Novel Use of Chitinases for Treatment of Lung Inflammatory and Fibrotic Diseases

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Technology description

Scientists at UCSF have identified distinct lung epithelial cells that secrete acidic mammalian chitinase (AMCase), an enzyme that degrades chitin. In their animal study, AMCase-deficient mice exhibit accumulation of environmentally derived chitin in the airways and develop spontaneous pulmonary fibrosis, which is ameliorated by restoration of lung chitinase activity by genetic or therapeutic approaches.In this sense, idiopathic pulmonary fibrosis (IPF) patientswho accumulate excess chitin polymers in their airways can benefit from the therapeutic administration of exogenous chitinase to relieve the chitin immune stimulus.

A novel approach for the treatment of lung inflammatory and fibrotic diseases by increased or repaired chitinase function in lung tissues

Existing technologies for the treatment mainly target the inflammatory cells that accumulate in the tissue, but few causative agents have been identified for these severe lung diseases. This invention aims to target a ubiquitous environmentally derived xenobiotic stimulus, chitin, which causes lung inflammation and fibrosis. Chitin can be degraded by an endogenous enzyme, chitinase (acidic mammalian chitinase, AMCase, in mammals), which is dysregulated in various disease states. Previous efforts have focused on developing inhibitors of AMCase to treat other diseases such as asthma and allergy in which AMCase is overexpressed. In contrast, this invention is to increase chitinase activity, either exogenously or endogenously, to relieve and resolve the inflammatory stimulus.

Data Availability

Animal data, Under CDA/NDA

Related Materials

Van Dyken SJ, Liang HE, Naikawadi RP, Woodruff PG, Wolters PJ, Erle DJ, Locksley RM (2017). Spontaneous Chitin Accumulation in Airways and Age-Related Fibrotic Lung Disease. Cell.

Van Dyken SJ, Garcia D, Porter P, Huang X, Quinlan PJ, Blanc PD, Corry DB, Locksley RM (2011). Fungal chitin from asthma-associated home environments induces eosinophilic lung infiltration. J Immunol.

Reese TA, Liang HE, Tager AM, Luster AD, Van Rooijen N, Voehringer D, Locksley RM (2007). Chitin induces accumulation in tissue of innate immune cells associated with allergy. Nature.

Advantages

First-in-class technology that degrades chitin as a treatment for inflammatory or fibrotic diseases
Targets the environmentally derived causative agents of severe immunologic lung diseases
Uses naturally occurring or recombinant chitinases to clear chitin in the airways and inflammatory cells

Institution

University of California, San Francisco

Inventors

Steven Van Dyken
Richard Locksley

联系我们

叶先生

电 话：021-65679356
手 机：13414935137
邮 箱：yeyingsheng@zf-ym.com