



## PEDIATRIC NEPHROLOGY FELLOWSHIP TRAINING PROGRAM



### Department Websites

- [MUSC Shawn Jenkins Children's Hospital | Charleston SC \(musckids.org\)](https://www.musckids.org)
- [Pediatric Nephrology | MUSC Health | Charleston SC \(musckids.org\)](https://www.musc.edu/health)
  - [Pediatric Nephrology Fellowship | College of Medicine | MUSC](https://www.musc.edu/college-of-medicine)



## *Welcome to Pediatric Nephrology Program!*

We are glad you are virtually visiting the Pediatric Nephrology fellowship training program at MUSC. The enclosed information should help acquaint you with our program. Interviewing for fellowship positions is an exciting experience. Even though you are not able to physically visit Charleston your interview day should still be enjoyable and informative. We hope to give you that experience virtually this year!



You will have the opportunity to meet and talk with our staff and faculty. Because we do not have fellows yet, we are going to host two optional meet and greet with fellows from other divisions that will be scheduled. We are proud of the care we provide to the children of South Carolina and the region. Please ask anyone here about the division and community.

If, during or after your interview, you have questions about the program, please feel free to contact any of our faculty. Their contact information can be found on the website ([www.musckids.org](http://www.musckids.org)). Also, you can contact us through our Education Program Coordinator, Caroline McElveen (843-792-0269 or [mcelveec@musc.edu](mailto:mcelveec@musc.edu)). Meet our team!



## Meet our Team



- Katherine Twombly, M.D.
- Chief, Pediatric Nephrology
- Medical Director, Pediatric Kidney Transplant
- Program Director, Pediatric Nephrology Fellowship
- Pediatric Nephrology fellowship-UT Southwestern/Children's Medical Center Dallas



- Oana Nicoara, M.D.
- Medical Director Pediatric Dialysis
- Pediatric Nephrology Fellowship-Boston Children's Hospital/Harvard Medical School-2015



- Dave Selewski, M.D.
- Director, Acute Care Services
- Pediatric Nephrology fellowship-University of Michigan, Ann Arbor, MI



- Anita Tambay-Perez, M.D.
- Pediatric Nephrology fellowship-Children's National Medical Center – Washington, DC



- Alli Anonino, M.D., MPH
- Pediatric Nephrology fellowship-Emory University School of Medicine, Atlanta, GA



- Naajah Hughes, B.S.N., D.N.P.
- BS in Nursing, Univ of North Florida
- DNP- MUSC



Stacy Sipple BSN, RN  
Nephrology Nurse Coordinator



Kimberly Marie Lewis  
Administrative Assistant

## Fellowship Overview

The fellowship is intended for physicians to acquire particular expertise and skills in clinical practice, teaching, investigative research and administrative functions related to the field of pediatric nephrology. The clinical information and skills acquired during residency training will sharpen and focus as the fellow gains new knowledge and experience pertinent to the management of children with kidney disease. The fellow will participate in teaching of both trainees and families. An understanding of clinical research will be fostered through course study in research design and the development and execution of a research project. In addition, exposure to the administrative aspects of managing a team will be afforded the fellow during the years of training.

## Clinical Facilities/Experience

MUSC Children's Health serves as the comprehensive regional pediatric quaternary hospital for Charleston and the surrounding area. The new Shawn Jenkins Children's Hospital which opened February 2020 contains 250 beds, an increase of nearly 20 percent over the previous hospital.



Unique features include:

- an entire floor dedicated to the care of children with heart problems
- a comprehensive interventional program for non-cardiac surgical procedures housing six operating rooms, four procedure suites, and an MRI scanner specifically designed for the care of children
- a full top floor dedicated to the care of children with cancer and blood disorders, providing these longer-term patients with soothing views of Charleston and surrounding tidal areas
- 22,000 lb. rooftop helio-pad is engineered to accommodate the Coast Guard's new Jayhawk helicopter for emergency and disaster situations

All major subspecialties are represented at our institution with national recognition in the US News and World Report hospital rankings in 4 specialties. MUSC Health has invested more than 500 million dollars to expand the clinical mission of pediatric care in the region with the construction of the new Shawn Jenkins Children's Hospital and a new medical office building and ambulatory surgical center that opened in early 2019.

Every year the Pediatric Nephrology division provides 3200 outpatient visits, 2000 inpatient consults, 1200 inpatient acute dialysis days, 70 kidney biopsies, 5-10 HD patients, 5-10 PD patients, and 8-12 kidney transplants. Our pediatric transplant program is one of the best in the country with a <6 month waiting time and 100% one-year patient and graft survival.



*Schedule for fellows...*

**Schedule**

Block	1	2	3	4	5	6	7	8	9	10	11	12
Year 1	R	IP	R/OP	R	IP	R/OP	R	IP	R/OP	R	IP	R/OP
Year 2	R/OP	R	IP	R/OP	R	IP	R/OP	R	IP	R/OP	R	IP
Year 3	IP	R/OP	R	IP	R/OP	R	IP	R/OP	R	IP	R/OP	R



## *Fellowship Curriculum*

### **Research Experience**

All pediatric fellows participate in both in-person and on-line courses in Evidence-Based Medicine and Clinical Research Methods during their dedicated research months. In addition, fellows will be expected to attend and participate in regular journal club meetings, during which critical review of current literature pertinent to pediatric nephrology will be conducted. The Pediatric residents participate in an Evidenced-Based Medicine Curriculum throughout their three years of training; the fellows will be encouraged to attend these weekly educational conferences and review of current literature. MUSC and GME also create regular conferences pertinent to fellows and their gaining knowledge in these endeavors.

Fellows will be expected to design and implement a research project during their three-year fellowship which will satisfy the “Meaningful Accomplishment in Research” requirement of the American Board of Pediatrics in order to sit for the Sub-board examination in Pediatric Nephrology.

Fellows entering the training program are not assigned to a research program. From discussions with faculty, educators and clinicians, the fellow is expected to identify a research question and a mentor to assist the fellow in addressing that question. We firmly believe that the project must be of the interest of the fellow, or it is not worth pursuing. This mentor must be responsible for providing the ongoing formative feedback that is essential to the trainee’s attainment of competence in clinical care, teaching and scholarship. The first block of the first year is dedicated to finding this project.

Each fellow will have a scholarship oversight committee (SOC) with appropriate expertise in scholarly research endeavors; the SOC will be appointed during the first year of fellowship. The mentor and SOC will ensure global scholarly success as mentioned above. We expect that fellows will submit their completed research projects to a national meeting for presentation, and if accepted will be supported by our division to present at the conference.

### **Teaching Experience**

Fellows will prepare and present instructional lectures to students, residents, nurses, and other medical personnel (e.g., nurses and medical assistants) on topics related to pediatric nephrology.

Pediatric fellows as a whole participate in a Teach the Teacher course which focuses on improving the skills of feedback and mentorship to name a few. In addition, MUSC’s Center for Academic Excellence collaborates with all Pediatric Fellowship Directors to provide resources for Peds fellows in specific courses such as developing a CV, how to conduct small group discussions, professionalism, scholarly publication preparation etc. Fellows have the opportunity to teach and mentor residents as well as medical students in several College of Medicine teaching courses. Fellows can also elect to participate in a certificate program

awarded by GME titled Certificate as a Clinician-Educator which expands formal instruction in teaching and provides an opportunity to be mentored in an educational research project.

### **Administrative Experience**

Fellows will participate in inter- and intra-departmental meetings as they relate to the Pediatric Nephrology and are of interest to the individual fellow. As part of this process, policies and procedures will be developed and reviewed. We encourage the fellow to choose multi-disciplinary committees or project development teams that support their interest within our field. Fellows have many opportunities and resources to perform and evaluate the success of Quality Improvement projects which impact operations in both the Pediatric Nephrology and the Children's Hospital as a whole. As an employee of MUSC, one is given free access to the Institute of Healthcare Improvement's course offerings including Quality Improvement, Patient Safety and Leadership.

### **Educational Conferences**

Every week there is time set aside for fellowship educational conferences. The format will vary week-to-week but will include: didactic lecture presentations from faculty within the department and faculty from other disciplines on topics germane to pediatric nephrology; review of sections of pediatric nephrology board specifications; case conference presentations such as morbidity and mortality; research conferences; and critical review of contemporary articles taken from a variety of academic journals. Fellows take an active role in Fellows Conference with presentations on topics relevant to M&M case review, and pathology. This will allow some administrative and teaching experience. A current fellows conference schedule is included for your review.

### **Weekly Conferences**

- Department of Pediatrics Grand Rounds Fridays 8-9am
- Weekly Pediatric Fellow Core Curriculum Lectures (ABP content outline for Pediatric Nephrology and journal club) Fridays 3-4pm
- Inpatient case discussions/sign out- Fridays 4-5pm
- Adult/Pediatric Nephrology Grand Rounds/Core Curriculum Lectures daily 12-1pm

### **Monthly Conferences**

- Pediatric Transplant Conferences – Selection Committee Meetings (2<sup>nd</sup> Thursday 4-5 pm)
- Monthly Pathology Conferences (4<sup>th</sup> Wednesday 1-2 pm)
- Monthly Pediatric Nephrology/radiology/urology Conference (4<sup>th</sup> Wednesday 730-830am)
- Fellows' Core Curriculum Conference 1-2 pm on 1<sup>st</sup> Fridays

### **Quarterly Conferences**

- Divisional Faculty/Fellow Research Review
- Quarterly M&M
- ESRD conference/QAPI – every 3 months on the 2nd Wednesday of that month 2-3pm
- Transplant QAPI-every 3 months on the 4<sup>th</sup> Wednesday of that month 2-3pm

## **Research Activities**

In 2005, MUSC opened the new **Darby Children's Research Institute**. This world-class institution is home to cutting edge research in pediatric cardiology, endocrinology, oncology, prenatal nutrition, and obesity. The Pediatrics department received \$9.3 million in research grants this year with 45 different principal investigators. It is one of 15 buildings in the country dedicated to children's research. Available Clinical/Basic/Translational research opportunities are listed below.

*"Guidance and the necessary resources are readily available for any resident interested in research."*

Hayden Zaccagni,  
Former Resident



### **Katherine Twombly, MD**

-*Cure Glomerulonephropathy (CureGN)*- Sponsored by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health (NIH), and NephCure Kidney International for the study of minimal change disease (MCD), focal segmental glomerulosclerosis (FSGS), membranous nephropathy (MN), and immunoglobulin A nephropathy (IgAN), which aims to improve the diagnosis, treatment and outcomes of patients affected by these diseases. This study has a large biobank and database of pediatric patients that a fellow can use to develop a research project.

- *Nephrotoxic Injury Negated by Just-In-Time Action (NINJA)*- Sponsored by the Agency for Healthcare Research and Quality (AHRQ). QI study to test a new approach to spread a medication safety intervention ('NINJA') and reduce more harm by planning for critical contextual and implementation factors during scale-up. Using routine surveillance of medications, lab monitoring, and changes in medication regimens, NINJA reduced nephrotoxic medication related Acute Kidney Injury (NTMx-AKI) by 62% at one hospital. In an AHRQ-funded prospective mixed methods study, four hospitals did not reduce AKI at all while five hospitals reduced AKI by over 50%.



- *Improving Renal Outcomes in Transplantation (IROC)*- IROC is a network-based learning health system of patients and families, clinicians, and researchers from the most advanced pediatric institutions in the country. This collaborative works together to solve difficult problems for children with kidney disease by sharing best practices and data regarding care, applying quality improvement methods, and engaging in research to improve health outcomes.

**David Selewski, MD**

- *Prepare-NS*- FDA funded grant to develop a patient reported outcomes standard reporting tool for the FDA to use in patients with nephrotic syndrome and fluid overload.

- *Nephrotic Syndrome Study Network (NEPTUNE) study*: MUSC is a participating site in NEPTUNE. The NEPTUNE study is collaborative investigational infrastructure of over 25 North American sites for conducting clinical and translational research in Focal Segmental Glomerulosclerosis (FSGS), Membranous Nephropathy (MN), and Minimal Change Disease (MCD). NEPTUNE provides prospective, un-blinded, standardized evaluation of clinical and molecular outcomes in two cohorts: 1) adults and children with incident, biopsy-proven FSGS, MCD, or MN, recruited at the time of first biopsy, and 2) children with incident NS without a diagnostic kidney biopsy (Nephrotic Syndrome Study Network - NEPTUNE ([neptune-study.org](http://neptune-study.org))).

- *Pediatric Nephrology Research Consortium (PNRC)*: Dr. Selewski is the site lead for this multicenter consortium. The PNRC currently includes over 100 participating sites and is dedicated to supporting research in pediatric nephrology. Their primary goals include the development and execution of multi-center retrospective and prospective clinical and translational studies addressing important clinical problems faced by nephrologists. The PNRC also is dedicated to providing opportunities for pediatric nephrology fellows and junior faculty to participate in multi-center clinical and translational studies and publications to enhance their career development (Pediatric Nephrology Research Consortium - Home ([pnrconsortium.org](http://pnrconsortium.org))).

- *Neonatal Kidney Collaborative (NKC)*: I am one of the founding members and currently sit on the steering committee for the Neonatal Kidney Collaborative (NKC - Neonatal Kidney Collaborative - Official Site | [babykidney.org](http://babykidney.org)). This multicenter (> 35 sites) multidisciplinary group is dedicated to the multicenter study of neonatal critical care nephrology and neonatal acute kidney injury. This research group has published the seminal work in neonatal AKI, the Assessment of Worldwide Acute Kidney Injury Epidemiology (AWAKEN) study in neonates (*Incidence and outcomes of neonatal acute kidney injury (AWAKEN)*): a multicentre, multinational, observational cohort study - PubMed ([nih.gov](http://nih.gov))). This consortium remains very active in research, mentoring, education, and advocacy.

- *Prospective pediatric acute kidney injury research group (ppAKI NEXUS)*: This multicenter consortium is dedicated to the study of critical nephrology in children. This research group is multidisciplinary with expertise in pediatric nephrology, pediatric critical care, and pediatric cardiac critical care. This group published the seminal work evaluating the epidemiology and impact of acute kidney injury in critically ill children, the Assessment of Worldwide Acute Kidney Injury & Renal Angina Epidemiology (AWARE) study (*Epidemiology of Acute Kidney Injury in Critically Ill Children and Young Adults* - PubMed ([nih.gov](http://nih.gov))).

- *Kidney Interventions During Membrane Oxygenation (KIDMO) study group*: Dr Selewski was founding member and former chair of this multicenter research consortium dedicated to studying acute kidney injury, fluid overload, and continuous renal replacement therapy in children on extracorporeal life support. This group remains active and has published over 10 publications of their multicenter work on the topic.

- *Neonatal and Pediatric Heart and Renal Outcomes Network (NEPHRON) study*: The Neonatal and Pediatric Heart and Renal Outcomes Network study is a multicenter, retrospective cohort study of consecutive neonates less than 30 days dedicated to understanding the incidence and impact of acute kidney injury and fluid overload in infants undergoing heart surgery for congenital heart disease. This

study just published its first two papers from a multicenter cohort of over 2000 infants undergoing congenital heart surgery including the definitive work evaluating the incidence and impact of acute kidney injury in this population (Epidemiology of Acute Kidney Injury After Neonatal Cardiac Surgery: A Report From the Multicenter Neonatal and Pediatric Heart and Renal Outcomes Network - PubMed (nih.gov) .)

**Oana Nicoara, MD**

- *Standardizing Care to Improve Outcomes in Pediatric Endstage Kidney Disease (SCOPE) collaborative collaborative*

prevents infections in children and adolescents on peritoneal dialysis and hemodialysis using large-scale collaboration to identify and spread effective interventions across pediatric care settings. SCOPE is recognized as evidence-based, data-driven, effective, and methodologically robust by leading organizations and is affiliated with the Children's Hospital Association. There is also a new partnership with Nationwide Children's to test the role of AMPs and other components of our immune system as biomarkers of peritonitis in patients receiving chronic peritoneal dialysis that fellows can participate.

**Omar Moussa, PhD. and Katherine Twombly, MD-** Translational Research: Transplant renal allografts do not last forever, with the most common cause of renal allograft loss being antibody mediated rejection (AMR). Currently, the only way to detect transplant renal antibody allograft injury is by measuring serum creatinine, donor specific antibodies (DSA), and doing a renal allograft biopsy, but biopsies are invasive and timely. Urine is a highly desirable median for the study of biomarker analysis because it can be easily collected multiple times by non-invasive techniques in significant volumes in any age patient. Urine contains cellular components, biochemicals, and proteins that reflect the allograft's metabolic and pathophysiologic state at the time it is collected. Unfortunately, there is a dearth of information about the urine proteome/peptidome. Exosomes offer a potential viable solution.

Exosomes are extracellular vesicles that are secreted by cells in times of stress or activation of the cell and can be found in a wide range of biological fluids including urine. Exosomes contain content that represent the state of the secreting parent cell, so examining them can give valuable information about what is going on in tissue and could provide the same information as a biopsy noninvasively.

**Denis Guttridge, PhD.** Basic Science Research- Denis is the director of DCRI. Denis is exploring mechanisms of cachexia in cancer patients and is looking at a cytokine called GDF15. There's two Ab against this cytokine (one against the ligand, the other against the receptor) that's in clinical trial for cachexia. We're testing the Pfizer antibody in our mouse model. He is now interested in exploring whether circulating levels of GDF15 can serve as a biomarker in kidney disease as we think it can in cancer cachexia. This could also be a marker of rejection in kidney transplant patients as there there's a high level of inflammation, you'll find elevated levels of GDF15.

**Dieter Haemmerich, PhD.** – Basic Science Research- Liposomes have been employed as cancer therapy clinically since the 1990s, with the primary benefit of reduced toxicity but no appreciable efficacy improvement. Thermosensitive liposomes (TSLs) are specifically formulated such that they release the encapsulated drug when exposed to hyperthermic temperatures in the fever range (~40-42°C) and have been investigated as cancer therapy for several decades, with first clinical trials initiated in the last decade. Combined with localized hyperthermia, TSLs allow precise drug delivery to a targeted region. Typically, the targeted tissue is exposed to localized hyperthermia facilitated by an image-guided hyperthermia device. Thus, TSLs enable image-guided drug delivery where drug is delivered to a tissue region identified by medical imaging. This therapy has a lot of potential for rejection in organ transplantation. Currently, when a patient has rejection of the graft, they get systemic anticoagulation which has systemic side effects including infections. This therapy would allow direct delivery of medication to the graft without the dangerous side effects.

**Takako Makita, PhD-** Her lab studies genetic and molecular mechanisms that control innervation of kidneys during embryogenesis, which could serve as a potential research project for the Pediatric

Nephrology fellows. Her research addresses molecular mechanisms that control establishment of the peripheral nervous system (PNS). A precise PNS circuitry is essential not only for neonatal survival but also for postnatal development and function throughout life. Furthermore, how the nervous system becomes correctly wired remains one of the major unexplained mysteries of biology. My lab uses mouse genetics and physiological assessment to dissect the biological roles of several signaling pathways in peripheral neural development, coupled with molecular and biochemical approaches to understand the underlying mechanisms in each process. All of these have direct application to human disease. Some of the current major projects include:

- (1) Sympathetic axon guidance to the heart, which is relevant to arrhythmia
- (2) Migration and fate specification of neural progenitors that populate the intestinal enteric nervous system, which is relevant to the congenital neurological disorder Hirschsprung disease
- (3) Synapse formation that influences glomerular morphogenesis and function in the kidney, which is relevant to kidney disease and renal transplant
- (4) Fate specification of neurons in the inner ear, which is relevant to congenital deafness Waardenberg-Shah syndrome.

*Plus...*

## Individual & Family Benefits

3 weeks of Annual Leave  
3 weeks of Sick Leave  
Maternity/Paternity Leave  
Health and Dental Insurance  
Optional Life Insurance

## Educational Benefits

- Full access to library, online journals and PubMed
- Monthly meal allowance
- Paid parking

**PG-4     \$63,384.00**  
**PG-5     \$66,456.00**  
**PG-6     \$68,773.00**

## *Living in Charleston*



### **Charleston is a great place to live!**

- Average daily high temperature of 74°F, average daily low temperature of 59°F
- Many superb restaurants (the Food Network has featured Charleston on its shows with Rachel Ray, Bobby Flay and Giada de Laurentis)
- Recognized as the “best-mannered” city in the country since 1995
- Has the 7<sup>th</sup> highest ranked high school in the country by Newsweek
- Fun and accessible minor league baseball and hockey teams (the Charleston Riverdogs and Stingrays)
- One of the top 10 aquariums in the country
- Spoleto Festival – America’s premier arts festival
- Recognized as one of the best cities for young professionals in America!





# CHARLESTON EATS



## Other fun things

- South Carolina Aquarium – *one of the best in the country*
- The Battery – *picturesque walkway along the southern edge of the downtown peninsula*
- Shem Creek – *bars and restaurants with a view of the intercoastal waterway and an occasional dolphin*
- Shopping on King Street – *a variety of boutiques and shops*
- Beaches – *Folly Beach, Isle of Palms, and Kiawah Island*
- Entertainment venues: Gaillard Center, Charleston Music Hall – *enjoy world class performances*
- History – *Charleston was founded in 1670 and has a rich historic background to explore*

## Some favorite downtown restaurants

- Indaco on King—*Superb Italian food. Fit for the Foodie!*
- Husk on Queen St—*lots of bacon (think Bill Murray)*
- Obstinate Daughter on Sullivan’s Island—*Sunday brunch is a must.*
- Poe’s on Sullivan’s—*named after our former resident author; burgers*
- Taco Boy downtown or Folly Road
- Monza on Upper King—*awesome pizza*
- Darling Oyster Bar – *Radcliffeborough seafood bar*
- Leon’s – *fantastic local seafood*
- Rue de Jean on John Street- *French brasserie and great for drinks*
- FIG-*farm to table at its best*
- Tattooed Moose- *Duck Club with Duck Fat Fries*
- Barsa on King – *Did anyone say tapas?*
- Rodney’s Scott’s BBQ- *need we say more?*



DARLING OYSTER BAR



Rodney Scott Cooking His World-Famous BBQ!!



Thanks for visiting!