

The Respiratory System

Fourth Lecture

Drugs used in the Management of Chronic Obstructive Pulmonary Disease (COPD)

Dr. BHAGAT SINGH JAISWAL
ASSISTANT PROFESSOR
SCHOOL OF STUDIES IN PHARMACEUTICAL SCIENCES
JIWAJI UNIVERSITY
GWALIOR

Normal bronchi



Bronchitis



INTRODUCTION

- n It affects more than 5 percent of the population and is associated with high morbidity and mortality
- n It is the **third-ranked** cause of death in the United States, killing more than 120,000 individuals each year

Burden of COPD

- The burden of COPD is projected to increase in coming decades due to continued exposure to COPD risk factors and the aging of the world's population.
- COPD is associated with significant economic burden.

Definition of COPD

COPD, a common **preventable** and **treatable** disease, is characterized by **persistent airflow limitation** that is usually **progressive** and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases.

COPD includes

1) Chronic Bronchitis

– 2) Emphysema

Chronic bronchitis

▫ Defined as a chronic productive cough for **three months** in each of **two successive years** in a patient in whom other causes of chronic cough have been excluded

Emphysema

- | Abnormal and permanent enlargement of the airspaces distal to the terminal bronchioles that is accompanied by destruction of the airspace walls, without obvious fibrosis

PATHOLOGY

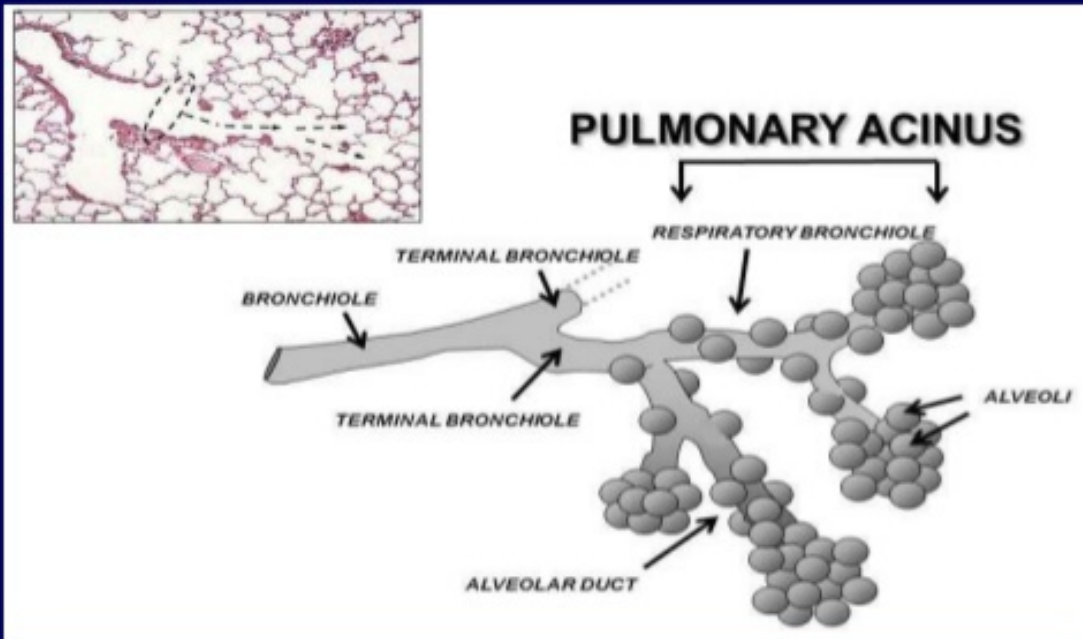
Airways

- Chronic inflammation
- Increased numbers of goblet cells
- Mucus gland hyperplasia
- Fibrosis
- Narrowing and reduction in the number of small airways
- Airway collapse due to the loss of tethering caused by alveolar wall destruction in emphysema

Lung Parenchyma

- | Emphysema affects the structures distal to the terminal bronchiole, consisting of the respiratory bronchiole, alveolar ducts, alveolar sacs, and alveoli, known collectively as the acinus.

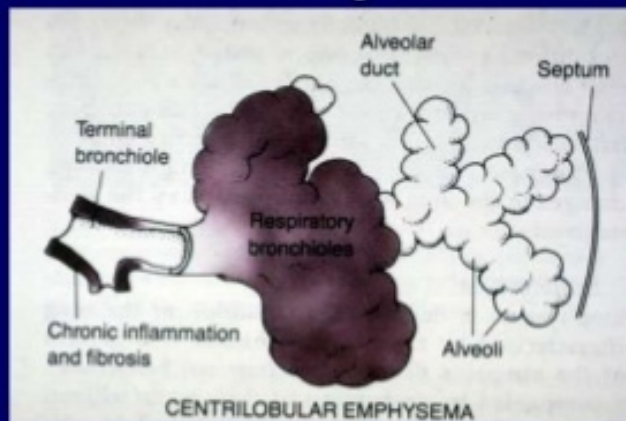
Normal Acinus



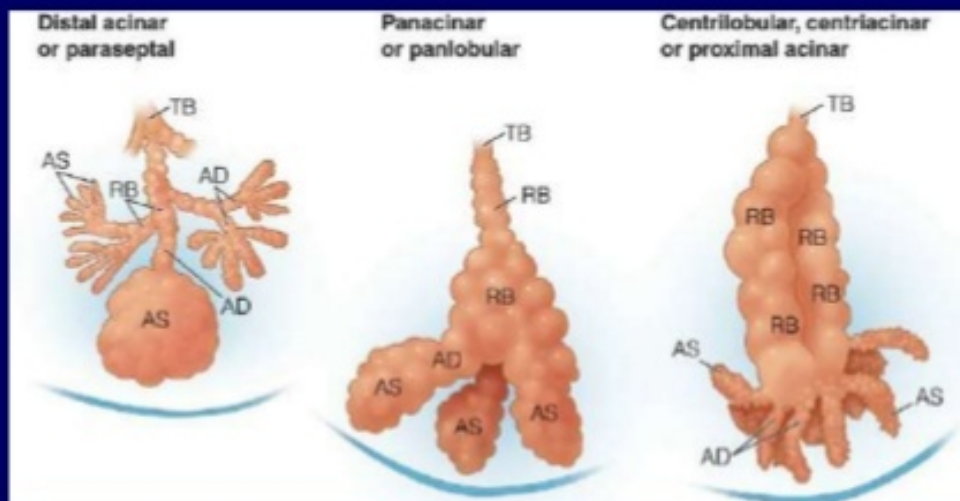
Subtype of emphysema.

Centrilobular emphysema (Proximal acinar)

- Abnormal dilation or destruction of the **respiratory bronchiole**, the central portion of the acinus. It is commonly associated with cigarette smoking,



Emphysema

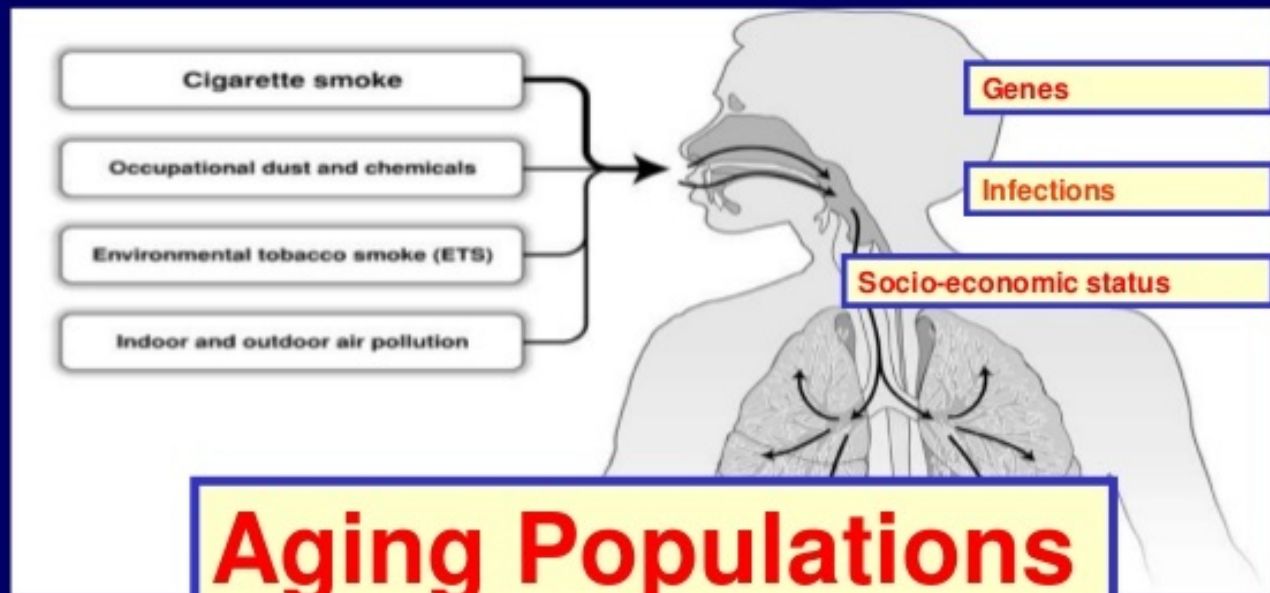


Pulmonary vasculature

- Intimal hyperplasia and smooth muscle hypertrophy or hyperplasia thought to be due to chronic hypoxic vasoconstriction of the small pulmonary arteries

Destruction of alveoli due to emphysema can lead to loss of the associated areas of the pulmonary capillary bed and pruning of the distal vasculature

Risk Factors for COPD



Symptoms of COPD

The characteristic symptoms of COPD are chronic and progressive dyspnea, cough, and sputum production that can be variable from day-to-day.

Dyspnea: Progressive, persistent and characteristically worse with exercise.

Chronic cough: May be intermittent and may be unproductive.

Chronic sputum production: COPD patients commonly cough up sputum.

Other Clinical features

- ✓ ***Wheezing***
- ✓ ***Chest tightness***
- ✓ ***Wt.loss***
- ✓ ***Respiratory infections***

Physical signs:

*Inspection:

Barrel-shaped chest ,

Accessory respiratory muscle participate ,

Prolonged expiration during quiet breathing.

Expiration through pursed lips

Paradoxical retraction of the lower interspaces during inspiration (ie, hoover's sign)

Tripod Position

Diagnosis

The presence of a **post-bronchodilator FEV₁/FVC < 0.70** confirms the presence of persistent airflow limitation and thus of COPD.

Management

Based on the principles of

- Prevention of further progress of disease
- Preservation and enhancement of pulmonary functional capacity
- Avoidance of exacerbations in order to improve the quality of life.

1. Bronchodilators

- **Bronchodilators are central to the symptomatic management of COPD.**
- **Improve emptying of the lungs, reduce dynamic hyperinflation and improve exercise performance .**

Bronchodilators

Three major classes of bronchodilators:

▣ **β 2 - agonists:**

Short acting: salbutamol & terbutaline

Long acting : Salmeterol & formoterol

▣ **Anticholinergic agents:**

Ipratropium, tiotropium

▣ **Theophylline** (a weak bronchodilator, which may have some anti-inflammatory properties)

2. Glucocorticoids

Regular treatment with **inhaled glucocorticoids** is appropriate for symptomatic patients with an $FEV_1 < 50\%$ pred and repeated exacerbations.

- Chronic treatment with **systemic glucocorticoids** should be avoided because of an unfavorable benefit-to-risk ratio.

3. COMBINATION THERAPY

- || **Combination therapy of long acting β 2-agonists and inhaled corticosteroids show a significant additional effect on pulmonary function and a reduction in symptoms.**
- *Mainly in patients with an FEV1<50%pred*

4.Others:

- ☐ Antioxidant agents
- ☐ Mucolytic

Phosphodiesterase-4 Inhibitors

■ In patients with severe and very severe COPD (GOLD 3 and 4) and a history of exacerbations and chronic bronchitis, the phosphodiesterase-4 inhibitor, **roflumilast**, reduces exacerbations treated with oral glucocorticosteroids.

Other Treatments

- **Pulmonary rehabilitation**

- **Nutrition**

- **Surgery:**


 - Bullectomy

 - Lung volume reduction surgery

 - Lung transplantation

Smoking Cessation

- Nicotine replacement therapy (nicotine gum, inhaler, nasal spray, transdermal patch, sublingual tablet, or lozenge) as well as pharmacotherapy with varenicline, bupropion, and nortriptyline reliably increases long-term smoking abstinence rates and are significantly more effective than placebo.

A 3D-rendered, light beige card with a thin gold border, standing upright on a white surface. The card is slightly tilted to the right. The words "Thank You" are written in a blue, cursive font across the center of the card. The card is set against a plain white background, with two vertical dark red lines on either side.

Thank You