



# Pulmonary Disease

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# **CHRONIC OBSTRUCTIVE PULMONARY DISEASE**

## ➤ **DEFINITION**

Chronic obstructive pulmonary disease (COPD) is a general term for pulmonary disorders characterized by chronic airflow limitation from the lungs that is not fully reversible.

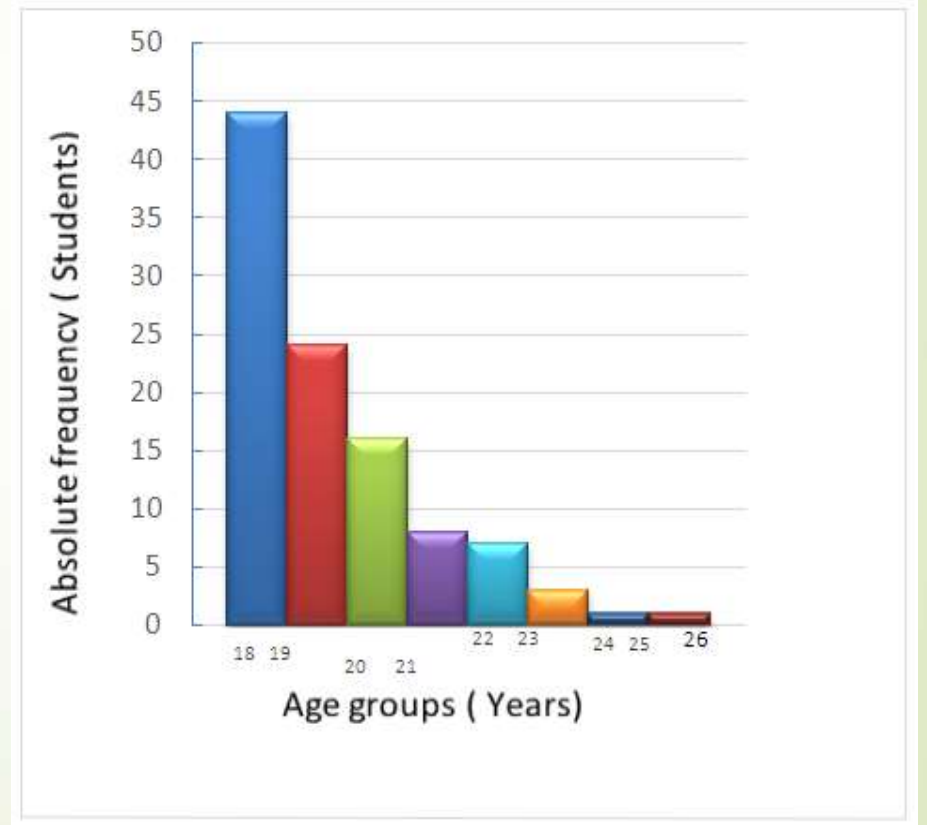
## ➤ **The two most common diseases classified as COPD are:**

1. **chronic bronchitis** : Chronic bronchitis is a condition associated with excessive tracheobronchial mucous production (at the bronchial level) sufficient to cause a chronic cough with sputum production for at least 3 months in at least 2 consecutive years.
2. **Emphysema**: defined as distention of the air spaces distal to the terminal bronchioles because of destruction of alveolar walls/septa (at the acinar level).

## EPIDEMIOLOGY

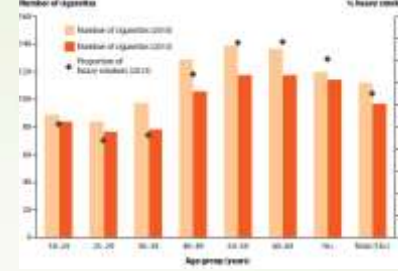
COPD is common in Iraq with hospital admissions in 2011 of 47,800. Asthma in children is 7.2% and so estimated at 132,214 adults

**Cigarette Smoking among Medical Students** in different medical schools in Baghdad, Iraq namely (University of Baghdad, Al-Mustansiriya University and Al-Nahrain University). The research team performed the study during the period of June 2005 to June 2006.



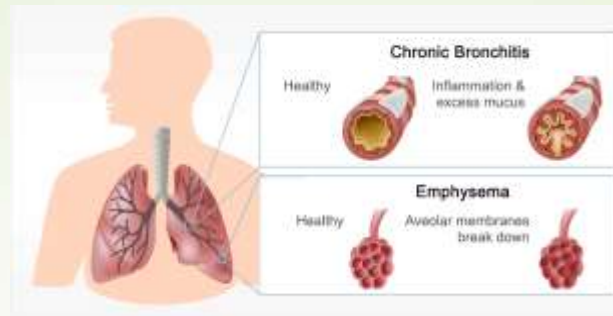
# Etiology

- 1) The most important cause of COPD is cigarette smoking. The risk of COPD is dose related and increases as the number of cigarettes smoked per day and the duration of smoking increase.
- 2) Despite the increased risk, only about one in five chronic smokers develops COPD. This suggests that genetic susceptibility to the production of inflammatory mediators (i.e., cytokines) in response to smoke plays an important role.
- 3) long-term exposure to occupational and environmental pollutants
- 4) The absence of alpha1-antitrypsin are causative factors that contribute to COPD.



**Alpha-1 Antitrypsin or  $\alpha$ 1-antitrypsin (A1AT)** is a protease inhibitor. Alpha 1-antitrypsin is also referred to as **alpha-1 proteinase inhibitor (A1PI)** because it inhibits a wide variety of **proteases**. It protects tissues from enzymes of inflammatory cells, especially **neutrophil elastase**, and has a reference range in blood of **1.5 - 3.5 gram/liter**, but the concentration can rise upon acute inflammation. In its absence (such as in alpha 1-antitrypsin deficiency), **neutrophil elastase is free to break down elastin, which contributes to the elasticity of the lungs**, resulting in respiratory complications such as **emphysema**, or **COPD** (chronic obstructive pulmonary disease) in adults and **cirrhosis** in adults or children.

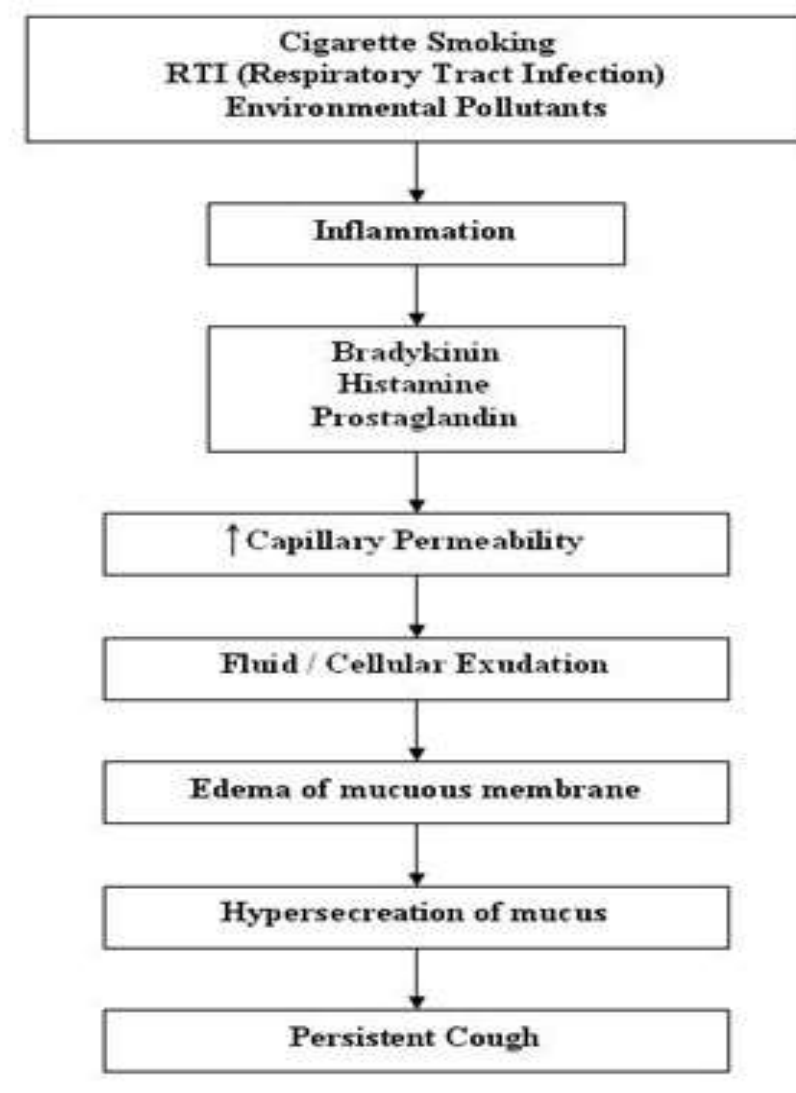
## Pathophysiology



In **chronic bronchitis**, pathologic changes consist of **thickened bronchial walls** with **inflammatory cell infiltrate**, **increased size of the mucous glands**, and **goblet cell hyperplasia**.

Obstruction is caused by **narrowing of small airways**, **increased sputum production**, **mucous plugging**, and **collapse of peripheral airways** resulting from loss of surfactant (. Obstruction is present on **inspiration and expiration**.

In **emphysema**, by contrast, smoke injures **alveolar epithelium** and causes **release of inflammatory mediators that attract activated neutrophils**. These neutrophils release enzymes (**elastase**) that destroy the alveolar walls, resulting in **enlarged air spaces distal to the terminal bronchioles** and **loss of elastic recoil of the lungs** . Obstruction is caused by the collapse of these unsupported and **enlarged air spaces on expiration**—not inspiration.

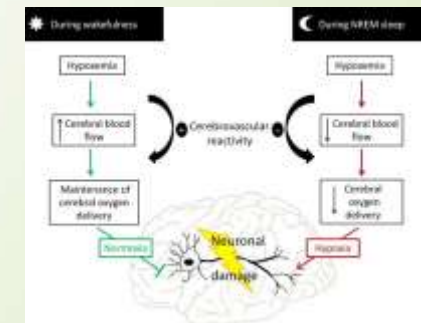
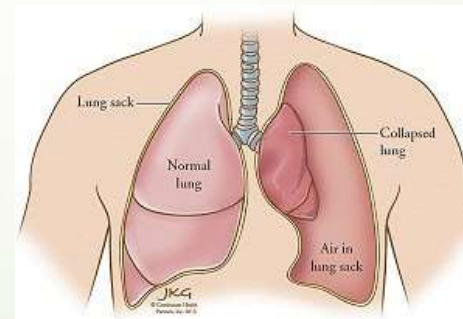




# Complications

The types of complications that develop vary depending on the predominance of chronic bronchitis or emphysema.

1. progressive **dyspnea and hypercapnia** to the point of severe debilitation.
2. Recurrent **pulmonary infections** with **Haemophilus influenzae, Moraxella catarrhalis, and Streptococcus pneumoniae** are especially common with bronchitis.
1. **Pulmonary hypertension** can develop, leading to **cor-pulmonale (right-sided heart failure)** in chronic bronchitis.
2. With emphysema more frequently experience **enlarged air space**, **thoracic bullae**, and **pneumothorax**.
3. Poor quality of sleep because of **nocturnal hypoxemia** is common with both types of COPD.
4. Although emphysema and chronic bronchitis are **irreversible processes** for which no cure exists, avoidance of pulmonary **irritants can be of significant benefit in decreasing the morbidity and mortality rates of both diseases.**



## Predominant Features of Patients With Chronic Bronchitis or Emphysema

### CHRONIC BRONCHITIS (BLUE BLOATER)

- Onset  $\approx$  50 years
- Frequently overweight
- Chronic productive cough
- Copious mucopurulent sputum
- Mild dyspnea
- Frequent respiratory infections
- Elevated pCO<sub>2</sub>
- Decreased pO<sub>2</sub> (hypoxia)
- Elevated hematocrit value
- Cor pulmonale common
- Chest radiograph shows prominent blood vessels and large heart



Cor pulmonale is a condition that most commonly arises out of complications from high blood pressure in the pulmonary arteries (pulmonary hypertension). It's also known as right-sided heart failure because it occurs within the right ventricle of your heart. Cor pulmonale causes the right ventricle to enlarge and pump blood less effectively than it should. The ventricle is then pushed to its limit and ultimately fails.

Higher than normal hematocrit levels represent abnormally elevated red blood cell counts. High hematocrits can be seen in people living at high altitudes and in chronic smokers

### EMPHYSEMA (PINK PUFFER)

- Onset  $\approx$  60 years
- Thin, barrel-chested
- Cough not prominent
- Scanty sputum
- Severe dyspnea
- Few respiratory infections
- Normal pCO<sub>2</sub>
- Decreased pO<sub>2</sub> (hypoxia)
- Normal hematocrit value
- Cor pulmonale rare
- Chest radiograph shows hyperinflation and small heart



## **Oral Complications and Manifestations**

**Patients with COPD who are chronic smokers have an increased likelihood of developing:**

- 1. Halitosis,**
- 2. Extrinsic tooth stains**
- 3. Nicotine stomatitis**
- 4. Periodontal disease**
- 5. Oral cancer. In rare instances,**
- 6. Theophylline has been associated with the development of Stevens-Johnson syndrome.**



# Laboratory examination

**Lung (pulmonary) function tests.** Pulmonary function tests measure the amount of air you can inhale and exhale, and if your lungs are delivering enough oxygen to your blood.

**Spirometry** is the most common lung function test. During this test, you'll be asked to blow into a large tube connected to a small machine called a spirometer. This machine measures how much air your lungs can hold and how fast you can blow the air out of your lungs.

**Chest X-ray**. A chest X-ray can show emphysema, one of the main causes of COPD. An X-ray can also rule out other lung problems or heart failure.

**CT scan**. A CT scan of your lungs can help detect emphysema and help determine if you might benefit from surgery for COPD. CT scans can also be used to screen for lung cancer.

**Arterial blood gas analysis**. This blood test measures how well your lungs are bringing **oxygen** into your blood and removing **carbon dioxide**.

**Laboratory tests**. Laboratory tests aren't used to diagnose COPD, but they may be used to determine the cause of your symptoms or rule out other conditions. For example, laboratory tests may be used to **determine if you have the genetic disorder alpha-1-antitrypsin (AAT) deficiency**, which may be the cause of some cases of COPD. This test may be done if you have a family history of COPD and develop COPD at a young age, such as under age 45.

# **MEDICAL MANAGEMENT**

## **Bronchodilators:**

These medications — which usually come in an inhaler — **relax the muscles around airways**. This can help **relieve coughing and shortness of breath and make breathing easier**. Depending on the severity of the disease, may need a short-acting bronchodilator before activities, a long-acting bronchodilator that use every day or both.

## **Inhaled steroids:**

Inhaled corticosteroid medications can **reduce airway inflammation and help prevent exacerbations**. Side effects may include **bruising, oral infections and hoarseness**.

## **Combination inhalers:**

Some medications combine bronchodilators and inhaled steroids. Salmeterol and fluticasone (Advair) and formoterol and budesonide (Symbicort) are examples of combination inhalers. Oral steroids.

## **oral corticosteroids**

For people who have **a moderate or severe acute exacerbation**, short courses (for example, five days) of oral corticosteroids **prevent further worsening of COPD**. However, **long-term use of these medications can have serious side effects**, such as **weight gain, diabetes, osteoporosis, cataracts and an increased risk of infection**.

## **MEDICAL MANAGEMENT**

### **Phosphodiesterase-4 inhibitors:**

A new type of medication approved **for people with severe COPD and symptoms of chronic bronchitis** is roflumilast (Daliresp), a phosphodiesterase-4 inhibitor. This drug **decreases airway inflammation and relaxes the airways. Common side effects include diarrhea and weight loss.**

### **Theophylline:**

This very inexpensive medication may help **improve breathing and prevent exacerbations**. Side effects may include **nausea, headache, fast heartbeat and tremor**. Side effects are dose related, and low doses are recommended.

### **Antibiotics:**

Respiratory infections, such as acute bronchitis, pneumonia and influenza, can aggravate COPD symptoms. Antibiotics help treat acute exacerbations, but they aren't generally recommended for prevention. However, a recent study shows that the **antibiotic azithromycin prevents exacerbations, but it isn't clear whether this is due to its antibiotic effect or its anti-inflammatory properties.**

# **Dental Management of the Patient With COPD**

Review history for evidence of concurrent heart disease; take appropriate precautions if heart disease is present:

- **Avoid treating if upper respiratory infection is present.**
- Treat in upright chair position.
- **Use local anesthetic as usual.**
- Avoid use of rubber dam in severe disease.
- **Use pulse oximetry to monitor oxygen saturation.**
- Use low-flow (2 to 3 L/min) supplemental oxygen when oxygen saturation drops below 95%; it may become necessary when oxygen saturation drops below 91%.
- **Avoid nitrous oxide/oxygen inhalation sedation with severe COPD and emphysema.**
- Consider low-dose oral diazepam or other benzodiazepine; these may cause oral dryness.
- **Avoid use of barbiturates, narcotics, antihistamines, and anticholinergics.**
- Supplemental steroids may be needed if patient is taking steroids and an invasive procedure is planned.
- **Avoid erythromycin, macrolide antibiotics, and ciprofloxacin for patients taking theophylline.**
- Do not use outpatient general anesthesia.

## References

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