

Winter 2022

MUSC Division of Nephrology Annual Newsletter



Trying to find a new and novel solution to treat COVID-19-related AKI: SB-101 containing allogenic human mesenchymal stromal cells are set up in series with Baxter PrisMax dialyzer. This study assesses whether 24-hour exposure to products from the stem cells will promote kidney recovery and change inflammatory biomarker profile caused by COVID-19 in patients with severe kidney failure who require continuous dialysis in the intensive care unit. L-R: Jessie Ramirez, RN, Sean Durkin, M.D., Erin Glikes, RN BSN, and Blaithe McMahon, MB.BCh.BAO, Ph.D.

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 2020-2021 academic year was one of landmark growth and milestone achievements for the division's clinical programs and practice changing research.

With a team of nationally renowned faculty, the Division of Nephrology is consistently among the highest-ranked programs in the country. There are currently 26 faculty members (including five transplant nephrologists) 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. Providers 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).

The Kidney Transplant Program at MUSC continues to expand. In CY2021, the transplant team performed 410 kidney transplants, putting MUSC in the top five kidney transplant programs in the country for volume, with outstanding patient outcomes.

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.



Division of Nephrology
Department of Medicine

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musc.edu/nephrology

MESSAGE FROM THE DIRECTOR



While this most difficult year has tested our patience and resolve, our faculty and staff in the Division of Nephrology have remained resolute in our commitment to provide exceptional patient care through clinical outreach, innovation, and education.

Despite a year complicated with the COVID-19 pandemic, our general nephrology clinical programs have expanded substantially.

Division providers cared for over 425 chronic dialysis patients at seven DCI outpatient hemodialysis units and the DCI home dialysis program, as well as patients seen at the VAMC in 2021. Our clinical programs evolved to provide the best possible patient-centered approach. In FY21, approximately 11,498 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 35% of our general nephrology patients and 35% of our transplant patients via virtual visits.

In FY21, the division's aggressive pursuit of external funding was rewarded: six new grants were secured and eight were continued. 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 past year's extraordinary difficulty has not defeated us. In contrast, we have transformed the challenge into opportunities to develop innovative approaches to expand and enhance patient care, research and education programs and to challenge the status quo of health equity, racial and ethnic diversity, and what it means to be inclusive in our daily work. The future is exciting and bright, and we are ready. I could not be more proud to be a part of this incredible group and of the work we have accomplished this year.

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

TRANSPLANT NEWS

Kidney Transplant Program Helps More Patients with an Impressive Expansion of Services

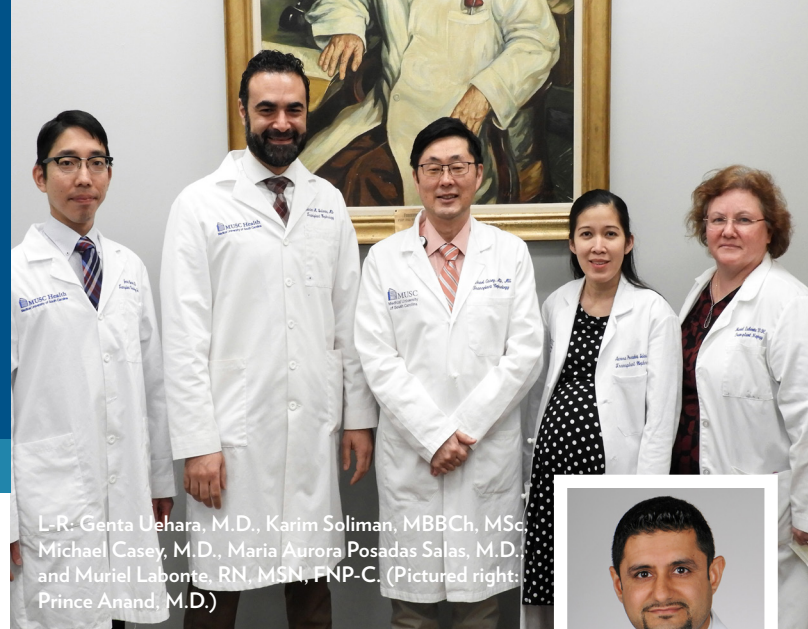
Article by Kat Hendrix, Ph.D.

It has been an unprecedented year of growth for the Kidney Transplant Program at MUSC. “It’s an exciting time,” says **Michael J. Casey, M.D.**, professor of medicine in the Division of Nephrology and interim medical director of Kidney Transplantation. “In 2021, we were one of the top five kidney transplant programs in the country for volume. We also broke last year’s record with 410 transplants in the last calendar year.” This impressive total is approximately three times higher than the average number of kidney transplants performed at other U.S. health centers where the procedure is available.

The program’s remarkable success is the result of long-term planning, adapting to new circumstances, and committing to expand the number of eligible patients and available donor organs.

In terms of planning, bringing new hospitals in the midlands and upstate under the MUSC Health umbrella has helped improve patients’ chances of getting on the kidney transplant waiting list and receiving an organ. In addition, a new MUSC Kidney Transplant Center will soon open in Lancaster, South Carolina. “This is an underserved area with a really great need. National data show that the lowest percentage of patients referred for transplant are from southern states like North and South Carolina,” says **Prince Anand, M.D.**, associate professor and medical director of Nephrology Transplant Services at the new Lancaster center. “Part of the reason is an overall lack of transplant services where they live. Many people don’t have the resources to make a three-hour trip to Charleston or have trouble completing the pre-transplant workup tests. Having this program right in their backyard makes all of that easier. We can coordinate with other local providers to get their pre-transplant and follow-up testing done in a more timely, convenient way.”

The new center also offsets geographic disadvantages due to changes in the national organ allocation system. “UNOS (United Network for Organ Sharing) decided to give greater priority to transplant centers within 250 miles of a deceased donor to avoid sending organs long distances



L-R. Genta Uehara, M.D., Karim Soliman, MBBCh, MSc, Michael Casey, M.D., Maria Aurora Posadas Salas, M.D., and Muriel Labonte, RN, MSN, FNP-C. (Pictured right: Prince Anand, M.D.)



because the shorter the distance, the better the organ does in transplant,” says Casey. “But, because Charleston is so far down on the coast, kidneys from a deceased donor in the upstate are prioritized to other transplant centers in Georgia or North Carolina.”

The Lancaster center effectively levels the playing field. “This program gives us priority for receiving organs from a larger catchment area,” says Anand. “That’s a huge plus for our patients because they’ll have a more competitive chance to get a kidney.”

Transplant patients in the midlands and upstate have also benefited from expanded telemedicine services that allow them to consult with physicians in Charleston without leaving their home town. Casey, who is also medical director of Transplant Telemedicine, explains, “When the pandemic started, we quickly transitioned to telemedicine for routine visits. It works really well because our patients are immunosuppressed. Telemedicine helps us stay connected with them while reducing their potential exposure to COVID.”

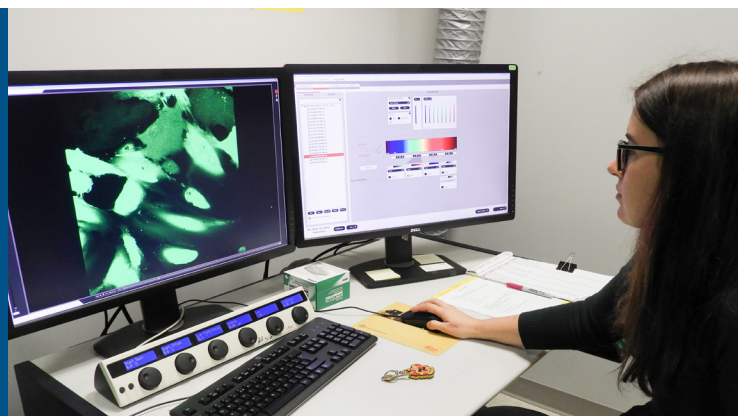
The team also expanded MUSC’s living and deceased donor programs in the past year. “We did about 50 living donor transplants in the past year and our goal is to ramp up to around 70 next year and 90 in the year after that,” says Casey. To increase living kidney donations, the MUSC Nephrology Transplant Program developed the ability to run its own paired kidney exchange program by matching incompatible living donors to patients on the transplant list within the MUSC Health system—something that is not typically available at smaller centers due to the need for computer support, personnel, and a large pool of potential donors. “Doing our own internal match runs really cuts down on red tape and medical uncertainty because we know all recipients and donors involved in the paired exchange.”

NEW RESEARCH FACULTY: *Working to close the loop from bench to bedside*

The Division of Nephrology welcomes two new research faculty: Associate Professor, **Oleg Palygin, Ph.D.**, from the Medical College of Wisconsin and Assistant Professor, **Justin Van Beusecum, Ph.D.**, from Vanderbilt University Medical Center. They each have received grants to study the roles of specific cellular signaling pathways in chronic kidney disease and their associations with cardiovascular disease.

Both researchers share a common philosophy regarding their work. “We can’t make clinically meaningful advances in the laboratory without knowing what problems the clinicians are facing with their patients. Having questions go back and forth both ways is what really informs my work and the direction we need to go in,” says Van Beusecum. “I want to look at what the Division of Nephrology sees in the clinic and help bridge that gap back to the bench to see what we can find on the research side that can be taken back into the clinic.” Palygin agrees, “Clinical departments need basic researchers because we all have the same goal of helping patients but you need both sides working together to be successful. Justin and I—and really all of the people in our division—think similarly. When we work together, we make the biggest improvements.”

Palygin received an RO1 grant award from the National Institutes of Health to study basolateral inwardly rectifying potassium (K⁺, Kir) channels (specifically Kir4.1 and Kir5.1) which are encoded by Kcnj10 and Kcnj16 genes. The genetic mutations causing dysfunction in these channels may directly contribute to strong changes in electrolyte homeostasis in humans. Palygin’s *ex vivo* and *in vivo* research uses newly developed pharmacological tools and novel



Marharyta Semenikhina, Ph.D., and
Oleg Palygin, Ph.D.



Kir4.1 and Kir5.1 knockouts on the Dahl salt-sensitive rat background to modulate Kir channel activity and identify the precise mechanisms of plasma K⁺ regulation and sodium reabsorption.

Because these channels play a dominant role in modulating water and electrolyte transport in the aldosterone-sensitive distal nephron, they are central to control of potassium homeostasis and development of salt-sensitive hypertension (HTN) and kidney injury. In light of their reported associations with cardiorenal diseases, Palygin hopes that better understanding of the mechanisms by which Kir4.1/Kir5.1 influence the electrolyte balance in the body will inform development of novel therapies that can prevent salt-induced HTN and lead to new ways of treating and preventing kidney damage. This would be a pivotal discovery for many patients who are seen in the divisions of nephrology and cardiology because nearly half of all Americans with HTN and approximately 75% of African American patients with HTN experience enhanced blood pressure sensitivity to salt intake.

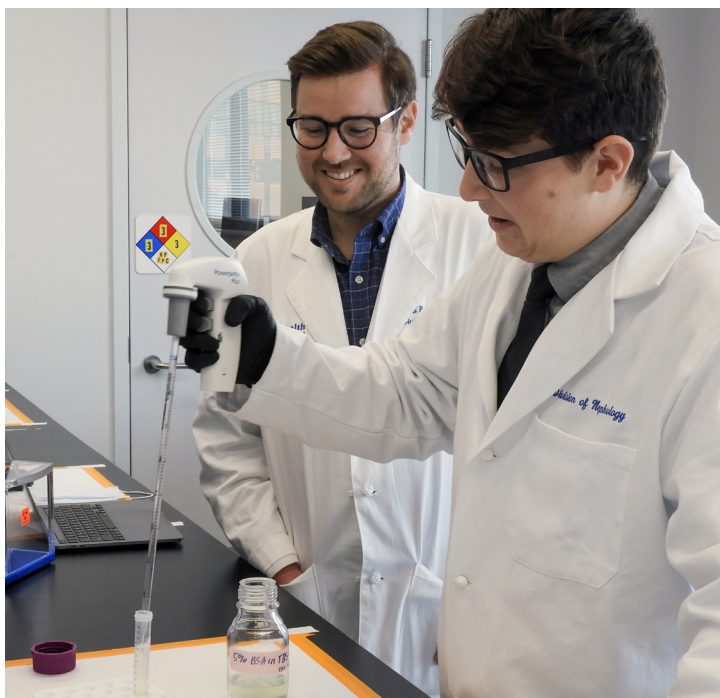
Van Beusecum received a Career Development Award from the Department of Veteran’s Affairs to study the role of growth-arrest specific 6 (GAS6) and its receptor (Axl) signaling in the development of essential HTN. His research uses a novel mouse model in which he has specifically deleted GAS6 in endothelial cells to better define the mechanisms of this signaling pathway and its role in dendritic activation of the immune system and endothelial dysfunction. Because inflammation and vascular dysfunction are typically seen in patients with HTN and other cardiovascular diseases, he hopes his research will illuminate

how Axl signaling promotes an inflammatory phenotype that, in turn, promotes hypertension and end-stage organ damage including renal failure.

His work is based on the finding that endothelial cell stress (from HTN-induced vessel stretching or increased pulse wave velocity) causes endothelial activation and GAS6 secretion which then activates the immune system. This increases inflammation, causing even greater activation in a feed-forward cycle. In trying to uncover ways to break this chain, Van Beusecum's team found that deleting Axl in both immunological and somatic cells could prevent HTN from developing in an angiotensin II mouse model.

His current *in vivo* and *ex vivo* research aims to further understand how chronic overactivation of immune cells may lead to tissue damage and high blood pressure. Among other things, his findings may provide an explanation for why patients with controlled HTN remain at elevated risk for cardiovascular events including stroke, heart failure, and heart attack. Van Beusecum hopes his work will lead to new therapies targeting underlying chronic immune cell activation to mitigate excess cardiovascular risk, renal and kidney function compromise, and chronic kidney and end-stage renal diseases.

He hopes to translate his findings into improved clinical treatments for patients with HTN and increased risk of cardiovascular disease. In particular, he hopes his project translates to the clinic in treating lupus nephritis in young female patients, who have high rates of cardiovascular complications despite receiving good treatment for the autoimmune component of their disease.



Justin Van Beusecum, Ph.D., and Christopher Colvert, research specialist.

KIDNEY TRANSPLANT PROGRAM *(continued)*

That's been a big improvement in our living donor program," says Casey, who estimates that it typically takes about three months to find a matched pair through the internal system. "It's like a donor swap where people who already have an eligible but incompatible donor are matched with another incompatible pair. That's improved our number of living donor transplants as well." If internal matching fails, the team reaches out to one of the national kidney paired exchange programs.

The Nephrology Transplant Program will add two to three new transplant nephrologists in the coming year to help keep up with the growing volume. **Genta Uehara, M.D.**, currently finishing the Nephrology Transplant Fellowship program, will join the faculty as an assistant professor in mid-2022. "When I rotated onto the transplant service, I noticed how happy the patients were. I enjoy working in a field where I can make patients so happy," says Uehara. "During training I had a patient who'd been on dialysis for over 10 years before she got a new kidney. When she started to make urine, she cried tears of joy in front of me. That was when I knew that this was what I really wanted to do."

Uehara is also excited to help educate and exchange ideas with the next generation of nephrologists. "The way we practice here is completely different from in Japan," he explains. "There, decisions are mostly based on the opinion of senior physicians whereas, here, it's based more on published evidence. Even young students and residents can have a free discussion with the attendings. They can say, 'Hey, I just read a new article and it said something different than what you're saying.' And the attending is interested in hearing what they have to say."

That enthusiasm for exploring new ideas and finding innovative ways to help patients with kidney failure receive a transplant are truly the heart of the MUSC Nephrology Transplant Program. "It's gratifying to get up every morning and know I'm going to help someone today," says Anand.

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.



Fellowship Director Ruth Campbell, M.D. (center) with nephrology fellows (l-r) Joshua Harbaugh, D.O., Maria Browne, M.D., Camilia Makhyoun, D.O., and Waleed Elsheikh Mohammed, MBBS

NEPHROLOGY APPS

General Nephrology APPs



Deborah Brooks, MSN, ANP-BC, CNN, CNN-NP
Nurse Practitioner



Lindsey DeLoach, RN, MSN, ANP
Nurse Practitioner



April Griffin, NP
Nurse Practitioner



Katherine Jackowski, ACNP
Nurse Practitioner



Megan Slappe, MSN, FNP-BC
Nurse Practitioner

Transplant Nephrology APPs



Chad Davis, MSN, FNP-BC
Nurse Practitioner



Chloe Jackson, MMSc
Physician Assistant



Bridgette Kadri, PA-C
Physician Assistant



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



Mary Elizabeth Shearer, DNP, FNP-C
Nurse Practitioner

NEPHROLOGY FACULTY

General Nephrology Faculty



Anand Achanti, M.D.
Associate 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



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

General Nephrology Faculty



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



Blathin McMahon, MB.BCh. BAO, Ph.D.
Associate Professor
Special Interests: AKI; CRRT in the ICU;



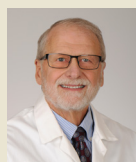
Roberto Pisoni, M.D.
Associate Professor
Special Interests: Resistant hypertension; proteinuria; chronic kidney disease



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



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



Harold Szerlip, M.D., MS(Ed)
Professor
Special Interests: Acute kidney injury in the ICU, the cardiorenal syndrome, chronic kidney disease; complicated hypertension



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

Nephrology Research Faculty



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



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

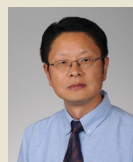
Nephrology Research Faculty



Oleg Palygin, MSc, Ph.D.
Associate Professor; SmartState® Endowed Chair in Renal Disease Biomarkers
Special Interests: Glomerulus in health/disease; pathophysiology of cardiorenal syndrome



Justin Van Beusecum, Ph.D.
Assistant Professor
Special Interests: Growth arrest specific-6 (GAS6) and Axl signaling in the development of hypertension and other cardiovascular diseases

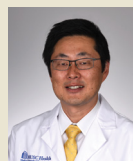


Xiaofeng Zuo, Ph.D.
Assistant Professor
Special Interests: Polycystic kidney disease; acute kidney injury; ciliogenesis

Transplant Nephrology Faculty



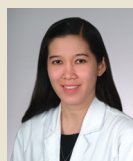
Prince Anand, M.D.
Associate Professor
Special Interests: Kidney & pancreas transplantation; antibody mediated rejection, and bk virus.



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



Vinaya Rao, M.D.
Professor
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

NEPHROLOGY

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KIDNEY
TRANSPLANTS
IN CY21

425 Division faculty cared for
425 chronic dialysis patients
at seven DCI outpatient hemodialysis
units, the DCI home dialysis program,
and the VAMC in 2021.

\$1.7M
FY21
RESEARCH
EXPENDITURES

Changing What's Possible