Scientists open door for asthma cure

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Children with asthma use inhalers to relieve some of their symptoms, which include coughing, wheezing, chest tightness and shortness of breath. Credit: Tradimus / Wikimedia commons / CC BY-SA 3.0

Scientists led by molecular immunologists at the Keck School of Medicine of the University of Southern California (USC) have identified a way to target a recently discovered cell type that causes asthma, paving the way to cure the chronic respiratory disease that affects 25 million Americans.

The team, which includes investigators from Janssen Research and Development, Dana-Farber Cancer Institute and Harvard Medical School, will publish its results in the March 17 edition of the peer-reviewed scientific journal *Immunity*.

Asthma is a chronic lung disease that irritates and narrows the airways, according to the Centers for Disease Control and Prevention. With no known cure for the 7 million children who suffer from this disease in the United States, as well as millions of adults, the goal of asthma treatment is to control the symptoms. The exact causes of this chronic disease are unknown, but researchers believe a combination of genetic and environmental factors contribute to developing asthma. Discovered within the last decade, type 2 innate lymphoid cells, or ILC2s, are a subset of immune cells that trigger primary asthma symptoms such as mucus production and hypersensitive airways. ILC2s do not express previously identified immune cell markers, however, making them tough to target.

"If we can target ILC2s, we might be able to cure asthma or exacerbations caused by these particular cells," said Omid Akbari, Ph.D., associate professor of molecular and cellular immunology at the Keck School of Medicine of USC and principal investigator of the study. "In this study, we discovered molecules critical to ILC2 homeostasis, survival and function. We believe that targeting these molecules or related pathways could one day cure a patient with ILC2-dependent asthma."

Akbari's team used mouse and human cells to show that inducible T cell costimulator molecules (ICOS) and their interaction with ICOS-ligand (ICOS-L) are crucial for ILC2 function and survival. ICOS and ICOS-L are proteins that influence cell behavior and cell response. Akbari's team developed a humanized mouse model to show how human ILC2s function in vivo; the model is currently being used to study how ILC2s

contribute to human asthma and test potential therapies in preclinical studies.

"Because ILC2s are the only cells that express both ICOS and ICOS-L, our research sets the stage for designing new therapeutic approaches that target ILC2s to treat asthma," said Hadi Maazi, D.V.M., Ph.D., a research associate in Akbari's lab and the study's first author.

More information: Maazi, H., Patel, N., Sankaranarayanan, I., Suzuki, Y., Rigas, D., Soroosh, P. ... & Akbari, O. (2015). ICOS: ICOS-ligand interaction is required for type 2 innate lymphoid cell function, homeostasis, and induction of airway hyperreactivity. *Immunity*. Published online March 10, 2015; DOI: 10.1016/j.immuni

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