

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

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## INVENTION NOVELTY

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

## VALUE PROPOSITION

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.

### 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

## 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) patients who accumulate excess chitin polymers in their airways can benefit from the therapeutic administration of exogenous chitinase to relieve the chitin immune stimulus.

## LOOKING FOR PARTNERS

## CONTACT

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## INVENTORS

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- ▶ Van Dyken, Steven J.

## OTHER INFORMATION

### KEYWORDS

Chitin, Chitinase, AMCase,  
 Lung Inflammation, Fibrosis,  
 Secretions, Immunology

### CATEGORIZED AS

- ▶ **Medical**
  - ▶ Diagnostics
  - ▶ Disease: Autoimmune and Inflammation
  - ▶ Disease: Respiratory and Pulmonary System
  - ▶ Therapeutics

### RELATED CASES

2015-112-0

To develop & commercialize the technology as a treatment of lung inflammatory and fibrotic diseases, and as a diagnostic to quantify amounts of chitin/chitinase or chitinase activity in lung tissues or secretions

## STAGE OF DEVELOPMENT

Pre-Clinical

## 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.](#)

## DATA AVAILABILITY

Animal data, Under CDA/NDA

## PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	<a href="#">WO 2018/191379</a>	10/18/2018	2015-112

Patent Pending

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