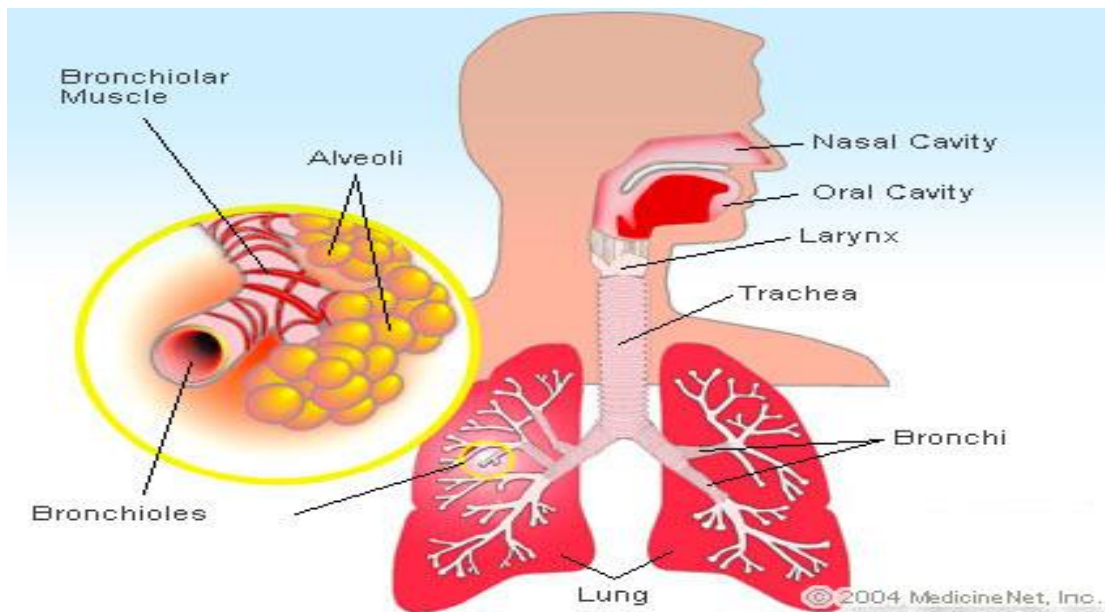
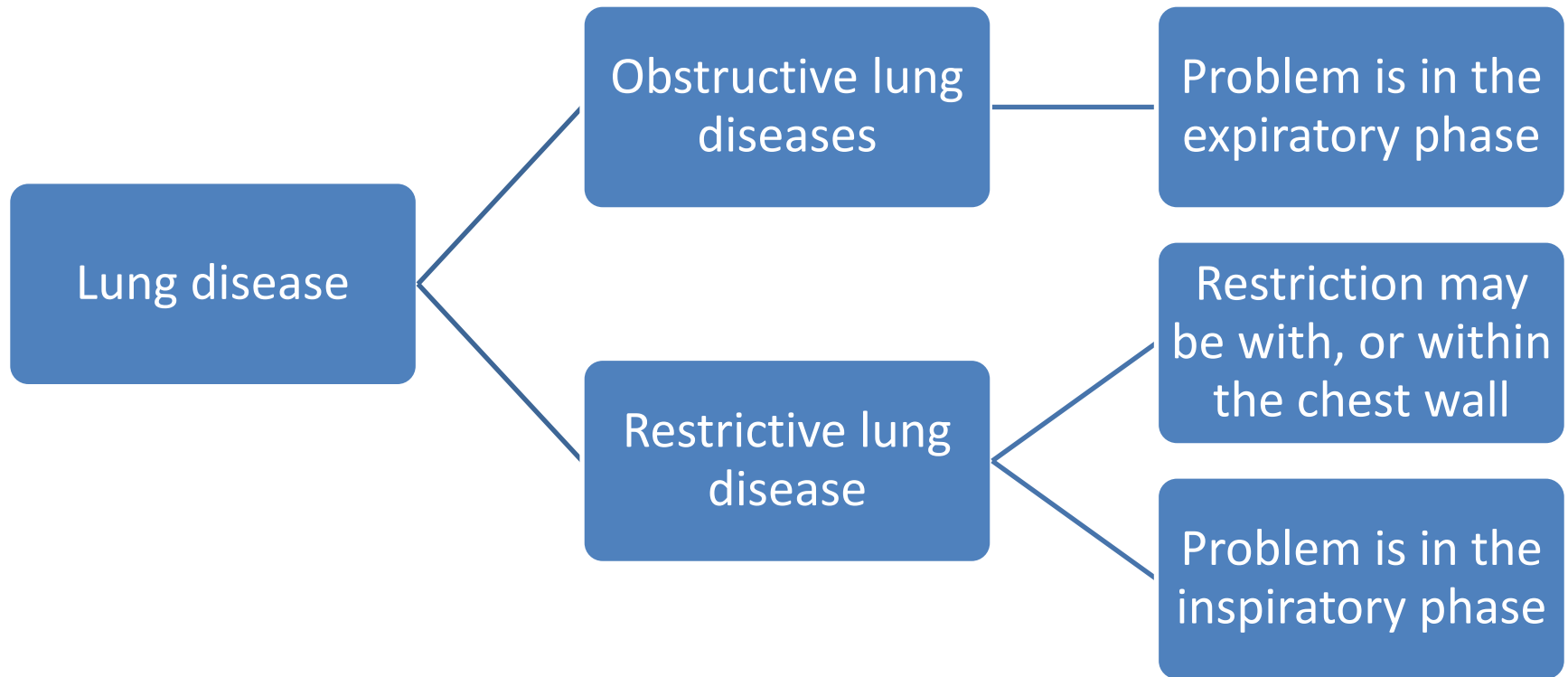


Chronic obstructive lung disease



Dr/Rehab F.Gwada

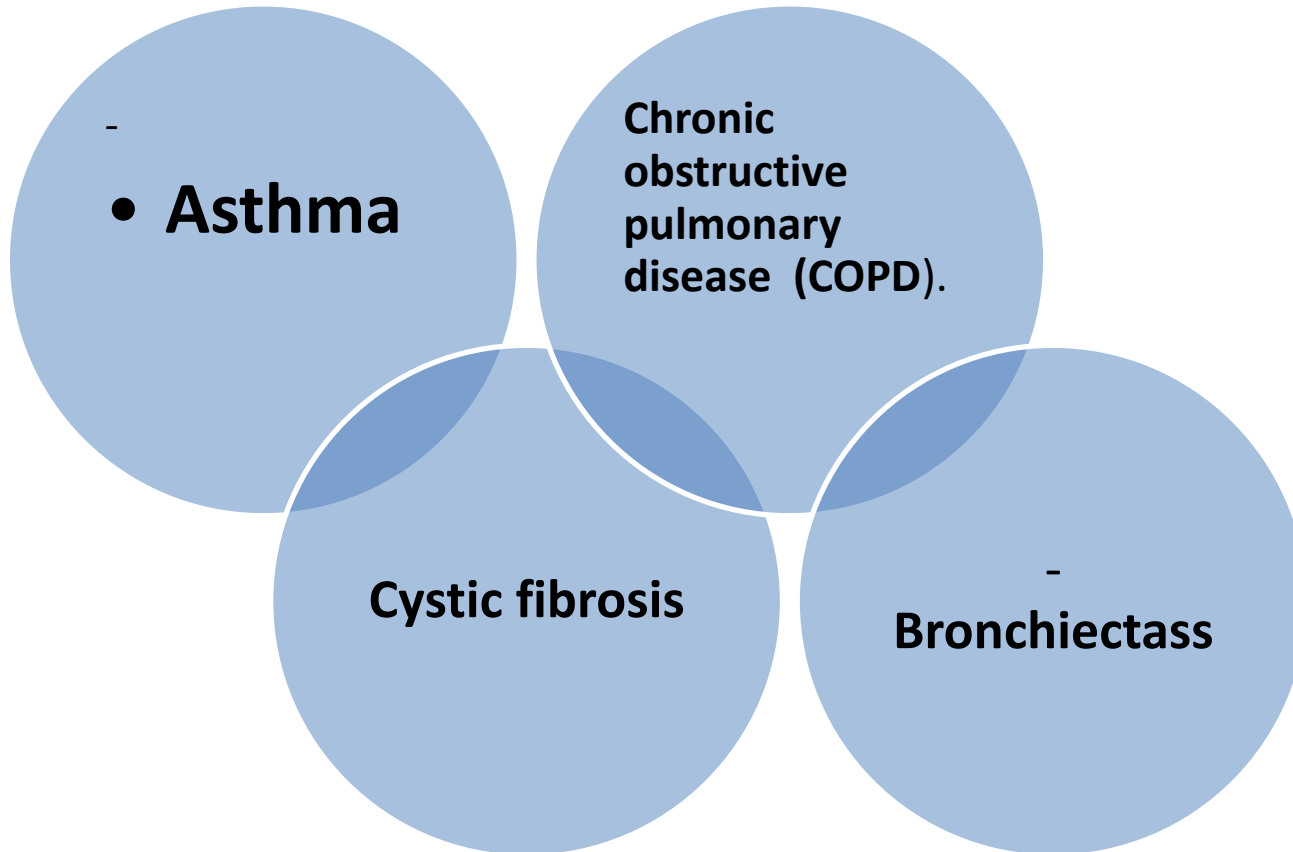


Both restrictive and obstructive lung disease are shared in respiratory symptoms mainly breathless, shortness of breath (SOB)

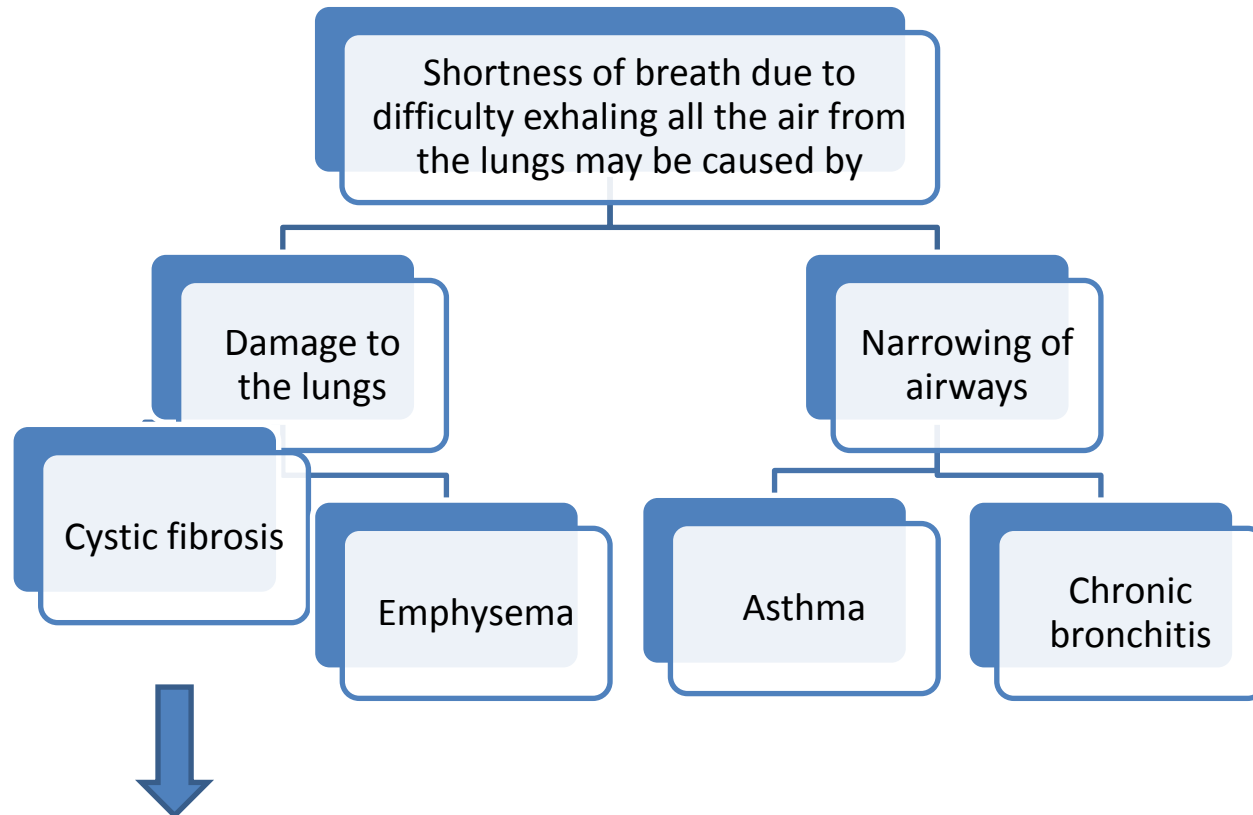
Obstructive lung disease

- It is a category of respiratory disease characterized by airway obstruction.
- It is generally characterized by :
 - inflamed and easily collapsible airways
 - obstruction to airflow
 - exhaling problems.
 - frequent medical clinic visits and hospitalizations.

Types of obstructive lung disease



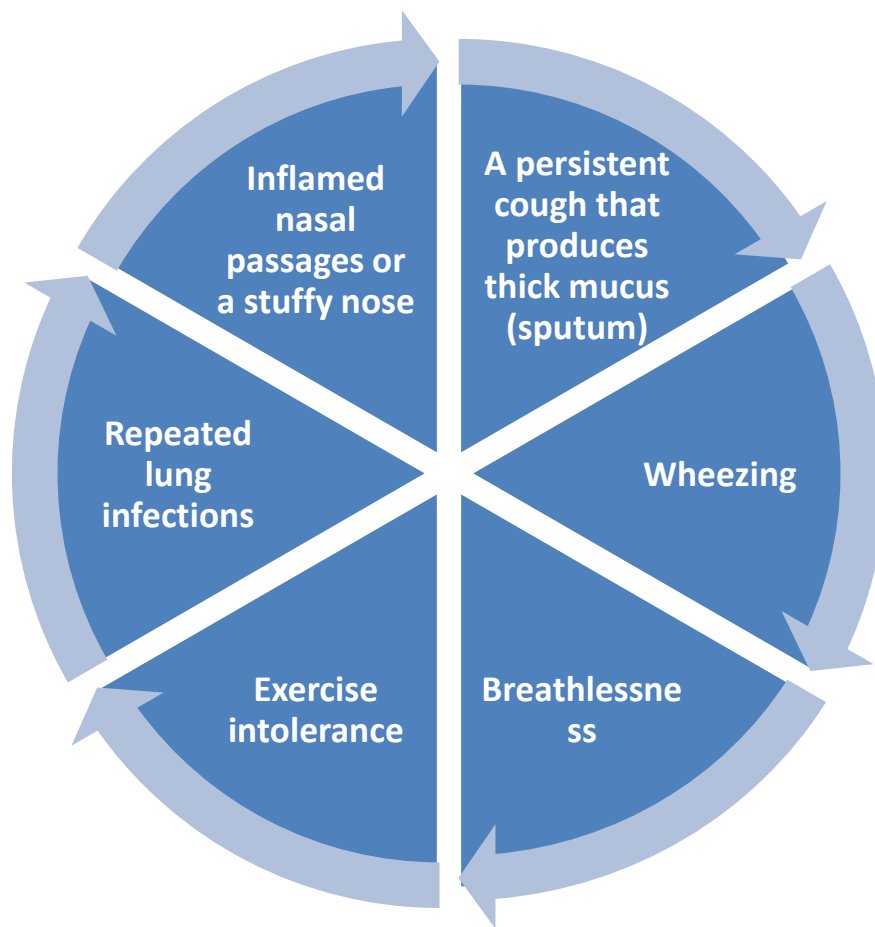
Obstructive lung disease



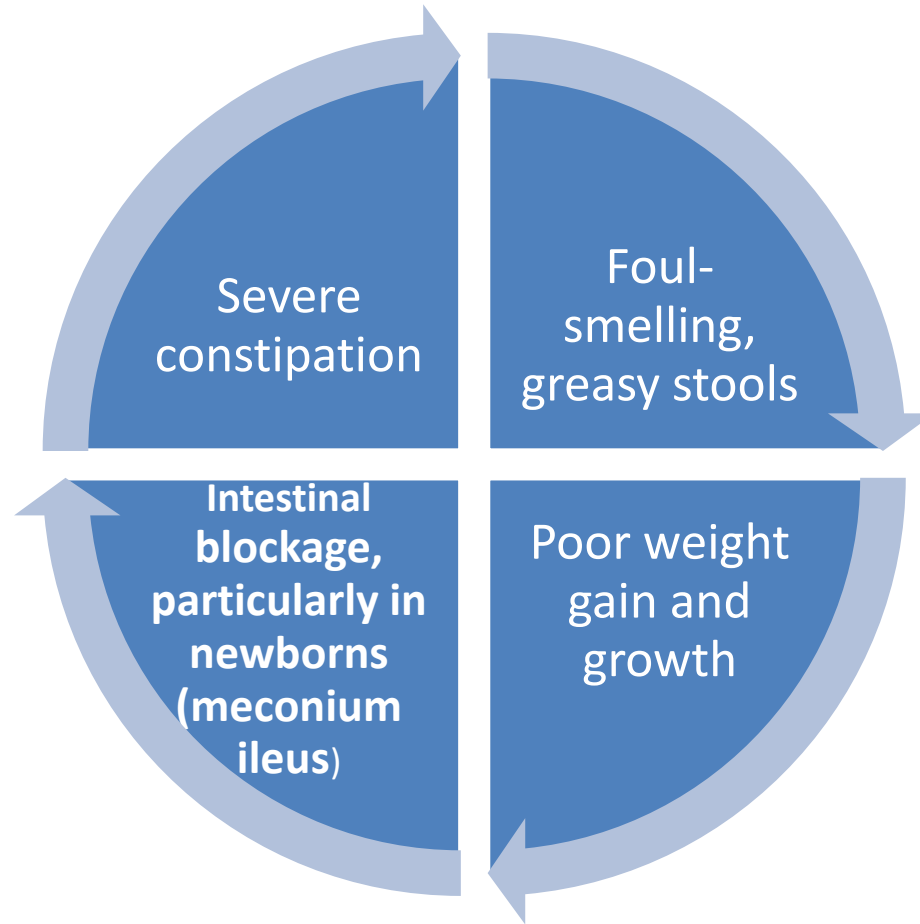
Is a hereditary disorders causes thick, sticky mucus to build up in the breathing passages of the lungs and in the pancreas.

. results in life-threatening lung infections and serious digestion problems. The disease may also affect the sweat glands and a man's reproductive system.

Respiratory signs and symptoms




Digestive signs and symptoms



Respiratory system complications


Damaged airways (bronchiectasis). This makes it harder to move air in and out of the lungs clear mucus from the airways (bronchial tubes).



Chronic infections. People with cystic fibrosis may often have sinus infections, bronchitis or pneumonia.




Growths in the nose (nasal polyps). Because the lining inside the nose is inflamed and swollen.



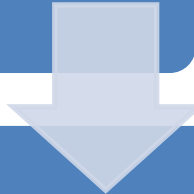
Coughing up blood (hemoptysis). Over time, cystic fibrosis can cause thinning of the airway walls.

Respiratory system complications

Pneumothorax. abnormal collection of air in the pleural space between the lung and the chest wall cause chest pain and breathlessness.(sudden onset)



Respiratory failure. Over time, cystic fibrosis can damage lung tissue so badly that it no longer works.



Acute exacerbations. People with cystic fibrosis may experience worsening of their respiratory symptoms, such as coughing and shortness of breath, for several days to weeks. This is requires treatment in the hospital

Chronic obstructive pulmonary disease

- It is mainly a combination of chronic bronchitis and emphysema
- In each condition there is chronic obstruction of the flow of air through the airways and out of the lungs, and the obstruction generally is permanent(not fully reversible) and may be progressive over time.
- Asthma being a reversible obstruction of airways is often considered separately

Chronic bronchitis

- It is an inflammation and swelling of the lining of the airways that leads to narrowing and obstruction of the airways.
- The inflammation also stimulates production of mucous (sputum), which can cause further obstruction of the airways.
- Obstruction of the airways, especially with mucus, increases the likelihood of bacterial lung infections. Chronic bronchitis usually is defined clinically as a daily cough with production of sputum for three months, two years in a row.

Normal bronchi

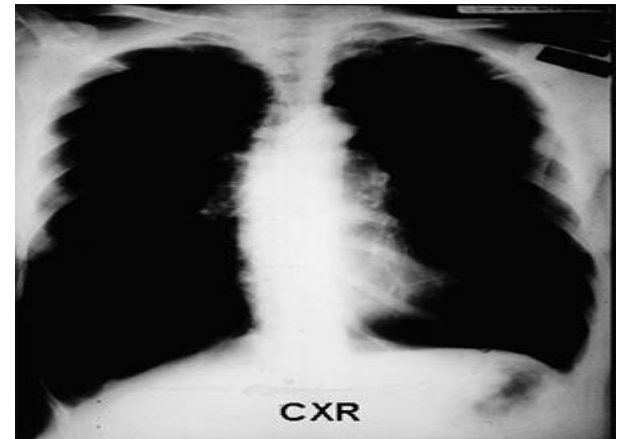


Bronchitis



What is emphysema?

- There is permanent enlargement of the alveoli due to the destruction of the walls between alveoli.
- The destruction of the alveolar walls leads to
- A) decrease the number of capillaries available for gas exchange. This adds to the decrease in the ability to exchange gases.
- B) reduce the elasticity of the lung overall.



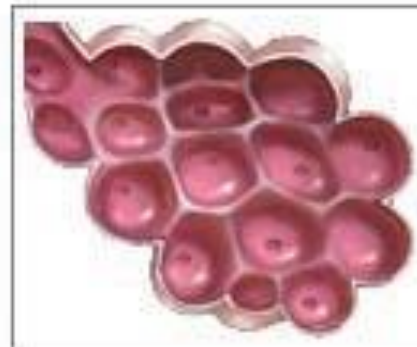
Hyperexpansion from Emphysema



Alveoli with emphysema



Microscopic view of normal alveoli



Emphysema cont.

- Loss of elasticity leads to the collapse of the bronchioles → obstructing airflow out of the alveoli.

Air becomes "trapped" in the alveoli and reduces the ability of the lung to shrink during exhalation.

This trapped air takes up space and results in:

- A reduced amount of air that can be taken in during the next breath.
- Less air gets to the alveoli for the exchange of gasses.
- Compress adjacent less damaged lung tissue, preventing it from functioning to its fullest capacity.

Emphysema cont.

- Normally, energy is only required for inhalation to inflate the lungs. While, exhalation, a passive process that does not require energy.
- In emphysema, inefficient breathing occurs because extra effort and energy has to be expended to empty the lungs of air due to the collapse of the airways.
- In addition, because of the reduced capacity to exchange gases with each breath, it is necessary to breathe more frequently (hyperventilation).

Emphysema cont.

- After a while, even hyperventilation cannot maintain adequate oxygen levels, and the arteries in the lung begin to constrict or narrow.
- The heart has to work harder to push blood into these narrower blood vessels, causing the blood pressure in the lung arteries to increase (**Pulmonary hypertension**).
- Over time, the extra work requirement causes the heart muscle to enlarge (hypertrophy) and can cause heart failure .

What causes COPD

- ➡ **smoking**
- ➡ **Air pollution**
 - Slow the normal growth of the lungs
- ➡ **Occupational pollutants** such as cadmium and silica
- ➡ **Alpha-1 antitrypsin deficiency(AAT)** This causes emphysema by age 40 or 50

- **Other**

The risk is greater in those who are poor due to risk factors associated with poverty, such as air pollution and malnutrition

What are the symptoms of COPD?

- **Chronic cough** and sputum production are the major symptoms of Chronic bronchitis
- **The sputum** is usually clear and thick.
- **Shortness of breath(Dyspnea)** ,is the major symptom of emphysema.
- **Frequent respiratory infections** can cause:
 - fever, dyspnea , coughing, production of purulent (cloudy and discolored) sputum, wheeze
- **Chest tightness**

Advanced COPD symptoms

Cyanosis.

Morning headaches

Weight loss

Cor pulmonale

Cough up blood (hemoptysis).

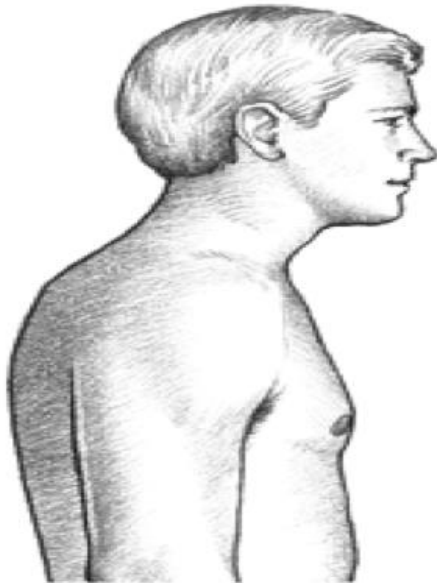
Signs of COPD

- **Tachypnea**
- **wheezing** sounds in the lungs heard through a stethoscope breathing out taking a longer time than breathing in
- **enlargement of the chest**, particularly the front-to-back distance)
- **active use of muscles in the neck** to help with breathing
- breathing through **pursed lips**
- **increased anteroposterior** to lateral ratio of the chest (barrel chest) .

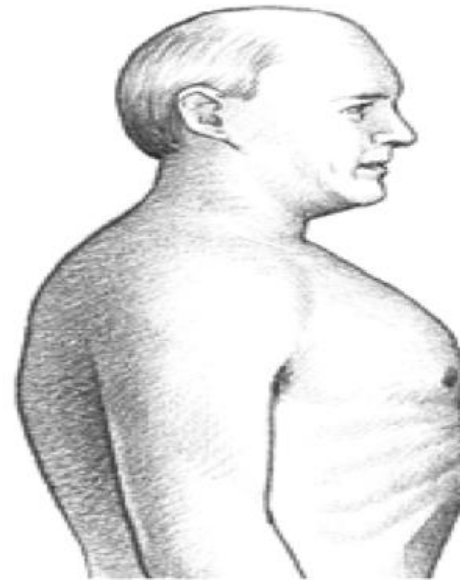
Recognizing barrel chest

In a normal adult chest, the ratio of anteroposterior to transverse (or lateral) diameter is 1:2. In patients with barrel chest, this ratio approaches 1:1 as the anteroposterior diameter enlarges.

NORMAL CHEST



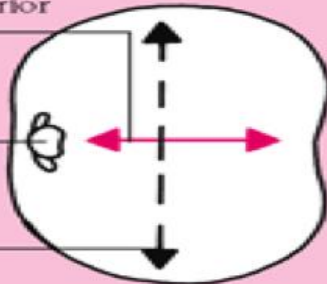
BARREL CHEST



Anteroposterior diameter

Spinal cord

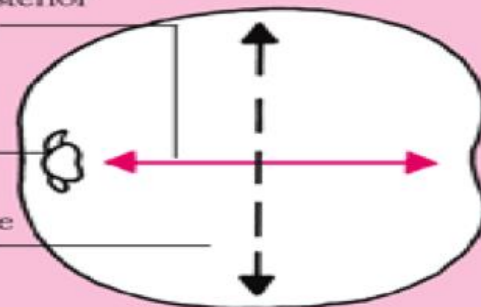
Transverse diameter



Anteroposterior diameter

Spinal cord

Transverse diameter



How is COPD diagnosed?

Medical history

physical examination

pulmonary function tests- Spirometry.

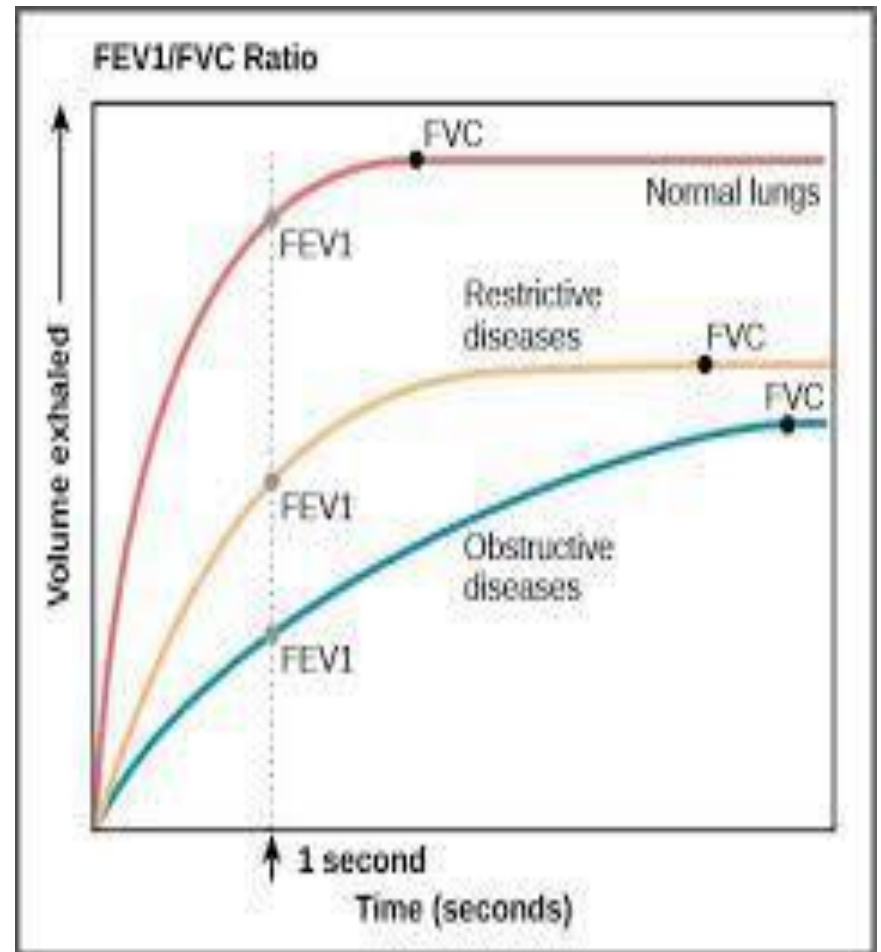
Chest x ray

(CT scan) of the chest.

ABG

Six minute walking test (6MWT) to determine the physical capability

Diagnosis of obstructive lung disease with spirometry



GOLD Spirometric Criteria for COPD Severity

I. Mild COPD

FEV1/FVC < 0.7* •
FEV1 \geq 80% predicted •

At this stage, the patient is probably unaware that lung function is starting to decline

II. Moderate COPD

FEV1/FVC < 0.7* •
50% \leq FEV1 < 80% •
predicted

Symptoms during this stage progress, with shortness of breath developing upon exertion.

III. Severe COPD

FEV1/FVC < 0.7* •
30% \leq FEV1 < 50% •
predicted

Shortness of breath becomes worse at this stage and COPD exacerbations are common.

IV. Very Severe COPD

FEV1/FVC < 0.7* •
FEV1 < 30% predicted or •
FEV1 < 50% predicted with
chronic respiratory failure

Quality of life at this stage is gravely impaired. COPD exacerbation can be life threatening.

***Classification of Airflow Limitation in COPD**

***For patients with FEV1/FVC < 0.70**

| GOLD Grade | Description | FEV1 |
|-------------------|--------------------|--|
| 1 | Mild | FEV1 \geq 80% predicted |
| 2 | Moderate | 50% \leq FEV1 < 80% predicted |
| 3 | Severe | 30% \leq FEV1 < 50% predicted |
| 4 | Very severe | FEV1 < 30% predicted |

The goals of COPD treatment

- to prevent further deterioration in lung function.
- to improve symptoms.
- to improve performance of daily activities and quality of life.

The treatment strategies

- Smoking cessation.
- taking medications to dilate airways (bronchodilators) and decrease airway inflammation, inhaled steroid.
- vaccination against [flu influenza](#) and [pneumonia](#).
- regular oxygen supplementation .(to decrease strain on Rt. Side of heart)
- Replacement of the missing or inactive AAT by injection
- Chest physiotherapy
- pulmonary rehabilitation.
- Surgery(E.g. Lung volume reduction surgery, lung transplantation)

Chest physiotherapy

- Especially during acute exacerbation of COPD
- **Exacerbations** are defined as “an event in the natural course of the disease characterized by an increase in dyspnea, cough and/or sputum beyond normal day-to-day variations
- Aims:
 - 1) To reduce the work load of breathing
 - 2) To prevent respiratory fatigue
 - 3) To drain excessive mucus from airway

Chest physiotherapy modalities

- **Humidification**
- **cough up secretions or tracheal suctioning when the patient is unable to cough.**
- **Posture drainage**
- **Manual or mechanical chest percussion & vibraton**
- **Positioning**
- **Deep breathing exercise to maximize o2 uptake & release Co2.**
- **Non-invasive positive pressure ventilation (NPPV)**

Pulmonary rehabilitation(PR)

- A cornerstone in the management of moderate to severe COPD .
- Pulmonary rehabilitation: is a program of exercise, disease management and counseling coordinated to benefit the individual.
- **PR. Include:**
 - Exercise training(Graded strengthening of diaphragm, chest, upper& lower extremities muscles)
 - Nutritional counseling
 - Education on your lung disease or condition and how to manage it
 - Energy-conserving techniques
 - Breathing strategies(breathing retraining & CPT.)
 - Psychological counseling and/or group support
- Pulmonary rehabilitation appears to improve over **all quality of life, the exercise tolerance, hospital admission and mortality.**

Reference

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- **Mitra PK: Handbook of Practical Chest Physiotherapy, Jaypee Brothers Medical Publishers,1st ed., 2007**



Thank you