Understanding COPD: Current Treatments and Emerging Breakthroughs

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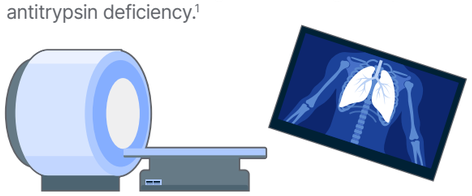
Understanding COPD

Chronic obstructive pulmonary disease (COPD) is characterised by long-term persistent respiratory symptoms and airflow limitations. It is often due to long-term exposure to irritants like tobacco smoke, but may also be caused by genetic predispositions, *in utero* exposures or early life events. With smoking being the leading risk factor.[1-2]

COPD is currently diagnosed through spirometry. Additional diagnostic tools include chest **X-rays** or **CT scans** to visualise lung damage, arterial blood gas analysis, and genetic testing for alpha-1 antitrypsin deficiency.[1]



COPD affects approximately

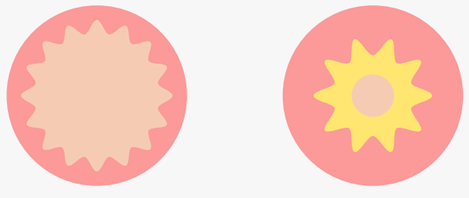
384 million people worldwide

and is the third leading cause of death, with around

3.23 million deaths each year

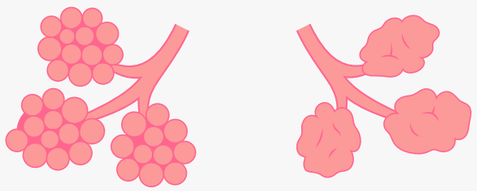
Two main types of COPD:

Chronic bronchitis

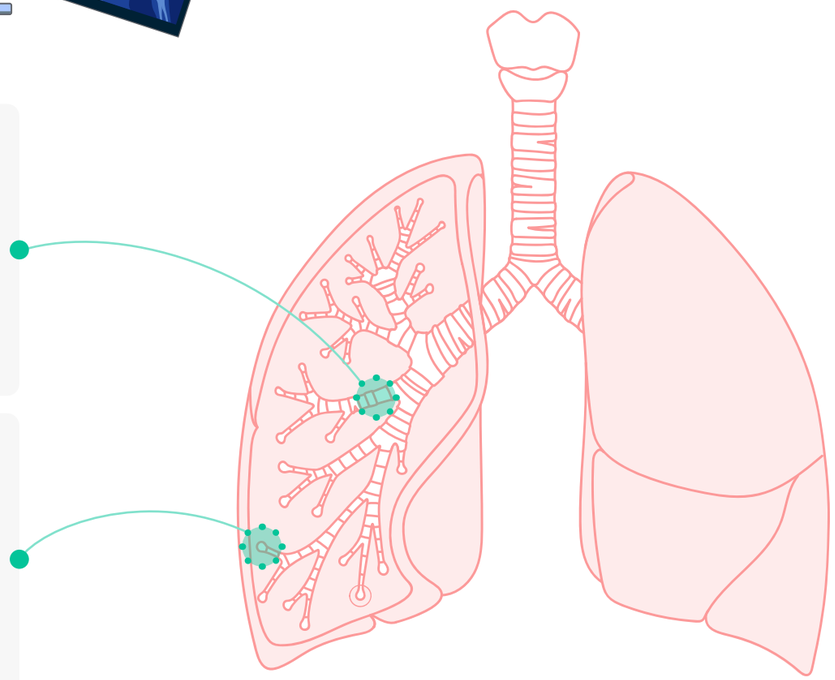


Healthy bronchus | Inflamed bronchus

Emphysema



Healthy alveoli | Inflamed alveoli



Management of COPD

Current management options for COPD focus on symptom alleviation, improving quality of life, preventing exacerbations, and slowing disease progression.

Smoking cessation

Smoking cessation is a primary intervention in COPD management, as it is the only measure proven to significantly slow disease progression and improve survival rates. It mitigates the accelerated decline in FEV1 and reduces inflammation, leading to fewer exacerbations and hospitalisations. Evidence-based approaches include behavioral counseling, pharmacotherapies like nicotine replacement therapy and comprehensive support programs tailored to individual patient needs.[1]

Bronchodialators

Bronchodialators, including beta-2 agonists and anticholinergics, reduce airway resistance by relaxing airway smooth muscle through increased cyclic adenosine monophosphate or inhibition of muscarinic receptors, improving flow rates.[3]

Inhaled corticosteroids (ICS)

ICS reduce airway inflammation by binding to glucocorticoid receptors, repressing pro-inflammatory gene expression, and decreasing cytokine and chemokine production, thus reducing exacerbation frequency in patients with eosinophilic inflammation.[4]

Long-term oxygen therapy

Long term oxygen therapy for patients with chronic resting hypoxemia (≥15 hours/day) improves oxygen delivery to tissues and may have a survival benefit.[1]

Pulmonary rehabilitation

Pulmonary rehabilitation combines tailored exercise programs, education, and psychological support to help patients improve their lung function, build physical endurance, and manage symptoms more effectively. By enhancing patients' ability to perform daily activities and reducing the frequency and severity of exacerbations, pulmonary rehabilitation improves overall quality of life and long-term outcomes for individuals with COPD.[1]

Challenges

Most challenges with current treatment options arise from continued disease progression, efficacy, and side effects. ICS are often associated with **increased pneumonia risk** and **tolerance issues**, while oxygen therapy can **exacerbate hypercapnia** in some patients.[1]

New Therapies in COPD

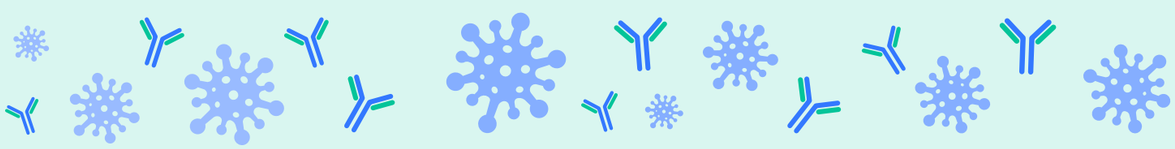
Biologics

Biologics are a new class of drugs derived from living organisms that target specific immune pathways involved in the disease processes, offering a precise treatment option for COPD.[5]

Types of biologics

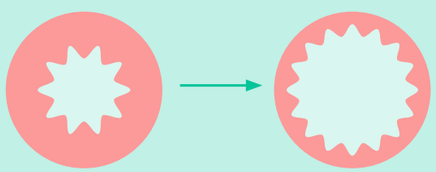
Anti-IL-5 Agents: reduce eosinophil counts by inhibiting IL-5, reducing inflammation and exacerbation rates in patients with eosinophilic COPD.[6]

Anti-IL-4/13 Agents: modulate IL-4 and IL-13 pathways, benefiting patients with mixed inflammatory profiles.[6]

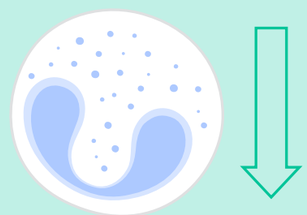


Ongoing clinical trials

Biologics targeting Il-4 and IL-13 cytokines block the receptors of IL-4 and IL-13, preventing the cytokines from binding and triggering inflammatory pathways. Reducing airway inflammation, mucus production, and immune response in patients with T2 inflammation. Phase III clinical trials have shown reductions in exacerbation rates, reduced lung function, and reduced need for steroids.



IL-5 targeting biologics block IL-5 or its receptor, **reducing eosinophil counts** in the blood and lung tissue, thereby lowering eosinophilic inflammation. Phase III clinical trials (METREX and METREO) showed **18–20% reduction in exacerbation rates** in patients with high eosinophil counts.[6]



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