

Airway inflammation and the potentially treatable trait of airway eosinophilia.

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Introduction

Airway inflammation is a common feature of respiratory diseases such as asthma, chronic obstructive pulmonary disease (COPD), and allergic rhinitis. Inflammation occurs when the body's immune system responds to harmful stimuli, such as allergens or pollutants, by releasing inflammatory cells and chemicals into the airways. This can lead to symptoms such as coughing, wheezing, shortness of breath, and chest tightness [1].

One type of inflammation that is particularly relevant to respiratory diseases is eosinophilic inflammation. Eosinophils are a type of white blood cell that is involved in the immune response to parasites and allergens. They are also involved in the pathogenesis of several respiratory diseases, including asthma, nasal polyps, and eosinophilic COPD. In asthma, eosinophilic inflammation is thought to contribute to airway hyperresponsiveness (AHR), which is a key feature of the disease. AHR refers to the exaggerated narrowing of the airways in response to various stimuli, such as exercise or allergens. This can lead to symptoms such as wheezing, coughing, and shortness of breath [2].

The presence of eosinophilic inflammation in the airways can be assessed using various techniques, such as sputum induction, bronchoalveolar lavage (BAL), or biopsy. Sputum induction involves inhaling a hypertonic saline solution, which stimulates the production of mucus in the airways. The mucus is then collected and analyzed for the presence of eosinophils. BAL involves washing out a small portion of the lung with saline and collecting the fluid for analysis. Biopsy involves taking a small sample of tissue from the airways and examining it under a microscope. The identification of eosinophilic inflammation in the airways has important implications for the management of respiratory diseases. It has been shown that patients with eosinophilic asthma respond better to corticosteroid treatment than those without eosinophilic inflammation. Corticosteroids are anti-inflammatory drugs that reduce the activity of inflammatory cells and chemicals in the airways. They are the cornerstone of asthma treatment and are effective in reducing symptoms, improving lung function, and preventing exacerbations [3].

However, not all patients with respiratory diseases respond equally well to corticosteroid treatment. This has led to the

concept of "treatable traits," which refers to specific features of a disease that are amenable to targeted treatments. Airway eosinophilia is one such treatable trait. By identifying patients with eosinophilic inflammation, healthcare providers can tailor treatment to address this specific feature of the disease.

Several new drugs have been developed that target eosinophilic inflammation in the airways. These drugs are known as biologics and are designed to selectively block the activity of certain inflammatory cells or chemicals. They are administered by injection or infusion and are usually reserved for patients with severe disease that is poorly controlled with standard treatments [4].

One such biologic is mepolizumab, which targets interleukin-5 (IL-5), a cytokine that is involved in the development and activation of eosinophils. Clinical trials have shown that mepolizumab is effective in reducing exacerbations and improving lung function in patients with severe eosinophilic asthma. Other biologics that target IL-5 or other inflammatory cells and chemicals are also available, such as benralizumab, reslizumab, and dupilumab. In addition to biologics, other treatments that target eosinophilic inflammation are being developed. For example, fevipiprant is a small molecule drug that blocks the activity of a receptor called CRTh2, which is involved in the activation of eosinophils and other inflammatory cells. Clinical trials have shown that fevipiprant is effective in reducing eosinophilic inflammation and improving lung function in patients with severe asthma. Another potential treatment for eosinophilic inflammation is macrolide antibiotics. Macrolides are a class of antibiotics that have anti-inflammatory properties in addition to their antibacterial effects. They have been shown to reduce eosinophilic inflammation in the airways and improve lung function in patients with severe asthma and COPD [5].

Conclusion

Airway eosinophilia is a potentially treatable trait that is a key feature of several respiratory diseases, including asthma, COPD, and allergic rhinitis. The identification of eosinophilic inflammation in the airways can help guide treatment decisions and improve outcomes for patients. Corticosteroids are effective in reducing eosinophilic inflammation, but new biologic drugs and other treatments are also being developed that target specific inflammatory cells and chemicals. By

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tailoring treatment to address the specific features of a patient's disease, healthcare providers can achieve better control of symptoms and prevent exacerbations.

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