneumonia

Pneumonia cont'd...



Bronchopneumonia

Lobar pneumonia

- Distributed in a patchy fashion, having originated in one or more localized areas within the bronchi and extending to the adjacent surrounding lung parenchyma
- Usually 2ry to other conditions
 - Viral infections
 - Obstruction of a bronchus (foreign body or neoplasm)
 - Inhalation of irritant gases
 - Major surgery
 - Chronic debilitating diseases, malnutrition
- More common than lobar

Lobar pneumonia:

- One or more lobes is involved
- *S. Pneumoniae*.
- Previously healthy individuals.
- Abrupt onset.
- Unilateral stabbing chest pain on inspiration (due to fibrinous pleurisy).

Pneumonia cont'd...

▶ According to the setting or clinical and environmental

- ◆ Community-acquired pneumonia(CAP)
- ◆ Hospital-acquired pneumonia(HAP)
- ◆ Aspiration pneumonia
- ◆ Pneumonia in immuno-compromised host

Pneumonia cont'd...

Community-acquired pneumonia (CAP)

- Infectious pneumonia in a person who has **not recently been hospitalized**
- **Common type** of pneumonia.
- Infection usually spread by **droplet inhalation**.
- Risk factors include: Cigarette smoking, Alcohol intake, Pre-existing lung disease, Old age, etc.

Causes of CAP

➡ *Streptococcus pneumoniae* (*pneumococcal pneumonia*)
commonest cause

➡ *Mycoplasma pneumoniae*

➡ *Chlamydia pneumoniae*

➡ *Haemophilus influenza*

➡ *Oral anaerobic bacteria*

➡ *Staphylococcus aureus*

➡ *Legionella pneumophila*

➡ *Mycobacterium tuberculosis*

Hospital-acquired pneumonia (HAP)

- ✓ Also called **nosocomial pneumonia**, that acquired during or after hospitalization - **at least 48 hours after admission**.
- Up to 5% of patients admitted to a hospital for other causes subsequently develop pneumonia.
- ▶ Nosocomial pneumonia is the **2nd most** common hospital-acquired infections.
- ▶ Nosocomial pneumonia is the leading cause of death from hospital-acquired infections.

Pneumonia cont'd...

Hospital-acquired pneumonia (HAP):- The presence of a new or progressive infiltrates of chest x-ray , plus at **least two of the following**

- **Fever >37.8 oc**
- **Leukocytosis $> 10,000/\text{mm}^3$**
- **Production of purulent sputum**
- Other findings: dyspnea, hypoxemia and chest pain

Pneumonia cont'd...

■ Hospitalized patients may have many risk factors for pneumonia:

- Mechanical ventilation (**VAP**)
- Prolonged malnutrition
- Underlying heart and lung diseases
- Decreased amounts of stomach acid
- Immune disturbances.

Pneumonia cont'd...

Causative agent

- Common organisms that cause HAP are:-
 - ➡ Gram-negative *bacilli including Pseudomonas aeruginosa, Klebsiella pneumoniae*
 - ➡ ***Staphylococcus aureus* (may be drug resistant)**
(MRSA)
 - ➡ *Oral anaerobes*
 - ➡ *H. influenza*

Pneumonia cont'd...

- ✚ **Methicillin-resistant *Staphylococcus aureus* (*MRSA*)** seen more commonly in patients
 - Received corticosteroids
 - Undergone mechanical ventilation >5 days
 - Presented with chronic lung disease
 - Had prior antibiotics therapy

3. Aspiration pneumonia:

- ✓ This occurs when large amount of oropharyngeal or gastric contents are aspirated into the lower respiratory tract.
- ✓ Aspiration occurs more frequently in patients with:
 - ✈ Decreased level of consciousness (alcoholism, seizure, strokes or general anesthesia),
 - ✈ Neurologic dysfunction of oropharynx and swallowing disorders.
 - ✈ People with periodontal disease are affected more.

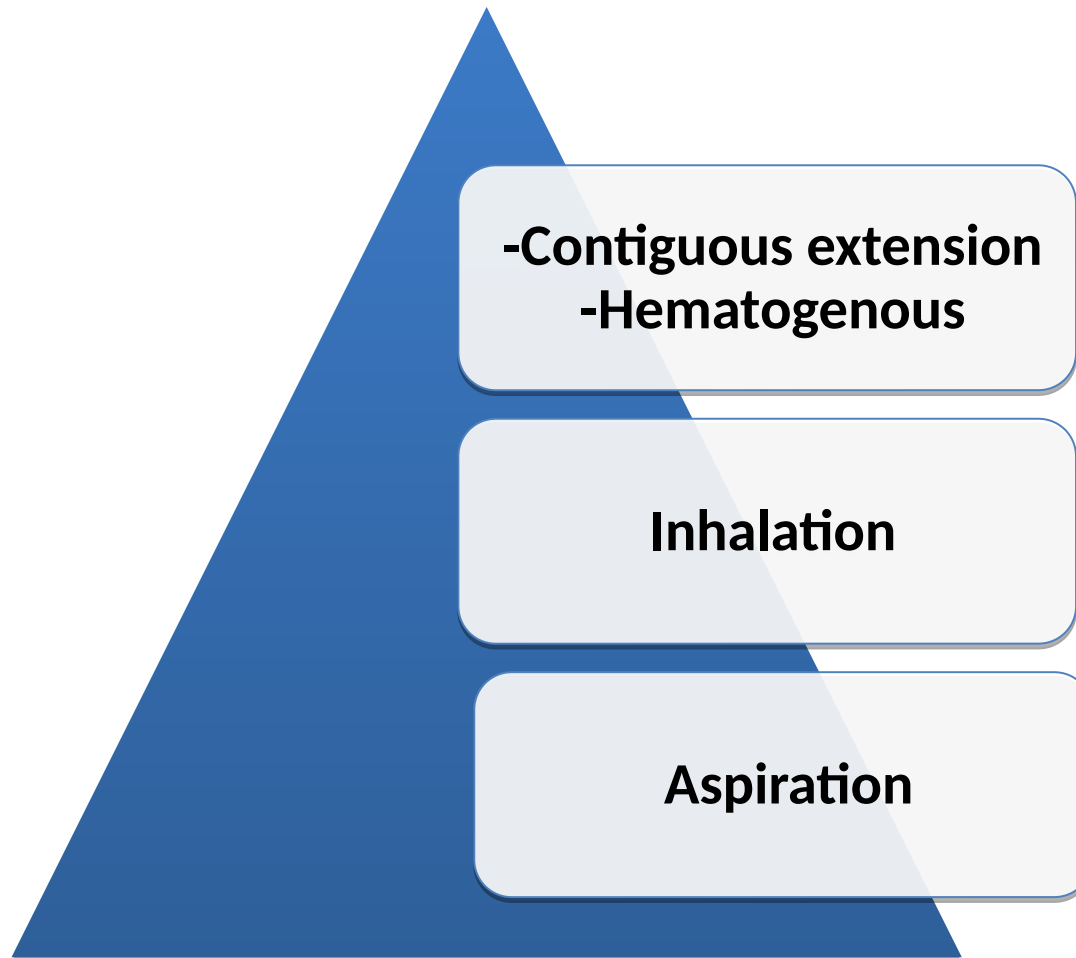
- Common Etiologic agents of **Aspiration pneumonia**:
- It is often polymicrobial
 - *Anerobic organisms in the oral cavity*
 - *Enterobacteriaceae*
 - *S. pneumoniae*
 - *S.aureus*
- Patients present with *cough and foul smelling sputum*.
- The cough may be chronic forming lung abscess and may resemble TB.
- There will be signs of cavity on physical exam and CXR.
- It is treated with *crystalline penicillin and metronidazole IV* for several weeks if lung abscess develops.

4. Pneumonia in Immunocompromised hosts

- **Immunocompromised hosts** such as transplant recipients, HIV infected patients, and patients on chemotherapy etc. are prone to develop pneumonia.
- The etiologic agents are:
 - ➡ Common bacterial causes of CAP : *St. Pnumoniae*, *H.influenzae*, *Mycoplasma*
 - ➡ Gram negative organisms : *enterobacteriaceae*
 - ➡ Funguses such as ***Pneumocystis carinii*** (*jerovecii*), *C.neoformans*
 - ➡ *Histoplasmosis* , *Aspergillus*
 - ➡ *Mycobaterium tuberculosis*
 - ➡ *Viruses* : *HSV* , *CMV*

Pathophysiology of Bacterial pneumonia

Port of Entry of bacteria to Lungs



Pneumonia cont'd...

Pathophysiology.....

- ▶ Once inside, bacteria may invade the spaces b/n cells and b/n alveoli through connecting pores.
- ▶ Invasion triggers the **immune system** to send neutrophils
- ▶ Neutrophils & macrophages engulf and kill the offending organisms
- ▶ The alveolar macrophages also initiate the inflammatory response
- ▶ It releases cytokines, causing a general activation of the immune system.

Pneumonia Pathophysiology cont'd...

- ▶ Neutrophils, bacteria and fluid from surrounding blood vessels fill the alveoli
- ▶ Interrupt normal oxygen transportation and venous blood entering the lungs passes through the under ventilated area. Bacteria often travel from an infected lung into the bloodstream, causing serious or even fatal illness such as septic shock
- ▶ Bacteria can also travel to the area between the lungs and the chest wall (the pleural cavity) causing a complication called an empyema.

General Clinical manifestations of Pneumonia

- ✚ High fever that may be accompanied by shaking chills
and Sweats
- ✚ *Tachypnea , Pleuritic Chest Pain*
- ✚ *Cough and Sputum and Sore Throat*
- ✚ Loss of appetite , *Dyspnea*
- ✚ *Headache*
- ✚ *Fatigue and Weakness*
- ✚ *Nausea and Vomiting*

Clinical Presentation of community acquired pneumonia

- Community acquired pneumonia can have **typical** or **atypical** presentations.
- More commonly patients have “typical” presentation and it is mainly caused by **S. Pneumoniae**.
- But other organisms like H. influenza and oral flora can be causes.
- Pneumonia is often preceded by a URTI.

The “typical” Community acquired pneumonia:

- Sudden onset with a single shaking chill. This is followed by high grade fever (up to 40.50c)
- Cough productive of purulent, blood streaked or rusty sputum
- Pleuritic chest pain on the involved side worsened during inspiration and coughing
- Dyspnea (shortness of Breath)
- Headache , myalgia , arthralgia and fatigue

Physical findings

- The Patient will have tachycardia (PR 100 to 40/min) and tachypnea (RR > 20/min).
- There will be pulmonary signs of consolidation (lobar pneumonia), which are
 - ✓ Increased tactile fremitus and vocal fremitus , dullness on percussion
 - ✓ Bronchial breath sound, egophony, whispering pectoriloquy, crackles and pleural friction rub.

The “atypical” CAP

- **Atypical** pneumonia is usually caused by *M. pneumoniae*, *C. pneumoniae*, oral anaerobes and *P. carinii* (usually in HIV patients), as well as *S. Pneumoniae*.
- Some viruses like influenza virus, Varicella zoster virus and cytomegalovirus may cause “atypical” pneumonia.
- **Tuberculosis** could also present in this form.

The “atypical” CAP present with:-

- More gradual onset of symptoms, dry cough, shortness of breath.
- Prominence of systemic symptoms like headache, malaise, fatigue, nausea, vomiting and diarrhea.
- Chest findings on physical examination are **minimal** even though X-ray changes are marked.

Pneumonia cont'd...

Diagnosis

■ History

■ Physical examination

✗ Inspection

- Increase respiratory rate

- cyanosis

✗ Palpation

- Increase vibration of the chest when speaking

- The way of chest expands

Pneumonia cont'd...

✗ Percussion

■ Dullness

✗ Auscultation

- ⊕ A lack normal breath sounds- **Bronchial Breath Sounds**
- ⊕ Crackle sounds
- ⊕ Increase loudness of whispered speech(**Tactile Fremitus**)
- ⊕ Ego phony

Pneumonia cont'd...

- ◆ Chest x-ray
 - ❖ Chest x-rays can reveal areas of opacity (seen as white) which represent **consolidation**.
- ◆ Blood tests- a CBC may show a high WBC count.
- ◆ Sputum cultures
- ◆ Chest CT scan or other tests may be needed to distinguish pneumonia from other illness.

Pneumonia cont'd...

Medical management

- Most cases of pneumonia can be treated without hospitalization.
- Typically, oral antibiotics, rest, fluids and home care are sufficient for complete resolution
- People with pneumonia who are having trouble breathing, other medical problems & the elderly may need more advanced treatment.

Pneumonia cont'd...

Medical management...

- ✓ Initially be treated with a broad-spectrum antibiotic regimen aimed **at covering all likely bacterial pathogen**
- ✓ This regimen should subsequently be narrowed, **according to the result of culture**

Management of Pneumonia

Mild form of CAP

- Patients with uncomplicated “typical” pneumonia can be treated at OPD
 - ✓ Amoxicillin 500 mg PO TID or
 - ✓ Ampicillin 500 mg PO QID for 7 to 10 days OR.
 - ✓ Procaine penicillin 600,000 IU IM every 12 hrs.
- ❖ **If “atypical” pneumonia is suspected,**
 - Erythromycin 500 mg PO QID for 7-10 days or
 - Doxycycline 100 mg PO BID

Management of Pneumonia....

Supportive Therapy:

- Patients should also get bed rest,
- adequate fluids and
- analgesics for pleuritic chest pain and fever.

Response – In mildly ill patients who are treated early, fever subsides in 24 to 48 hrs. Others may require 4 days to respond.

Mgt of Severe forms of CAP

- ❖ Seriously ill should be treated as **inpatient**.
- **Criteria for hospitalization of patients with pneumonia** are:
 - RR of $>28/\text{min}$, tachycardia $>140/\text{min}$
 - SBP $<90\text{mm Hg}$ (hypotension)
 - Hypoxemia (arterial $\text{PO}_2 < 60\text{mm hg}$)
 - New onset of confusion or ALOC
 - Unstable /significant co-morbidity (e.g. HF , uncontrolled diabetes, chronic renal insufficiency ,alcoholism , immunosuppression)
 - Multilobar pneumonia
 - Pleural effusion and complicated result

Mgt of Severe forms of CAP.....

➤ Other **conditions** in which **inpatient management** may be advisable:

- Elderly patient >65 yrs of age
- Leukopenia <5000 WBC/ml
- Pneumonia caused by st. Aureus or gram negative bacilli
- Suppurative complications e.g. Empyema, arthritis, meningitis, endocarditis
- Failure of outpatient treatment
- Inability to take oral medication or persistent vomiting

Mgt of Severe forms of CAP.....

Antibiotic Therapy

- Admitted patients should be started on antibiotics empirically
 - ✈ High dose of crystalline penicillin 3-4 million IU IV every 4-6 hours
 - ✈ Alternatives are Ceftriaxone 1gm IV daily or 2X /day or Ampicillin 500 mg IV QID Or Cefotaxime
 - ✈ In severely ill patients erythromycin or a flouroquinolone can be added.
- Choice of Antibiotics may be modified based on **culture and sensitivity results**, if available.
- If the patient improves, IV treatment can be changed to oral after 3-4 days to complete a 7-10 days course.

Mgt of Severe forms of CAP.....

Non-Drug treatment:

- ✚ Bed rest
- ✚ Frequent monitoring of temperature, blood pressure and pulse rate.
- ✚ Give attention to fluid and nutritional replacements.
- ✚ Administer Oxygen
- ✚ Analgesia for chest pain

Prevention of CAP

- Cessation of smoking and alcoholism
- Vaccines : Influenza an Pneumococcal vaccines

Treatment of HAP

- Antibiotics: Should be initiated empirically which latter on may be modified based on **culture and sensitivity result**.
- Antibiotics should cover at least G- negatives and S. ureus
- Ceftriaxone 1gm IV daily or BID plus Cloxacillin or meticillin Or Levofloxacin 500 mg IV /day

When resistant organisms are suspected

- Cefotaxime 750 mg IV TID plus Vancomycin 1gm IV BID
- Pneumocystis pneumonia responds to Trimethoprin + Sulfamethoxazole (cotrimoxazole)

Prevention of HAP

- Strict hand washing protocols by health care providers
- Remove NG tubes when the patient is stable
- Proper aseptic handling of IV lines
- Protect Airway of those with altered consciousness.
- Oral Care
- Avoid over medicating
- Vaccines

Pneumonia cont'd...

Complications

- ⊕ Shock and respiratory failure
- ⊕ Empyema
- ⊕ Pleural effusion
- ⊕ Atelectasis
- ⊕ Abscess formation
- ⊕ Bacteremia

Nursing management

The nurse should monitor:

- Changes in temperature and pulse
- Amount, odor, and color of secretions
- Frequency and severity of cough
- Degree of tachypnea or shortness of breath
- Changes in physical assessment & chest x-ray findings
- unusual behavior, altered mental status, dehydration, fatigue

Pneumonia cont'd...

Nursing diagnoses

- ✓ Ineffective airway clearance related to copious tracheo-bronchial secretions
- ✓ Activity intolerance related to impaired respiratory function
- ✓ Risk for deficient fluid volume related to fever and dyspnea
- ✓ Imbalanced nutrition: less than body requirements

Pneumonia cont'd...

Nursing intervention

- Encourages hydration
- Lung expansion maneuvers- deep breathing, direct coughing
- Administers oxygen therapy as prescribed.
- Encourage increased fluid intake (at least 2 L/day)
- Limited activity and encourage rest
- proper diet and hygiene

Nursing intervention

TEACHING PATIENTS SELF-CARE

- Instruct patient to continue taking full course of antibiotics as prescribed;
- teach the patient about their proper administration and potential s/e.
- Encourage breathing exercises
- Encourage follow-up chest x-rays.
- Encourage patient to stop smoking.
- Instruct patient to avoid stress, fatigue, and excessive alcohol intake, all of which lower resistance to pneumonia.
- Recommend influenza vaccine (Pneumovax) to all patients at risk.

Prognosis:

- ❑ The overall mortality rate is low, if treated early.
- ❑ Factors that herald a poor prognosis include the following:-
 - ✓ Extremes of age, especially < 1 yr or > 60 yrs,
 - ✓ Positive blood culture
 - ✓ Involvement of more than one lobe
 - ✓ Peripheral WBC $< 5000/\text{ml}$
 - ✓ Presence of associated diseases (e.g. cirrhosis, CHF, immunosuppression)
 - ✓ Development of extrapulmonary complications like meningitis and endocarditis.

Prognosis.....

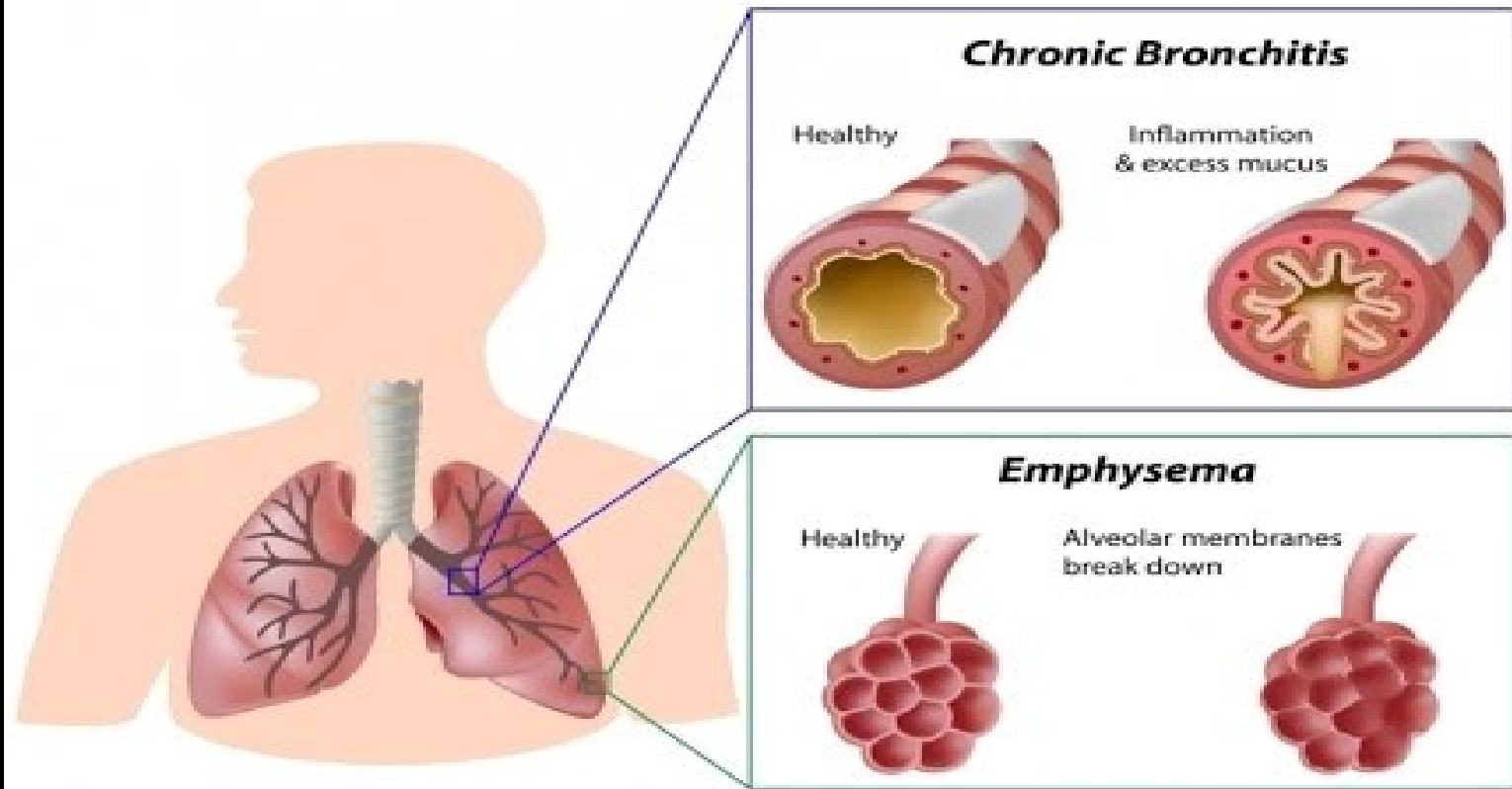
- If a patient does not improve, the following factors should be considered:
 - ✓ Wrong etiologic diagnosis
 - ✓ Adverse drug reaction
 - ✓ Far advanced case or super infection
 - ✓ Inadequate host defenses due to associated condition
 - ✓ Non-compliance to the drug regimen in outpatients
 - ✓ Antibiotic resistance of the strain and
 - ✓ Complications like empyema requiring drainage, or metastatic foci of infection requiring higher doses (e.g. meningitis, endocarditis or septic arthritis).

Note:

- ***Persistent cough and infiltration on chest x-ray for more than 6 weeks after therapy suggests possibility of an underlying bronchogenic neoplasm or tuberculosis.***

Chronic Obstructive pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease (COPD)



Chronic Obstructive pulmonary Disease (COPD)

- COPD is a disease characterized by **airflow limitation** that is **not fully reversible**
- Global Initiative for Chronic Obstructive Lung Disease (GOLD) has defined chronic obstructive pulmonary disease (**COPD**) as “a **preventable** and **treatable** disease with some significant extrapulmonary effects that may contribute to the severity in individual patients
- Primary symptoms of COPD are *cough, sputum production and Dyspnea*

COPD....

- COPD may include diseases that cause airflow obstruction
 - Emphysema,
 - Chronic bronchitis)or
 - Any combination of these disorders.
 - Other diseases such as :
 - Cystic fibrosis,
 - Bronchiectasis,
 - Asthma
- Previously classified as types of COPD
now classified as chronic pulmonary
disorders.**
- COPD can coexist with asthma. Both of these diseases have the same major symptoms; however, symptoms are generally more variable in asthma than in COPD.

Causes of COPD

1. *Cigarette smoking*

- ✓ Primary cause of COPD
- ✓ 80% to 90% of COPD deaths are related to tobacco smoking

2. *Occupational chemicals and dusts*

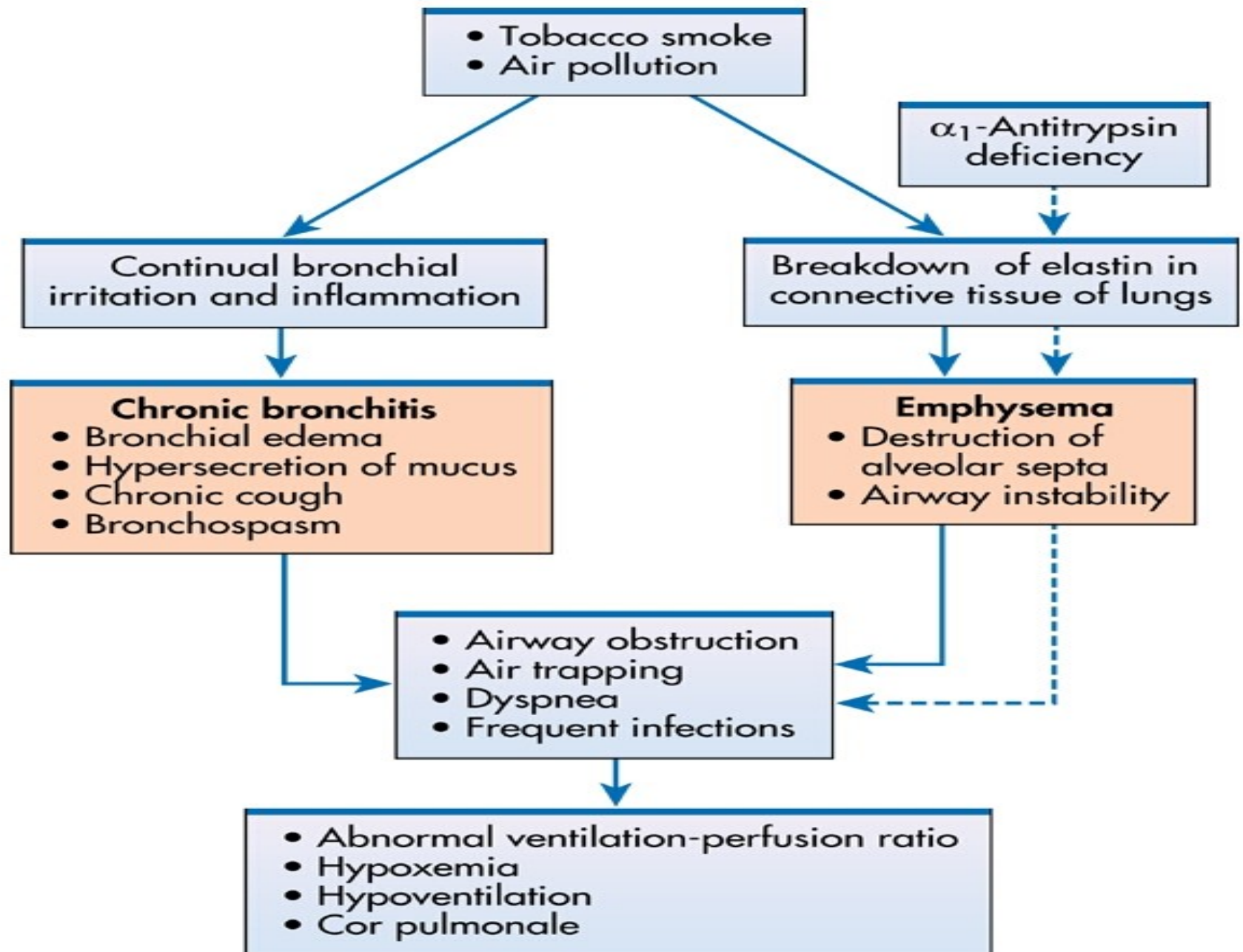
3. *Air pollution*

4. *Infection*

5. *Heredity- α_1 -antitrypsin deficiency*

- ✓ α_1 - Antitrypsin (AAT) deficiency (produced by liver and found in lungs); accounts for < 1% of COPD cases.

6. *Aging*



Pathophysiology of COPD

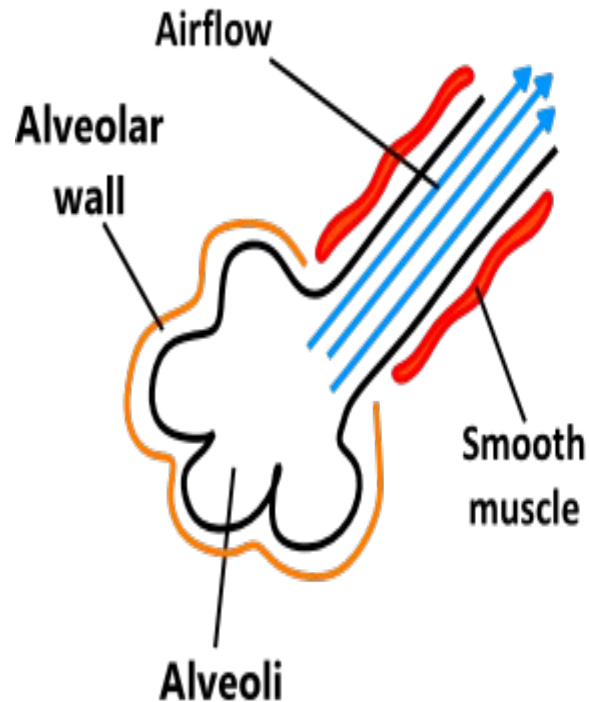
- Airflow limitation is both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases
- Chronic inflammation and the body's attempts to repair it, changes and narrowing occur in the airways.
- Proximal airways (trachea and bronchi greater than 2 mm in diameter), changes include increased numbers of goblet cells and enlarged submucosal glands, both of which lead to hypersecretion of mucus.
- In the peripheral airways (bronchioles less than 2 mm diameter), inflammation causes thickening of the airway wall, peribronchial fibrosis, exudate in the airway, and overall airway narrowing (obstructive bronchiolitis).

Pathophysiology of COPD....

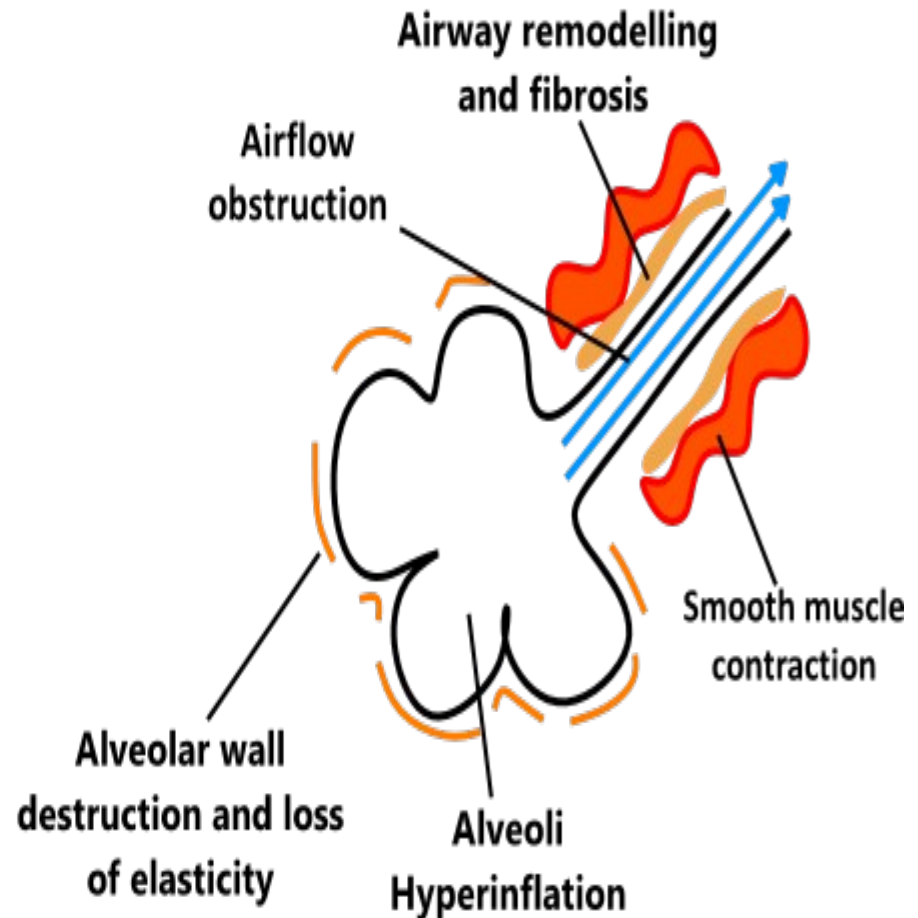
- Over time, this ongoing injury-and-repair process causes scar tissue formation and narrowing of the airway lumen
- Inflammatory and structural changes also occur in the lung parenchyma
- Alveolar wall destruction leads to loss of alveolar attachments and a decrease in elastic recoil.
- Finally, the chronic inflammatory process affects the pulmonary vasculature and causes thickening of the lining of the vessel and hypertrophy of smooth muscle, which may lead to pulmonary hypertension

LUNGS IN COPD

Normal



COPD



Chronic Bronchitis

- A disease of the airways, is defined as the presence of **cough** and **sputum production** for at least 3 months in each of 2 consecutive years.

Etiology/ risk factors

- Bronchial irritants (e.g. cigarette smoke, exposure to pollution)
- Genetic predisposition (alpha-1 antitrypsin deficiency)
- Secondary bacterial or viral infections

Chronic Bronchitis: Pathophysiology

- ◆ Chronic inflammation
- ◆ Hypertrophy & hyperplasia of bronchial glands that secrete mucus
- ◆ Increase number of goblet cells
- ◆ Cilia are destroyed
- ◆ Narrowing of airway
 - $\Rightarrow$ airflow resistance
 - $\Rightarrow$ work of breathing
- ◆ Hypoventilation & CO₂ retention $\Rightarrow$ hypoxemia & hypercapnea
- ◆ Bronchial walls thickened, bronchial lumen narrowed, and mucus may plug in the airway

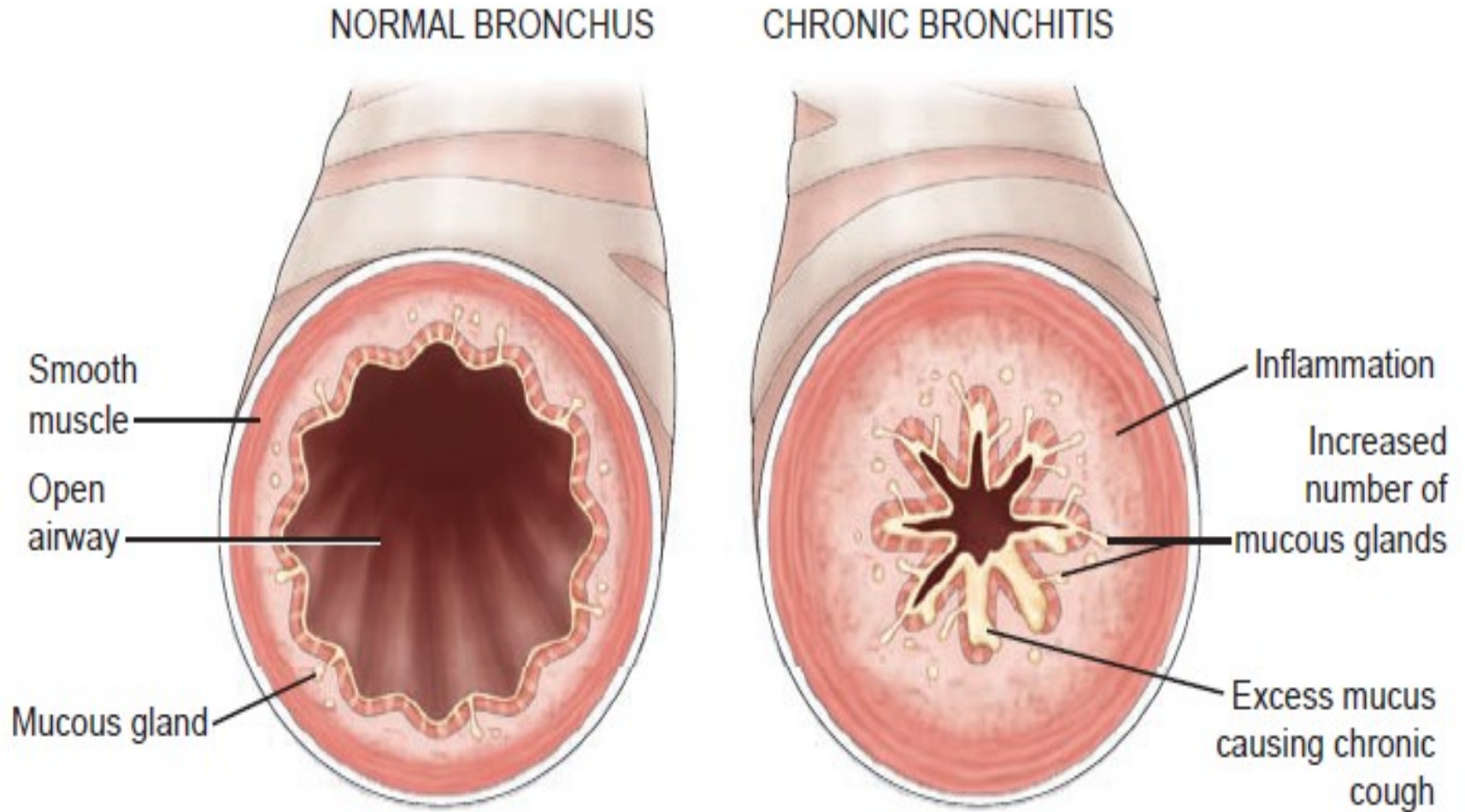
Chronic Bronchitis: PP....

- Alveoli become damaged and fibrosed,
- Altered function of the alveolar macrophages.
- The patient becomes more susceptible to respiratory infection.

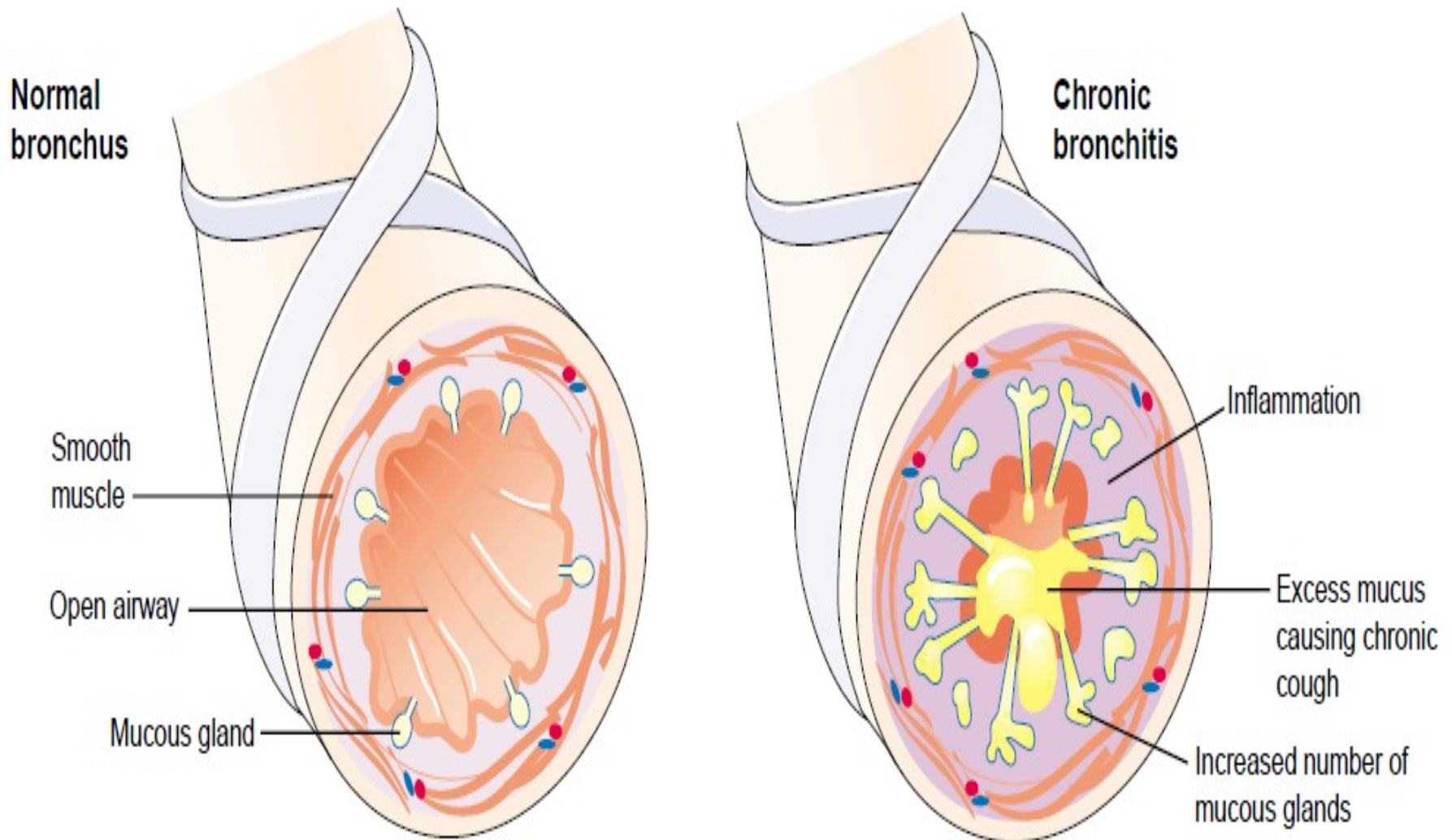
Pathologic lung changes in chronic bronchitis

- Hyperplasia of mucus-secreting glands
in trachea and bronchi = Narrow airway lumen and
reduced airflow = Increase in goblet cells =
Disappearance of cilia = Chronic inflammatory
changes and narrowing of small airways = Altered
function of alveolar macrophages = infections

Chronic Bronchitis: PP....



Chronic Bronchitis: PP....



Chronic Bronchitis: PP....

Normal bronchi

Bronchitis



Normal lumen

Mucus plug

ADAM.

Chronic Bronchitis: cont...

Clinical manifestations

■ In early stages

- Clients may not recognize early symptoms
- Symptoms progress slowly
- May not be diagnosed until severe episode with a cold or flu

- Productive cough (copious)
- Cyanosis
- Dyspnea , Tachypnea , Wheezing

Chronic Bronchitis cont'd...

Diagnoses

- ▶ Hx (e.g., smoking, occupation, environmental exposure)
- ▶ Physical exam
- ▶ Radiology
- ▶ Sputum culture
- ▶ ABG analysis ($\equiv$ PaCO₂, decrease PaO₂)

Chronic Bronchitis: Management

- ➡ The treatment is complex and depends on the stage of bronchitis and whether other health problems are present.
- ➡ Lifestyle changes, such as quitting smoking or polluted air, controlled regular exercise.
- ➡ Supplemental oxygen
- ➡ Treat other respiratory infections
- ➡ Nutritional support, Fluid intake ~3 lit/day

Chronic Bronchitis cont'd...

Medical management

Medications

- ◆ Inhaled bronchodilators
 - Short acting B₂-agonists
 - Long-acting B₂-agonists
 - Methylxanthines
- ◆ Anti-inflammatory
 - Corticosteroids

Chronic Bronchitis cont'd...

- ⊕ Expectorants for cough
 - Codeine phosphate
 - Dextromethorphan hydro bromide
- ⊕ Antipyretics for fever
- ⊕ Mucolytics, e.g. Acetylcysteine

Chronic Bronchitis cont'd...

Nursing management

- ✓ Rest
- ✓ Encourage Increased fluid intake
- ✓ Smoking cessation
- ✓ Maximize self-management and improved coping ability,
- ✓ Adherence to the therapeutic program and home care,
- ✓ Promoting absence of complications.

Chronic Bronchitis cont'd...

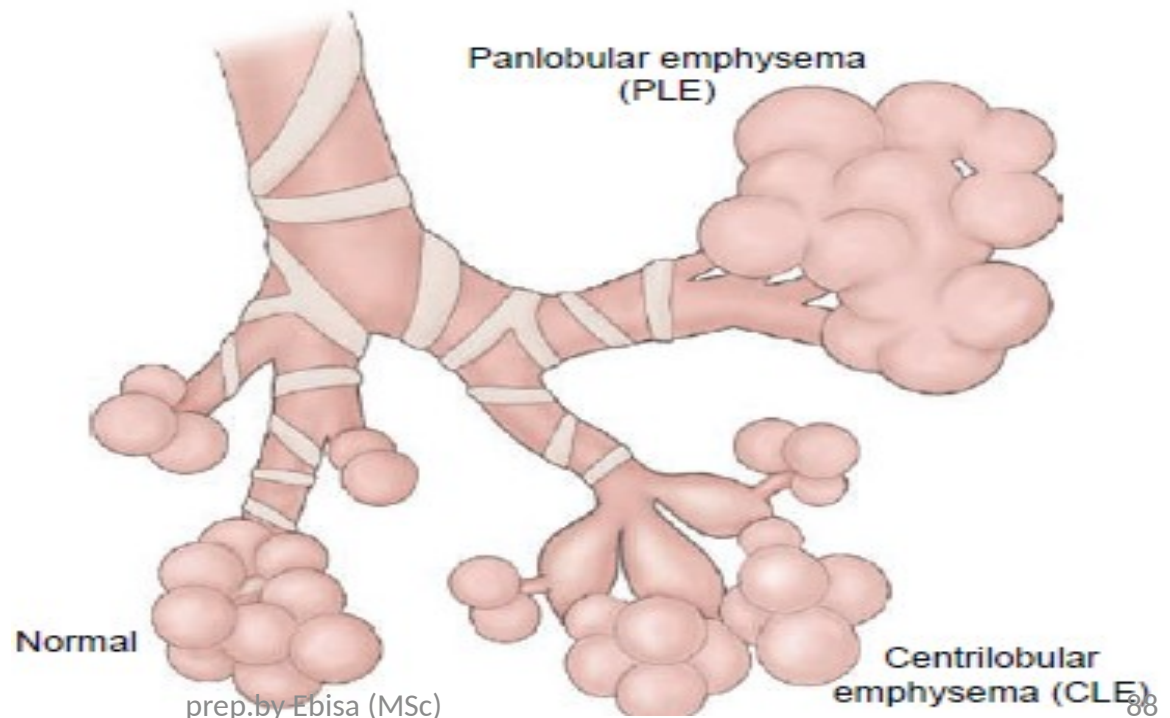
➤ Prognosis

The progression of chronic bronchitis may be **slowed**, and an initial improvement in symptoms may be achieved.

➤ However, there is **no cure** for chronic bronchitis, and the disease can often lead to or coexist with emphysema.

Emphysema

- ✦ An abnormal distention of the air spaces beyond the terminal bronchioles, with destruction of the alveoli result in impaired gas exchange.



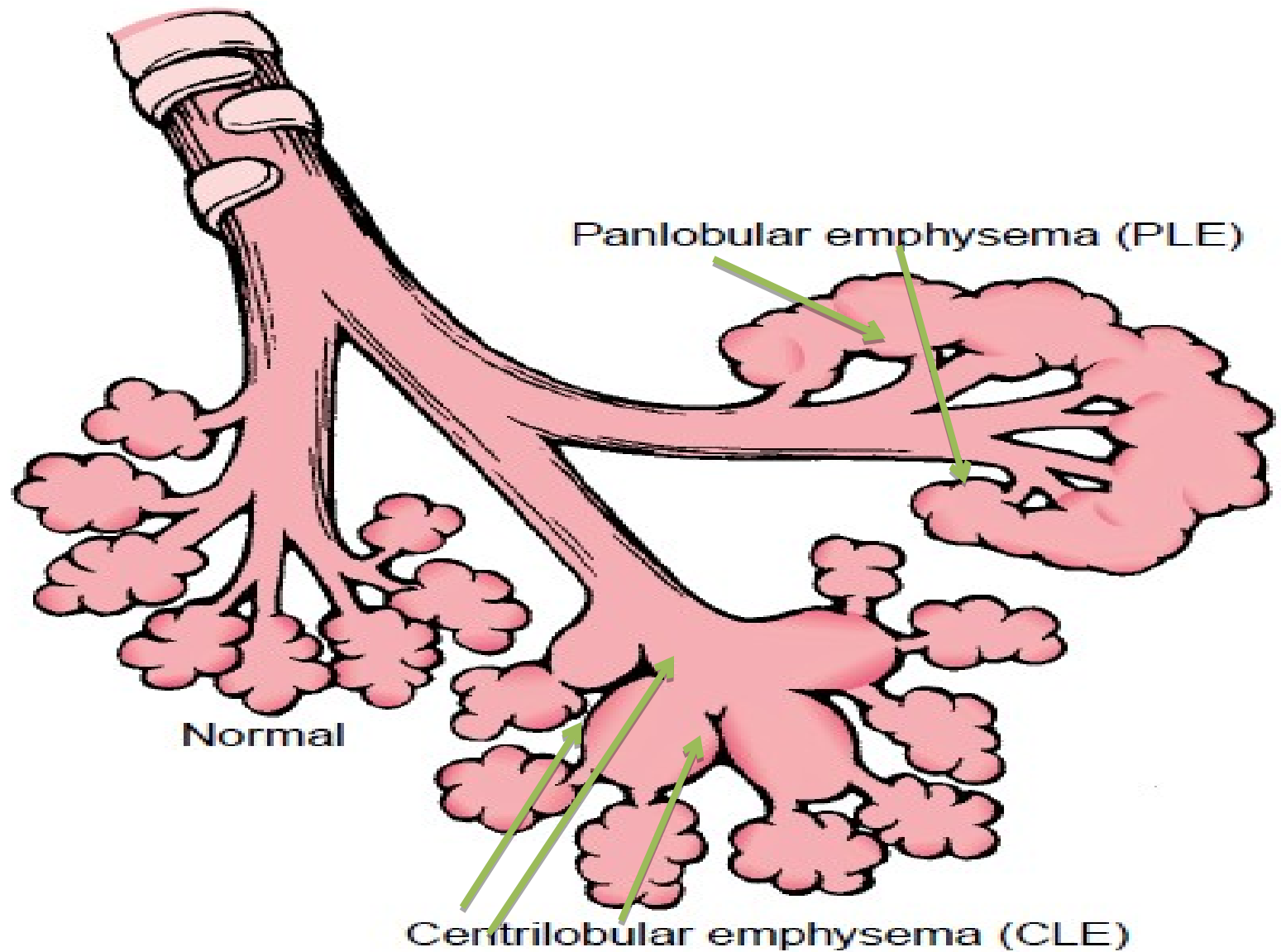
Emphysema cont'd...

Types of emphysema

▶ Two main types, both may occur in the same patient.

1. **Pan lobular-** there is destruction of the respiratory bronchioles, alveolar duct and alveoli.
2. **Centrilobular-** pathologic changes take place mainly in the center of the secondary lobule, preserving the **peripheral portions** or alveoli unchanged.

Emphysema cont'd...



Emphysema cont'd...

Etiology /risk factors

- Actual cause is unknown
- ▶ Tobacco smoking (80%)
- ▶ Other percentages is caused by inhaling too many air pollutants (especially in occupational setting)
- ▶ Underlying respiratory disease
- ▶ Congenital-alpha 1-antitrypsin deficiency

Emphysema cont'd...

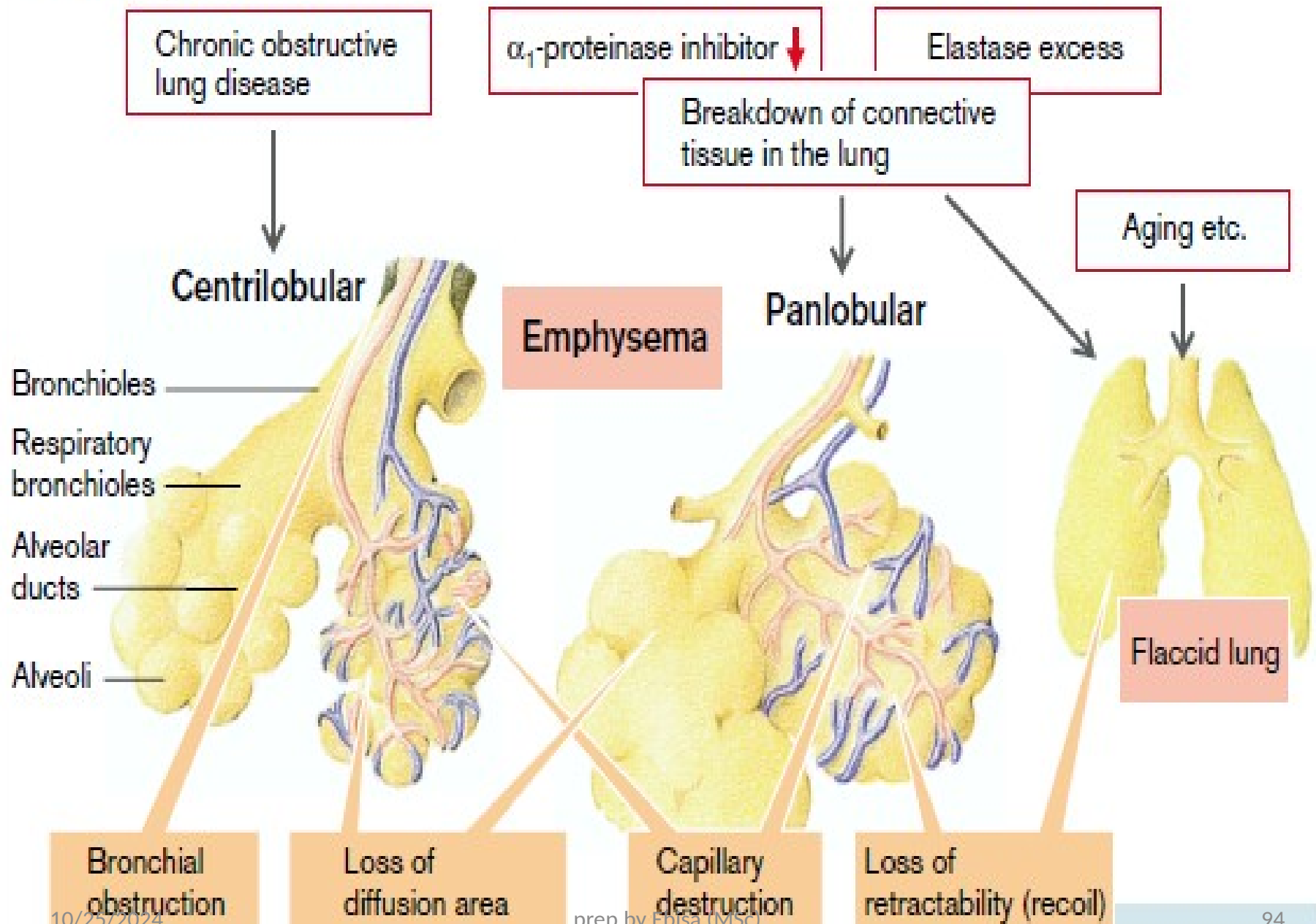
Pathophysiology

- ◆ Smoking damages cleansing mechanism of lung
 - ◆ Airflow is obstructed and
 - ◆ Air becomes trapped **behind** the obstruction.
- ◆ Affects alveolar membrane
 - ◆ Destruction of alveolar wall
 - ◆ Loss of elastic recoil
 - ◆ Over distended alveoli
- ◆ Smoking also irritates the goblet cells and mucus glands-
infection and damage to the lung.

Emphysema Pathophysiology cont'd...

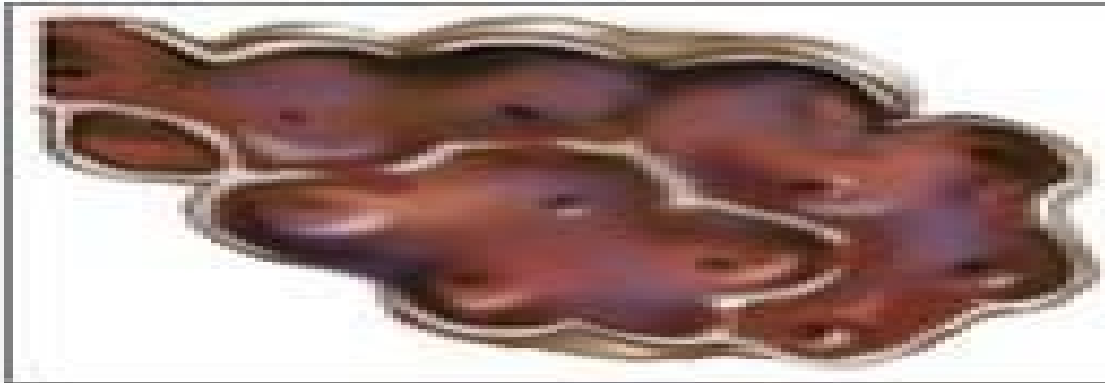
- Walls of the alveoli are destroyed that causing
 - ✚ An increase in dead space &
 - ✚ Impaired oxygen diffusion.
- In later stages of disease, carbon dioxide elimination is impaired
- Resulting in increase carbon dioxide tension in arterial blood and causing respiratory acidosis.

A. Emphysema

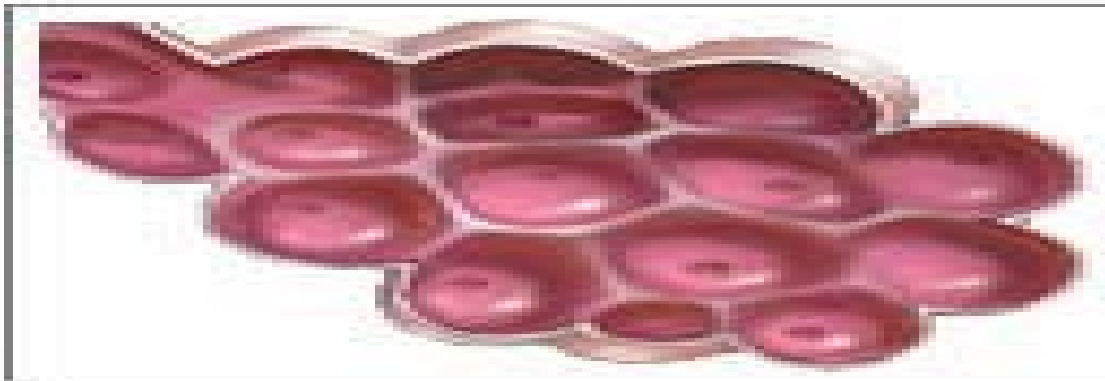


Emphysema cont'd...

Alveoli with
emphysema



Microscopic view
of normal alveoli



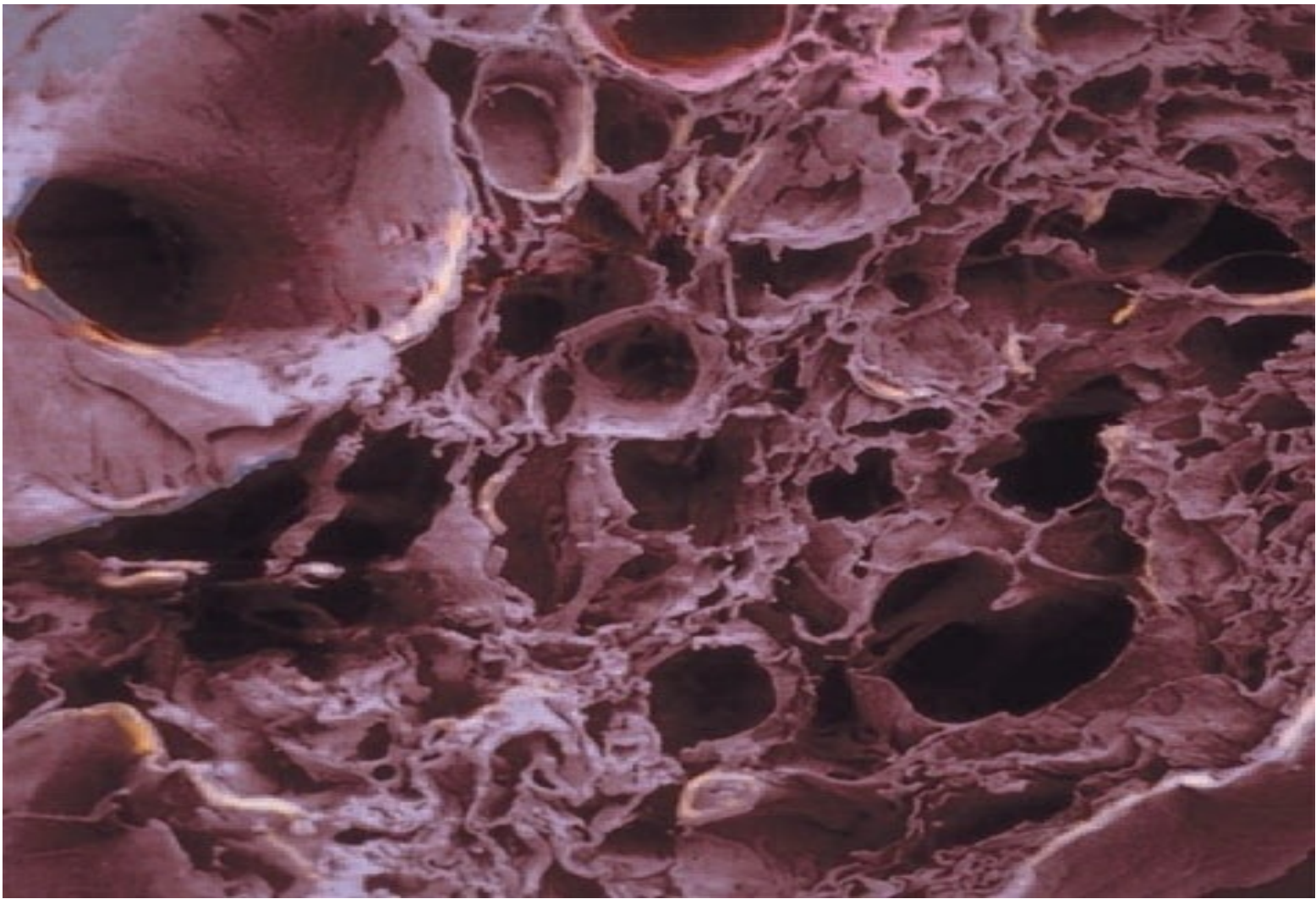


Fig. Scanning electron microscopy (SEM) of lung tissue indicating emphysema.

Emphysema cont'd...

Clinical manifestation

➤ Early stages

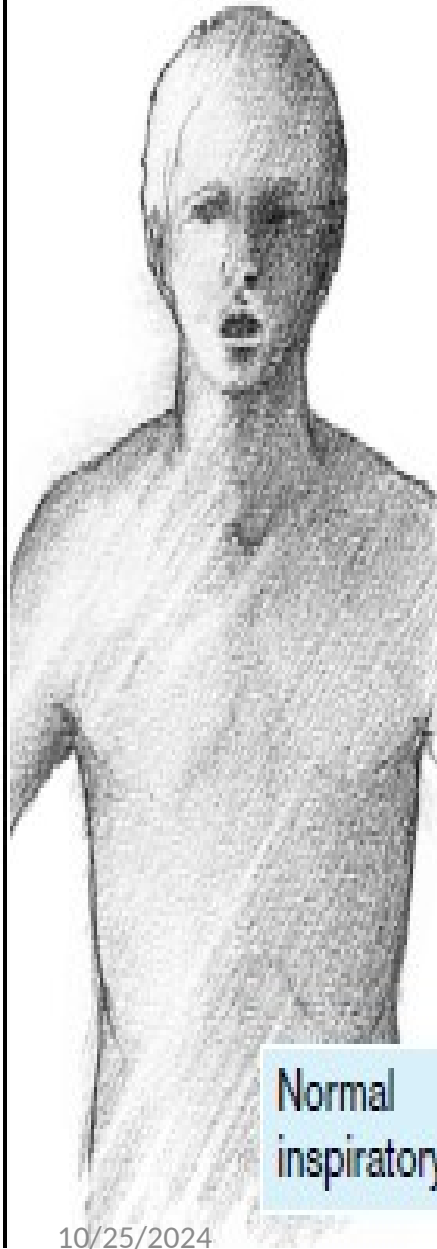
- ✓ Barell chest
- ✓ Central cyanosis
- ✓ Finger clubbing
- ✓ Dyspnea
- ✓ Wheezing
- ✓ Chronic fatigue
- ✓ Difficult in sleeping
- ✓ Hypoxia
- ✓ Polycythemia
- ✓ Cough & sputum production

Emphysema cont'd...

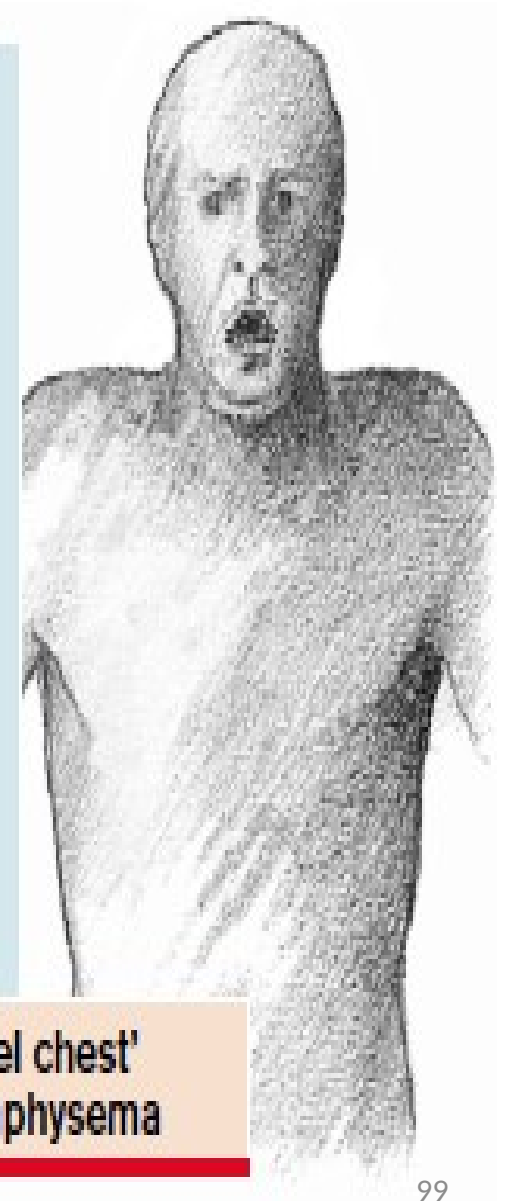
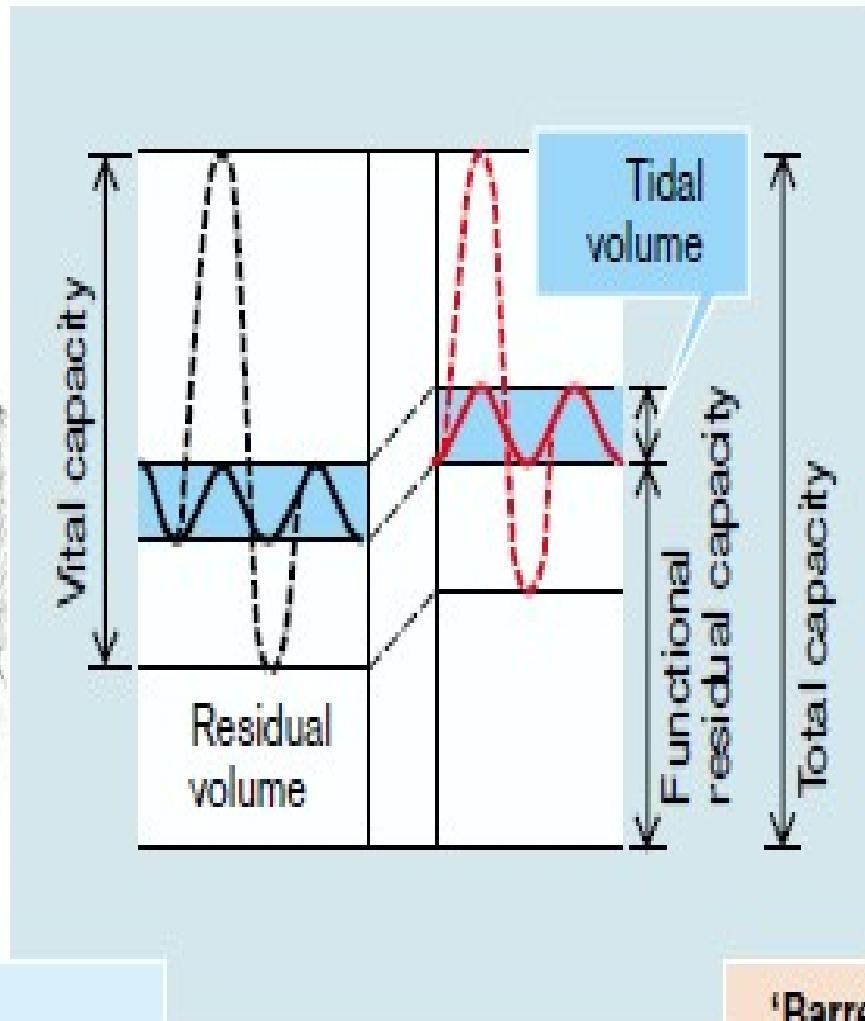
➤ Later stages

- Hypercapnea
- Purse-lip breathing
- Use of accessory muscles to breathe
- Underweight
 - ⊕ No appetite & increase breathing workload

B. Development of Barrel Chest in Emphysema

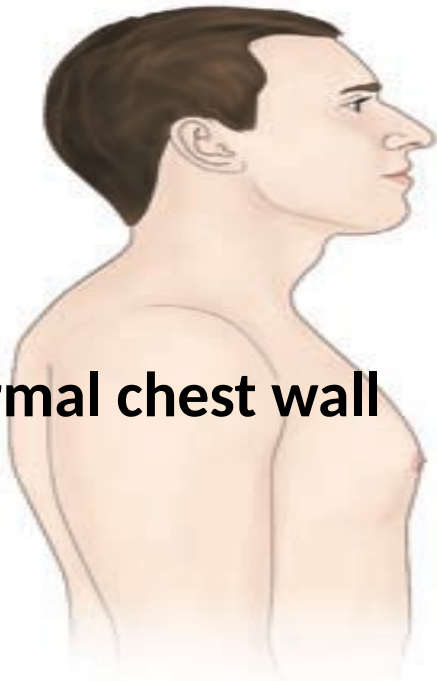


Normal
inspiratory position

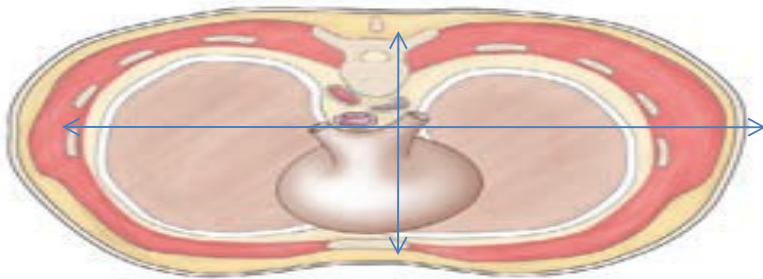
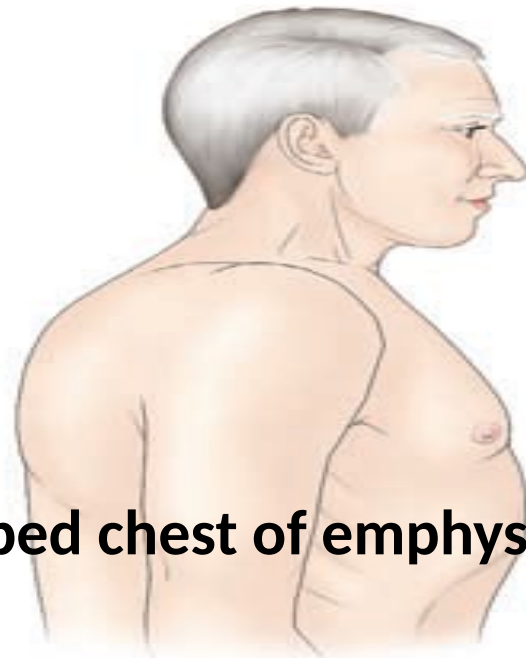


'Barrel chest'
in emphysema

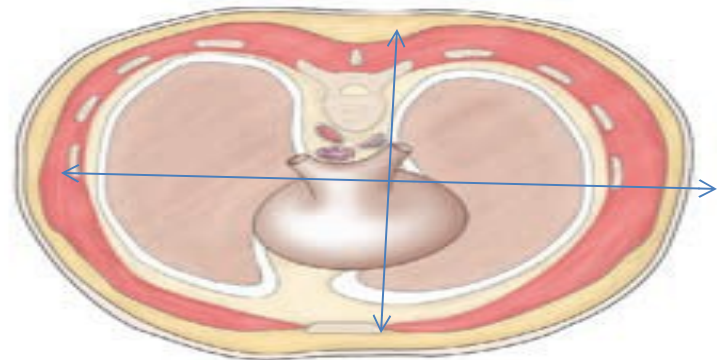
Normal chest wall



Barrel-shaped chest of emphysema



A-P diameter 1
Transverse diameter = 2



A-P diameter 2
Transverse diameter = 1

Emphysema cont'd...



Pursed lips and barrel chest of emphysema.



Typical posture of a person with COPD—primarily emphysema. The person tends to lean forward and uses the accessory muscles of respiration to breathe, forcing the shoulder girdle upward and causing the supraclavicular fossae to retract on inspiration.

Emphysema cont'd...

Diagnoses

- ▶ Hx (smoking, occupational exposure),
- ▶ Physical exam
- ▶ Chest-X-ray
- ▶ ABG analysis
 - Normal in moderate disease
 - Later: hypercapnia and respiratory acidosis
- ▶ CBC
 - Increase RBC
 - Leukocytes

Emphysema cont'd...

Management

Medications

- ⊕ Anti-inflammatory- Corticosteroids

- ⊕ Bronchodilators

 - Beta-adrenergic agonist

 - Methylxanthines

 - Anticholinergics

- ⊕ Mucolytics

- ⊕ Expectorants

Emphysema cont'd...

- ⊕ Anti-infective drugs
- ⊕ Steroid medications- Prednisolone.
- ⊕ Antitrypsin replacement therapy -**prolastin**
- ⊕ Oxygen
- ⊕ **Surgery** : in advanced emphysema.
 - ✓ **Lung-reduction surgery,**
 - ✓ **Transplantation** of either one or both lungs

Emphysema cont'd...

- **Client teaching**
 - ◆ Support to stop smoking
 - ◆ Conservation of energy
 - ◆ Breathing exercises
 - Pursed lip breathing
 - ◆ Chest physiotherapy
 - Percussion, vibration
 - Postural drainage

Emphysema cont'd...

Nursing diagnosis

- ✓ Ineffective Air way clearance related to broncho-spasm evidenced by statement of difficulty breathing
- ✓ Imbalanced nutrition, less than body requirements related to dyspnea evidenced by weight loss.

Emphysema cont'd...

Nursing interventions

❖ **Maintain patient air way**

- ◆ Assist patient to assume position of comfort
- ◆ Keep environmental pollution to a minimum
- ◆ Encourage/assist with abdominal or pursed-lip breathing exercises
- ◆ Increase fluid intake to 300 ml/day within cardiac tolerance.

Nursing interventions Emphysema cont'd...

➤ **Maintain adequate diet intake**

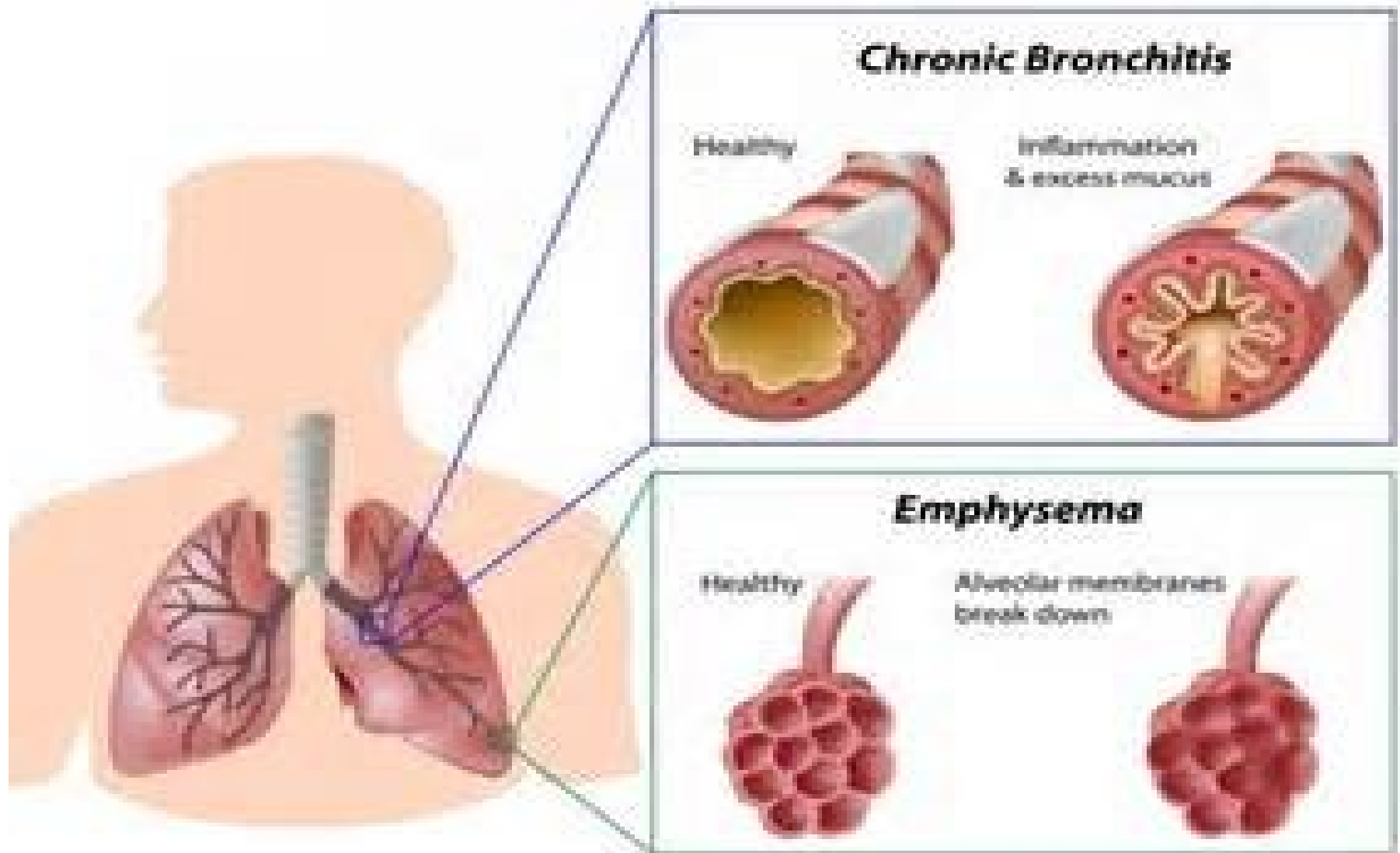
- ⊕ Assess dietary habits, recent food intake.
- ⊕ Give frequent oral care, remove expectorated secretions promptly
- ⊕ Encourage a rest period of 1 hr before and after meals.
Provide frequently small feedings
- ⊕ Avoids gas-producing foods and carbonated beverages,
- ⊕ Avoid very hot or very cold foods.

Emphysema cont'd...

Prognosis

- ✦ It is a serious and chronic disease that **cannot be reversed**.
- ✦ Overall, the prognosis for patients with emphysema is **poor**
- ✦ If detected early, the effects and progression can be **slowed**.
- ✦ However, individual cases vary and many patients can live much longer with supplemental oxygen and other treatment.
- ✦ Complications of emphysema include: higher risks for pneumonia and acute bronchitis.

Chronic Obstructive Pulmonary Disease (COPD)



Diagnosis of COPD

History and physical exam

- Cough
- Sputum
- Dyspnea
- Exposure to risk factor like
 - Smoking
 - Occupational hazard
 - History of family

- Chest x-rays early in the disease may **not show abnormalities**
- Pulmonary function studies
- **ABGs(Arterial Blood Gases)**
 - $\nearrow$ PaO_2
 - $\searrow$ PaCO_2 (especially in chronic bronchitis)
 - $\nearrow$ pH (especially in chronic bronchitis)
 - $\searrow$ Bicarbonate level found in late stages COPD

Complication of COPD

- Lung infection
- Heart failure
- Lung collapsed
- Sleep problem
- Problems with weight and
- Osteoporosis
- Pulmonary hypertension
(pulmonary vessel constriction
do to alveolar hypoxia &
acidosis)
- Corpulmonale (Rt heart
hypertrophy $\pm$ RV failure)
- Pneumonia
- Acute Respiratory Failure

Medical Management of COPD

- **Smoking cessation** is the **single most effective** intervention to prevent COPD or slow its progression
- Pharmacologic
 - ✓ Corticosteroids
 - ✓ Bronchodilators e.g. *Albuterol*, *Salmeterol*, Theophylline
 - ✓ Antibiotics
- Supplemental oxygen
 - Oxygen ⇨ Raises PO_2 in inspired air ⇨ Treats hypoxemia
- Nutritional therapy.

Management of COPD...

- **Theophylline**
 - Bronchodilation
 - Increase in central respiratory drive
 - Increased cardiac output
 - Increased muco- ciliary clearance
 - Increased fatigue threshold of the diaphragm

Management of COPD ...

Nutritional therapy

- To decrease dyspnea and conserve energy-
 - Rest at least 30 minutes prior to eating
 - Use bronchodilator before meals
 - 5-6 small meals to avoid bloating $\Rightarrow$ Full stomachs press on diaphragm causing dyspnea and discomfort
 - Avoid foods that require a great deal of chewing
 - Avoid exercises and treatments 1 hour before and after eating
 - Avoid gas-forming foods
 - high-protein diet is recommended

Nursing management of COPD

- **Health Promotion**

- STOP SMOKING!!!
- Avoid or control exposure to occupational and environmental pollutants and irritants
- Early detection of small-airway disease
- Early diagnosis of respiratory tract infections

Nursing management of COPD.....

- **Pulmonary rehabilitation**
 - Control and alleviate symptoms of pathophysiologic complications of respiratory impairment
 - Teach patient how to achieve optimal capability in carrying out ADLs
 - Physical therapy, Nutrition and Education
 - Activity considerations
 - Exercise training of upper extremities to help improve function and relieve dyspnea.

Nursing diagnosis for COPD

- Ineffective airway clearance
- Impaired gas exchange
- Imbalanced nutrition: less than body requirements
- Disturbed sleep pattern
- Risk for infection

Nursing diagnosis for COPD...

e.g.1. Ineffective Airway Clearance related to

- bronchoconstriction
- Increased production of secretions
- retained secretions, thick
- viscous secretions
- Decreased energy or fatigue

As evidenced by

- ✓ Statement of difficulty breathing
- ✓ Changes in depth and rate of respirations,
- ✓ use of accessory muscles
- ✓ Abnormal breath sounds such as wheezes, rhonchi, crackles
- ✓ Cough (persistent), with or without sputum production

Nursing diagnosis for COPD...

e.g.2. impaired Gas Exchange related to

- Altered oxygen supply—obstruction of airways by secretions, bronchospasm, air-trapping
- Alveoli destruction

As evidenced by

- ✓ Dyspnea
- ✓ Confusion,
- ✓ restlessness
- ✓ Inability to move secretions
- ✓ Abnormal ABGs—hypoxia and hypercapnia
- ✓ Changes in vital signs
- ✓ Reduced tolerance for activity

NURSING INTERVANTION

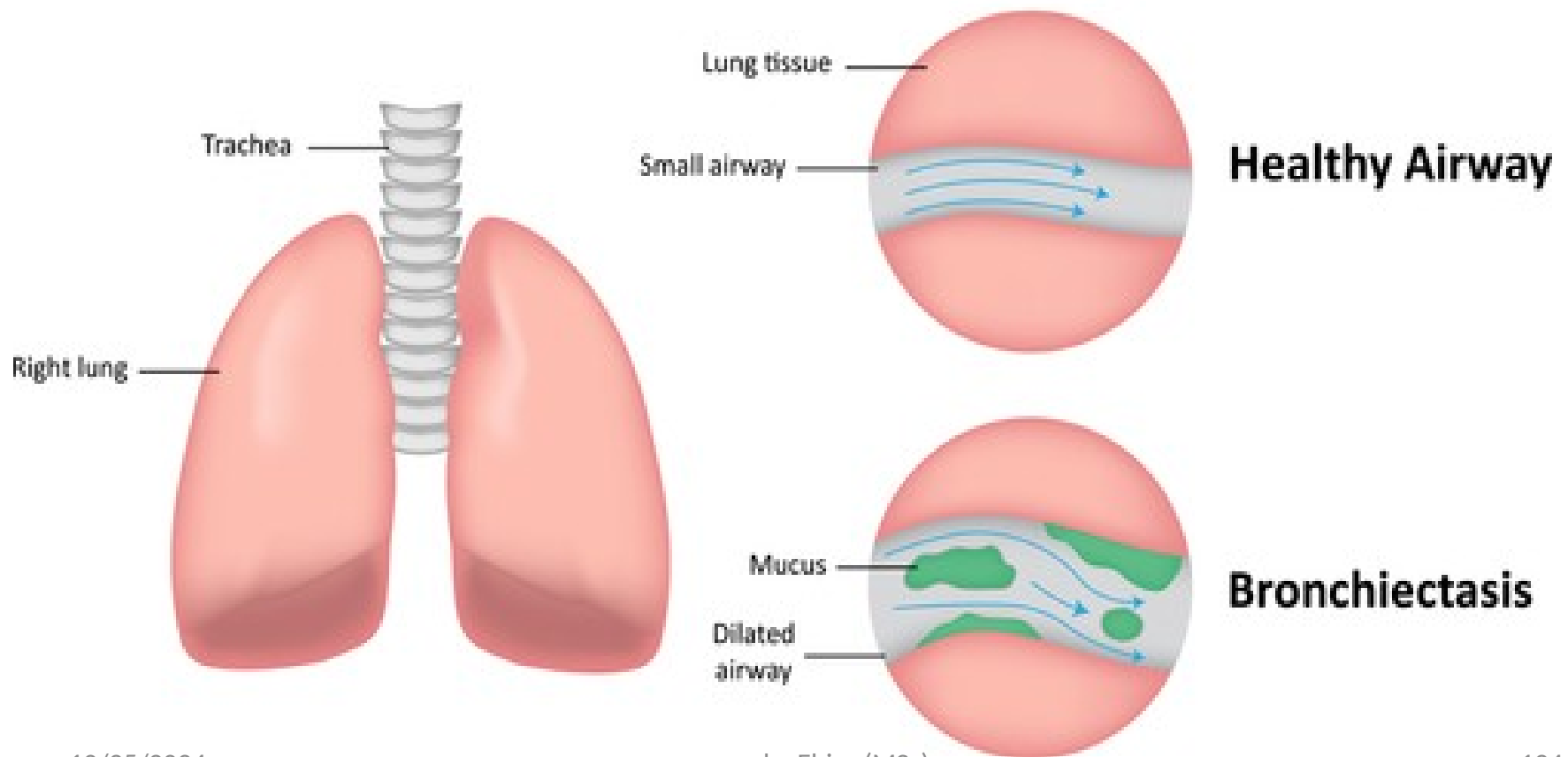
- ☐ Monitor respiratory status for rate, effort, use of accessory muscles, sputum production and breath sounds.
- ☐ Monitor pulse oximetry to check oxygen saturation levels.
- ☐ Monitor sputum for changes in color and amount.
- ☐ Monitor vital signs for changes.
- ☐ Place patient in high Fowler's or semi-Fowler's position on bed rest
- ☐ Monitor ventilator settings if appropriate.
- ☐ Change patient position every 2 hours to decrease chance of skin breakdown.
- ☐ Monitor intake and output of fluids to check for balance.

NURSING INTERVENTION...

- Explain to the patient:
 - The importance of doing coughing and deep-breathing exercises to fully expand lungs and enhance the expelling of mucous.
 - How to identify the signs of respiratory distress
- Monitoring the ***arterial blood gases, pulse oximetry, and vital signs***
- Turning schedule, mouth care, skin care, range of motion of extremities to prevent complications

Bronchiectasis

Bronchiectasis



Bronchiectasis

- ▶ *It is one of the suppurative lung diseases*
- ▶ A pathologic, chronic, **irreversible** dilation of the **bronchi and bronchioles walls**
- ▶ Dilation of the bronchial walls results
 - ⌚ airflow obstruction
 - ⌚ impaired clearance of secretions
- ▶ Causing sputum to **pool inside** the dilated areas instead of being **pushed upward**

Bronchoectasis cont'd....

- ▶ The pooled sputum provides an environment **conducive to the growth of infectious pathogens**, and these areas of the lungs are thus very vulnerable to infection.
- ▶ **Bronchiectasis** is usually **localized**, affecting a **segment or lobe of a lung**, most frequently the **lower lobes**

Bronchoectasis cont'd....

Causes/risk *factors*

- ✓ Air way obstruction
- ✓ Diffuse air way injury
- ✓ Pulmonary infection
- ✓ Genetic disorder such as cystic disorder
- ✓ Inhalation of noxious gases
- ✓ Repeated pneumonia
- ✓ Respiratory irritation- smoking
- ✓ Repeated URTI
- ✓ Underlying disease (e.g. cystic fibrosis, immunodeficiency, TB)
- ✓ Complications of measles & pertussis (whooping cough)

Bronchoectasis cont'd....

Pathophysiology

- ▶ Inflammations associated with pulmonary infection damages bronchial wall and causing loss of its supportive structure
- ▶ Diminish cilia function
- ▶ Retention of secretion & obstruction
- ▶ Collapse of alveoli distal to obstruction
- ▶ Increase mucus production, reduced elasticity

Bronchoectasis cont'd....

Pathophysiology...

- ▶ Permanent dilation of anxious areas in the tracheobronchial tree.
- ▶ Inflammatory scarring or fibrosis replaces functioning lung tissue.
- ▶ Respiratory insufficiency, decrease ventilation, increase the ratio of residual volume
- ▶ Ventilation- perfusion imbalance, hypoxemia

Bronchoectasis cont'd....

Clinical manifestation

▶ Chronic productive cough

- Copious
 - purulent sputum
 - Foul smelling/ Offensive
- The sputum typically forms three layers when collected in a glass container:
 - upper layer is **foam** (mucus),
 - middle one is **liquid**
 - lower one is **sediment**.

Bronchoectasis cont'd....

Clinical manifestation

- ▶ Hemoptysis
- ▶ Clubbing of the fingers
- ▶ Repeated episodes of pulmonary infection
- ▶ Fever, malaise, wheezing
- ▶ **Night sweating, weight loss, anorexia**



Bronchoectasis cont'd....

Diagnosis

- ◆ History
- ◆ Physical examination
- ◆ Radiology peribronchial fibrosis with **honeycomb** appearance, **Segmental lung collapse**
- ◆ CT scan detects cystic fibrosis and rule out neoclassic obstruction
- ◆ Bronchography - **Definitive diagnosis**

Bronchoectasis cont'd....

Medical Management

- ✓ Postural drainage (drainage by gravity)
- ✓ Mucopurulent sputum must be removed by bronchoscopy.
- ✓ Antibiotic to treat of bacterial
- ✓ Bronchi dilators
- ✓ Vaccination against influenza & pneumococcus pneumonia
- ✓ Surgery (resection or lung transplantation)

Bronchoectasis cont'd....

Nursing Management

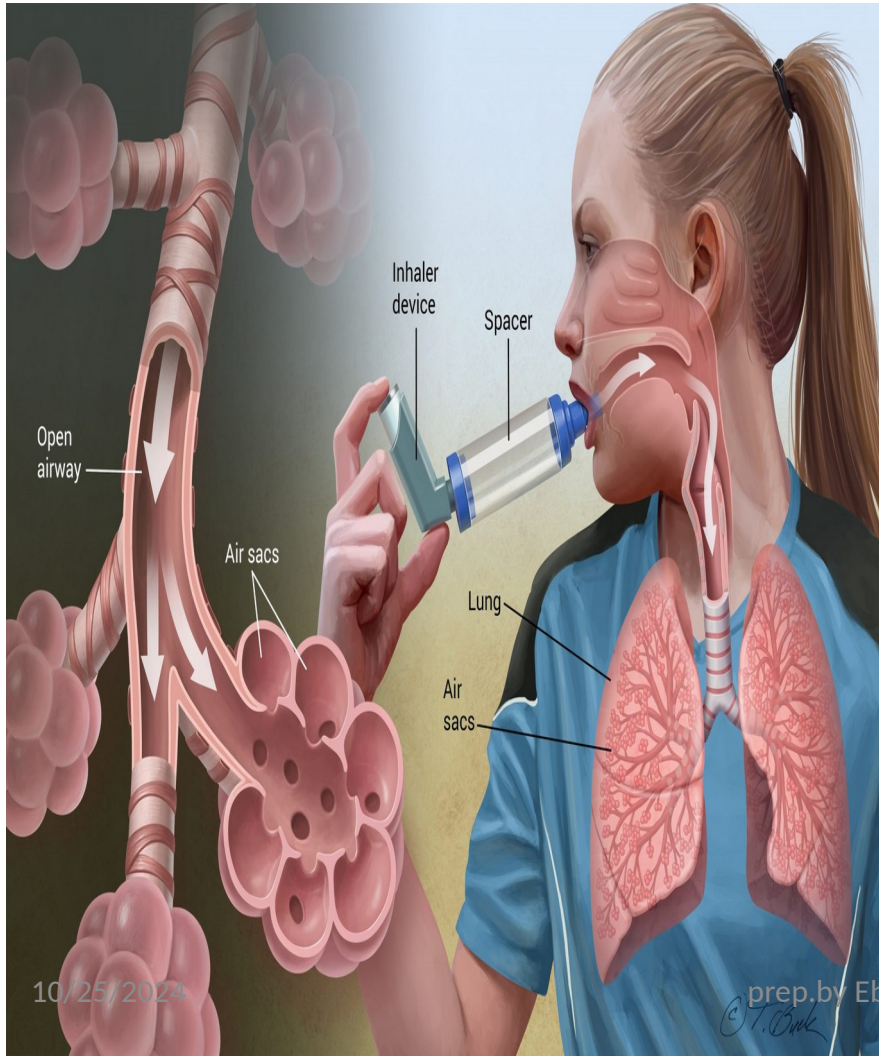
- ✿ Encourage to stop smoking & other factors that increase the production of mucus
- ✿ Teaching the patient and family
 - ◆ How perform **postural drainage**
- ✿ Encourage to increase fluid intake
- ✿ Assess patients' nutritional status/appetite
- ✿ Teach the patient about early signs of respiratory infection and the progression of the disorder

Bronchoectasis cont'd....

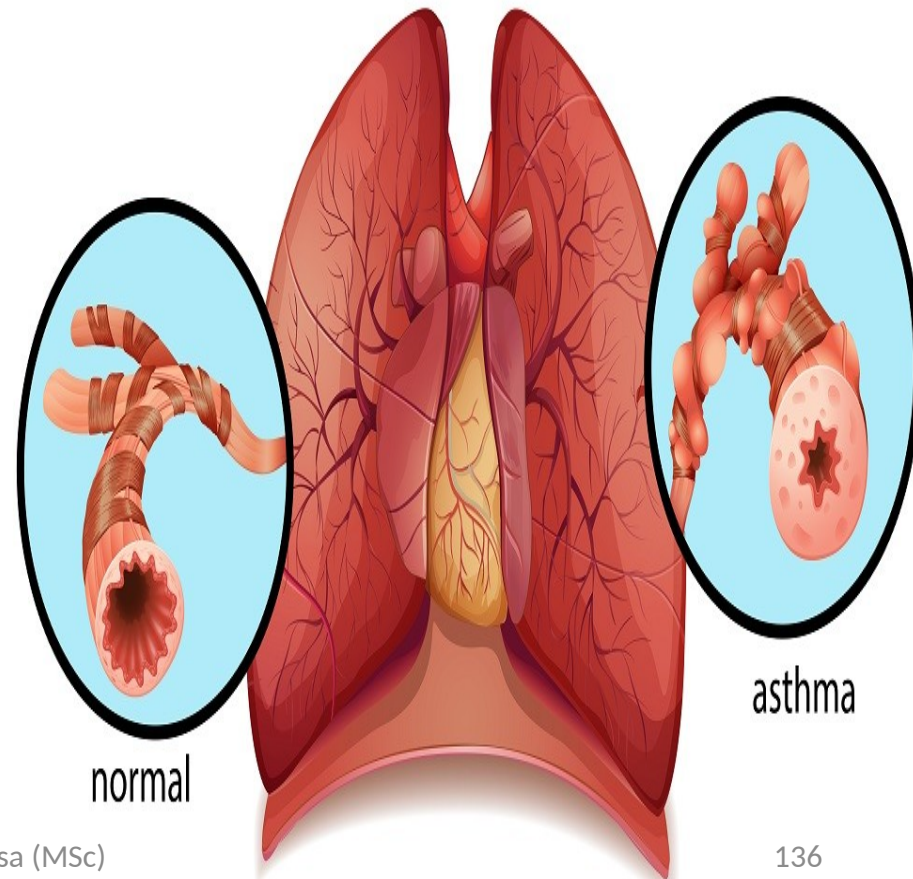
Complication

- ◆ Atelectasis
- ◆ Pneumonia
- ◆ Respiratory failure

Asthma



Asthma - Inflamed Bronchial Tube



Bronchial Asthma

■ A chronic inflammatory disease of the airways that characterized by **reversible airflow** obstruction which causes:

- ✓ Airway hyper responsiveness
- ✓ Mucosal edema
- ✓ Mucus production

■ Patients with asthma may experience symptom-free periods alternating with acute exacerbations, which last from minutes to hours or days.

Asthma cont'd...

- ▶ Asthma is characterized as:
 - ◆ Reversible inflammation and obstruction
 - ◆ Intermittent attacks
 - ◆ Sudden onset
 - ◆ Varies from person to person
 - ◆ Severity varies from shortness of breath to death

Asthma cont'd...

Etiology/ predisposing factors

- ◆ Allergens

- ◆ Genetic predisposition

- Common allergens

- ✓ Seasonal

- ✓ Perennial

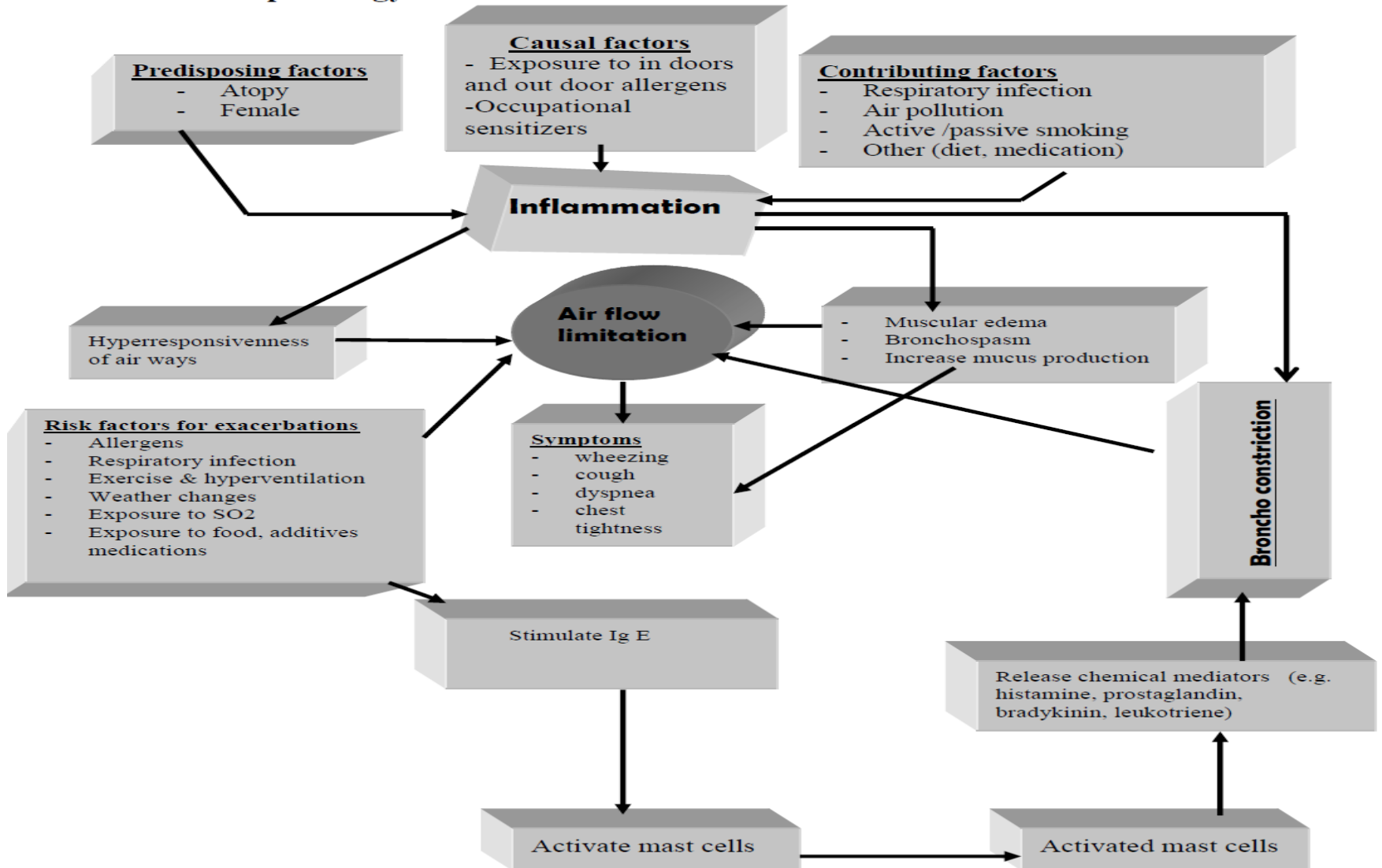
- Common triggers for asthma symptoms and exacerbations:-

- ✓ Extrinsic agents - e.g. dust, pollen, food, animals, perfumes, etc...

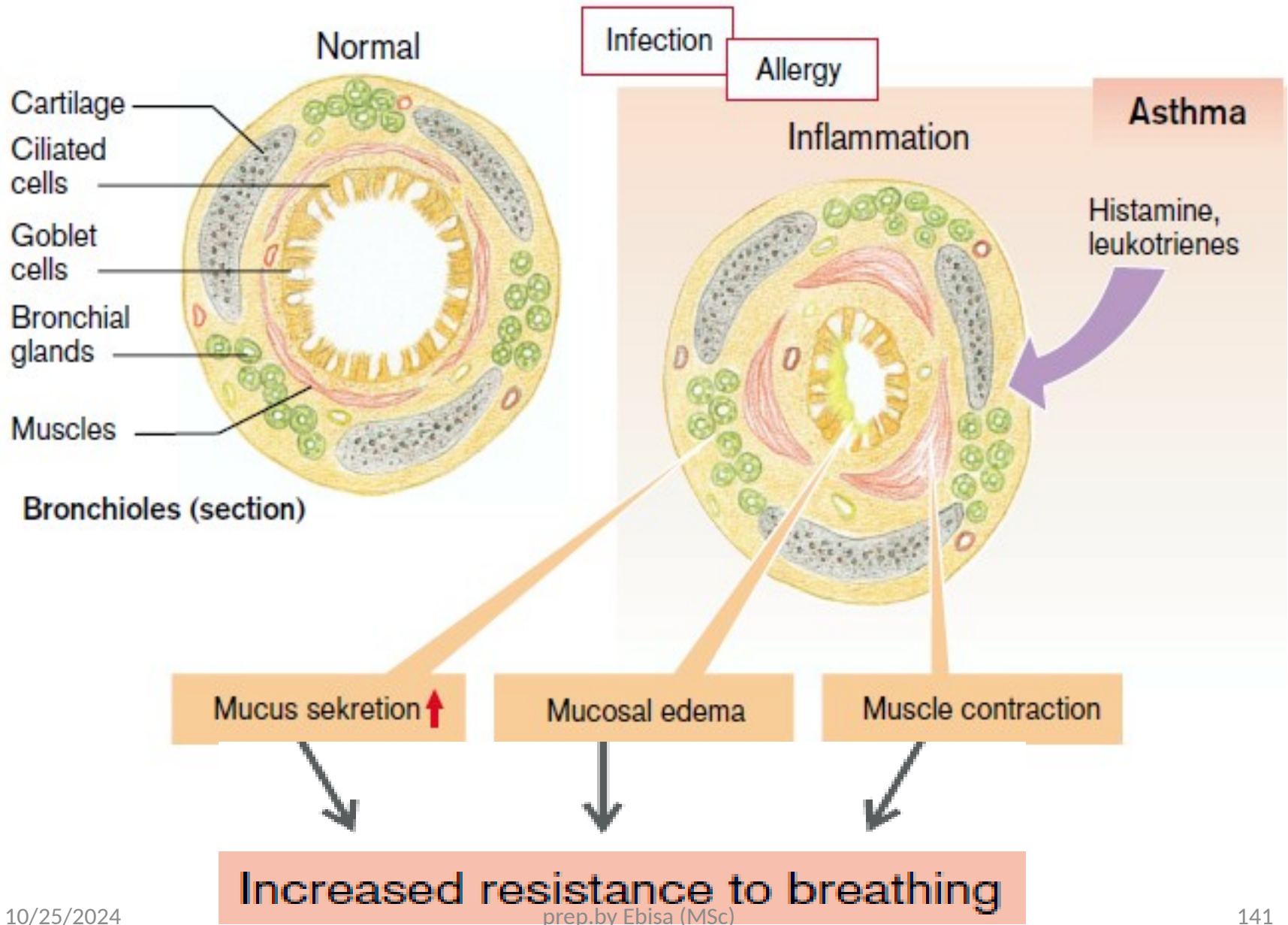
- ✓ Intrinsic agents- It is not related to specific allergen.

Asthma cont'd...

Pathophysiology

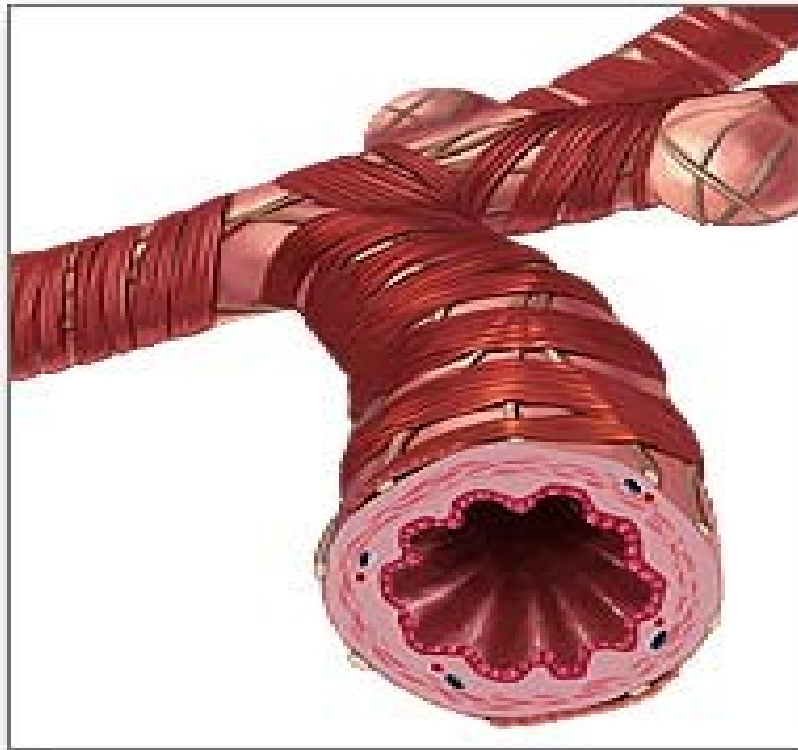


Asthma cont'd...pathophysiology....

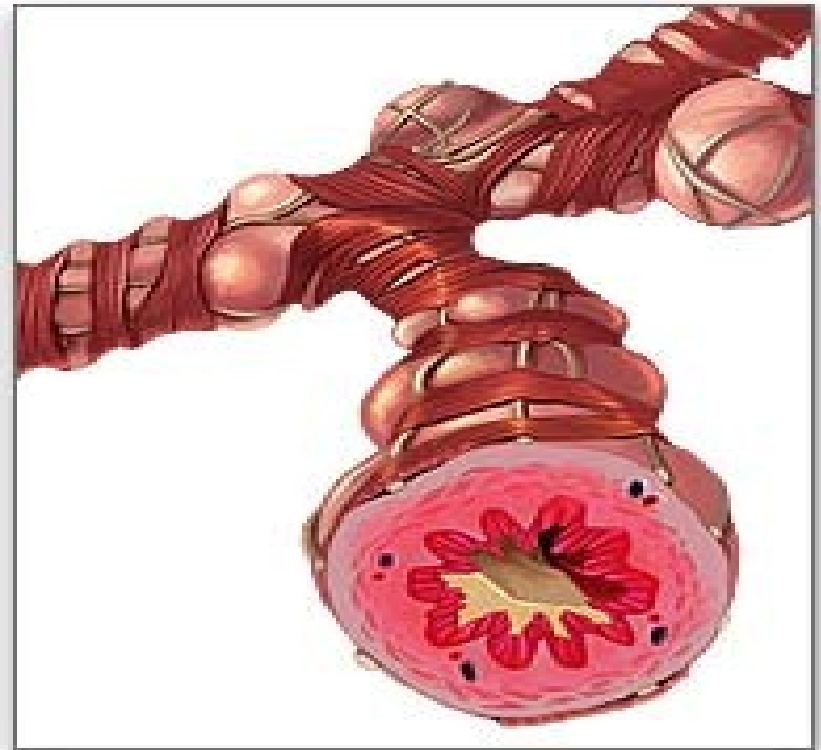


Normal bronchiole/ Asthmatic bronchiole

Normal bronchiole



Asthmatic bronchiole



Asthma cont'd...

Clinical classification of severity

Severity in patients ≥ 12 years of age	Symptom frequency	Nighttime symptoms	%FEV ₁ of predicted	Interference with normal activity	Use of short-acting beta ₂ agonist for symptom control (not for prevention)
Intermittent	≤ 2 per week	≤ 2 per month	$\geq 80\%$	None	≤ 2 days per week
Mild persistent	> 2 per week but not daily	3-4 per month	$\geq 80\%$	Minor limitation	> 2 days/week but not daily
Moderate persistent	Daily	> 1 per week but not nightly	60–80%	Some limitation	Daily
Severe persistent	Throughout the day	Frequent (often 7x/week)	$< 60\%$	Extremely limited	Several times per day

Asthma cont'd...

Clinical manifestation

+ The most common three symptoms are:-

- Cough
- Dyspnea (Chest tightness)
- Wheezing (Prolonged expiratory phase)

+ If exacerbation progresses:-

- Diaphoresis
- Tachycardia
- Central cyanosis (hypoxemia)

Asthma cont'd...

C/M...

- ✓ Hypoxia
- ✓ Confusion
- ✓ Increased heart rate & blood pressure
- ✓ Respiratory rate up to 40/minute & pursed lip breathing
- ✓ Use of accessory muscles
- ✓ Flaring nostrils

Asthma cont'd...

Diagnosis

- ◆ Hx
- ◆ Physical examination
- ◆ Chest X-ray
- ◆ Sputum increase viscosity
- ◆ CBC- eosinophils
- ◆ Lung Function Tests
- ◆ Arterial blood gas analysis and pulse oximetry

- **Medical Management**
- The focus of treatment is
 - To return the respiratory status to normal
 - Deliver adequate oxygen and
 - Limit the number of recurrences

Asthma cont'd...

Medical management

■ ***Non-drug treatment:*** Prevention of exposure to known allergens and inhaled irritants.

■ ***Drug treatment***

■ Broncho dilators-

■ β_2 -adrenergic agonists

■ Methylxanthines

■ Corticosteroids

■ Leukotriene modifiers

■ Anticholinergics

Asthma cont'd...

Initial treatment

- ✓ Salbutamol (metered dose inhaler MDI).

Alternatives

- ✓ Aminophylline, 5mg/kg by slow I.V. push over 5 minutes. **OR**
- ✓ Adrenaline, 0.5ml sc.

Asthma cont'd...

Maintenance therapy for chronic asthma in adults:

- ❖ Requires prolonged use of anti-inflammatory drugs
mainly in the form of steroid inhalers

Intermittent asthma:

- Salbutamol, inhaler 200 microgram/puff, 1-2 puffs to be taken as needed but not more than 3-4 times a day

Alternative

- Ephedrine + Theophylline

Asthma cont'd...

Persistent mild asthma

- ✓ Salbutamol, inhaler, 200 micro gram/puff 1-2 puffs to be taken, as needed but not more than 3-4 times/day **PLUS**
- ✓ Beclomethasone, oral inhalation 1000mcg QD for two weeks

Alternative

- ✓ Ephedrine + Theophylline (11mg + 120mg), P.O. two to three times a day **PLUS**
- ✓ Beclomethasone oral inhalation 1000mcg QD for two weeks.

Asthma cont'd...

Persistent moderate asthma

- ▶ Salbutamol, inhalation 200microgram/puff 1-2 puffs as needed PRN not more than 3-4 times a day.

PLUS

- ▶ Beclomethasone, 2000mcg, oral inhalation QD for two weeks and reduce to 1000 mcg if symptoms improve.

Asthma cont'd...

Severe persistent asthma

- ✓ Salbutamol, inhalation , 200 micro gram/puff 1-2 puffs not more than 3-4 times a day

PLUS

- ✓ Beclomethasone, 2000 mcg, oral inhalation daily

Asthma cont'd...

Nursing management

- ✓ Assessing the patients respiratory status
- ✓ Obtaining history of allergic reaction to medication before administering
- ✓ Fluid administration if the patient is dehydrated
- ✓ Antibiotics administration for underlying respiratory infections
- ✓ The purpose and action of each medication
- ✓ Triggers to avoid, and how to do so

Asthma cont'd...

Complications

- + Respiratory failure

- + Pneumonia

- + Atelecastsis

- + Status asthmatics

Asthma cont'd...

Status asthmatics

- Severe & persistent asthma that does not respond to conventional therapy can be experienced as a complication.
- Pts aware of increasing chest tightness, wheezing, and dyspnea that are often not or poorly relieved
- The attacks can last longer than 24 hours.

Clinical Manifestations

- The clinical manifestations are the same as those seen in severe asthma:
 - ✓ Labored breathing,
 - ✓ Prolonged exhalation,
 - ✓ Engorged neck veins, and
 - ✓ Wheezing
- As the obstruction worsens, wheezing may disappear, a sign of impending respiratory failure.

Asthma cont'd...

Mgt of status asthmatics

- Pts requires supplemental Oxygen administration and IV fluid administration
 - Oxygen therapy is initiated to treat dyspnea, central cyanosis, and hypoxemia.
- Initially pts treated with high dose of short acting beta-adrenergic agonist & corticosteroids
 - If there is no response to repeated treatments, hospitalization is required.

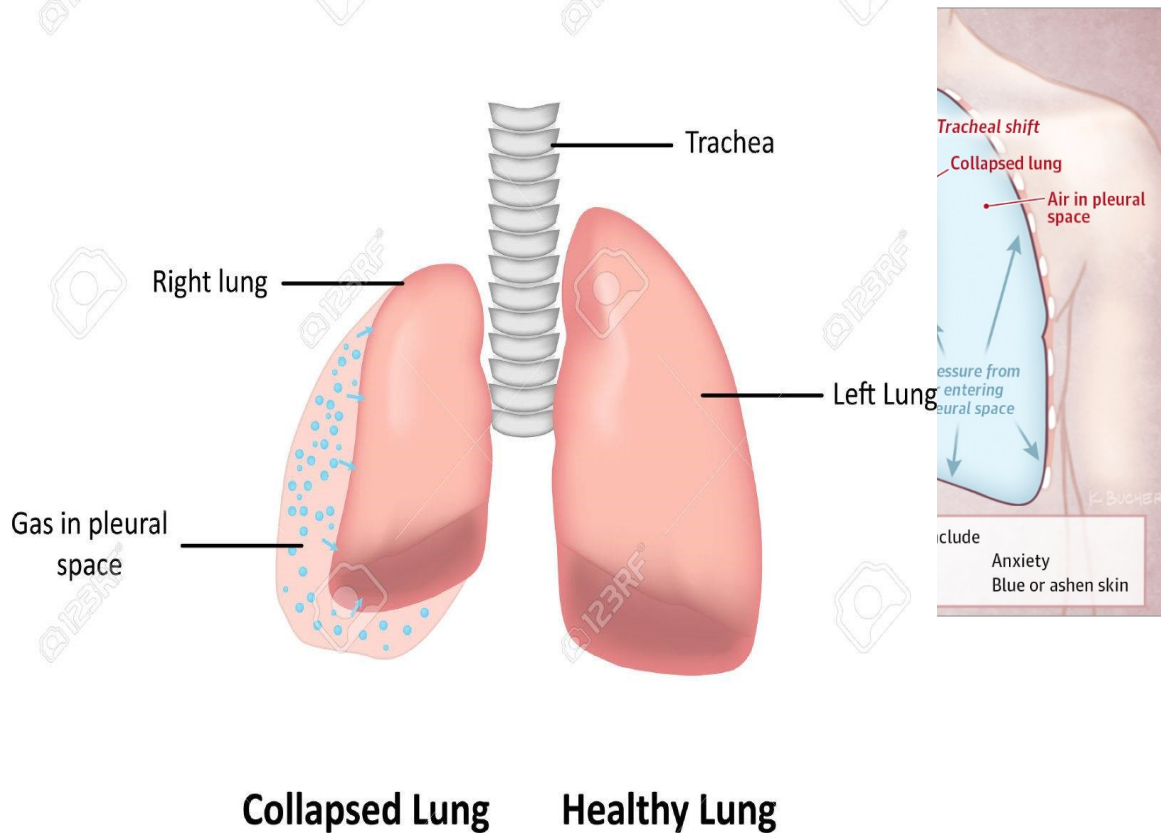
Asthma cont'd...

Nursing management

- ✓ Constantly monitors the patient for the first 12 to 24 hrs.
- ✓ Place patient in high Fowler's position to ease respirations
- ✓ Assesses the patient's skin turgor to identify signs of dehydration.
- ✓ Fluid intake is essential to combat dehydration, to loosen secretions & to facilitate expectoration.
- ✓ Room should be quiet and free of respiratory irritants

Pneumothorax

Pneumothorax



Pneumothorax

- Pneumothorax occurs when the parietal or visceral pleura is breached and the pleural space is exposed to **positive atmospheric pressure**
- Normally the pressure in the pleural space is **negative or sub atmospheric**; this negative pressure is required to maintain lung inflation.
- When **air** is allowed to enter the pleural space between the lung and the chest wall, a pneumothorax develops.
- When either pleura is breached, air enters the pleural space, and the lung or a portion of it collapses.

Pneumothorax...

Types of Pneumothorax

- **Include :**
 - Simple,
 - Traumatic, and
 - Tension pneumothorax.

Types of Pneumothorax....

Simple Pneumothorax/ spontaneous Pneumothorax,

- Air enters the pleural space through a breach of either the parietal or visceral pleura (**bronchopleural fistula**)
- It may be associated with diffuse interstitial lung disease and severe emphysema.(i.e. may be secondary to another disease or occur on its own).

Types of Pneumothorax....

Traumatic Pneumothorax

- Air escapes from a laceration in the **lung itself and enters the pleural space** or from a **wound in the chest wall**.

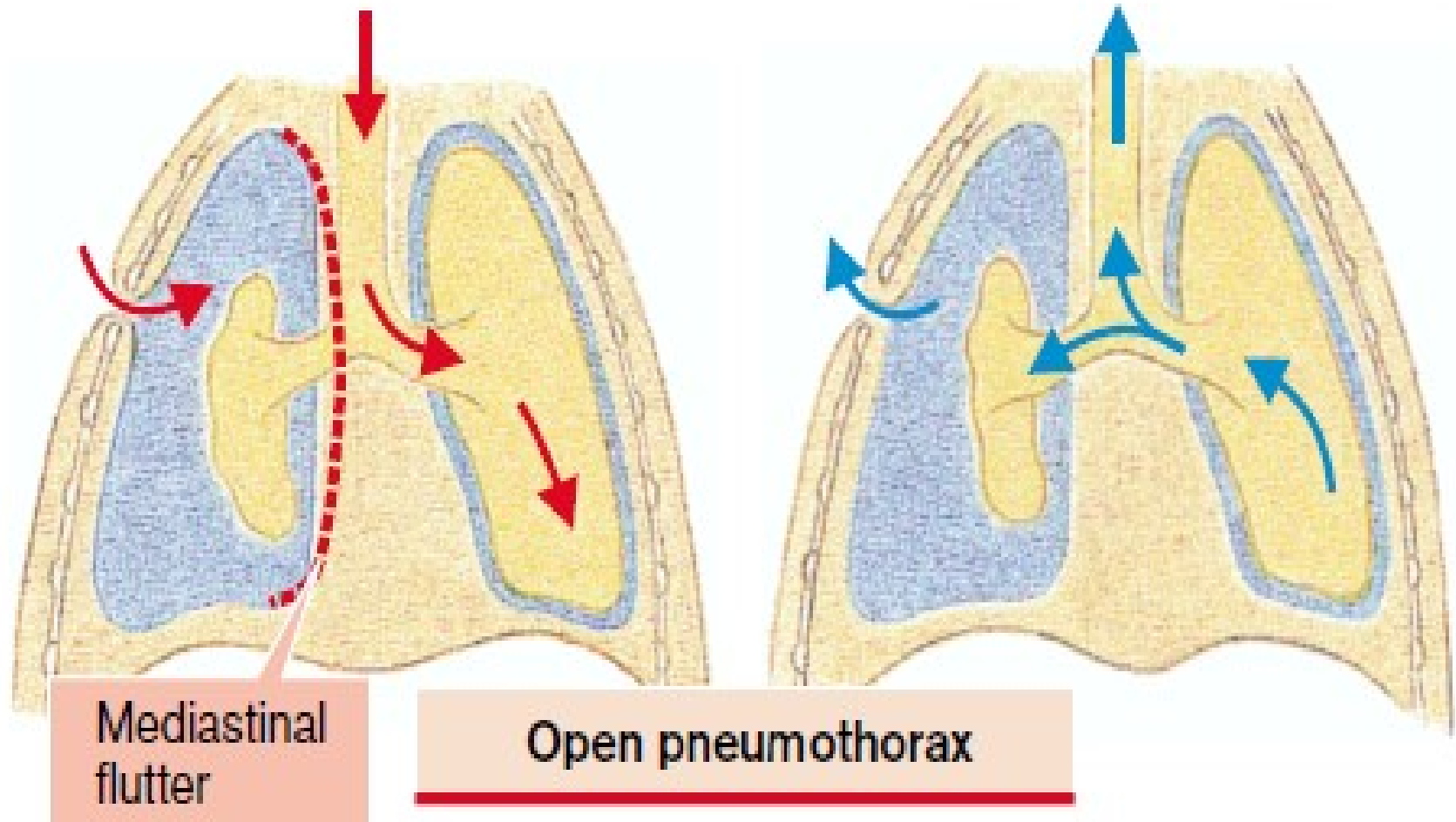
Causes:

- Blunt trauma (e.g., rib fractures),
- Penetrating chest or abdominal trauma
- Diaphragmatic tears.
- Invasive thoracic procedures (ie, thoracentesis, transbronchial lung biopsy, insertion of a subclavian line
- Accompanied by **hemothorax**

Traumatic Pneumothorax....

- Often both blood and air are found in the chest cavity (hemopneumothorax) after major trauma.
- **Open pneumothorax** is one form of traumatic pneumothorax (occurs when a wound in the chest wall is large enough to allow air to pass freely in and out of the thoracic cavity with each attempted respiration.)

Open pneumothorax

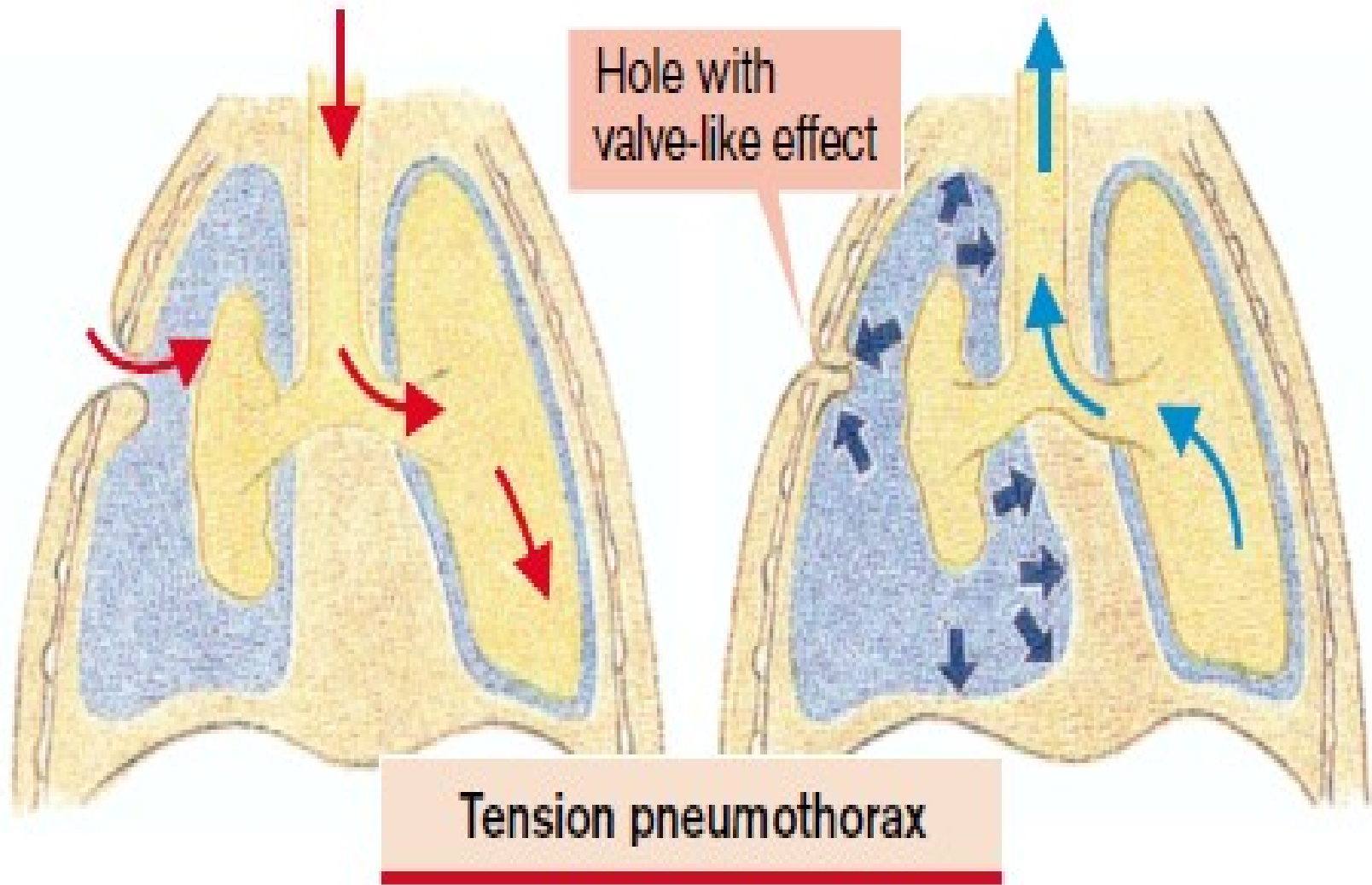


Types of Pneumothorax....

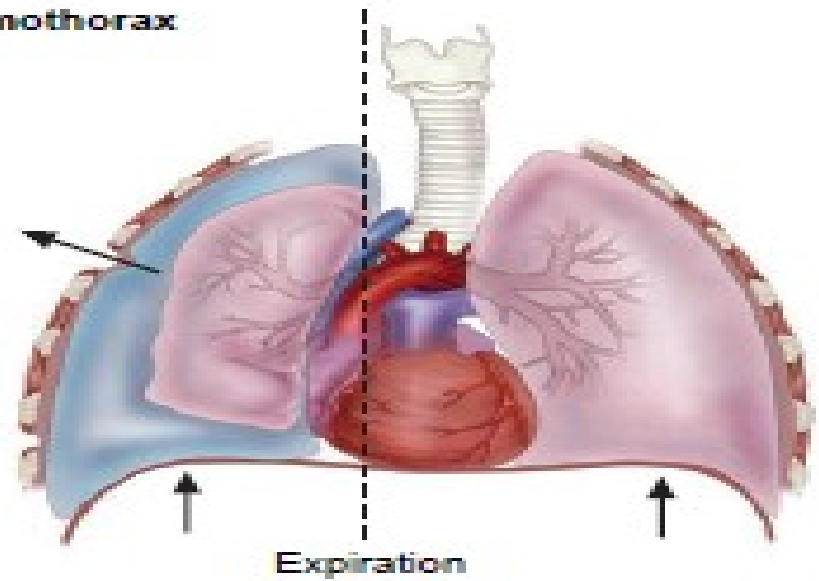
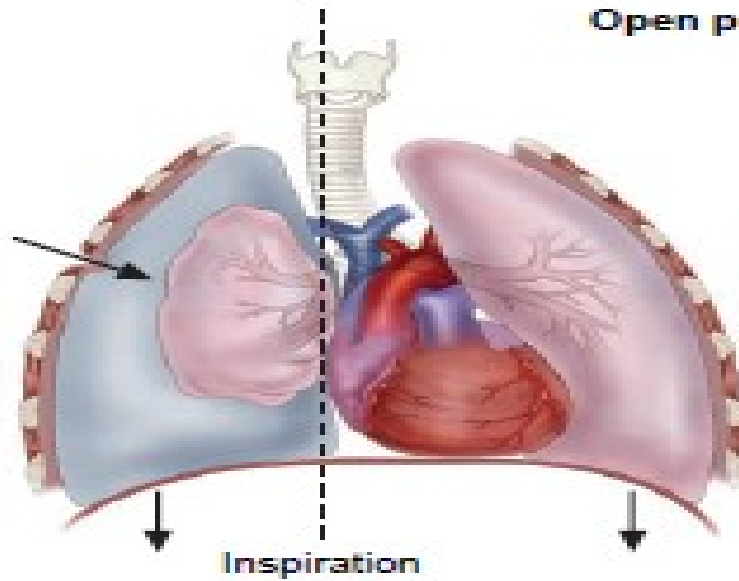
Tension pneumothorax

- **Occurs when large enough amount of air is drawn into the pleural space from a lacerated lung or through a small opening or wound in the chest wall, if the tension within the area increases**
- **It may be a complication of other types of pneumothorax.**

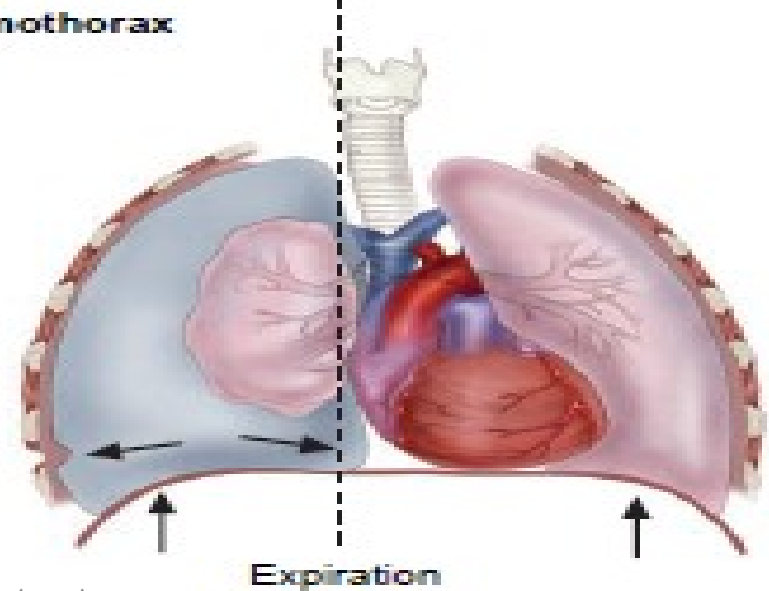
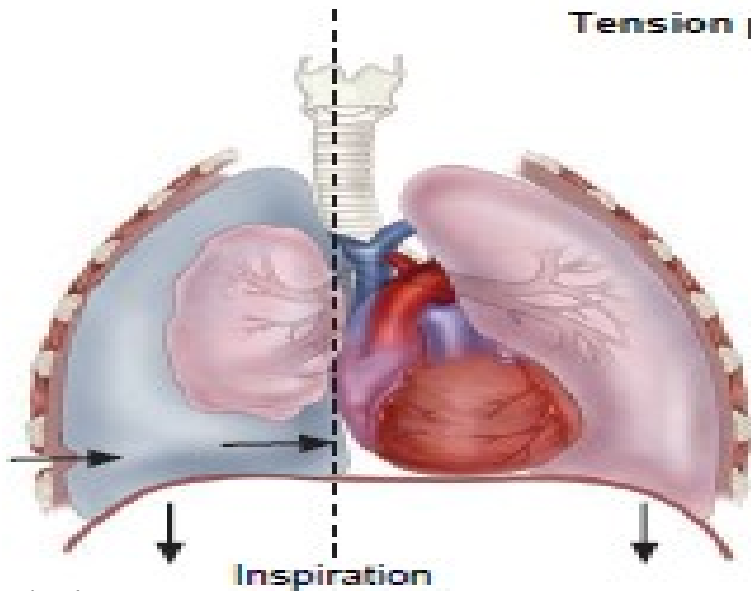
Tension pneumothorax....



Open pneumothorax



Tension pneumothorax



Clinical manifestations

- Signs and symptoms associated with pneumothorax **depend on its size and cause.**
- **Pain is usually** sudden and pleuritic.
- Only minimal **respiratory distress** with slight chest discomfort and tachypnea
- Pneumothorax **is large** and the lung collapses totally, **acute respiratory distress** occurs.

Clinical Manifestations....

- In a **simple pneumothorax**, the
 - trachea is **midline**,
 - **expansion of the chest** is decreased,
 - **breath sounds may be diminished**
 - **percussion of the chest may reveal normal sounds or hyperresonance.**
- In a **tension pneumothorax**,
 - **trachea is shifted away** from the affected side,
 - chest expansion may **be decreased or fixed in a hyperexpansion state**,
 - **breath sounds are diminished or absent**
 - **percussion to the affected side is hyperresonant.**

Management

Medical management

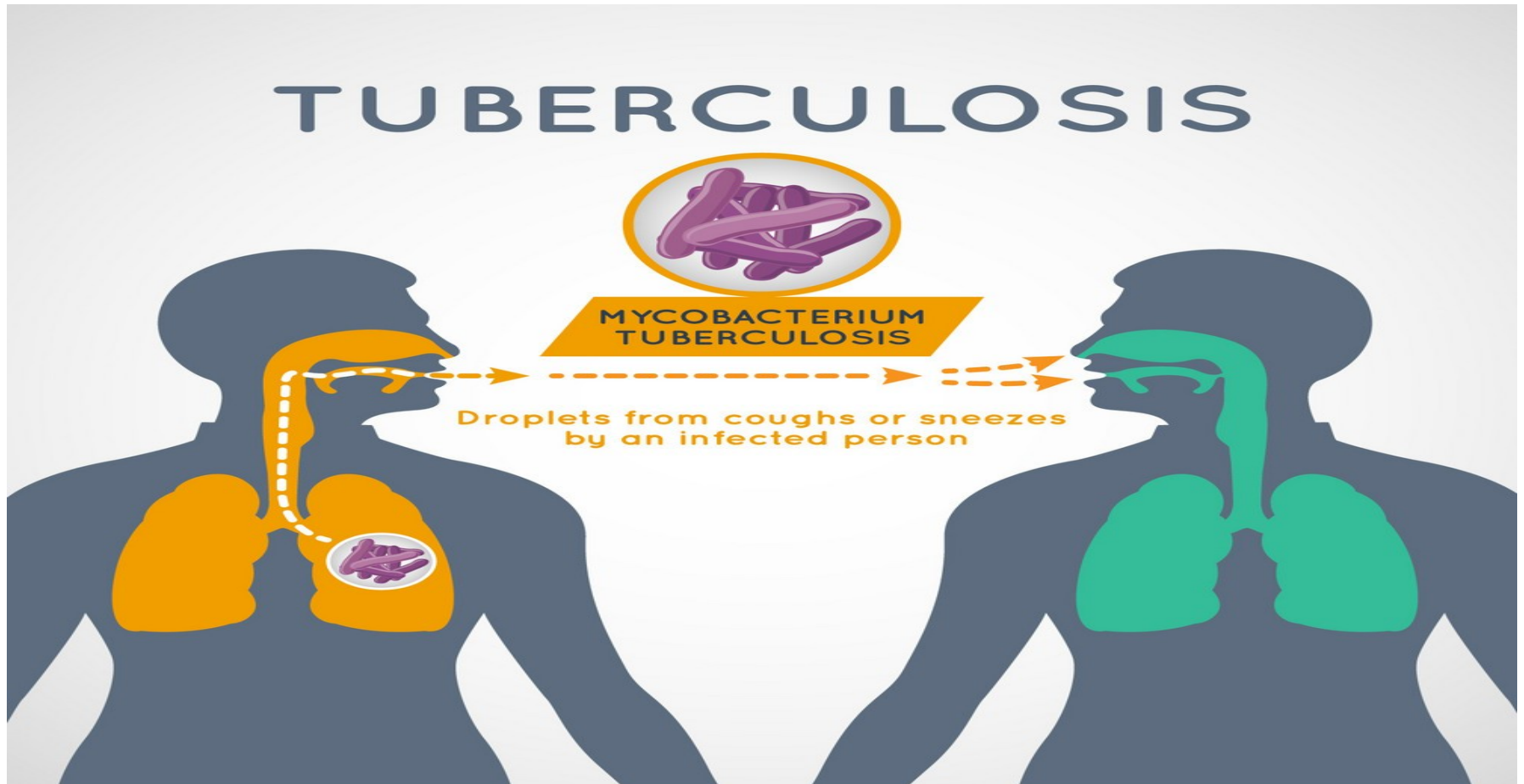
- Depends on its cause and severity.
- Goal of treatment is to **evacuate the air or blood from the pleural space**
- Small chest tube (28fr) is inserted near the **second intercostal space**
- **Hemothorax, a large-diameter** chest tube
 - Opened surgically (thoracotomy) if more than 1500 ml of blood is aspirated initially by thoracentesis (or is the initial chest tube output) or if chest tube output continues at greater than 200 ml/h.

Management...

Medical Management.....

- In an emergency situation, a tension pneumothorax can be **decompressed** or quickly converted to a simple pneumothorax by **inserting a large-bore needle** (14-gauge) at the **second intercostal space, midclavicular line on the affected side.**

Tuberculosis



Tuberculosis

- **Tuberculosis (TB)** is an infectious disease that primarily affects the lung parenchyma.
- Tuberculosis (TB) is an infectious disease caused by **Mycobacterium tuberculosis** which acid fasting aerobic rod
- Occasionally the disease can also be caused by **Mycobacterium bovis** and **Mycobacterium africanum**.

Tuberculosis

Transmission:

- **Inhalation of *Droplet* - most commonly**
 - *Droplet nuclei (the dried residua of larger respiratory droplets) while* talking, sneezing, spitting or singing
 - Single cough can produce 3,000 droplet nuclei and they can remain suspended in the air for several hours.
- **Consumption of raw milk (Un-boiled milk) containing *m.Bovis* , but the incidence seems to be decreasing because of health education on boiling or pasteurizing milk.**

Tuberculosis

- **Risk of infection** depends on:
 - **Extent of exposure** to droplet nuclei - determine **by concentration** of droplet nuclei in contaminated air and **length of time** spent breathing that air.
 - **Susceptibility to infection**- determined by the proximity and duration of contact with an infectious source case
- Factors that facilitate transmission of pulmonary tuberculosis are
 - Infectivity of the contact (patients with heavy bacterial load)
 - Environment: overcrowding
 - Duration of contact (prolonged exposure)
 - Intimacy (how close the source and the subject are)

Tuberculosis

- TB affects individuals of all ages and both sexes.
- More vulnerable to develop the disease.
 - Poverty,
 - Malnutrition and
 - Over-crowded living conditions
 - HIV infection
 - In HIV- infected persons the risk of developing **TB is increased by more than 10 times** compared to those who are HIV negative.
 - Age group mainly affected is between **15 and 54 years**, and this leads to grave socio-economic consequences in a country with a high prevalence of the disease.

PATHOPHYSIOLOGY

- **(INITIAL INFECTION OR PRIMARY INFECTION)**



- **ENTRY OF MICRO ORGANISM THROUGH DROPLET NUCLEI**



- **BACTERIA IS TRANSMITTED TO ALVEOLI THROUGH AIRWAYS**



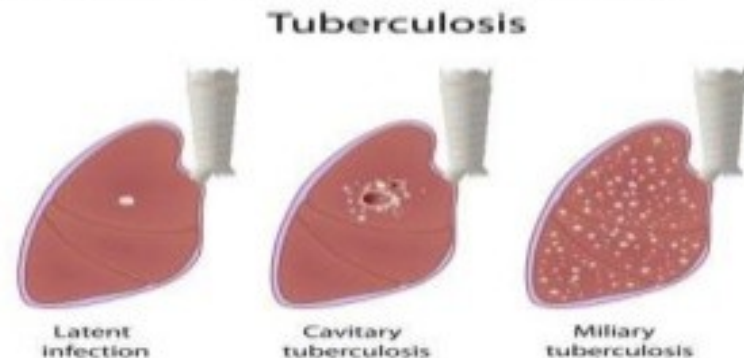
- **DEPOSITION AND MULTIPLICATION OF BACTERIA**



- **BACILLI ARE ALSO TRANSPORTED TO OTHER PARTS OF THE BODY THROUGH**

BLOOD STREAM AND LYMPHNODE

INFLAMMATION



Pathogenesis:

- Pulmonary infection occurs when TB bacilli, contained in a **small infectious aerosol droplet**, reaches a **terminal airway**
- A localized **granulomatous inflammatory process** occurs within the lung and this is called the **primary (ghon) focus**.
- From the **ghon focus**, **bacilli drain via lymphatics** to the regional lymph nodes.
- The **ghon focus** with associated **tuberculous lymphangitis** and **involvement of the regional lymph nodes** is called the **primary (ghon) complex**.

Pathogenesis:

- From the **regional lymph nodes** bacilli enter the **systemic** circulation directly or via the lymphatic duct.
- This occult **haematogenous spread** occurs during the incubation period, before adequate immune responses contain the disease.
- After dissemination, bacilli may survive in target organs for prolonged periods.
- The future course of the disease at each of these sites depends on the dynamic **balance between host immunity and the pathogen.**

Tuberculosis

Natural history:

- **90-95% of persons infected with M. Tuberculosis**, keeps them suppressed (silent focus) causing latent Tuberculosis infection.
- **Only a 5-10% of such infected persons** (primary infection) develop active disease.
- **Post primary TB usually affects the lungs (>85%)**

Natural history....

- If untreated, TB leads to deaths **within 5 years** in at least half of the patients.
- Without treatment, about
 - **20 to 25%** would have natural healing and
 - **25 to 30%** would remain chronically ill,

The burden of TB - Ethiopia

- According to a report from Ministry of health **Ethiopian Hospitals Data**
 - **TB is a leading cause of morbidity**
 - **Third cause of hospital admission**
 - **First cause of hospital death**
- WHO Estimates Incidence of TB in Ethiopia is 356 per 100,000 /year and the incidence Smear positive TB is 155 per 100,000/year.

Tuberculosis

Classification of TB

➤ Cases of TB are also classified according to the:

1. Anatomical site of disease;
2. Bacteriological results (including drug resistance);
3. History of previous treatment;
4. HIV status of the patient.

Classification of TB ...

1. Anatomical site of TB disease

TB disease usually affects the **lungs** but **almost all organs** can be affected.

- **Pulmonary tuberculosis (PTB)** -refers to a case of TB involving the lung parenchyma
 - PTB- accounts for 80% of all TB cases.
- **Extrapulmonary tuberculosis (EPTB)** - refers to a case of TB involving organs other than the

Classification of TB ...

- **Bacteriologic classification** - smear status of pulmonary cases and the identification of *M. tuberculosis* for any cases by culture or newer method
 - ***Smear-positive pulmonary TB (PTB+)***
 - ***Smear-negative pulmonary TB (PTB-)***
 - ***Extra-pulmonary TB (EPTB)***

Bacteriologic classification of TB...

a. Smear-positive pulmonary TB (PTB+)

A patient with at least **two initial** sputum smear examinations **positive** for AFB by **direct microscopy**,

Or

A patient with one initial smear examination positive for AFB by **direct microscopy** and **culture positive**,

Or

A patient with one initial smear examination positive for AFB by **direct microscope** and **radiographic abnormalities** consistent with **active TB as determined by a clinician.**

Bacteriologic classification of TB...

b. Smear-negative pulmonary TB (PTB-)

➤ A patient having symptoms suggestive of TB with at least **3 initial** smear examinations **negative for AFB** by direct microscopy, **And**

1. No response to a course of broad-spectrum antibiotics, **And**

2. Again three negative smear examinations by direct microscopy, **And**

3. Radiological abnormalities consistent with pulmonary tuberculosis, **And**

4. Decision by a clinician to treat with a full course of anti- tuberculosis

Or

A patient whose diagnosis is based on **culture positive for M. tuberculosis** but three initial smear examinations negative by direct microscopy

Bacteriologic classification of TB...

c. Extra-pulmonary TB (EPTB)

- TB in organs other than the lungs, proven by **one culture-positive specimen** from an extra-pulmonary site or histo-pathological evidence from a biopsy,

Or

- TB based on strong clinical evidence consistent with active EPTB and the decision by a clinician to treat with a full course of anti-TB therapy.

Classification of TB....

3. History of previous treatment: patient registration group –

- At the time of registration, each patient meeting the case definition is also classified according to whether or not he or she has previously received TB treatment and, if so, the outcome (if known).
- identify previously treated patients because they are at increased risk of drug resistance, including MDR-TB.
 - **New patients**
 - **Previously treated patients**

History of previous treatment...

New case (N):

- A patient who never had treatment for TB, or has been on anti-TB treatment for less than four weeks.

Relapse (R):

- A patient declared cured or treatment completed of any form of TB in the past, but who reports back to the health service and is now found to be AFB smear-positive or culture positive.

History of previous treatment....

Treatment after Failure (F):

- A patient who, while on treatment, is smear or culture positive at the end of the fifth month or later, after commencing.

Return after default (D):

- A patient previously recorded as defaulted from treatment and returns to the health facility with smear-positive sputum.

History of previous treatment...

Transfer in (T):

- A patient who is transferred-in to continue treatment in a given treatment unit after starting treatment in another treatment unit. The receiving treatment unit should register such patients as “*transfer in*” or “***T***” ***in the unit TB registers.***

Other (O):

- A patient who does not fit in any of the above mentioned categories, e.g. smear-negative PTB case who returns after default, EPTB case returning after default, previously treated TB patients with an unknown outcome of that previous treatment and who have returned to treatment with smear-negative PTB or bacteriologically negative EPTB.

Classification of TB....

4. **HIV status-** Classifications of TB Cases in HIV positive individuals

Smear-positive PTB:

- One sputum smear examination positive for Acid-fast bacilli (AFB) and
- Laboratory confirmation of HIV infection

HIV status-...

Smear-negative PTB:

- At least three sputum specimens negative for AFB, **and**
- Radiologic abnormalities consistent with active tuberculosis, **and**
- Laboratory confirmation of HIV infection, **and**
- Decision by a clinician to treat with full course of Anti-TB chemotherapy, **or**
- A patient with AFB smear-negative sputum which is culture-positive for MTB.

HIV status-...

Extrapulmonary TB:

- One specimen from an extra pulmonary site culture or smear Positive for AFB, **or**
- Histological or strong clinical evidence consistent with active extra pulmonary TB.
- Laboratory confirmation of HIV infection, **and**
- Decision by a clinician to treat with full course of Anti-TB chemotherapy.

Clinical presentation of tuberculosis

- Symptoms of TB are grouped in to **general**(non-specific)and symptoms associated with organ specific TB.
- **General** symptoms of **TB(pulmonary or extra-pulmonary)** include:
 - Weight loss,
 - Fatigue
 - Malaise
 - Fever
 - Night sweats
 - loss of appetite

Clinical presentation...

- **Symptoms of pulmonary tuberculosis(PTB):**
 - **Cough with or without sputum production, chest pain, haemoptysis, and breathlessness (SOB).**
- **Symptoms of extra-pulmonary TB:**
 - in addition to the general symptoms of TB, patients with extra pulmonary TB present with features **related to the pathology of the affected organ.**

Symptoms of extra-pulmonary TB...

- **Tuberculous lymphadenitis** - painless Cervical Lymph node
- **Tuberculous pleurisy**: pain while breathing in, dull lower chest pain, intermittent cough, breathlessness on exertion.
- **TB of bones and/or joints**: localized pain and/or swelling of insidious onset, discharge of pus, muscle weakness, paralysis, and stiffness of joints.
- **Intestinal TB**: loss of appetite and weight, chronic abdominal pain, diarrhoea or constipation, mass in the abdomen, fluid in the abdominal cavity (ascites).
- **Tuberculous meningitis**: Headache, fever, vomiting, neck stiffness and mental confusion of insidious onset.

TB Diagnosis:

❖ ***A TB suspect:***

- ***any person who presents with symptoms and signs suggestive of TB, in particular cough of ≥ 2 weeks duration.***

❖ ***A TB case:***

- **a patient in whom TB has been bacteriologically confirmed, or who has been diagnosed by a clinician.**

Diagnostic methods

1. History and physical examination:

- signs and symptoms
- history of anti-TB treatment previously.
- check lymph nodes, lungs and other systems as appropriate.

Diagnostic methods of TB

2. Bacteriological methods

A. Direct light smear microscopy/conventional microscopy

- Mainstay of diagnostic methods for **TB in Ethiopia.**
- Most efficient and applicable in **peripheral laboratories.**
- Three sputum specimens must be collected and examined in two consecutive days (**spot-early morning-spot**).
- **Day 1:**the first "on-the-spot" sample is collected.
- **Day 2:**the early morning sample (sample 2) is submitted, and then the second "on- the-spot" sample (sample 3)is collected.

Smear-positive PTB is confirmed when there are at least 2 **AFB positive smear** results.

- In **HIV positive** individual, smear-positive PTB is diagnosed when **one AFB positive** smear result is found.

Diagnostic methods....

B. Light emitting diode (LED) fluorescent microscopy

- Newly introduced
- Recommended for centers with high case load as it saves time and improves sensitivity.
- Requires additional training.

C. Culture: to isolate mycobacterium, is a highly sensitive , **gold standard**, with **DST** used for

Diagnostic methods....

3. Molecular Tests for TB Diagnosis

- Line Probe Assay (LPA):
- **GeneXpert MTB/RIF**: (Mycobacterium tuberculosis and rifampicin resistance by polymerase chain reaction)
- new rapid DNA test for TB

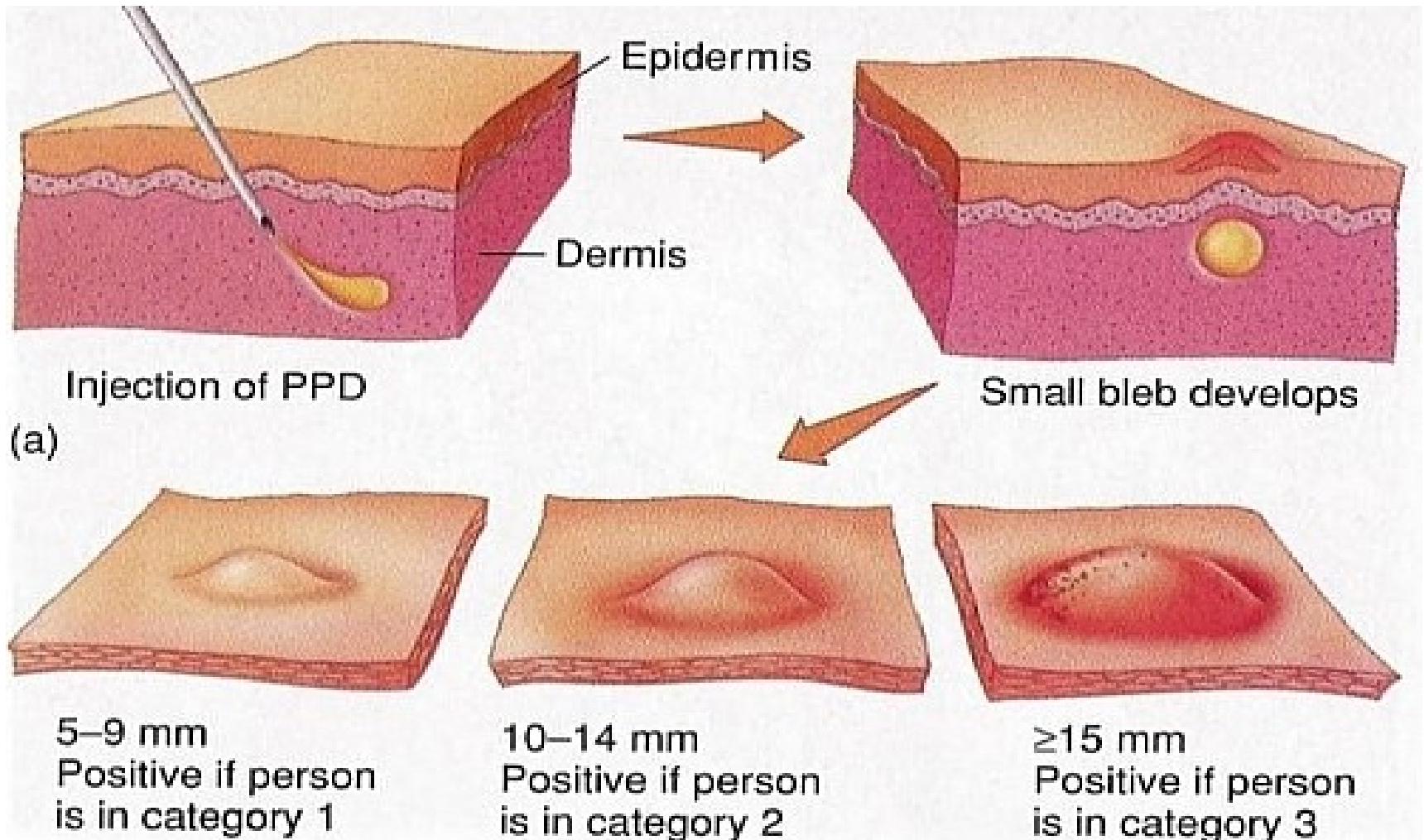
4. Histo-Pathological Examination

- Samples can be collected
 - Fine needle aspiration (FNA) & Tissue biopsy
- FNA / Biopsy can play a role in the confirmation of **EPTB**

5. Radiological Examination

- X-ray

Tuberculin skin test



Treatment of TB

The aims of TB treatment:

- To Cure the TB patient and restore quality of life and productivity
- To prevent death from active TB or its late effects
- To prevent relapse of TB
- To prevent the development and transmission of drug resistance
- To decrease TB transmission to others.

Treatment of TB...

- To achieve the aims of TB treatment, the patient should receive **adequate chemotherapy**:
 - Rapidly and substantially reduces the number of actively multiplying bacteria.
 - Cures patients.
 - Prevents relapse of the disease
 - prevents the development of resistance to the drugs.

Treatment of TB...

- The requirements for **adequate chemotherapy** are therefore:
 - An appropriate combination of drugs
 - Prescribed in the correct dosage
 - Taken regularly by the patient
 - For a sufficient period of time

Drugs used for the chemotherapy of TB

Second line :

- **First line** drugs for the treatment of TB in Ethiopia include:

- Rifampicin(R)
- Ethambutol (E)
- Isoniazid (H)
- Pyrazinamide (Z)
- Streptomycin (S)

- **Fluoroquinolones:** Moxifloxacin (Mfx); Levofloxacin (Lfx)
Oral bacteriostatic - Ethionamide (Eto); Cycloserine (Cs); para-aminosalicylic acid (PAS)
- **Injectable**
Kanamycin(Km);
Amikacin(Am);
Capreomycin(Cm); S
- **Unclear role in DR-TB:** Clofazimine (Cfz); Linezolid (Lzd);
Amoxicillin/clavulanate(Amx/Clv);
Thioacetazone (Thz);
Imipenem/cilastatin (Ipm/Cln); High-dose isoniazid

Treatment of TB...

Fixed dose combination (FDC):

- RHZE 150/75/400/275 mg
- RHZ 150/75/400 mg
- RH 150/75 mg
- EH 400/150mg

Loose form:

- ethambutol 400 mg
- isoniazid 300 mg
- streptomycin sulphate
vials 1 gm (injectable)

Pediatric FDC:

- Rifampicin + Isoniazid(RH):
60mg + 30mg
tab/dispersible
- Rifampicin + Isoniazid(RH):
60mg + 60mg
tab/dispersible
- Rifampicin + Isoniazid(RH) +
Pyrazinamide: 60mg + 30mg
+ 150mg tab/dispersible

loose form:

- • Ethambutol: 100mg tab

Phases of Chemotherapy

- **Intensive (initial) phase**
 - **8 weeks**
 - **Five drugs** for the first eight weeks followed by four drugs for the **next four weeks** for re-treatment cases.
- **Make non-infectious within 2-3 weeks except in case of drug resistance.**
- *Continuation phase*
 - Immediately follows the intensive phase
 - Two drugs, to be taken for 4 months for new cases and treatment with a combination of three drugs for re-treatment cases for 5 months.
 - Ensure cure or completion of treatment.

Treatment of TB...

- **TB patient categories and how to select the correct treatment regimen**
- Before you put patients on anti TB drugs:
 - Determine the type of TB: PTB+, PTB- and EPTB
 - Determine previous treatment history: New patient, Previously treated
 - Select based on the three standard treatment regimens:
 - i. New patient regimen**
 - ii. Previously treated patient regimen**
 - iii. MDR-TB regimen**

Treatment of TB...

- **New TB Patients** will be treated with 2RHZE/ 4RH.
- **Previously treated TB cases** will be re-treated with 2S(RHZE) / 1(RHZE) / 5 (RH)E
(streptomycin CI for pregnant women and max.Dose 0.75g for age >60 yrs)
- **Others** will be treated with 2RHZES/RHZE/5RHE

S. N o	TB Patient Type	Recommende d Regimen	Action
1	NEW	Rx as new <u>2 RHZE/4RH</u>	Send sputum for culture & DST if contact of known MDR- TB case. End of 2 nd , 5 th , and 6 th month AFB

S.No	TB Patient Type	Recommended Regimen	Action
2	PREVIOUSLY TREATED		
	•Rx after failure •Rx after default or •Relapse after one course of RX	Rx as retreatment 2RHZES/ 1RHZE/5RHE	Send sputum for culture & DST while treating the pt End of 3 rd , 5 th & 8 th months AFB
	• Others Default pt come with smear -ve PTB,EPTB or previously treated pt come with unknown outcome	Rx as retreatment 2RHZES/ 1RHZE/5RHE	Send sputum for culture & DST while treating the pt. End of 3 rd , 5 th & 8 th months AFB

S. No	TB Patient Type	Recommended Regimen	Action
	PREVIOUSLY TREATED		
	Relapse after second or subsequent course of RX	Wait for DST result	Send culture & DST and refer to MDR treatment initiating center

Anti-TB Drug Dosages

Drugs	Recommended Dose	
	Dose and range (mg/kg Bwt)	Maximum (mg)
Isoniazid	5 (4–6)	300
Rifampicin	10 (8–12)	600
Pyrazinamide	25 (20–30)	2,000
Ethambutol	15 (15–20)	1600
Streptomycin ^a	15 (12–18)	1000
10/25/2024	prep.by Ebisa (MSc)	219

Anti-TB drugs dosage for new TB cases

Patient's weight in kgs	Treatment regimen and dose	
	Intensive phase 2RHZE	Continuation phase 4RH
20-29*	1 ½	1 ½
30-39	2	2
40-54	3	3
≥55	4	4

Anti-TB drugs dosage for previously treated cases

Patient's weight in kgs	Treatment regimen and dose			
	Intensive Phase 2SRHZE/1RHZE		Continuation Phase 5 (RH)E	
	S*	RHZE	RH	E
20-29*	½ (0.5 g)	1 ½	1 ½	1 ½
30-39	½ (0.5 g)	2	2	1 ½
40-54	¾ (0.75g)	3	3	2
≥55	1g	4	4	3

Treatment of TB in Special Situations

- **Pregnancy-** streptomycin (permanent deafness in the baby) Pyridoxine supplementation for INH
- **Oral Contraception – interaction with Rifampicin**
- Take an oral contraceptive pill containing a higher dose of estrogen
- Another form of contraception.
- **Breastfeeding-INH preventive for baby then, give BCG if not given, Pyridoxine for all breast feeding on INH**
- **Patients with TB & Leprosy -Rifampicin common to both&must be given with the required dose for TB. Once anti-TB course is completed, patients should continue their anti-leprosy treatment.**

Special Situations.....

Patient with Renal Failure

- Consult expert, otherwise avoid Streptomycin & Ethambutol.
- recommended regimen is therefore 2RHZ/4RH.

Patients with Liver Disorder-

avoid Pyrazinamide

2SERH/6RH, 9RHE or

2SEH/10EH.

HIV Patients on Anti-retroviral drugs

- temporary worsening of symptoms and signs after starting TB treatment

Indications for Admission of TB Patients

- In the majority of cases, admission is not necessary for TB patients. However, indicated when there is:
- Severe clinical deterioration
- Tuberculosis related complications like massive hemoptysis, pneumothorax, empyema;
- Serious side effects
- Severe co-morbid conditions

Outcomes.....

Treatment failure:

- A patient whose sputum smear or culture is positive at 5 months or later during treatment. Or Patients found to harbor a multidrug-resistant (MDR) strain at any point of time during the treatment, whether they are smear-negative or -positive.

Died:

- A patient who dies for any reason during the course of TB treatment.

Outcomes.....

Defaulter:

- A patient who has been on treatment for at least four weeks and whose treatment was interrupted for eight or more consecutive weeks.

Transfer out:

- A patient who has been transferred to another recording and reporting unit and whose treatment outcome is unknown.

Drug-Resistant Tuberculosis

- Man-made problem - consequence of human error
 - Management of drug supply,
 - Patient management,
 - Prescription of chemotherapy, and
 - Patient adherence
 - Poor infection control practice

MDR-TB..... Terms

- **Mono-resistance:** Resistance to only one first line anti-TB drugs.
- **Poly-resistance:** Resistance to more than one first line anti-TB drugs, but not to both isoniazid and rifampicin.
- **Multidrug-resistance (MDR):** Resistance to at least isoniazid and rifampicin.
- **Extensive drug-resistance (XDR):** Resistance to isoniazid and rifampicin (i.e. MDR) as well as any fluoroquinolone, and any of the second line injectable Anti TB drugs (capreomycin, kanamycin, and amikacin).

MDR-TB.....

- The diagnosis of DR-TB is made only by laboratories performing DST.
- Treatment of MDR-TB is more complicated and longer than treatment of drug susceptible TB.
- It is important to treat MDR-TB patients both to prevent morbidity, mortality and to limit the spread of drug-resistant TB in the community.

MDR-TB.....

- Increased risk for drug resistance
- previous exposure to anti-tb treatment
- Exposure to a known MDR-TB case
- History of using poor or unknown quality TB drugs
- Treatment in poorly-performing control program
- Co-morbid conditions associated with mal-absorption
- HIV/AIDS

MDR-TB Suspects

- Treatment failure of previously treated cases
- Symptomatic close contacts of confirmed MDR-TB cases
- Symptomatic individuals from known high risk groups (ex: healthcare workers (hcws))
- Previously treated cases (treatment failure of new cases, return after relapse, return after default)

MDR-TB Treatment Regimens in Ethiopia

The standardized treatment regimen addresses 5 patient categories:

1. Patients with MDR-TB confirmation, but no full DST results available yet: regimen: **e-z-km(am)-lfx-eto-cs**
 - Ethambutol (E), Pyrazinamide (Z) , Kanamycin(Km);, Amikacin(Am);
 - Levofloxacin (Lfx) , Ethionamide (Eto); Cycloserine (Cs);
2. MDR-TB patients susceptible to both kanamycin and quinolone:

Regimen is the same as above.

MDR-TB Treatment Regimens...

3. MDR-TB patients susceptible to Kanamycin, but resistant to Quinolone:

Regimen: **E-Z-Km(Am)-Mfx-Eto-Cs-PAS**

Ethambutol (E), Pyrazinamide (Z) ,

Kanamycin(Km);Amikacin(Am);

Moxifloxacin (Mfx); , Ethionamide (Eto); Cycloserine (Cs);

para-aminosalicylic acid (PAS)

4. MDR-TB patients susceptible to Quinolone, but resistant to

Kanamycin: Regimen: **E-Z-Cm-Lfx-Eto-Cs**

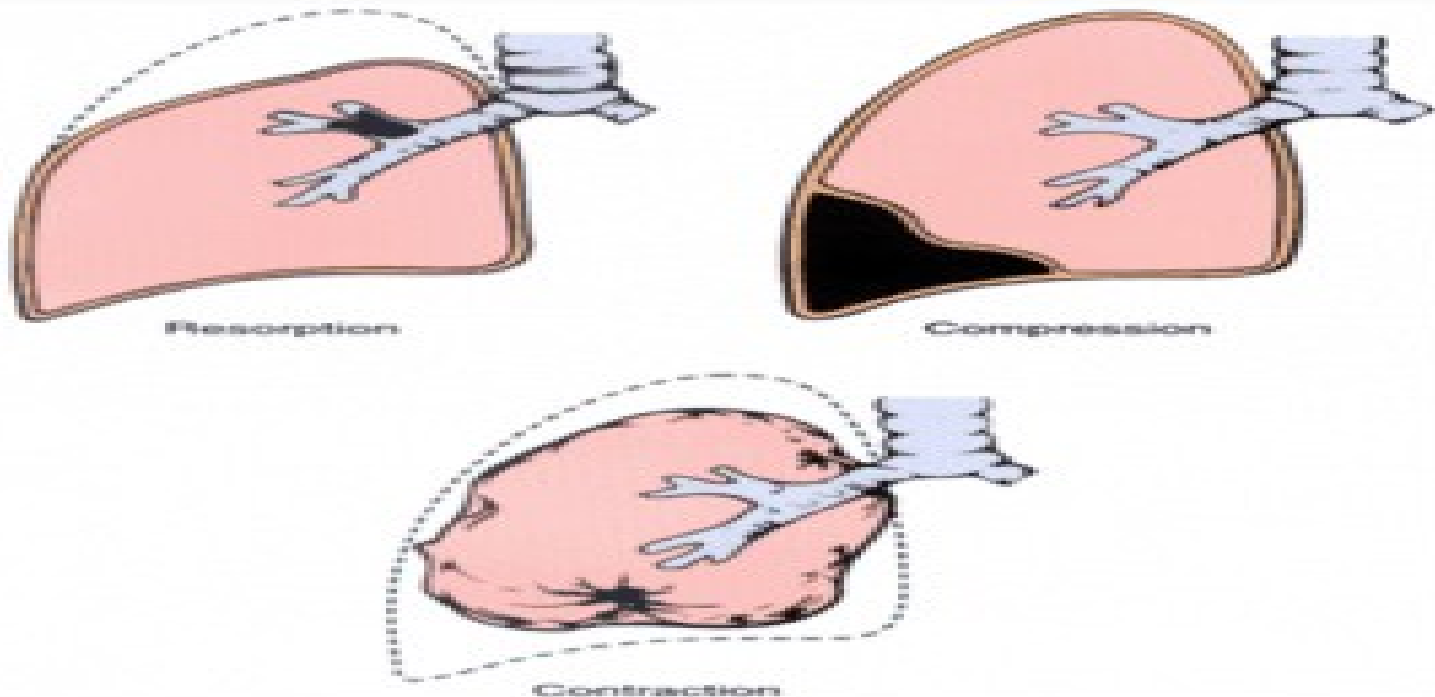
Ethambutol (E), Pyrazinamide (Z) Capreomycin(Cm); Levofloxacin

5. XDR-TB Cases (i.e.: MDR-TB and resistance to Quinolone and Kanamycin) Regimen: **E-Z-Cm-Mfx-Eto-Cs-PAS**

- Ethambutol (E), Pyrazinamide (Z)
Capreomycin(Cm); Moxifloxacin (Mfx);
Ethionamide (Eto); Cycloserine (Cs); para-aminosalicylic acid (PAS)

Atelectasis/lung collapse

Atelectasis



Atelectasis/lung collapse

- Closure or collapse of alveoli
- Occurs when a portion of the lung does **not expand completely, decreasing the lung's capacity to exchange gases**, which results in **decreased oxygenation of blood**.
- Excess secretions or **mucous plugs** may also cause **obstruction of airflow and result in atelectasis** in an area of the lung.
- Atelectasis also is observed in **COPD that impedes or blocks air flow to an area of the lung** (eg, obstructive atelectasis)

Atelectasis....

- High risks for atelectasis
 - Postoperative patients are at risk for atelectasis due to pain, immobility, medications for pain or anesthesia, and lack of deep breathing.
 - Monotonous, low tidal breathing
 - Supine positioning, splinting of the chest wall because of pain, or abdominal distention
 - Secretion retention,
 - Airway obstruction, and an impaired cough reflex

Clinical Manifestations

- Difficulty of breathing (dyspnea) due to the lack of expansion of part of the lung
- Anxiety due to decrease in oxygenation
- Tachypnea in an attempt to increase available Oxygen
- Tachycardia as body tries to increase available oxygen

❖ **cough, and sputum production.**

❖ **In large lung tissue involvement (lobar atelectasis), marked respiratory distress.**

❖ **pleural pain, and central cyanosis and anxious.**

Atelectasis....

INTERPRETING TEST RESULTS

- Shadows on chest x-ray indicate collapsed area of the lung.
- The airless state in this area of the lung creates a more dense appearance on the x-ray.
- CT scan will show an area of atelectasis.

Atelectasis....

Management

Goal : to improve ventilation & remove secretions

- In case of bronchial obstruction from secretions, the secretions must be removed
- Chest physical therapy (postural drainage)
- If the cause of atelectasis is compression of lung tissue, the goal is to decrease the compression
- Thoracentesis

Atelectasis....

Prevention: first-line measures

- Frequent turning,
- Early ambulation,
- Lung volume expansion maneuvers (eg, deep-breathing exercises, incentive spirometry), and
- Coughing,

NURSING INTERVENTION

- Cough and deep-breathing exercise every 2 hours to prevent a further area of atelectasis.
- Instruct the patient to use the incentive spirometer every 2 hours to encourage deep breathing and monitor progress.
- Provide humidified air.
- Monitor breath sounds for abnormalities such diminished sounds

NURSING INTERVENTION.....

- Monitor mechanical ventilation if needed.
- If a large area of the lung is affected, respiratory support may be needed.
- ❖ Explain to the patient:
 - How to perform coughing and deep-breathing exercises.
 - Proper use of incentive spirometer.

Pleural conditions

- Involves :
 - Membranes covering the lungs (visceral pleura)
 - Surface of the chest wall (parietal pleura)
 - Pleural space.

Pulmonary edema

- **Pulmonary edema is defined as abnormal accumulation of** fluid in the lung tissue, the alveolar space, or both.
- It is a severe, life-threatening condition.

Pulmonary edema....

Clinical manifestations

- **Increasing respiratory distress, with dyspnea, air hunger, and central cyanosis**
- **Usually very anxious and often agitated.**
- **Coughs up foamy, frothy, and often blood-tinged secretions.**
- **The patient experiences acute respiratory distress and may become confused.**
- **crackles in the lung bases (especially in the posterior bases)**

Medical Management Management

- focuses on **correcting the underlying disorder.**
- Cardiac origin
Vasodilators, inotropic medications, afterload or preload agents, or contractility medications may be administered.
Additional
- If the problem is **fluid overload, diuretics and fluids are restricted**
- **Oxygen and pain control**
- **Nursing management**
- **Administration of oxygen and intubation** and mechanical ventilation if respiratory failure occurs.
- **Administers medications**

Reading assignments

- ▣ ***Lung abscess***
- ▣ ***Cor pulmonale***
- ▣ ***Pulmonary embolism***

