

Drugs used to treat chronic obstructive pulmonary disease (COPD)

COPD is a chronic, irreversible obstruction of airflow that is usually progressive and characterized by persistent symptoms. These may include cough, excess mucus production, chest tightness, breathlessness, difficulty sleeping, and fatigue. Although symptoms are similar to asthma, the characteristic irreversible airflow obstruction of COPD is one of the most significant differences between the diseases. Smoking is the greatest risk factor for COPD and is directly linked to the progressive decline of lung function. Smoking cessation should be recommended regardless of stage and severity of COPD, or the age of patient. Drug therapy for COPD is aimed at relief of symptoms and prevention of disease progression.

Used drugs:

- 1- Inhaled bronchodilators, including the β 2-adrenergic agonists and anticholinergic agents (ipratropium and tiotropium), are the foundation of therapy for COPD as they increase airflow, alleviate symptoms, and decrease exacerbation rates.
- 2- The long-acting agents (LABAs) and tiotropium, are preferred as first-line treatment of COPD for all patients except those who are at low risk with less symptoms.
- 3- Combination of both an anticholinergic and a β 2 agonist may be helpful in patients who have inadequate response to a single inhaled bronchodilator.
- 4- The addition of an ICS to a long-acting bronchodilator may improve symptoms, lung function and quality of life in some COPD patients. However, the use of an ICS is associated with an increased risk of pneumonia, and therefore, use should be restricted to these patients.

Drugs used to treat allergic rhinitis

- Rhinitis is an inflammation of the mucous membranes of the nose and is characterized by sneezing, itchy nose/eyes, watery rhinorrhea, nasal congestion, and sometimes, a nonproductive cough.
- An attack may be precipitated by inhalation of an allergen (such as dust). The foreign material interacts with mast cells coated with IgE generated in response to a previous allergen exposure. The mast cells release mediators, such as histamine, leukotrienes, and chemotactic factors that promote bronchiolar spasm and mucosal thickening from oedema and cellular infiltration.
- Antihistamines and/or intranasal corticosteroids are preferred therapies for allergic rhinitis.

A. Antihistamines (H1-receptor blockers)

- Antihistamines are useful for the management of symptoms of allergic rhinitis caused by histamine release (sneezing, watery rhinorrhea, itchy eyes/nose). However, they are more effective for prevention of symptoms, rather than treatment once symptoms have begun.
- Ophthalmic and nasal antihistamine delivery devices are available for more targeted tissue delivery.
- First-generation antihistamines, such as diphenhydramine and chlorpheniramine, are usually not preferred due to adverse effects, such as sedation, performance impairment, and other anticholinergic effects.
- The second-generation antihistamines (such as loratadine, desloratadine and intranasal azelastine) are generally better tolerated.
- Combinations of antihistamines with decongestants are effective when congestion is a feature of rhinitis.

B. Corticosteroids

- Intranasal corticosteroids, such as beclomethasone and fluticasone are the most effective medications for treatment of allergic rhinitis. They improve sneezing, itching, rhinorrhea, and nasal congestion.
- Systemic absorption is minimal, and side effects of intranasal corticosteroid treatment are localized. These include nasal irritation, nosebleed, sore throat, and, rarely, candidiasis.
- To avoid systemic absorption, patients should be instructed **not** to inhale deeply while administering these drugs because the target tissue is the nose, not the lungs or the throat. For patients with chronic rhinitis, improvement may not be seen until 1 to 2 weeks after starting therapy.

C. α -Adrenergic agonists

- Short-acting α -adrenergic agonists (“nasal decongestants”), such as phenylephrine, constrict dilated arterioles in the nasal mucosa and reduce airway resistance. Longer acting oxymetazoline is also available.
- When administered as an aerosol, these drugs have a rapid onset of action and show few systemic effects. Unfortunately, the α adrenergic agonist intranasal formulations should be used no longer than 3 days due to the risk of rebound nasal congestion (rhinitis medicamentosa). For this reason, the α -adrenergic agents have no place in the long-term treatment of allergic rhinitis.
- Administration of oral α -adrenergic agonist formulations results in a longer duration of action but also increased systemic effects.

- As with intranasal formulations, regular use of oral α -adrenergic agonists (phenylephrine and pseudoephedrine) alone or in combination with antihistamines is not recommended.

D- Other agents

- Intranasal cromolyn may be useful in allergic rhinitis, particularly when administered before contact with an allergen.
- To optimize the therapeutic effect, dosing should begin at least 1 to 2 weeks prior to allergen exposure. A nonprescription (over-the-counter) nasal formulation of cromolyn is available.
- Some LT antagonists are effective for allergic rhinitis as monotherapy or in combination with other agents. They may be a reasonable option in patients who also have asthma.

Drugs used to treat cough

- Coughing is an important defence mechanism of the respiratory system to irritants and is a common reason for patients to seek medical care.
- A troublesome cough may represent several etiologies, such as the common cold, sinusitis, and/or an underlying chronic respiratory disease.
- In some cases, cough may be an effective defence reflex against an underlying bacterial infection and should not be suppressed.
- Before treating cough, identification of its cause is important to ensure that antitussive treatment is appropriate. The priority should always be to treat the underlying cause of cough when possible.

A. Opioids and Benzonatate

- Codeine, an opioid, decreases the sensitivity of cough centres in the central nervous system to peripheral stimuli and decreases mucosal secretion. These therapeutic effects occur at doses lower than those required for analgesia. However, common side effects, such as constipation, dysphoria, and fatigue, still occur. In addition, it has addictive potential.
- Dextromethorphan is a synthetic derivative of morphine that has no analgesic effects in antitussive doses. In low doses, it has a low addictive profile. However, it is a potential drug of abuse, since it may cause dysphoria at high doses.
- Dextromethorphan has a significantly safer side effect profile than codeine and is equally effective for cough suppression.

- Guaifenesin, an expectorant, is available as a single-ingredient formulation and is also a common ingredient in combination products with codeine or dextromethorphan.
- Unlike the opioids, benzonatate suppresses the cough reflex through peripheral action. Side effects include dizziness, numbness of the tongue, mouth, and throat. These localized side effects may be particularly problematic if the capsules are broken or chewed and the medication comes in direct contact with the oral mucosa.

References:

- 1- Katzung, B.G., 2018. Basic and clinical pharmacology. Mc Graw Hill.
- 2- Whalen, K., 2019. Lippincott illustrated reviews: pharmacology. Lippincott Williams & Wilkins.