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UNIVERSITY OF COLORADO
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Anti-GM-CSF Antibody as a Treatment for Eosinophilic Esophagitis

Category

Gastrointestinal Therapeutics

Problem

Current treatments for eosinophilic esophagitis (EoE) often have side effects and do not specifically target an underlying cause of the disease

Technology Overview

A GM-CSF neutralizing monoclonal antibody for treatment of EoE

IP Status

- Patent Pending covering a new method of use
- Available for Exclusive or Non-Exclusive Licensing

Advantages

- Decreases esophageal eosinophil infiltration
- Decreases basal cell hyperplasia
- Decreases angiogenesis

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Problem: Eosinophilic esophagitis (EoE) is a rapidly emerging medical condition affecting one in 2,000 people globally caused by eosinophil infiltration into the esophagus and GI tract. EoE typically develops in response to ingestion of allergy-inducing foods, which results in difficulty swallowing, food impaction, and decreased quality of life; symptoms associated with EoE may be confused with other more common diseases such as gastroesophageal reflux disease. A histological hallmark of EoE is extensive tissue remodeling including basal zone hyperplasia, fibrosis, and angiogenesis.

No FDA approved treatments for EoE currently exist. As a result, clinicians prescribe dietary changes or topical steroids that effectively improve symptoms and tissue abnormalities in many patients. These treatments may not help all patients, carry side effects, and impact quality of life. Thus, there is an unmet medical need for efficacious EoE treatments that target alternative mechanisms and provide other approaches.

Solution: Pre-clinical research by a University of Colorado research team has found that a monoclonal antibody targeting granulocyte-macrophage colony-stimulating factor (GM-CSF) may be a potential treatment for EoE. GM-CSF is a glycoprotein secreted by immune cells that functions as a cytokine to stimulate the generation of mature granulocytes and macrophages. In an EoE mouse model, the inventors found that GM-CSF levels are significantly increased in the esophagus. They reduced GM-CSF levels by administering a GM-CSF neutralizing monoclonal antibody and found that it diminished some negative consequences of EoE, such as eosinophil infiltration into the esophagus, basal cell hyperplasia, and angiogenesis. The ability of Anti-GM-CSF to decrease eosinophil infiltration is shown in Figure 1.

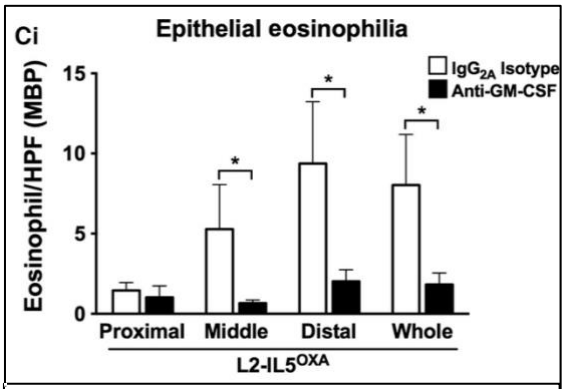

Figure 1. In a mouse model of EoE, esophageal eosinophils significantly decreased in esophageal tissues following treatment with anti-GM-CSF compared to those that underwent anti-IgG_{2A} control antibody treatment. Eosinophils were quantified by staining tissues for Major Basic Protein (MBP) and enumerating microscopically.

Advantages and Value Propositions: It is forecasted that by 2024, the EoE drug market will grow to 150 million from 100 million in 2019, registering a 6.2% CAGR. This strategy impacts a novel therapeutic target that underlies known mechanisms related to eosinophilia.

Additional Documents and Sources:

"Methods of Treating Eosinophilic Gastrointestinal Diseases." Provisional patent application No. 62/382,653 filed September 1, 2016 available under NDA.

McNamee EN, Biette KA, Hammer J, et al. Targeting granulocyte-macrophage colony-stimulating factor in epithelial and vascular remodeling in experimental eosinophilic esophagitis. *Allergy.* 2017;72(8):1232-1242. Doi:10.1111/all.13105.

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