**2014 Research Annual Report**

**Pulmonary Medicine**

### Division Summary

**RESEARCH AND TRAINING DETAILS**

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
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<tbody>
<tr>
<td>Number of Faculty</td>
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<td>Number of Joint Appointment Faculty</td>
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<td>Number of Research Fellows</td>
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<td>Number of Research Students</td>
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**CLINICAL ACTIVITIES AND TRAINING**

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<tr>
<td>Number of Clinical Staff</td>
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<td>Number of Staff Physicians</td>
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### Significant Accomplishments

**High National Ranking Continues**

For the fourth year in a row, our Division was ranked the No. two pediatric pulmonary program in the nation by *US News & World Report*.

**New Ways to Treat Complex and Difficult Asthma**

This year we developed The Asthma Complex Care Center (ACCC) for children with complex and difficult to treat asthma. Specialists including otolaryngologists (ENT), pulmonologists, allergists, gastroenterologists, bronchoscopists, nutritionists, and sleep and adherence specialists collaborate in a single location to care for each child. They meet weekly to review each child’s case and care plan. The ACCC focuses on children with asthma who are prone to sleep difficulty, eczema, gastroesophageal reflux, eosinophilic esophagitis, allergies and food allergies.

The program allows children to spend up to eight hours in a patient unit as outpatients in order to complete treatment that would otherwise take several trips to the hospital to accomplish. For those who require multiple days of treatment, the ACCC allows families to return home or stay at the nearby Ronald McDonald House if they live out-of-town.

**New Lung Transplant Program**

Our new Lung Transplant program began in January 2014. We have had 23 referrals or inquiries into the
program and completed several evaluations. So far, planning has focused on processes, patient flow, space needs, key personnel, education, and establishing collaborative relationships throughout the hospital.

Quality metrics and data collection processes are in place; research efforts are underway to collect and store tissue and fluid to advance research in pediatric lung disease. In the coming year, the Lung Transplant program will continue to build collaborations among the Division of Pulmonary Medicine, the Heart Institute, and other disciplines within the hospital. We will continue to evaluate patients for transplant, attain proof of concept for storage of tissue, and refine processes.

A Collaborative Chronic Care Network (C3N) for Cystic Fibrosis

Leaders and faculty from Pulmonary Medicine and the Anderson Center for Health Systems Excellence collaborated with the Cystic Fibrosis (CF) Foundation and the Dartmouth Institute to develop a Collaborative Chronic Care Network (C3N) for CF. A C3N is a peer-produced Learning Health System in which patients, families, providers, and researchers collaborate to learn, conduct research, and implement the findings. We envision this will become the CF care model of the future: ensuring that patients get the right treatment at the right time, every time. The design of the network began in July 2014 and will continue for one year; the team will then conduct a pilot within the CFF Learning and Leadership Collaborative at select CF Care Centers. The CF Foundation will award Pulmonary Medicine $776,373 for this project.

Research Highlights

Recruitment

The Division of Pulmonary Medicine continues to expand its research focus with the recruitment of two leading senior pulmonary researchers, Drs. AP Naren and Assem Ziady.

Anjaparavanda P. Naren, PhD, is the Thomas Boat Chair in Cystic Fibrosis Research, co-director of the Cystic Fibrosis Research Center, and professor of Pediatrics. His laboratory is interested in (1) identifying interactions between the cystic fibrosis transmembrane conductance regulator (CFTR) and its binding partners, and (2) defining how spatiotemporal regulation of CFTR-containing macromolecular complexes in the apical compartment of polarized epithelial cells regulates overall fluid secretion. CFTR is a cAMP-regulated chloride channel located primarily on the apical surface of epithelial cells that line various organs, including the airways and the gut, and CFTR dysfunction can result in life-threatening medical disorders. Dr. Naren's laboratory studies two such disorders; (1) Cystic fibrosis, a lethal genetic disease in which the CFTR chloride channel is HYPO-functional and (2) Secretory diarrhea, a disease affecting millions of children worldwide, in which HYPER-function of the CFTR chloride channel can occur due to infectious toxins, such as Cholera toxin and *E. coli* enterotoxin. The goal of the Naren research program is to identify new drug targets for cystic fibrosis, secretory diarrhea, and other diseases resulting from CFTR dysfunction, and provide insights into the etiology of diseases associated with CFTR-interacting molecules.

Assem G. Ziady, PhD, is an associate professor who joined Pulmonary Medicine from Emory University. His laboratory is interested in (1) the study of redox-mediated inflammatory signaling and design, and (2) application of non-viral gene-delivery vectors in cystic fibrosis. He also is working with leaders across the CF community nationally to identify and validate novel biomarkers of CFTR function and CF disease severity. This work utilizes a systems biology approach, and is built off of a proteomics platform. The Ziady laboratory studies the role of the antioxidant response element (ARE) in inflammatory signaling by CF airway epithelial cells and discovered that Nrf2, a transcription factor central to ARE, is downregulated in CF cells. Dr. Ziady was the first to describe a decrease of Nrf2 function in CF epithelia resulting in a significant increase in oxidants that stimulate inflammation. More recently, his laboratory has described the mechanism of
downregulation of Nrf2, which stems from feedback responses to the loss of CFTR function. A goal of the Ziady research program is the development of DNA nanoparticles for gene therapy in the lung, brain, and liver.

Annual Celestial Ball
Cystic fibrosis (CF) is a disorder affecting over 30,000 patients in the US and 70,000 worldwide. CF patients develop problems with mucus in the lungs and abnormal food absorption that lead to lung infections, poor growth, and death in early adulthood.

The 2014 Celestial Ball marked the 10-year anniversary for this annual fund-raising event and honored Boomer and Gunnar Esiason. The Celestial Ball is a CF-focused partnership between individuals, local businesses, and Cincinnati Children’s. Both the Esiasons and Cris Collinsworth were on hand as more than 1,300 friends of Cincinnati Children’s came together in celebration of the medical center. The event’s fundraising totaled $1 million, and honoree Boomer Esiason presented a $1 million check from the Boomer Esiason Foundation to make this a $2 million dollar event for Cincinnati Children’s.

Clinical Research Programs
The Pulmonary Medicine division has among the highest number of clinical research studies at Cincinnati Children’s, with the initiation of more than 30 trials since 2012 in a wide variety of disciplines, including cystic fibrosis, asthma, sleep disorders, and prenatal-related lung diseases.

Current trials and studies are focused on a number of pulmonary-related questions and disorders, including:

- novel treatments and monitoring tools for cystic fibrosis
- understanding the role of gut-derived hormones in sleep disordered breathing
- new ways to monitor lung function in children with myopathies
- phenotyping of asthma patients with severe disease
- development of learning platforms for the care of children with chronic lung diseases
- expansion of human lung cells and tissues to develop personalized model systems for drug testing
- defining the microbiome of the upper and lower airway of children with cystic fibrosis
- utilizing emerging gene-sequencing techniques to identify and track bacterial infections in patients with various pulmonary disorders
- determining the role of bone-marrow-derived cells in driving lung injury and fibrosis
- defining the long-term effects of prematurity on lung development and risk of disease

The basic and clinical research program in the Pediatric Pulmonary Medicine division is rapidly expanding and provides an integrated approach with clinical care to improve our understanding and treatment of critical lung diseases.

Significant Publications


Arikace is a liposomal amikacin preparation for aerosol delivery with potent *Pseudomonas aeruginosa* killing and prolonged lung deposition. This study examined the safety and efficacy of 28 days of once-daily Arikace in cystic fibrosis (CF) patients chronically infected with *P. aeruginosa*. Subjects were evaluated in double-blind, placebo-controlled studies. Primary outcomes included safety and tolerability. Secondary outcomes included lung function, *P. aeruginosa* density in sputum, and the Cystic Fibrosis Quality of Life Questionnaire-Revised. The adverse event profile was similar among Arikace and placebo subjects. An open-label extension for 28
days followed by 56 days off over six cycles confirmed durable improvements in lung function and sputum \( P. \) \textit{aeruginosa} density. Once-daily Arikace demonstrated acute tolerability, safety, biologic activity and efficacy in CF patients with \( P. \) \textit{aeruginosa} infection.


Pulmonary fibrosis is often triggered by an epithelial injury resulting in the formation of fibrotic lesions in the lung, which progress to impair gas exchange and ultimately cause death. Although activation of MAPK and PI3K pathways have been detected in human fibrotic lung samples, the therapeutic benefits of in vivo modulation of these two pathways in combination are unknown. Overexpression of TGF\( \alpha \) in the lung epithelium of transgenic mice results in the formation of fibrotic lesions similar to those found in human pulmonary fibrosis, and inhibitors of either the MAPK or PI3K pathway can alter the progression of fibrosis. The objective of this study was to determine whether simultaneous inhibition of the MAPK and PI3K signaling pathways is a more effective therapeutic strategy for established and progressive pulmonary fibrosis. Inhibiting both pathways had additive effects compared to inhibiting either pathway alone in reducing fibrotic burden, including reducing lung weight, pleural thickness, and total collagen in the lungs of TGF\( \alpha \) mice. This study demonstrated that inhibiting MAPK and PI3K in combination abolished proliferative changes associated with fibrosis and myofibroblast accumulation and thus may serve as a therapeutic option in the treatment of human fibrotic lung disease where these pathways play a role.


Physicians deliver about half of indicated care, and patients do about half of what it takes to stay healthy, despite the best intentions and tireless efforts of both physicians and patients. The learning healthcare system (LHS) has been proposed as a solution. As envisioned by the Institute of Medicine, an LHS would “generate and apply the best evidence for the collaborative healthcare choices of each patient and provider, drive the process of discovery as a natural outgrowth of patient care, and ensure innovation, quality, safety, and value in healthcare.” However, this model begs the questions: Who is learning? And how? Traditional models suppose that highly trained experts—expert clinicians and expert researchers—are best suited for producing information, knowledge, and know-how. This reliance, however, on a small group of experts to improve health care and health outcomes has yielded the current system performance and impedes immediate, continuous, and transformative improvement. A new model of production is necessary.


In patients with pulmonary alveolar proteinosis (PAP) syndrome, disruption of granulocyte/macrophage colony-stimulating factor (GM-CSF) signaling is associated with pathogenic surfactant accumulation from impaired clearance in alveolar macrophages. The aim of this study was to overcome these barriers by using monocyte-derived induced pluripotent stem (iPS) cells to recapitulate disease-specific and normal macrophages. iPS cells were generated from children with hereditary PAP (hPAP) caused by recessive CSF2RA(R217X) mutations and normal people, differentiated into macrophages (hPAP-iPS-Mφs and NL-iPS-Mφs, respectively), and evaluated for macrophage functions with and without gene-correction to restore GM-CSF signaling in hPAP-iPS-Mφs. Both hPAP and normal iPS cells had human embryonic stem cell-like morphology, expressed pluripotency markers, formed teratomas in vivo, had a normal karyotype, retained and expressed mutant or normal CSF2RA genes, respectively, and could be differentiated into macrophages with the typical
morphology and phenotypic markers. Compared with normal, hPAP-iPS-Mφs had impaired GM-CSF receptor signaling and reduced GM-CSF-dependent gene expression, GM-CSF- but not M-CSF-dependent cell proliferation, surfactant clearance, and proinflammatory cytokine secretion. Restoration of GM-CSF receptor signaling corrected the surfactant clearance abnormality in hPAP-iPS-Mφs. Patient-specific iPS cells were used to accurately reproduce the molecular and cellular defects of alveolar macrophages that drive the pathogenesis of PAP in more than 90% of patients. These results demonstrate the critical role of GM-CSF signaling in surfactant homeostasis and PAP pathogenesis in humans and have therapeutic implications for hPAP.


In rodents and some other mammals, partial pneumonectomy (PNX) of adult lungs results in rapid compensatory lung growth. In the past, quantification of compensatory lung growth and realveolarization in animal models could be accomplished only after euthanasia, removal of lungs, and histologic analysis of lungs at single time points. Hyperpolarized (3)He diffusion magnetic resonance imaging (MRI) allows in vivo morphometry of human lungs, and this technique has been adapted by the authors for application to mouse lungs. Through imaging, maps of lung microstructural parameters that allow quantification of morphometric and physiologic measurements can be obtained. In this study, the (3)He MRI technique was used to image in vivo morphometry at baseline and serially assess compensatory growth after left PNX of mice. Compared with the individual mouse's own baseline, MRI was able to detect and serially quantify changes in lung volume, alveolar surface area, alveolar number, and regional changes in alveolar size that occurred during the course of post-PNX lung growth and were consistent with morphometry measurements reported in the literature for mouse post-PNX compensatory lung growth. Serial assessment and quantification of changes in the physiologic parameter of lung compliance during the course of compensatory lung growth also was performed. With these techniques, a noninvasive, in vivo method to serially assess the effectiveness of therapeutic interventions on post-PNX lung growth in the same mouse has been described.

Division Publications


40. Rohan JM, Drotar D, Perry AR, McDowell K, Malkin J, Kercsmar C. Training health care providers to


Faculty, Staff, and Trainees

Faculty Members

Raouf Amin, MD, Professor
Leadership Director, Division of Pulmonary Medicine;; Endowed Chair, Hubert and Dorothy Campbell Professorship in Pediatric Pulmonology
Research Interests Cardiovascular morbidity of sleep apnea in children

Thomas Boat, MD, Professor
Leadership Executive Associate Dean, University of Cincinnati College of Medicine

Ronald Bokulic, DO, Associate Professor

Lisa Burns, MD, Assistant Professor
Research Interests CF Transition of Care; Pulmonary Vascular Disease

Barbara Chini, MD, D-ABSM, FAAP, Associate Professor
Leadership Director, Pulmonary Fellowship Program; Associate Director, Cystic Fibrosis Center; Medical Director, A7C1
Research Interests Sleep Disordered Breathing, Outcomes Research, Self-Management of Chronic diseases

John P. Clancy, MD, Professor
Leadership Thomas Boat Endowed Chair; Director, Clinical and Translational Research
Research Interests Airway and epithelial biology, examining novel targets to treat cystic fibrosis;

Zackary Cleveland, Ph.D., Assistant Professor

Joseph Crisalli, MD, Assistant Professor
Research Interests Pediatric Sleep, Exercise Physiology

Daniel Grossoehme, DMin, BCC, Associate Professor
Research Interests Religion/ spirituality, adherence, coping, cystic fibrosis

William Hardie, MD, Professor
Leadership Director, Pulmonary Function Laboratory
Research Interests Molecular mechanism of pulmonary fibrosis, pediatric pulmonary function tests, pediatric pneumonia complications

Patricia Joseph, MD, Professor
Research Interests Cystic fibrosis infections and quality improvement
Carolyn Kercsmar, MD, Professor
  **Leadership** Co-Director, Division of Pulmonary Medicine; Director, Asthma Center
  **Research Interests** Asthma, inner city asthma, clinical outcomes and clinical trials, airway inflammation

Satish Madala, PhD, Assistant Professor
  **Research Interests** Immunoregulatory Mechanisms in pulmonary inflammation and fibrosis; Stromal cell contribution in pulmonary fibrosis

Karen McDowell, MD, Associate Professor
  **Leadership** Director, Infant Pulmonary Function Laboratory
  **Research Interests** Asthma self management, utilization of technology for chronic disease management, bronchoscopy and wheezing/asthma, health care effectiveness, outcomes.

Gary McPhail, MD, Associate Professor
  **Leadership** Director, Cystic Fibrosis Center; Associate Director, Fellowship Training Program
  **Research Interests** Cystic fibrosis, quality improvement, clinical outcomes, pulmonary vascular disease

Anjaparavanda Naren, PhD, Professor
  **Research Interests** Cystic fibrosis; secretory diarrhea.

Hemant Sawnani, MD, Assistant Professor
  **Research Interests** Pulmonary Management of children with Neuromuscular diseases; sleep disordered breathing in Duchenne Muscular Dystrophy; Infant Apnea; Obstructive Sleep Apnea; Outcomes in Sleep Medicine

Marc Schecter, MD, Associate Professor
  **Leadership** Medical Director, Pediatric Lung Transplant Program
  **Research Interests** Risk factors affecting transplant outcomes and the impact of transplant procedures on recipients’ quality of life.

Michael Seid, PhD, Professor
  **Leadership** Director, Health Outcomes and Quality of Care Research
  **Research Interests** Health outcomes for children with chronic health conditions, interventions to overcome barriers to care and adherence, clinical behavior and effects on self-management, quality improvement research

Abu Shamsuzzaman, MD, Assistant Professor
  **Research Interests** Sleep and Cardiovascular Diseases

Narong Simakajornboon, MD, Professor
  **Leadership** Director, Sleep Disorders Center; Director, Sleep Medicine Fellowship Program
  **Research Interests** Sleep-disordered breathing in children, sleep apnea, restless legs syndrome, periodic limb movement disorders

Cherie Torres-Silva, MD, Assistant Professor
  **Research Interests** Biomarkers in bronchoalveolar lavage and Pulmonary Outcomes in childhood cancer survivors

Robert Wood, PhD, MD, Professor
  **Leadership** Director, Pulmonary Bronchology Program
Research Interests Airway abnormalities; pulmonary alveolar proteinosis

Jason Woods, Ph.D., Professor

Leadership Director, Pulmonary Imaging Research Center

Research Interests Pulmonary MRI, translational imaging, and image-guided pulmonary interventions

Joint Appointment Faculty Members

Kelly Byars, PsyD, Associate Professor (Psychology)

Research Interests Current research focuses on improving the assessment and treatment of pediatric insomnia and pediatric obstructive sleep apnea

Rhonda Szczesniak, PhD, Assistant Professor (Biostatistics & Epidemiology)

Research Interests Current areas of interest are Mixture Models and Functional Data Analysis with focus on Bayesian statistics, primarily using Markov Chain Monte Carlo. Content-specific areas include integration of fMRI and MEG modalities; developing statistical models to assess impact of OSA; CF outcomes research

Bruce Trapnell, MD, Professor (Neonatology and Pulmonary Biology)

Nanhua Zhang, M.D., Assistant Professor (Biostatistics & Epidemiology)

Research Interests Missing data; comparative effectiveness; clinical trial design; meta-analysis; scale development; joint modeling; environmental health; community-based intervention; health disparity; behavioral intervention; health psychology

Clinical Staff Members

- Moutazz Abdulhadi, RPSGT,
  
  PSG Tech/RRT III

- Rosalynn Allie, RRT,
  
  RT I

- Denetra Bamonte, RRT, RPSGT,
  
  PSG Tech III

- Sallie Bauer, RRT, RPSGT,
  
  PSG Tech III

- Laura Bellew, RN,
  
  Nurse Coordinator

- Walter Blower, RRT,
  
  Resp Therapist III

- Marsha Blount, CNP,
  
  Certified Nurse Practitioner

- Kelli Brock, MA,
  
  Medical Assistant II

- Ginger Browning, RRT, BS,
  
  Airway Clearance Specialist

- Johnny Bryant, RRT, RPSGT,
  
  PSG Tech

- Carolyn Burrows, CNP,
  
  Certified Nurse Practitioner

- Monica Chapman, RN,
  
  Nurse Coordinator

- Jessica Co, CNP,
  
  Certified Nurse Practitioner
- Amy Cole, RRT, RPSGT, 
  Clinical Manager
- Adrienne Conrad, RRT, 
  PSG Tech/RRT
- Mindy Copens, 
  Patient Care Assistant
- Lisa Corlett, RT, 
  PSG Tech/RRT
- Shannon Deidesheimer, RN, 
  Nurse Coordinator
- Guido DiMarco, LSW, 
  Social Worker III
- Geri Dinkins, RN, 
  Care Manager
- Catherine Disney, RT, 
  PSG Tech II
- Melodie Dixon, RRT, RPSGT, 
  PSG Tech III
- Amanda Dressman, CNP, 
  Certified Nurse Practitioner
- Lori Duan, RN, 
  Clinical Manager
- Rebekah Dunning, RRT, 
  RT II
- Julie Feldstein, RRT, CPFT, 
  RT III
- Karla Foster, MS, 
  Exercise Physiologist
- Shanda Furnish, 
  PSG Tech Asst
- Janice Gramke, RN, 
  Nurse Coordinator
- Chuck Grone, RT, 
  RT III
- Neepa Gurbani, DO, 
  Staff Physician
- Robin Hamilton, RN, 
  Clinical Director
- Joann Harmeyer, RRT, RPSGT, 
  Education Specialist I
- Amanda Hatfield, RRT, 
  PSG Tech III
- Samantha Hollandsworth, MA, 
  Medical Assistant II
- Jami Johnson, CNP, 
  Certified Nurse Practitioner
- Marion Johnson, RRT, 
  PSG Tech II
- Robin Johnson, RRT, 
  PSG Tech I
• Shannon Johnson, RN,  
  Clinical Manager  
• Sharon Kadon, RN,  
  Nurse Coordinator  
• Michelle Kaiser, RRT,  
  RRT III  
• Amanda Kelly, RRT,  
  PSG Tech  
• Michelle Kleinhenz, RRT,  
  PSG Tech II  
• Beth Koch, RRT, RPFT,  
  Clinical Manager  
• Margaret Landers, RRT, RPSGT,  
  PSG Tech III  
• Denise Leonard, RN,  
  Care Manager  
• Jean Luchini, RN,  
  Nurse Coordinator  
• Janice MacBrair, CNP,  
  Certified Nurse Practitioner  
• Julie Malkin, CNP,  
  Certified Nurse Practitioner  
• Holly Malone,  
  PSG Tech Asst  
• Patricia Manaster, RN,  
  Registered Nurse  
• Carrie Martin, CNP,  
  Certified Nurse Practitioner  
• Karin Mauser, RN,  
  Registered Nurse II  
• Susan McCarthy, RRT, RPSGT,  
  PSG Tech III  
• Carolyn McHendry, RT,  
  RT II  
• Connie Meeks, RN,  
  Care Manager  
• Jamie Miller, LSW,  
  Social Worker  
• Alyssa Mohr, RN,  
  Nurse Coordinator  
• Steve Moore, RN,  
  Clinical Coordinator  
• Susan Moore, LSW,  
  Social Worker  
• Abigail Motz, RT,  
  RT II  
• Whitney Niles,  
  PSG Tech Asst  
• Patricia Norton, RN,  
  Clinical Program Manager
Andrea O'Brien, Ph.D, MSW, LSW,
Social Worker II

Laura Ogilby, RRT,
RT II

Teresa O’Hara, RN,
Care Manager

Kenneth Olding, RT,
PSG Tech/RRT

John Pack, RRT,
RT III (Bronch)

Jennifer Parson,
PSG Tech

Grace Pestian, RD,
Registered Dietician

Rebecca Quarles, RN,
Care Manager

Jeanne Race, RN,
Registered Nurse II

Steven Reimondo, RT,
PSG Tech/RRT

Melissa Rice, CNP,
Certified Nurse Practitioner

Rachel Sackenheim, MSW, LSW,
Social Worker

Valerie Sackenheim, RN,
Nurse Coordinator

Kathy Santoro, RD, LD,
RD III

Jennifer Schaber, RT,
PSG Tech/RRT

Kary Schmale, RN,
Nurse Coordinator

Leah Seals, RD,
Registered Dietician

Joshua Shannon, RT,
RT II

Erika Skovmand, RT,
PSG Tech II

Dusti Snider, RN,
Registered Nurse

Dianne Stratton, RRT,
RT II

Jackie Taylor, RD, LD,
RD III

Jenetta Thomas, RN,
Nurse Coordinator

Sarah Thomas, CNP,
Certified Nurse Practitioner

Karin Tiemeyer, RN,
Care Manager
Stephanie Torrens, RN,
Registered Nurse

Simone Urbach, CNP,
Certified Nurse Practitioner

Tracey Van Vliet, CNP,
Certified Nurse Practitioner

Aarthi Vemana, M.D.,
Staff Physician

Allison Volpenhein,
PSG Tech Asst

Brittany Waddle, CNP,
Certified Nurse Practitioner

Mark Washam, CNP,
Certified Nurse Practitioner

Debbie Webster, BA, RRT, RPSGT,
RRT II

Tonya Weddle, RRT,
PSG Tech II

Jeanne Weiland, CNP,
Certified Nurse Practitioner

Erin Wells, RN,
Transplant Care Manager

Jenny Werder, RN,
Care Manager

Kathy Witschger, RRT,
RT II

Lilianna Wooten, CNP,
Certified Nurse Practitioner

Brenda Young, RRT,
PSG Tech

Trainees

- Dan Benscoter, DO, PL-8, Geisinger Medial Center
- John Brewington, MD, PL-5, Cincinnati Children's Hospital Medical Center
- Justin Brockbank, MD, PL-6, Virginia Comm. Univ. Medical Center
- Thomas Dye, MD, PL-6, Cincinnati Children's Hospital Medical Center
- Zarmina Ehsan, MBBS, PL-5, Indiana University
- Annette Lopez, MD, PL-4, University of Arizona Tucson, Arizona
- Oscar Rodriguez, MD, PL-7, St. Louis Children's Hospital Medical Center
- Geoffrey Rulong, M.D, MPH, PL-4, Children's Hospital of the Kings Daughter Norfolk, VA
- Christopher Siracusa, MD, PL-5, Akron Children's Hospital

Division Collaboration

Treatment of chronically ill children with complex airway, pulmonary, upper digestive tract, sleep and feeding disorders.
(Robert Wood, MD, PhD)

Aerodigestive and Sleep Center » Raouf Amin, MD, Dan Benscoter, D.O., Cherie Torres-Silva, MD, and Robert Wood, MD, PhD
Treatment of children with neuromuscular disorders. This collaboration focuses on the development of an integrated neuromuscular program as well as clinical research activities characterizing cardio-pulmonary interactions in DMD. (Hemant Sawnani, MD)

**Comprehensive Neuromuscular Center** » Raouf Amin, MD and Hemant Sawnani, MD

The Asthma Center has developed and implemented best practices that have significantly improved the percentage of children with well-controlled asthma. The center also leads important research into understanding the causes of asthma and improving treatment. (Carolyn Kercsmar, MD; Karen McDowell, MD, Theresa Guilbert, MD)

**Asthma Center** » Carolyn Kercsmar, MD, Theresa Guilbert, MD, and Karen McDowell, MD

The Cystic Fibrosis Research Program examines the underlying cause of CF and novel treatment strategies. (JP Clancy, MD; Anjaparavanda Naren, PhD; Michael Seid, PhD; Satish Madala, PhD)

**Cystic Fibrosis Research** » Raouf Amin, MD, Barbara Chini, MD, John P. Clancy, MD, Gary McPhail, MD, Anjaparavanda Naren, PhD, and Bruce Trapnell, MD

Pulmonary Fibrosis Research investigates lung injury and disease and the repair of damaged tissues. (William Hardie, MD; Satish Madala, PhD)

**Pulmonary Fibrosis Research** » William Hardie, MD and Satish Madala, PhD

Diagnosis and management of children with rare lung diseases, including interstitial lung diseases, surfactant mutations, lung development disorders, lymphatic disorders and chronic lung diseases associated with immunodeficiency/immune dysfunction, rheumatologic disorders and other systemic disorders. (Christopher Towe, MD)

**Rare Lung Disease Center** » Raouf Amin, MD and Bruce Trapnell, MD

Craniofacial Team. Helps children born with head and/or facial abnormalities who require care from many specialists. The Center follows children through each stage of treatment, usually beginning after birth and continuing through adolescence (Barbara Chini, MD)

**Craniofacial Team** » Barbara Chini, MD

The Spine Center assembles a world-class team of experts to diagnose and treat early onset scoliosis and other spine conditions. (Gary McPhail, MD)

**Crawford Spine Center** » Raouf Amin, MD and Gary McPhail, MD

The Sleep Center offers multidisciplinary assessment and management to help children with sleep problems get the sleep they need to stay healthy. The Sleep Center offers services for serious sleep disorders in two outpatient clinics, as well as in an inpatient sleep laboratory, where sleep patterns are studied more in depth. (Narong Simakajornboon, MD; Hemant Sawnani, MD; Joseph Crisalli, MD; Barbara Chini, MD; Gary McPhail, MD; Kelly Byars, PsyD)

**Sleep Center** » Raouf Amin, MD, Kelly Byars, Psy.D., Barbara Chini, MD, Joseph Crisalli, MD, Gary McPhail, MD, Hemant Sawnani, MD, and Narong Simakajornboon, MD
Lung Transplant Center is a multi-disciplinary activity that synergizes surgical and medical specialties to transplant lung and or heart/lungs from donors to patients who have severe pulmonary-related disorders.

(Marc Schecter, MD; Christopher Towe, MD)

**Lung Transplant Center** » Raouf Amin, MD and Marc Schecter, MD

Upper Airway Center-Provides care coordination for patients suffering from upper airway abnormalities requiring intervention from multiple services.

(Raouf Amin, MD; Barbara Chini, MD; Joseph Crisalli, MD)

**Upper Airway Center** » Raouf Amin, MD, Barbara Chini, MD, Joseph Crisalli, MD, Gary McPhail, MD, Narong Simakajornboon, MD, and Dan Benscoter, D.O.

Our cystic fibrosis program is one of the largest in the US and is a major center for research to develop a new generation of more effective therapies.

(Gary McPhail, MD; Raouf Amin, MD; Lisa Burns, MD; JP Clancy, MD; Barbara Chini, MD; Patricia Joseph, MD)

**Cystic Fibrosis Center** » Raouf Amin, MD, Gary McPhail, MD, JP Clancy, MD, Benscoter, Dan, Bokulic, Ronald E., Carolyn Kercsmar, MD, Barbara Chini, MD, William Hardie, MD, Karen McDowell, MD, Hemant Sawnani, MD, Miachel Seid, PhD, Rhonda Szczesniak, PhD, Daniel Grossoehme, DMin, Jeanne Weiland, CNP, and Amanda Dressman, CNP

Cardiomyopathy Clinic. Studying arterial structure function in sleep apnea.

(Lisa Burns, MD)

**Cardiomyopathy Clinic** » Raouf Amin, MD and Hemant Sawnani, MD

The Division of Asthma Research partners with the Pulmonary Asthma Center to form the Cincinnati Children's Asthma Program to improve the health of children with asthma by integrating the evidence-based clinical care with innovative research that will lead to personalized asthma therapy for children living in the Greater Cincinnati area.

(Carolyn Kercsmar, MD; Karen McDowell, MD, Theresa Guilbert, MD)

**Asthma Research** » Theresa Guilbert, MD, Carolyn Kercsmar, MD, and Karen McDowell, MD

Collaboration with Epidemiology and Biostatistics and Pulmonary Medicine on extramural grants and publications for asthma, neuromuscular dystrophy, cystic fibrosis, rare lung disease and sleep apnea research. Rhonda Szczesniak and Nanhua Zhang oversee the Pulmonary Biostatistical Core, which acts to advance all facets of pulmonary research through biostatistical consulting and collaboration with excellence in education, collaborative research and methodologic research.

(Rhonda Szczesniak, PhD; Nanhua Zhang, PhD)

**Epidemiology and Biostatistics** » Raouf Amin, MD, JP Clancy, MD, Daniel Grossoehme, DMin, Carolyn Kercsmar, MD, Gary McPhail, MD, Michael Seid, PhD, Abu Shamsuzzaman, MD, Narong Simakajornboon, MD, and Jason Woods, PhD

The Pulmonary Imaging Research Center is developing novel ways to assess lung conditions while reducing the need for invasive surgical biopsies.

(Jason Woods, PhD; Zachary Cleveland, PhD)

**Pulmonary Imaging Center** » Raouf Amin, MD, Jason Woods, PhD, and Zachary Cleveland, PhD

Grants, Contracts, and Industry Agreements
<table>
<thead>
<tr>
<th>AMIN, R</th>
</tr>
</thead>
</table>
| **Passive Stretch of the Chest Wall in Patients with Congenital Muscular Dystrophy**  
National Institutes of Health  
R34 HL 113390  
08/01/13-05/31/15  
$252,587 |
| **Pediatric Sleep Research Program**  
National Institutes of Health  
K24 HL 078989  
03/01/11-02/29/16  
$139,466 |
| AMIN R / FLECK R / GUTMARK I / SHOTT S |
| **Dynamic Computational Modeling of Obstructive Sleep Apnea in Down Syndrome**  
National Institutes of Health  
R01 HL 105206  
09/17/10-08/31/15  
$702,133 |

| BREWINGTON, J |
| **Clinical Fellowship Training Grant**  
Cystic Fibrosis Foundation  
07/01/13-06/30/15  
$48,000 |

| CLANCY, J |
| **CFF Research Development Program**  
Cystic Fibrosis Foundation  
R457-CR11  
03/01/12-06/30/15  
$380,144 |

| Whitsett, J  
Transgenic Core  
$50,000 |
| Hogan, S  
Pilot & Feasibility Project  
$65,000 |
| Szczesniak, R  
Pilot & Feasibility Project  
$65,000 |
| Hoebe, K  
Pilot & Feasibility Project  
$65,000 |

| **CFF Therapeutics Development Center**  
Cystic Fibrosis Foundation Therapeutics, Inc  
CLANCY14Y0  
01/01/13-12/31/15  
$140,968 |

| **MR Predictors of Infection, Inflammation, and Structural Lung Damage in CF**  
National Institutes of Health  
R01 HL 116226  
09/26/12-06/30/16  
$375,937 |

| **CFFT Biomarker Consortium**  
Cystic Fibrosis Foundation Therapeutics, Inc.  
CLANCY11CS0  
01/01/2014-12/31/2014  
$23,232 |

| GROSSHOEME, D |
| **Parental Adherence to CF Homecare: Research Chaplaincy Career Commitment**  
National Institutes of Health |
<table>
<thead>
<tr>
<th>Principal Investigator</th>
<th>Title and Details</th>
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| **HARDIE, W** | **Ruth L. Kirschstein National Research Service Award Short-Term Institutional Research Program**  
National Institutes of Health  
T35 HL 113229  
05/01/12-04/30/16  
$50,255  
**Biomarkers of Immunologic Function and Preterm Respiratory Outcomes**  
National Institutes of Health  
U01 HL 101800  
05/01/10-04/30/15  
$111,771 |
| **HEUBI, J** | **Baby Observational and Nutritional Supplement (BONUS) Study**  
Cystic Fibrosis Foundation Therapeutics, Inc (Seattle Children’s)  
12/01/10-04/30/15  
$14,592 |
| **MADALA, S** | **Molecular Mechanisms of TGF (alpha)-driven Pulmonary Fibrosis**  
Parker B. Francis Fellowship Program  
07/01/13-06/30/16  
$50,000  
**Role of TGFα-induced Fibrocytes in Pulmonary Fibrosis and Pulmonary Hypertension**  
American Heart Association  
12SDG9130040  
01/01/12-12/31/15  
$70,000  
**The Role of IL-31 in TH2 Cytokine-Driven Systemic Sclerosis**  
National Institutes of Health  
R03 AR 062832  
06/17/13-05/31/16  
$50,000 |
| **MCPHAIL, G** | **Cystic Fibrosis Center Program Accreditation And Funding**  
Cystic Fibrosis Foundation  
07/01/13-06/30/18  
$118,320 |
| **NAREN, A** | **Inhibition of an Apical cAMP/cGMP Transporter (MRP4) in the Gut Induces Diarrhea**  
National Institutes of Health  
R01 DK 080834  
09/18/13-03/31/18  
$222,205  
**LPA2 Receptor-Containing Complexes in Regulating Secretory Diarrhea**  
National Institutes of Health  
R01 DK 093045  
08/01/13-06/30/15  
$184,126  
**Stabilizing Macromolecular Complexes of Mutant CFTR at the Plasma Membrane**  
Cystic Fibrosis Foundation  
08/01/13-12/31/13  
$13,875 |
<p>| <strong>SEID, M</strong> | |</p>
<table>
<thead>
<tr>
<th>Project Title</th>
<th>Grant Owner</th>
<th>Fiscal Years</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL3X: An Adaptive Intervention to Improve Outcomes for Youth with Type I Diabetes</td>
<td>National Institutes of Health (University of North Carolina)</td>
<td>09/15/13-06/30/18</td>
<td>$260,098</td>
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<tr>
<td>Evaluation of Endobronchial Interventions for COPD via CT and 3He MRI</td>
<td>National Institutes of Health</td>
<td>08/28/13-07/31/14</td>
<td>$146,617</td>
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<td>Regulatory Advancement of HXe as a Diagnostic MRI Contrast Agent</td>
<td>National Institutes of Health (Xemed, LLC)</td>
<td>02/01/13-01/31/15</td>
<td>$98,112</td>
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<tr>
<td>Severe Asthma Research Program</td>
<td>National Institutes of Health (Washington University)</td>
<td>02/01/13-05/31/17</td>
<td>$5,586</td>
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<tr>
<td>Single-Session Bronchial Thermoplasty for Severe Asthmatics Guided by Hxe MRI</td>
<td>National Institutes of Health (Xemed, LLC)</td>
<td>08/22/13-07/31/14</td>
<td>$83,395</td>
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</tbody>
</table>

**Current Year Direct** $3,632,448

| Industry Contracts | | |
|--------------------|----------------|
| CLANCY, J          |                 |
| Genentech, Inc.    | $12,000         |
| Seattle Children's Hospital | $22,221 |
| Gilead Sciences, Inc. | $75,990 |
| Synedgen           | $1,666          |
| Vertex Pharmaceutical Incorporated | $132,581 |
| KaloBios Pharmaceuticals, Inc. | $64,833 |
| N30 Pharmaceuticals  | $83,234         |

| SIMAKAJORNBOON, N   | | |
|---------------------|----------------|
| Jazz Pharmaceuticals | $50,004        |

**Current Year Direct Receipts** $442,529

**Total** $4,074,977