Researchers in the Division of Pediatric Pulmonology, Allergy & Immunology are engaged in research on how the lung responds to viral and other infections in chronic lung diseases such as cystic fibrosis, asthma and bronchopulmonary dysplasia. A further focus is on the role of sphingolipids in the development of childhood asthma and on long term lung complications of childhood cancer. Specific research projects in these areas include:

- **Sphingolipid Synthesis and Asthma.** Stefan Worgall, M.D., Ph.D., Division Chief and Distinguished Professor of Pediatric Pulmonology, and his laboratory study how abnormalities in the production of sphingolipids are related to asthma. The group has demonstrated that that reduced activity of serine-palmitoyl transferase, the critical enzyme for sphingolipid synthesis, results in airway hyperreactivity. Additional studies evaluate sphingolipid metabolism in primary cell cultures of human airway epithelial cells and primary airway smooth muscle cells. The group collaborates with investigators from both Weill Cornell Medicine (Jennie G. Ono, M.D., MS) and Columbia University to translate these lab-based findings clinically. The investigators analyzed cohorts of children in their composition of sphingolipids in the blood and exhaled breath condensates. These studies have now led to the identification of sphingolipid markers that can be used to predict if asthma persists in these children.

- **Pediatric Obesity and Asthma.** There has long been an observed, but poorly understood, link between pediatric obesity and asthma. Dr. Worgall's laboratory collaborates with pediatric pulmonologist Ibrahim Janahi, M.D., for a population study opportunity to further explain the role between pediatric obesity, asthma, and sphingolipid synthesis. Both obesity and asthma are common in Qatari children, and their geographically concentrated population and Weill Cornell's campus in the region makes this an ideal research opportunity. The study is funded by the Qatar Foundation.

- **Adenovirus-based vaccines against Pseudomonas and respiratory syncytial virus.** Dr. Worgall's laboratory studies the recombinant adenovirus-based vaccines against pulmonary
infections with Pseudomonas aeruginosa, which is a dominant problem for patients with cystic fibrosis and a still-growing source of opportunistic, hospital acquired infections, and RSV, a common threat for infants, particularly those born prematurely.

- Lung microbiome and Pseudomonas and respiratory viral infections. Dr. Worgall’s laboratory collaborates with Largus (Lars) T. Angenent, Ph.D. from Cornell University in Ithaca on the important issue how the lung microbiome is altered in cystic fibrosis and how microbes in the lung affect lung infections with the bacterium Pseudomonas aeruginosa and respiratory viruses such as RSV and rhinovirus. Anurag Sharma, Ph.D. and Emily Wasserman, M.D. study the microbiome in mouse lungs and also in airways of children with respiratory viral infections related to asthma who require admission to the intensive care unit.

- Mast cells in the development of chronic lung disease and asthma in premature infants. In collaboration with Randi B. Silver, Ph.D., professor of physiology and biophysics at Weill Cornell Medicine Dr. Worgall’s laboratory studies the role of mast cells and mast cell products for bronchopulmonary dysplasia.

- Preexisting lung function abnormalities as predictors for acute pulmonary impairment in children undergoing hematopoietic cell transplant for acute leukemia or myelodysplastic syndrome. Anne Stone, M.D., Director for Clinical and Educational Programs, Pediatric Pulmonology, leads this project, which aims to determine the relationship between pre-existing obstructive or restrictive defects and short-term pulmonary outcomes after hematopoietic cell transplant (HCT) and survivors of advanced