Emergency Medicine

RESEARCH AND TRAINING DETAILS

Faculty 42
Joint Appointment Faculty 3
Research Students 6
Support Personnel 47
Direct Annual Grant Support $1,603,933
Peer Reviewed Publications 77

CLINICAL ACTIVITIES AND TRAINING

Staff Physicians 50
Clinical Fellows 12
Outpatient Encounters 163,037

Research Highlights

Lynn Babcock, MD, MS; Tara Rhine, MD, MS – Traumatic Brain Injury: Diagnostics,
Prognostics and Rehabilitation
Emergency medicine faculty members, Drs. Babcock, Rhine, Chan, Alessandrini, Gittelman, and Pomerantz, have been collaborating within the institution with other researchers from the divisions of Pediatric Physical Medicine and Rehabilitation, Sports Medicine, Trauma, Neurology, and Biostatistics and Epidemiology to advance knowledge and improve care of traumatic brain injury across the continuum of care: from diagnosis, prognosis, rehabilitation and prevention. On the clinical front, the group is working to identify and stratify children with mild injuries who do not need head CTs (Alessandrini) and improve their care by implementing an observation care pathway that seeks to standardize practices and potentially further decrease rates of head CTs (Rhine, Babcock). They have developed and are assessing the effectiveness of an innovative multi-modal virtual outpatient treatment program for kids with concussion that will promote patient engagement in the early recovery process through a combination of self-monitoring and cognitive behavioral coping skills (Babcock). To further understand the epidemiology and outcomes of children in the United States requiring inpatient care for traumatic brain injury, the group is analyzing the Pediatric Health Information System database in hopes to highlight effective care practices (Rhine, Babcock). They are planning to assess the impact of emergency department treatment of post-concussive headache on sequelae following traumatic brain injury (Chan, Babcock).
Applying translational science, they are uncovering approaches to improve clinicians’ diagnostic and prognostic acumen for pediatric traumatic brain injury by studying serum biomarkers (Babcock), advanced radiologic techniques (Babcock), and novel postural control analytics (Rhine).

Michelle Eckerle, MD, MPH – Global Health Research: Malawi
Michelle Eckerle, MD, MPH was awarded a Fogarty Global Health Fellowship and spent ten months studying viral etiologies of acute respiratory illness among children admitted at Kamuzu Central Hospital in Lilongwe, Malawi. During her time there, she was also active in clinical care and educational efforts, both for Malawian trainees as well as visiting Cincinnati Children’s residents and fellows. She was subsequently awarded a Thrasher Early Career Award to characterize the urine metabolite profiles of Malawian children with viral respiratory illness compared with those of healthy controls. This research in the emerging field of metabolomics may lead to further work in improving the accuracy of diagnosis and treatment of respiratory illness in low resource settings.

Todd Florin MD, MSCE – Acute Lower Respiratory Tract Infection; Etiology, Severity and Biomarkers
Todd Florin, MD, MSCE, leads a research program focused on the acute care of pediatric lower respiratory tract infections, and is the principal investigator of Catalyzing Ambulatory Research in Pneumonia Etiology and Diagnostic Innovations in Emergency Medicine (CARPE DIEM). This study, which began enrollment in July 2013, and has received funding from the National Institutes of Health (NIH) (including a KL2 award from the CCTST), Gerber Foundation and a Cincinnati Children's Trustee Award, is pursuing three major areas of investigation: (1) understanding pneumonia pathophysiology; (2) improved prediction of pneumonia severity and risk stratification; and (3) enhanced differentiation of pneumonia etiology. This study is a multidisciplinary effort that involves investigators and collaborators from Emergency Medicine (Drs. T. Florin, MD, MSCE; and R. Ruddy, MD); Hospital Medicine (Drs. L. Ambrogi, PhD (co-PI of CARPE DIEM) and S. Shah, MD); Infectious Diseases (Dr. S. Shah); and Biostatistics and Epidemiology (Drs. L. Ambrogi, PhD; J. Meinzen-Derr, PhD; B. Huang, PhD; and H. Sucharew, PhD). Current CARPE DIEM research activities are focused on the use of biomarkers to develop a clinical prediction rule for pneumonia severity (Dr. Florin) and the use of NMR metabolomics to differentiate various pneumonia etiologies (Dr. Ambrogi). In addition, we are establishing a biorepository of nasal, blood and urine specimens from children with pneumonia in collaboration with the Cincinnati Children's Biobank Core Facility. Dr. Florin’s other research activities are focused on resource utilization, management of bronchiolitis, and multicenter research in the Emergency Department.

Jacqueline Grupp-Phelan, MD, MPH – ED Screening and Brief Mental Health Intervention
Jackie Grupp-Phelan, MD, MPH, along with nationally known suicidology experts Cheryl King, PhD, from the University of Michigan, and David Brent, MD, from Western Psychiatric Institute of Pittsburgh, are multi-principal investigators in the newly launched UO1 Emergency Department Screen for Teens at Risk for Suicide (ED-STARS). This multi-site collaborative study with the Pediatric Emergency Care and Applied Research Network (PECARN) will determine prospectively the optimal suicide risk screening strategy for youth who present to the pediatric ED and develop and validate a parsimonious algorithm for risk stratification to facilitate the triage of youth to “acute risk,” “at risk,” and “no further follow-up needed” groups, with recommendations for each group. Dr. Grupp-Phelan is a multi-PI along with Jeff Bridge, PhD at Nationwide Children’s. They are in the final year of an R01 supporting a randomized control trial testing the effectiveness of a brief treatment engagement intervention for adolescent emergency department patients with non-psychiatric presenting complaints who are identified by screening to be at risk for suicidal behaviors.

Benjamin Kerrey, MD, MPH; Matthew Mittiga MD; Andrea Rinderknecht MD – Management of Pediatric Airways and Critical Care Procedures

This research team over the past seven years has led discovery and implementation of best practice for pediatric emergency physicians in emergent pediatric airway management. The initial efforts were to understand the practice of, and then improve the safety and reliability of, rapid sequence intubation (RSI) in the ED. The three studies published ran the gamut of knowledge generation to translation of our findings into improved care for our patients. The initial study found more frequent problems with RSI than had been reported for children in an ED. The validation of clinical care using video demonstrated what no one had reported—higher failure rates at RSI attempt and oxygen desaturation that we believed was unnecessary and potentially harmful. This was accentuated in those children under 2 years of age (Academic Emerg Med, 2015). The implementation of a RSI check list within a multidisciplinary team has demonstrated and sustained improved outcomes; increased the rate of success; and reduced the rate of desaturations during RSI (BMJ Qual and Safety, 2015). The team is also collaborating with two other pediatric EDs (Children’s Hospital of Philadelphia and Children’s National) to establish a multicenter pediatric resuscitation registry based on video review. The investigators received funding from the Zoll Foundation in 2014 to establish this registry and will initiate the multicenter work in FY16.

Michael Gittelman, MD, and Wendy Pomerantz MD, MS – Injury Prevention Research

Injury Prevention Research is now turning to implementation projects that include the modeling of safe sleep programs within the six Ohio Children’s Hospitals (EASE Project), the results of which were presented at the Pediatric Academic Society Meeting APA Plenary Session in 2015 by Mike Gittelman, MD. He received the Ohio AAP Ellen R. Schmidt Award that recognizes a Safe States Alliance member who has made a significant contribution to the field of injury and violence prevention. He was recognized for the development of an outstanding statewide injury and violence prevention program. His work on the Maintenance of Certification Part 4 Quality Improvement project is now used by Ohio primary care providers during well child office visits for children 0 to 1 years of age. Other important research and QI implementation initiatives included the work of the Injury Prevention/Safe Sleep Collaborative implemented in four states’ practices; the work of the “Put a Lid on It” bicycle helmet program which involved social media and the targeting of children to use helmets when riding; and a multi-center paper describing reduction of burns from glass fronted gas fireplaces. The team of Mike Gittelman and Wendy Pomerantz, MD, MS, has been truly innovative at providing opportunities for injury prevention efforts to make a difference in our community, as well as in a much larger regional and national community.

Melinda Mahabee-Gittens, MD, MS – ED Based Tobacco Cessation Interventions

The research of Melinda Mahabee-Gittens, MD, MS, CTTS, focuses on the development and testing of Emergency Department (ED) based tobacco cessation interventions for caregivers. She is a principal investigator (PI) on a National Cancer Institute funded study (R21) that will develop, refine, and integrate an electronic health record (Epic-based) tobacco treatment decision support system tool for children in the ED. Dr. Mahabee-Gittens is the PI of a Eunice Kennedy
Shriver National Institute of Child Health and Human Development (R01) grant that will test the efficacy of a screening, brief intervention, and assisted referral to treatment (SBIRT) intervention for caregivers. The study will highlight the effects of tobacco smoke extract (TSE) on their child's health compared to a control condition in which caregivers will receive instruction on healthy lifestyle choices to improve their child’s health.

Richard M Ruddy, MD; Lynn Babcock MD, MS; Hamilton Schwartz MD, MEd; Evaline Alessandrini, MD, MSCE; Seema Bhatt, MD, MS; Jacqueline Grupp-Phelan, MD, MPH – Pediatric Emergency Care Applied Research Network (PECARN), Hospitals of the Midwest Emergency Research Node (HOMERUN)

Cincinnati Children's has been a member of the Health Resources and Service Administration (HRSA)/Maternal and Child Health Bureau (MCHB) funded Pediatric Emergency Care Applied Research Network (PECARN) since 2001, and has been one of six nodes since 2011. Cincinnati Children's has once again been funded as the nodal center with Richard M Ruddy, MD, as the nodal PI through 2019. The node includes the Emergency Department from Cincinnati Children's, Children’s Hospital of Wisconsin and St. Louis Children's Hospital at Washington University. Nicole McClanahan is the nodal administrator and secretary elect of the PECARN Steering Committee, Lynn Babcock, MD, MS, is the site principal investigator (PI) for Cincinnati, Hamid Schwartz, MD, is the pre-hospital scientific advisor for the next four years. Important studies for children currently under way include:

1) Electronic Health Record registry (E. Alessandrini, MD, MSCE, as co-investigator (co-I)) implementing all of the ED records and making a quality report card by site and provider.
2) Probiotics for Acute Gastroenteritis (Seema Bhatt, MD, and Richard M Ruddy, MD, as site PI) – RCT for healthy children less than 4 years of age with gastroenteritis.
3) Suicide Screening (J. Grupp-Phelan, MD, MPH, as U01 co-PI) – above.
4) Knowledge Translation of PECARN Head Injury Rule (E. Alessandrini as co-I) – use of decision support to reduce CT rates in very low risk children with head injury.
5) Alcohol Screening in Teens (J. Grupp-Phelan as site PI) – validate the Center for Disease Control (CDC) Alcohol screening questions and perform follow up for a cohort.
6) Biosignatures in Infants < 2 months with Fever (Richard M Ruddy as site PI) – with second RO1 to continue the work just receiving funding.
7) Prehospital and ED Validation of Risk for Cervical Spine Injury (Hamid Schwartz as site PI) – a nodal study.
8) Safety in the ED (Richard M Ruddy as site PI).

**Significant Publications**


This study had three important findings. First, pediatric providers' smoking cessation advice and support should begin when their children are infants and preschoolers, and parents who have recently quit may be particularly primed for another attempt. Second, providers' advice to parental smokers should emphasize the effects of tobacco smoke exposure on their child's health and the benefits of quitting on both their child's and their own current and future health. Finally, consistent with broader research in tobacco control, this study emphasizes that messaging may be more important to increase in families with less education and lower socioeconomic status.

Community acquired pneumonia (CAP) is a common cause of hospitalization in children. Blood cultures are the most widely available diagnostic tests for identifying a bacterial pathogen in children with CAP. This study used improvement methodology to increase ordering of blood cultures in children hospitalized with CAP and is in alignment with the recent Infectious Disease Society of America (IDSA)/Pediatric Infectious Disease Society (PIDS) guideline. Within six months, the percentage of patients admitted with CAP who had blood cultures ordered increased from 53% to 100%. This change has been sustained for 12 months. Overall, 239 (79%) of the 303 included patients had a blood culture ordered; of these, six (2.5%) were positive. Patients who had a blood culture did not have an increased LOS compared with those without a blood culture. These results support obtaining blood cultures on all patients admitted with CAP without negative effects on LOS in a setting with a reliably low false-positive blood culture rate. The efficient implementation of evidence and its being sustained remains critical to our work of improving outcomes for children here at Cincinnati Children’s.


Acute bronchiolitis is the most frequent lower respiratory tract infection in infants, yet there are no effective therapies available. Initial studies found that nebulized 3% saline was effective at reducing hospital length of stay in infants with bronchiolitis; however, its efficacy in the emergency department (ED) setting is unclear. This randomized clinical trial of 62 infants compared nebulized 3% saline to nebulized normal saline in infants 2-24 months with bronchiolitis cared for in the ED. We found that infants with bronchiolitis in the emergency department had less improvement after receiving 3% saline compared with those who received normal saline. Based on these results and the existing evidence, administration of a single dose of 3% saline does not appear to be indicated to treat bronchiolitis in the acute care setting.


The aim was to assess the impact of measures of crowding on the important task of responding to abnormal vital signs by interventions and with patient reassessment. We found delays in the reassessment of critically abnormal vital signs (heart rate, respiratory rate and blood pressure) associated with times of crowding in the ED despite an electronic reminder in the EHR. We utilized validated measures of crowding: the number of patients in the lobby, the overall ED census, and the number waiting admission. Future work is needed to develop systems to mitigate these delays.

Division Publications


5. Aronson PL, Thur C, Williams DJ, Nigrovic LE, Alpern ER, Tieder JS, Shah SS, McCulloh RJ, Balamuth F,


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**Faculty, Staff, and Trainees**

**Faculty Members**

**Richard M. Ruddy, MD**, Professor  
Leadership Division Director; Nodal PI - Pediatric Emergency Care Applied Research Network (PECARN), Hospitals of the Midwest Emergency Research Node (HOMERUN)  
Research Interests Pediatric Emergency Care Applied Research Network multicenter trials; respiratory disease and quality research.
Javier Gonzalez del Rey, MD, MEd, Professor
Leadership Associate Director, Division of Emergency Medicine; Director, Pediatric Residency Training Programs
Research Interests Medical education and training.

Jacqueline Grupp-Phelan, MD, MPH, Professor
Leadership The Richard Ruddy and Barbara Wriston-Ruddy Endowed Chair for Pediatric Research; Associate Director, Division of Emergency Medicine; Director of Research and Prevention Research Focus Team Leader; CCTST Co-Director of Research Training and Career Development
Research Interests Suicide screening mental health services and treatment; engagement; health services research; cost-effectiveness; clinical effectiveness and utilization.

Joseph Luria, MD, Professor
Leadership Associate Director, Division of Emergency Medicine; Medical Director, Emergency Department; Clinical Leadership Team
Research Interests Improvement related to ED quality; patient safety, flow.

Constance McAneney, MD, MS, Professor
Leadership Associate Director, Division of Emergency Medicine; Director, Pediatric Emergency Medicine Fellowship; Director, Education for the Division of Emergency Medicine
Research Interests Medical education.

Lynn Babcock, MD, MS, Associate Professor
Leadership Clinical Research Focus Team Leader; Site PI, HOMERN/PECARN
Research Interests Traumatic brain injury (translational research combining neuroimaging, biomarkers, and functional outcomes); injury prevention.

Berkeley L. Bennett, MD, MS, Associate Professor
Leadership Medical Director of the Northern Kentucky Advocacy Center
Research Interests Cardiac injury in association with non-accidental trauma; child abuse.

Seema Bhatt, MD, MS, Assistant Professor
Research Interests Education; management of dehydration.

Ted Brenkert, MD, Assistant Professor
Research Interests Utilizing multimedia in resident education.

Corinne Bria, MD, MEd, Assistant Professor
Research Interests Education; including milestone implementation; reduction of time to expert with simulation as a tool in acute illness and high risk conditions; implementation of sustainable learner evaluation process.

Terri L. Byczkowski, PhD, MBA, Associate Professor
Research Interests Family centered care in PEM; transition to adult focused care.

Patricia Chambers, MD, Assistant Professor
Leadership Liberty Campus ED Assistant Medical Director
Research Interests Patient experience and communication in healthcare; humanism in medicine.

Holly Depinet, MD, MPH, Assistant Professor
Research Interests Sedation; sepsis identification and mitigation; decision support in acute appendicitis; health services; global health.

Judith Dexheimer, PhD, Assistant Professor
Research Interests Clinical decision support applications in the pediatric Emergency Department.

Cinnamon Dixon, DO, MPH, Assistant Professor
Research Interests Global injury epidemiology and trauma surveillance; mobile health interventions for injury prevention; dog bite prevention education.
Elena Duma, MD, Assistant Professor
Leadership Clinical Staff Coordinator; Director, PED 4th Year Medical Student Clerkship; Clinical Leadership Team
Research Interests Pediatric emergency medicine; child abuse.

Michelle Eckerle, MD, MPH, Assistant Professor
Research Interests Global health, biomarkers / metabolomics, sepsis care in resource-limited settings.

Michael Fitzgerald, PhD, Assistant Professor
Leadership Education Research Focus Team Leader
Research Interests Feedback in medical education; assessment and evaluation of medical learners.

Todd Florin, MD, MSCE, Assistant Professor
Research Interests Bronchiolitis; pneumonia.

Gary L. Geis, MD, Associate Professor
Leadership Assistant Medical Director, The Cincinnati Children’s Center for Simulation and Research
Research Interests Medical simulation; resuscitation; sepsis.

Michael Gittelsohn, MD, Professor
Leadership Co-Director, Comprehensive Children's Injury Center; Co-Director, Injury Free Coalition for Kids; Director, Injury Prevention and Advocacy Resident Course
Research Interests Injury control; behavior change counseling; community prevention.

Selena Hariharan, MD, MHSA, Associate Professor
Leadership Clinical Leadership Team; Interim Associate Medical Director, Burnet ED
Research Interests Prevention and health care delivery issues.

Srikant Iyer, MD, MPH, Associate Professor
Leadership Clinical Leadership Team; Assistant Vice President, HNCC Quality and Operations Improvement
Research Interests Systems and process improvement; patient flow, acute ED pain management.

Laurie H. Johnson, MD, MS, Assistant Professor
Research Interests Asthma; resuscitation.

Stephanie Kennebeck, MD, Associate Professor
Leadership EPIC IT Leadership
Research Interests Quality care; informatics use in ED.

Benjamin Kerrey, MD, MS, Assistant Professor
Research Interests Improving the process and outcomes of intubation of pediatric emergency patients; the use of high-fidelity simulation to study and improve systems of care for critically ill pediatric emergency patients.

Pamela Lachniet, MD, PhD, Assistant Professor
Research Interests Sports medicine; pediatric emergency medicine.

Melinda Mahabey-Gittens, MD, MS, Professor
Research Interests Adolescent tobacco prevention; adult tobacco cessation; intervention development.

Matthew Mittiga, MD, Assistant Professor
Leadership Associate Fellowship Director
Research Interests Resuscitation team training and communication; critical care in the pediatric ED; pediatric airway management/complications; resident and fellow PEM education.

Eileen Murtagh Kuroski, MD, MS, Assistant Professor
Research Interests Emergency care of adult patients with chronic childhood illness; implementation of evidence-based care and quality improvement.
Wendy Pomerantz, MD, MS, Professor
    Leadership Co-Director, Injury Free Coalition for Kids; Co-Director, Safety Resource Center
    Research Interests Injury and poison prevention; epidemiology; geographic information systems; playground related injuries and emergency medical services.

Jennifer Reed, MD, Associate Professor
    Research Interests Adolescent ED health issues; STI testing and treatment; adolescent research consent challenges; quality improvement.

Scott Reeves, MD, Associate Professor
    Leadership Liberty Campus ED Medical Director; Quality Research Focus Team Leader; Clinical Leadership Team
    Research Interests Quality care; evidence-based care; acute ED pain management.

Tara Rhine, MD, MS, Assistant Professor
    Research Interests Variations in care and outcomes for children with traumatic brain injury; advancing the emergency department care of very young children with traumatic brain injury.

Andrea Rinderknecht, MD, Assistant Professor
    Research Interests Critical care in the pediatric ED; resuscitation team training and communication; pediatric airway management/chest complications; health services ED use across diseases/referrals.

Charles J. Schubert, MD, Professor
    Leadership Associate Director, Pediatric Residency Training Program - Global Health
    Research Interests Global child health and vulnerable populations.

Hamilton P. Schwartz, MD, Associate Professor
    Leadership Medical Director, Transport Team; Medical Director, Statline; Pediatric Medical Director, Cincinnati Fire Department
    Research Interests Pediatric EMS and transport medicine.

Brad Sobolewski, MD, MMed, Assistant Professor
    Leadership Coordinator Emergency Department Resident Education
    Research Interests Education, technology and multimedia.

Richard Strait, MD, Associate Professor
    Research Interests Early immunologic response to infectious disease; immunologic response to anaphylaxis; procedural sedation.

Nathan Timm, MD, Associate Professor
    Leadership Cincinnati Children’s Emergency Preparedness Officer; Clinical Leadership Team
    Research Interests Hospital emergency management; quality care; overcrowding in ED.

Lisa Vaughn, PhD, Professor
    Research Interests Cross-cultural psychology issues especially with Latinos, women and children; community-based participatory research; international global studies; social psychology related.

Shan Yin, MD, MPH, Assistant Professor
    Leadership Medical Director, Drug and Poison Information Center
    Research Interests Pediatric toxicology.

Joint Appointment Faculty Members

Evaline Alessandrini, MD, MSCE, Professor (James M. Anderson Center for Health Systems Excellence)
    Research Interests Outcomes and risk-adjustment in pediatric emergency care; quality measurement.

Kate Berz, DO, Assistant Professor (Sports Medicine)
    Research Interests Sports medicine.
**Gregory Walker, MD**, Assistant Professor (Sports Medicine)

**Research Interests** Physical inactivity in youth; running mechanics and shoe wear in youth and the link to risk for acute and chronic injury in all sports.

**Clinical Staff Members**

- **Mary Jo-Ellen Erickson, MD**, PEM Trained
- **Catherine Gouldin, MD**, PEM Trained
- **Lisa Lewis, MD**, PEM Trained
- **Margaret Orcutt-Tuddenham, DO, Clinical Leadership Team**, Pediatric and EM Trained; Medical Director, Urgent Cares; Clinical Leadership Team;
- **Kristen Paddon, MD**, PEM Trained
- **Kirsten Ahrens, MD**
- **Amber Anastasi, MD**
- **Arash Babaoff, MD**
- **Kelly Bennett, MD**
- **Eunice Blackmon, MD**
- **Scott Bolton, MD**
- **Kamali Bouvay, MD**
- **Michael Chua, MD**
- **Lizbeth Dammert Gonzalez, MD**
- **Jenny Lynn DeBruer, MD**
- **Emily Eagen, MD**
- **Nafeh Fananapazir, MD**
- **Kathryn Gieselman, MD**
- **Kerry Gorman, MD**
- **Jennifer Hellmann, MD**
- **Laura Howell, MD**
- **Emily Kelleher, MD**
- **Joanna Nacopoulos, MD**
- **Matthew O'Rourke, MD**
- **Jennifer Porter, MD**
- **Janice Roeder, MD**
- **Rima Rusnak, MD, Clinical Leadership Team**, ED Clinical Leadership Team
• Lori Schroeder, MD, PhD
• Agata Slosar, MD
• Kristin Stackpole, MD
• Karen Sullivan, MD
• Karen Szczepanski, MD
• Elizabeth Templin, MD
• Gregory Walker, MD
• Evan Yeung, MD
• Angela Brown, RN, CNP
• Katrina Fananapazir, MA, RN, CPNP
• Karen Ford, MSN, CPNP
• Jamie Gerdemann, CPNP
• Kristina Kaufmann, RN, CNP
• Jennifer Kelley, MS, CNP
• Natalie Lingren, MSN, RN, CPNP
• Julie Miller, PhD, MSN, APRN, PNP-BC, FNP-C
• Amy Mulcahy, CPNP, MSN
• Sara Newman, MSN, CNP
• Stacie Richmond, MSN, CNP
• Michelle Schrand, MSN, CNP
• Molly Stenger, MSN, CPNP
• Anika Surratt, MSN, CPNP
• Michelle Wiedeman, DNP, APRN, CPNP, PC/AC, CPEN, Clinical Leadership Team

Trainees
• Kari Schneider, MD, PL-VI, St. Louis Children’s Hospital, St. Louis, MO
• Steven Chan, MD, PL-VI, Children’s Hospital Pittsburgh, Pittsburgh, PA
• RoseAnn Cyriac, MD, PL-VI, Washington University, St. Louis, MO
• Constance Gong, MD, PL-VI, Emory University School of Medicine, Atlanta, GA
• Holly Hanson, MD, PL-V, Northeast Ohio Medical University, Rootstown, OH
• Emily Sterrett, MD, PL-VI, Eastern Virginia Medical School, Norfolk, VA
• Adam Vukovic, MD, PL-VI, University of Cincinnati College of Medicine, Cincinnati, OH
- **Paria Wilson**, MD, PL-V, University of Louisville School of Medicine, Louisville, KY
- **Emily Fain**, MD, PL-IV, Cincinnati Children's Hospital Medical Center/University of Cincinnati College of Medicine, Cincinnati, OH
- **Theresa Frey**, MD, PL-IV, Washington University/St. Louis Children's Hospital, St, Louis, MO
- **Erin Hoehn**, MD, PL-IV, Cincinnati Children's Hospital Medical Center/University of Cincinnati College of Medicine, Cincinnati, OH
- **Lauren Riney**, DO, PL-IV, Rainbow Babies and Children's Hospital, Cleveland, OH

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**Grants, Contracts, and Industry Agreements**

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**Current Year Direct**  
$1,603,933

**Total**  
$1,603,933
Some Antibodies Play ‘Back-Up Defense’ Against Kidney Disease in Mice

Immunologists have long known that some antibodies are highly capable of identifying and disabling foreign substances inside the body — called antigens — by clumping them together and removing them from the body by activating complement and binding to antibody surface receptors, called FcgRs, on cells.

In a Nov. 2, 2014, study published online in *Nature*, researchers led by Richard Strait, MD, have discovered that certain types of antibodies — even though they do not activate, complement or interact strongly with activating antibody receptors — still play critical roles in clearing these antigens from the body and preventing disease.

Strait’s study, co-published with several other investigators including senior author and his mentor, Fred Finkelman, MD, Division of Immunobiology, looked specifically at kidney disease associated with the interaction of antibodies with antigen in mice. In normal healthy mice, antigen exposure did not cause disease. However, in mice genetically deficient in IgG1, the most abundant subtype of antibody and roughly equivalent to human IgG4, antigen exposure resulted in developing a fatal kidney disease.

The fatal kidney disease arose secondary to the occurrence of large and numerous cryoglobulin complexes made from the interaction between the antigen and the antibody subtype IgG3. These complexes proceeded to obstruct blood flow to the kidney, eventually causing organ failure and death.

Cryoglobulins also are responsible for kidney damage and other tissue injury in hepatitis C and other diseases. Providing IgG1 back to IgG1-deficient mice prevented cryoglobulin development and saved the mice. Of extreme interest is that the IgG1 performed this disease prevention independent of the usual involvement of the complement system and the antibody receptors.

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**RESEARCH AND TRAINING DETAILS**

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*Nature*
This figure demonstrates *in vivo* how the addition of antigen-specific IgG1, IgG2a or IgG2b intravenously in increased amounts differentially prevents kidney disease (as measured by proteinuria) invoked by antigen plus antigen-specific IgG3 immune complex precipitation in the capillaries of the glomeruli.