The Grayson Lab

What we study
Allergies are a major health burden and the number of people afflicted is increasing rapidly in the westernized world. It is not known why these diseases are increasing, but it has been documented that severe viral infections early in life greatly increase a child’s risk of developing asthma and allergies. To understand the mechanisms behind how a viral infection can lead to allergic disease, we have been using a mouse model where the mice develop allergies and asthma after a single respiratory infection with a mouse-specific virus.

Our studies are focused on trying to understand the specific cells and mediators that are involved in this response, and seeing how they translate the viral infection into allergic diseases. Additional work has begun to determine whether the pathways identified in mice are also operative in humans. Our data suggest that our model is indeed relevant to human disease.

We hope that these studies will ultimately lead to the development of therapeutic interventions to stop or prevent the development of allergies throughout childhood. As a side benefit of these studies, we also hope to better understand the immune system response to respiratory viral infections.

Major techniques we use
Animal (mouse) husbandry
Animal models of allergic disease and asthma
Flow cytometry and flow-activated cell sorting (FACS)
Magnetic cell sorting
Tissue culture
Fluorescent microscopy
Enzyme linked immunosorbent assays (ELISAs)
Quantitative PCR

How to find out more
Contact Dr. Grayson at Mitchell.Grayson@NationwideChildrens.org or 614-722-4404.
Research Focus:
1. Understanding how viral infection lead to the development of atopic diseases such as asthma.
2. Develop novel therapeutic interventions that can treat or prevent the disease.

Research Significance:
Asthma and other atopic diseases are on the rise in USA and other developed countries. Reason is not Clear.

Approximately 8% of the population has asthma

Respiratory viral infections have been implicated in both the development of asthma and its exacerbation. A person with a paramyxovirus such as Respiratory Syncytial Virus is at high risk of developing asthma

Sendai virus (SeV) is a rodent paramyxovirus.

Grayson lab has developed model of respiratory viral infection using SeV

Like human viral respiratory infections, Infection with SeV leads to acute bronchiolitis followed by a chronic inflammatory response associated with airway hyper reactivity (AHR)

Urban population study showed anti-viral IgE prevents allergy induced asthma. Suggesting that IgE is important in asthma exacerbations.

Using mouse models we are currently studying the type of cells (Dendritic cell, Mast Cells, Neutrophils) and mediators that are involved in the development of allergic disease.