The Helminth-Altered Gut Microbiome Project

Translational Science Benefits Model

IMPACT PROFILE

Helminth altered gut microbiomes can alleviate allergic asthma symptoms in mice. We aim to determine why this happens and identify potential therapeutics for use in human asthma patients.

The Challenge

In Western countries like America, the **rates of asthma have been on the rise for decades.** However, in developing nations, asthma rates are at a constant low. Comparing these two environments, it has been shown that **there is an inverse relationship between infection with parasitic worms and asthma development**.

The Approach

So far, it has been challenging to transfer the immune system benefits of parasitic infections from animal models to human patients. A more targeted approach is needed to identify the key effector molecules involved.

- Our germ-free worm protocol to investigate how the gut microbiome is altered by helminth infection.
- Investigate the gut microbiome's role in helminth-induced relief of house dust mite-driven allergic asthma.
- Identify the specific molecules or compounds secreted by the helminth or gut microbiome that are crucial for alleviating asthma symptoms.

The Impact

The Helminth-Altered Gut Microbiome project resulted in clinical, community, and economic benefits.

The CDC estimates that asthma is associated with $50 billion a year in healthcare costs. Research indicates that interactions between parasitic worms and the gut microbiome can alleviate asthma symptoms. We have developed a simplified protocol (PMID: 39167493) to generate germ-free larvae of the parasitic worm used to model the effect of helminths on asthma. This new protocol increases accessibility by relying on common laboratory equipment. This work will allow us to rigorously study the impact of the helminth-altered gut microbiome on asthma and pave the way for other groups to participate in this research. Use of this protocol has already allowed for the **discovery of differentially expressed genes in the lung that were dependent on helminth infection and a fully intact gut microbiome.**

RESEARCH HIGHLIGHTS

The Helminth-Altered Gut Microbiome project resulted in:

- **100%** cost savings on generating germ-free larvae used to rigorously study the helminth-altered gut microbiome
- Determination of gut microbiome driven statistically significant changes in the lung microenvironment following helminth infection
- Excellent potential to establish the helminth-altered gut microbiome as an important novel source of potential therapeutics

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Key Benefits

CLINICAL — A germ-free worm protocol could offer a way for researchers to study the effects of helminths on gut microbiota in a controlled, reproducible environment.

COMMUNITY — There are currently very few therapeutics on the market for treating asthma.

ECONOMIC — Development of an asthma therapeutic has potential to lower the overall economic burden of asthma.

CLINICAL — Genes that are active in the helminth-altered gut microbiome may help scientists identify drugs that have the potential to develop new asthma treatments.

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