



The Division of Nephrology at the Medical University of South Carolina (MUSC) has a long and notable history in the study of and potential treatments for kidney disease. Under the leadership of **Josh Lipschutz, M.D.**, the division enjoyed another productive year marked with accomplishments in education, research, and patient care.

With a team of nationally renowned faculty, the Division of Nephrology is consistently among the highest-ranked programs in the country. There are currently 24 faculty members in the division with a wide range of clinical expertise and a robust research portfolio.

Clinical faculty provide a complete range of consultative, diagnostic, and treatment services for patients with kidney disease. Fourteen general nephrologists, along with four APPs, see patients at Ashley River Tower, MUSC University Hospital, and the Ralph H. Johnson VA Medical Center. Clinical patients are seen at six MUSC clinic locations in the Lowcountry and seven dialysis units, which are managed in

partnership with Dialysis Clinic Incorporated (DCI).

Under the direction of Transplant Nephrology Section Chief **Vinaya Rao, M.D.**, and Transplant Surgery Division Director **Derek DuBay, M.D.**, the Kidney Transplant Program at MUSC continues to expand and performs over 300 transplants per year. The division now has four transplant nephrologists and four transplant APPs.

In addition, faculty members are actively involved in innovative basic science, outcomes, and clinical research aimed at better treatment options as well as prevention of kidney-related health issues. The division hosts a flourishing fellowship program that supports 10 general nephrology fellows and one transplant nephrology fellow. The publications, honors, and grant funding received by division faculty this year highlight the quality and ingenuity of work being done in the division to advance cures for kidney disease through scientific discoveries, cutting-edge treatments, and renal transplants.

300
KIDNEY
TRANSPLANTS
PER YEAR

600 Division faculty cared
for over 600 chronic
dialysis patients at six DCI outpatient
hemodialysis units, the DCI home dialysis
program, and the VAMC in 2020.

\$1.7M
FY20
RESEARCH
EXPENDITURES



Division of Nephrology
Department of Medicine

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Our Providers

On the Cover: *Fellowship
Director Ruth Campbell, M.D.
(center) with nephrology fellows
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muscd.edu/nephrology

MESSAGE FROM THE DIRECTOR



As I write this letter we are in the midst of unprecedented times, a global pandemic due to SARS CoV-2. Over the past 10 months, I have been inspired daily by my team's ingenuity, creativity, and commitment to excellence in the face of this pandemic, as they continue to find innovative solutions to care for our patients, conduct research, and educate our fellows.

During this crisis, the Division of Nephrology has continued to flourish over the past year. In fact, in spite of the many challenges COVID-19 has presented in academic medicine, we have continued to provide health care services using best-practices to protect the health of our patients and care teams. Our world-class faculty have made outstanding contributions in research and scholarship, education, and clinical care.

In FY20, the division's aggressive pursuit of external funding was rewarded: two new NIH R01s and a VA Merit grant were secured and eight non-competing grants were renewed. The division continues to have a robust clinical presence, and in FY20, approximately 20,000 outpatient visits were made to our nephrology clinics. In response to the pandemic, our clinical care team rapidly transitioned from in-clinic visits to telehealth visits, with our providers now seeing 30% of our general nephrology patients and 75% of our transplant patients via virtual visits.

Seamless integration of education has been the hallmark of the division's activities, as we mentor and train the next generation of academic leaders in nephrology. Our competitive fellowship program offering five first-year positions attracted many outstanding applicants this year.

The current times stretch us, but the achievements presented in this report underscore our strength and commitment to meet the challenges of the pandemic in our mission to provide exceptional care for all.

Josh Lipschutz, M.D.
Professor and Director, Division of Nephrology
Department of Medicine

Six Convenient Locations:

Downtown Charleston Clinic
135 Rutledge Avenue, 9th Floor
Charleston, SC 29425

East Cooper Medical Pavilion
1600 Midtown Avenue
Mount Pleasant, SC 29464

MUSC Health - Nexton
5500 Front Street, Suite 320
Summerville, SC 29483

West Ashley Medical Pavilion
2060 Sam Rittenberg Boulevard
Charleston, SC 29407

Rutledge Transplant Clinics
135 Rutledge Avenue, 9th Floor
Charleston, SC 29425

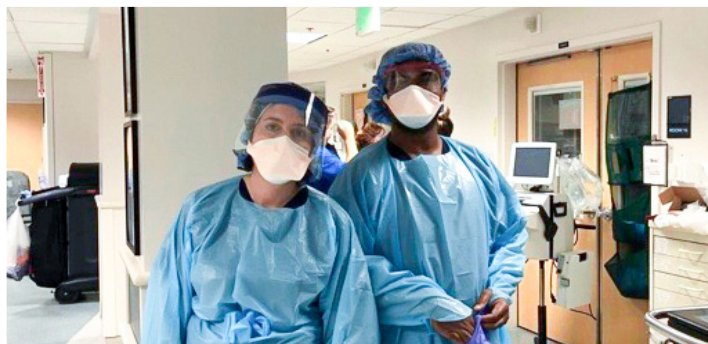
Beaufort Port Royal Dialysis Clinic
8 Presnell Circle
Beaufort, SC 29906

Call for Appointments:

MUSC Nephrology Clinics:
843-792-9200

MUSC Kidney Transplant Clinics:
843-792-6100

DIVISION-WIDE COVID-19 RESPONSE



L-R: Blaithin McMahon, MB.BCh.BAO, Ph.D., and Anand Achanti, M.D.



Maria Aurora Posadas Salas, M.D., (left) demonstrating kidney biopsy at the MUSC Simulation Lab with first year nephrology fellows.

Outpatient Care:

The Nephrology Division in partnership with Dialysis Clinic, Inc (DCI), runs seven outpatient hemodialysis units with approximately 600 patients who require dialysis 3-4 times per week. Dialysis is an essential, life-prolonging service which means there is no such thing as quarantine for dialysis patients. Early in the pandemic, MUSC Nephrology in conjunction with DCI leadership put new protocols into place to protect both our patients and the staff who take care of them. One protocol that was deemed critical was to screen patients as soon as they entered the dialysis unit. The division developed screening and reporting tools to monitor the status of our patients. When identified, symptomatic patients were isolated from other patients, and if a center had more than one COVID-19 positive patient, those patients were grouped on the same shift for dialysis.

Additionally, the division created a daily process of arranging COVID testing for DCI staff who were exposed to COVID-19 and at high-risk for the disease. This herculean effort was led in part by **Megan Slappe, MSN, FNP-BC**, nurse practitioner. “Megan managed a daily roll call so any of our at-risk clinical support staff were identified and tested in an expedited manner to ensure our dialysis patient care was not compromised,” said Sandra Hurley, former nephrology division administrator.

The team quickly transitioned in-clinic visits to virtual telehealth visits, whenever possible, to ensure continuity of care to our patients. On the educational front, Fellowship Director **Ruth Campbell, M.D.**, redesigned the nephrology fellowship curriculum to virtual platforms and led the transition to virtual interviews in the fall.

“Our entire division has met this crisis with fortitude, fellowship and resiliency, and I’m grateful to each of them for their devotion to both the patients we care for and each other,” said Lipschutz. “Despite the challenges that remain, I am confident that as a division, we will emerge in unison and stronger than ever.”

Since the onset of the COVID-19 pandemic in early March, the Division of Nephrology has responded in innovative and collaborative ways to provide premier health care services to our patients, safe work environments for our faculty and staff, and vital training to our fellows.

The COVID-19 pandemic has had a disproportionate effect on patients with and at risk of kidney disease. Patients with chronic kidney disease (CKD) are at high risk of SARS-CoV-2 infection and COVID-19-associated mortality, whereas acute kidney injury (AKI) is a frequent complication of COVID-19 and augments mortality in infected patients, particularly in the ICU setting.

MUSC General Nephrology runs five busy consult services: one at the Ralph H. Johnson VA Memorial Hospital, two at Ashley River Tower, and two at Main University Hospital downtown. During the course of the pandemic, all three hospitals saw a surge in the demand for kidney replacement therapy (KRT) for both patients with AKI and end stage kidney disease (ESKD).

Due to the exponential increase in patients requiring these life-sustaining therapies, MUSC nephrology quickly adapted clinical workflows to accommodate increased clinical volumes by using prolonged intermittent kidney replacement therapies and acute peritoneal dialysis, as well as other strategies to augment dialysis resources and capabilities.

“At times throughout the pandemic, the number of patients we saw in the ICUs rose significantly, but we had protocols in place to handle the increased volume and dedicated faculty and health care providers across our division who stepped up to the challenge,” said **Josh Lipschutz, M.D.**, professor and director of the nephrology division. “It has been a group effort, with each of us playing a vital role in what has been a historic and unprecedented response to the COVID crisis.”

NEPHROLOGY CLINICAL RESEARCH AT MUSC

Clinical research is central to good health, increasing life expectancy, and reducing the burden of chronic diseases. Only through clinical research can we gain insights and solutions about the safety and efficacy of new medications and therapies. The challenge of recruiting clinical trial participants has serious implications for the success or failure of research. For patients living with kidney disease this is more important now than ever, as the number of patients with chronic kidney disease continues to rise.

The Division of Nephrology maintains a robust clinical research program with a wide variety of ongoing studies investigating new approaches to care for patients with or at risk of kidney disease. Expanding clinical research opportunities and increasing visibility of the division's clinical trials programs are a major focus area for **Blaithin McMahon, MB.BCh.BAO, Ph.D.**, who serves as the director of nephrology clinical research at MUSC.

The nephrology clinical trials program at MUSC is committed to bringing patients novel and innovative treatment options, especially for those patients who have no specific treatment options other than supportive or standard-of-care approaches.

“Our team carefully vets new clinical trials to choose only those studies that show the most promise and are the best fit for the needs and resources of our area,” says McMahon. “This is particularly true for diseases such as IgA nephropathy, diabetic kidney disease, focal segmental glomerulosclerosis, and COVID-19-related acute kidney injury.”

CRRT Registry at MUSC

Unlike regular dialysis, which takes 3-4 hours, continuous



Dr. Blaithin McMahon (far-right) with senior research coordinators, Linda Walker (far-left) and Marcie Pregulman.

dialysis runs 24-hours a day and is increasingly used in intensive care units for patients with acute kidney failure. The safe and adequate delivery of continuous renal replacement therapy (CRRT) to critically ill patients is a paramount aspect of ICU care since the mortality rate for critically ill patients with acute kidney failure who need dialysis has been reported to be higher than 50 percent. There are limited publications in the literature on CRRT programs or observational studies directly related to the safe delivery of CRRT in the ICU. To assess outcomes related to CRRT, the nephrology research team combined efforts with the Biomedical Informatics Center and the South Carolina Clinical and Translational Research (SCTR) Institute at MUSC, to establish an extensive registry of acute kidney injury (AKI) patients who require CRRT and logged their outcomes. Additionally, the MUSC CRRT registry was combined with the Shared Health Research Information Network (SHRINE) AKI consortium which includes other CRRT registries from the University of Kentucky, UAB, and University of Arkansas.

The Urine Biobank at MUSC

The urine biobank at MUSC is a collection of over 1,000 urine specimens from various cohorts of patients that MUSC-affiliated researchers can use for urine biomarker studies and other diagnostic test development.

Mentorship of MUSC Nephrology Fellows in Clinical Research

The nephrology clinical research team works closely with the nephrology fellowship program to encourage fellows to engage in one clinical research project during their fellowship. The goal is to drive fellows to present abstracts at regional and national conferences during their training. Fellows can opt to engage in an epidemiology study or other study of choice and cross-collaboration with other disciplines of medicine and surgery is encouraged.

FEATURED ACTIVE CLINICAL TRIALS:

SBI-101 in COVID positive patients requiring continuous renal replacement therapy

Use of SB-101 (human mesenchymal stromal cells attached to a plasmapheresis device) in patients with severe acute kidney failure on continuous renal replacement therapy (Sentien Biotechnology). SBI-101 will be integrated into the dialysis circuit and will be run for up to 24 hours. Mesenchymal cells remain on the device but their regeneration products enter the patient. Mesenchymal cells have been shown to promote recovery and repair in early clinical studies.

ASCEND

The purpose of this study is to test how effective daprodustat is compared with darbepoetin alfa which has been approved to treat anemia. This study will assess how safe and effective this agent is in both our chronic dialysis patients and patients with chronic kidney disease.

VX19-NEN-801

This study determines how many patients with focal segmental glomerulosclerosis (FSGS) of African or Caribbean descent test positive for a genetic mutation called APOL1 (apolipoprotein L1). APOL1 is a naturally occurring gene that can be found in many organs of the body, including the kidneys. People with FSGS who have a mutation in APOL1 gene have a higher risk of losing kidney function and requiring life-long dialysis therapy. This information may help us understand how to better treat people with FSGS in the future.

VX19-147-101

This study is being done to learn more about the safety and effectiveness of agent VX-147 in subjects with APOL1-dependent FSGS. VX-147 is an investigational drug; “investigational” means the drug is not approved by the United States Food and Drug Administration (FDA) or the European Medicines Agency (EMA) in the European Union and is still being tested for safety and effectiveness.

Omeros

The purpose of this study is to test the effectiveness of OMS721 in people with IgA Nephropathy (IgAN). The study is a phase III drug study, meaning the OMS721 has passed previous study drug testing phases and is now being tested for proof of concept on a substantial number of patients for clinical effectiveness of OMS721 in treating IgAN. IgAN can be a progressive disease leading to end stage kidney disease for a proportion of patients with IgAN.

Alynlyam

This study is a Phase II clinical trial to investigate the safety and effectiveness of the investigational drug, cemdisiran, for patients with IgA Nephropathy.

Liposorber

The purpose of this study is to evaluate the LIPOSORBER® LA-15 System for treating primary focal segmental glomerulosclerosis (FSGS) that cannot be treated effectively with other currently available treatments, such as drug therapy and /or plasmapheresis. This treatment is for subjects who are not responding to standard treatment or have FSGS recurrence after kidney transplantation. Pre-clinical data suggests that this treatment reduces proteinuria and thereby could promote remission of the kidney disease.

CureGN

Cure GN is a large multi-center observational cohort of several different types of glomerular diseases, such as minimal change disease (MCD), FSGS, membranous nephropathy (MN), and IgAN. The purpose of CureGN is to establish the largest cohort of these glomerular diseases and create a valuable source of information including blood, urine and biopsy specimens to better understand these diseases.

For More Information on Clinical Trials:

The research program has two highly-trained senior research coordinators, [Linda Walker](#) and [Marcie Pregulman](#), who serve as a liaison between our patients and the research project. Both coordinators are extremely skilled and knowledgeable in the proper conduct of clinical trials and the necessary regulations to keep patients safe during their enrollment.

For further information on nephrology clinical trials at MUSC, please contact: **843-792-6109** or **843-792-8166** or email: walkerlp@musc.edu, pregulma@musc.edu.

RECENT NIH & VA FUNDING

The Exocyst in Ciliogenesis and Acute Kidney Injury

Josh Lipschutz, M.D., secured a VA Merit Review grant renewal to study how the exocyst protects against injury and enhances repair in mice, and to test possible treatments for AKI. Lipschutz was also made a Senior Clinician Scientist Investigator at the Ralph H. Johnson VA, which, among other things, extends this grant to eight years.

Physiological Role of the Vitamin A Transporter RBPR2 for Vision

Glenn Lobo, Ph.D., was awarded a four-year NIH/NEI R01 grant to test the novel hypothesis that the systemically expressed retinol binding protein receptor 2 (RBPR2) facilitates and regulates dietary vitamin A transport and hence physiologically plays an important role in photoreceptor health and vision.

FELLOWSHIP NOTES

The Division of Nephrology's ACGME-approved, two-year fellowship training program is directed by **Ruth Campbell, M.D.**, with the assistance of associate program directors **Anand Achanti, M.D.**, **Blaithin McMahon, MB.BCh.BAO, Ph.D.**, and **Natalie Freidin, M.D.** The division strives to provide a robust and innovative learning environment that promotes life-long learning.

Five clinical fellows are accepted into the training program each year. They are exposed to an extensive range of renal conditions and pathologies, including acute kidney injury, glomerulonephritis, hypertension, cystic kidney diseases, fluid and electrolyte disorders, nephrolithiasis, cardio-renal syndrome, chronic kidney disease, and kidney transplantation across multiple settings: inpatient consultation services, outpatient clinics, outpatient dialysis units, and the simulation center.

MUSC Nephrology utilizes the spectrum of dialysis modalities including hemodialysis, home peritoneal dialysis, continuous renal replacement therapy as well as plasmapheresis. Fellows develop expertise in all of these therapies. The advanced care provided at MUSC in the fields of transplant, heart failure, autoimmune disorders, oncology and critical care results in a rich learning environment.

All fellows are required to participate in clinical or basic research and are encouraged to submit their work to national nephrology conferences. Fellows are well prepared for practice in either an academic or clinical practice. Many graduates have chosen to pursue additional training in transplant nephrology or critical care.



(Back row, L-R): Samar Medani, M.D., Megan Goff, D.O., Maria Browne, M.D., Dariush Liske-Doorandish, M.D., Waleed Elsheikh Mohammed, MBBS; (Middle row, L-R): Joshua Harbaugh, D.O., Camilia Makhayoun, D.O., Sammy Nassri, M.D.; (Front row, L-R): Ruth Campbell, M.D., Genta Uehara, M.D., Kathy Clayton, Syed Quadri, M.D., and Blaithin McMahon, MB.BCh.BAO, Ph.D.

NEPHROLOGY APPS

General Nephrology APPs



Deborah Brooks, MSN, ANP-BC, CNN, CNN-NP
Nurse Practitioner
Named the 2020 APRN of the Year by the APP Council and APP Best Practice Center



Lindsey DeLoach, RN, MSN, ANP
Nurse Practitioner



Katherine McElmurray, ACNP
Nurse Practitioner



Megan Slappe, MSN, FNP-BC
Nurse Practitioner

Transplant Nephrology APPs



Chad Davis, MSN, FNP-BC
Nurse Practitioner



Lee Erbe, MSN, FNP-BC
Nurse Practitioner



Bridgette Kadri, PA-C
Physician Assistant



Mary Elizabeth Shearer, DNP, FNP-C
Nurse Practitioner



Muriel Labonte, RN, MSN, FNP-C
Nurse Practitioner

NEPHROLOGY FACULTY

General Nephrology Faculty



Anand Achanti, M.D.
Assistant Professor
Special Interests: Complement based kidney diseases and glomerulonephritis



Milos Budisavljevic, M.D.
Professor and Director, Apheresis Medical
Special Interests: Pathogenesis and treatment of glomerulonephritis; calciphylaxis; hemodialysis



Ruth Campbell, M.D.
Professor and Director, Nephrology Fellowship Program
Special Interests: Chronic kidney disease; diabetic nephropathy; medical education



Natalie Freidin, M.D.
Assistant Professor
Special Interests: CKD management; palliative care; nutrition and kidney disease; hypertension



Tibor Fulop, M.D.
Professor and Nephrology Section Chief, Veteran's Affairs
Special Interests: Peritoneal dialysis/home dialysis modalities; ICU nephrology and RRT



Florence Hutchinson, M.D.
Professor
Special Interests: Treatment of veterans with kidney disease; ethnic variations in healthcare delivery; glomerular disease



Zipporah Krishnasami, M.D.
Professor
Special Interests: Global healthcare; community outreach; acute kidney injury; chronic kidney disease



Josh Lipschutz, M.D.
Professor and Arthur Williams Chair in Nephrology, and Division Director
Special Interests: PKD; acute kidney injury; ciliogenesis

General Nephrology Faculty



Michael Madaio, M.D.
Professor
Special Interests: Immune-mediated kidney disease; lupus nephritis and other forms of glomerulonephritis



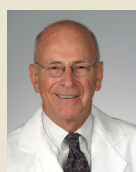
Albert Maniscalco, M.D.
Associate Professor
Special Interests: Dialysis efficiency and treatment



Blaithin McMahon, MB.BCh. BAO, Ph.D.
Assistant Professor
Special Interests: AKI; CRRT in the ICU; *Named 2020 Consult Teacher of the Year by the Dept. of Medicine*



Roberto Pisoni, M.D.
Associate Professor
Special Interests: Resistant hypertension; proteinuria; chronic kidney disease



David Ploth, M.D.
Distinguished University Professor
Special Interests: General nephrology; hypertension; renal vascular based hypertensive disease



Rachel Sturdivant, M.D.
Associate Professor
Special Interests: Management of chronic kidney disease; anemia of CKD; iron therapy for CKD; primary care of patients with ESRD



Michael Ullian, M.D.
Professor
Special Interests: Hypertension; peritoneal dialysis

Nephrology Research Faculty



Entesham Arif, Ph.D.
Assistant Professor
Special Interests: Glomerular diseases; podocyte biology; in-vitro and in-vivo models; preclinical studies; drug screening

Nephrology Research Faculty



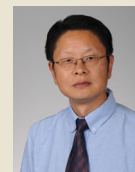
Wayne Fitzgibbon, Ph.D.
Associate Professor, Research
Special Interests: Hormonal regulation of renal function; mechanisms of renal disease;



Seok-Hyung Kim, Ph.D.
Assistant Professor
Special Interests: Inherited metabolic liver diseases; mTORC1 signaling in diseases; zebrafish

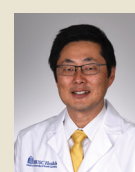


Glenn Lobo, Ph.D.
Assistant Professor
Special Interests: Retinal cell degeneration; ciliopathies of the eye and kidney; membrane receptors



Xiaofeng Zuo, Ph.D.
Assistant Professor
Special Interests: Polycystic kidney disease; acute kidney injury; ciliogenesis

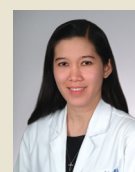
Transplant Nephrology Faculty



Michael Casey, M.D.
Associate Professor
Special Interests: Kidney transplantation; pancreas transplantation; immunotherapy



Vinaya Rao, M.D.
Professor and Medical Director, Kidney Transplant
Special Interests: Kidney and pancreas transplantation; immunotherapy; kidney transplant policy



Maria Aurora Posadas Salas, M.D.
Associate Professor
Special Interests: Kidney transplant; pancreas transplant; immunosuppression



Karim Soliman, MBBCh, MSc
Assistant Professor
Special Interests: Transplant nephrology; general nephrology immunology



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THE MUSC DEPARTMENT OF MEDICINE

Founded in 1824 in Charleston, The Medical University of South Carolina is the oldest medical school in the South. Today, MUSC continues the tradition of excellence in education, research, and patient care. MUSC educates and trains more than 3,000 students and residents, and has nearly 14,000 employees, including approximately 1,500 faculty members.

As the largest Department in the MUSC College of Medicine, the Department of Medicine provides essential leadership to numerous programs across the university, MUSC Health, and South Carolina. Our Department—made up of 10 divisions engaged in care at two hospital systems and multiple ambulatory practices—is guided by our vision to provide superior patient care, to educate the next generation of physicians, and to perform seminal discovery research.

Changing What's Possible