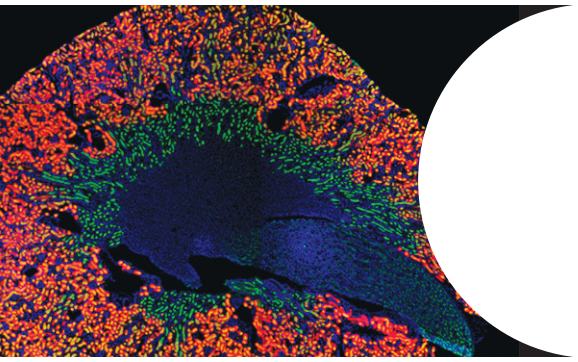

WASHINGTON UNIVERSITY ALUMNI NEWSLETTER
Fall 2018

NEPHROLOGY UPDATE

Tracking and Enhancing Dialysis Care

Over the past three years, a comprehensive effort within the Division of Nephrology's outpatient dialysis centers has resulted in better care coordination, reduced blood stream infection rates, and improved patient satisfaction and communication.

The effort, by physicians, nurses and staff, was part of an internal quality improvement project focused on multiple areas tracked by the Centers for Medicare and Medicaid Services as part of its national End-Stage Renal Disease Quality Incentive Program (QIP). The program annually evaluates outpatient dialysis facilities and reduces reimbursement rates for those that do not meet defined performance criteria, including infection control and hemodialysis adequacy benchmarks as well as results from independent patient satisfaction surveys.

Forest Park Kidney Center staff, left to right: Kelly Stockhausen, Jean Audrain, Jamie Miles, Tifty Courtney, Lori Gawat-Abuelo, Patty Anderson, Dr. George Jarad, Amy Lucas, Marcos Rothstein, Tiarra Steward, Sam Najduch, Natalie Moretz

"We had significant concerns because our patient population is typically urban, low-income and without regular access to transportation to get to and from dialysis appointments," said Nephrology Division Chief Benjamin Humphreys, MD, PhD. "Reduced reimbursement rates could have impacted the viability of our outpatient centers if we didn't consistently focus on process improvements."

After reviewing initial QIP scorecards, some of which were not optimal, the Division's two outpatient dialysis centers zeroed in on three primary issues: monthly data tracking, infection control and overall communication between care providers and patients.

First, the Division created its own QIP scorecard that was reviewed monthly to highlight any trends that might negatively impact the federal QIP score. "Our own scorecard kept everything top of mind because we could look at the data faster and start making changes if we saw a downtrend in outcomes," says Forest Park Dialysis Nurse Administrator Patricia Anderson, RN.

Then, the dialysis centers each created a team of expert cannulators for new fistula cannulations. "At Chromalloy, our team comprises RNs, LPNs and technicians who have special expertise in all aspects of catheter care, including documentation, assessment and ongoing care," says Brenda Bingle, RN, nurse administrator for the Chromalloy American Kidney Center. "We also work with physicians to remove the catheters as quickly as possible."

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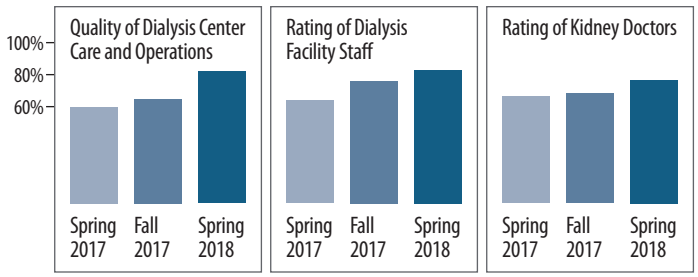
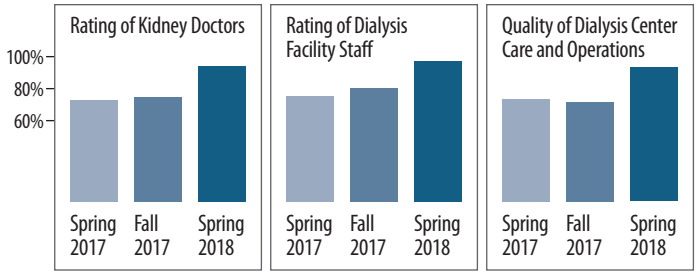
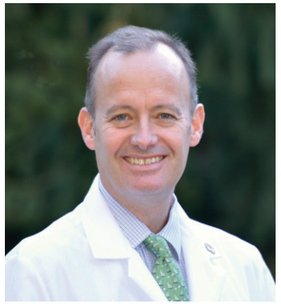
Chromalloy American Kidney Center



Forest Park Kidney Center



Message from the Chief



At this month's ASN Kidney Week, one of our esteemed faculty, Anitha Vijayan, MD, is co-chairing the Nephrologists Transforming Dialysis Safety Project update. The lecture, titled *"21st Century Killers – How Nephrologists Can Fight Back,"* is a visible example on the national level of the aggressive efforts we need to all focus on to eliminate infections in dialysis patients. Not only is this effort a best-practice initiative, it also mirrors our internal efforts to improve the care of our own dialysis patients. As our lead story mentions, we were challenged with multiple quality improvements not only to improve care but also to improve our ratings — and resulting reimbursement rates — with the Centers for Medicare and Medicaid Services.

Moving the needle on quality efforts requires a team approach, but it's a vital process to maintain or improve patient outcomes. By focusing on specific steps to tackle major issues, we have succeeded in lowering our infection rate, increasing patient satisfaction and improving on a host of other quality and safety metrics. I want to recognize all of our facult and staff as well as our Director of Business Operations, Jodean Baldauf, who worked so hard over the last year and a half to achieve this great result.

We are excited about two new programs — an inpatient renal biopsy service and a new transplant nephrology clinic at the VA Medical Center. Both engage our nephrologists more with key patient populations and offer more opportunities to enhance our fellowship program. I'm pleased that we also are partnering with a former alumnus, Steven Bander, MD, to open an interventional nephrology clinic in west St. Louis.

Our new fellows are off to a wonderful start to the year, and we are encouraged by the response we are getting on next year's recruitment, which just wrapped up. As always, we hope to see you at ASN Kidney Week and at our Friends and Alumni Reception there. We look forward to receiving updates on your respective career paths. Feel free to also email Virginia Kelly (Virginia.Kelly@wustl.edu) with any news notes.

Ben

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Fellowship Notes

By Steven Cheng, MD, Director, Nephrology Fellowship Program

How do you maximize the learning environment in fellowship without exhausting trainees? It's a critical question faced not only by our division, but also by large academic programs with a heavy influx of clinically complex cases.

In the Division of Nephrology, we've instituted numerous changes over the last several years to address this issue of burnout. We set a 20-patient note-writing cap and started a non-teaching service, staffed by our attending physicians and a nurse practitioner. Both steps are working well. Last year, however, a new issue cropped up: the expansion of ICU beds and the opening of a new patient tower at Barnes-Jewish Hospital led to a substantial increase in our volume of work, particularly with the number of home calls for late night nephrology consults.

In response, Dr. Goldberg (the associate program director) and I worked closely with our fellows to create a new Home Call Coverage service. Based on the night float system utilized by many primary services in the hospital, the designated Home Call Coverage fellow covers consults and questions from 4 PM to 7 AM. The fellow assigned to this service is free from all other daytime duties and clinical responsibilities the ensuing day. In the morning, the coverage fellow provides a sign out of overnight events to our service fellows, who assume care in the morning after having had a free night to read, rest, and recharge. Facilitating this change is the timely implementation of the new EPIC electronic medical records system, which has helped to make transitions in patient care as seamless as possible.

The new Home Call Coverage service is a definite plus for the division. Fellows like guaranteed time to rest and reflect each night, even when they are on service. And the Home Call Coverage fellows have been able to cover the evening hours without having to worry about daytime responsibilities. It's another example of how seriously our program takes the learning environment, the work-life balance, and the input of our outstanding fellows!

Dialysis Care

continued from page 1

"Compared to fistulas or grafts, dialysis catheters are associated with a significantly higher risk of infection, so we made concerted efforts to minimize the time they were needed," adds George Jarad, MD, medical director for the Forest Park facility. "We also evaluated and started using specialized catheter caps impregnated with alcohol to minimize the risk of catheter-associated blood stream infections (BSIs)."

In addition, better hygiene steps reduced infection control issues, such as using a faster drying and less irritating hand disinfectant and placing gloves at every dialysis station.

Communications issues were two-fold: between hospital and outpatient staff, and between staff and patients. Discussion with the hospital team prior to patient discharge helped with vein mapping, earlier catheter removal and adherence to follow-up outpatient visits. More frequent and, frankly, more casual conversations with patients not only picked up issues that needed to be addressed, but also improved patient satisfaction and, in turn, satisfaction survey scores.

"I pull up a chair and meet with every single dialysis patient just to get a better understanding of what they are going through and anything they need," says Chromalloy medical director Daniel Coyne, MD. "And the nurses and staff were all asked to chat one-on-one with patients socially. We also impressed upon them the importance of filling out the satisfaction surveys. The end result was that the number of surveys completed went up and patient satisfaction improved overall."

Chromalloy American Kidney Center staff, left to right: Kelly Lazarus, Dr. Daniel Coyne, Vickie Haldaman, Kina Holmes, Maurice Murray, Holly Dockins

"It was a total staff effort," agrees Bingle. "They had to go outside of their box and be aware of what other people think of them. We have to be professional but we don't have to be overly clinical. I think the interactions worked both ways to enhance compassion and empathy."

With more than 165 patients seen three times a week at the Chromalloy center and 200+ plus patients on in-center and home dialysis at the Forest Park facility, the overall QIP changes were outstanding — this year, both facilities earned significantly higher ratings by the CMS. "When we look at the numbers, everything we did had an incremental change, but together, it made a major impact," says Coyne.

Alumni Connections

Brad Rovin, MD

The Lee A. Hebert Distinguished Professor of Nephrology
Director, Division of Nephrology
Vice Chair for Research, Department of Internal Medicine
The Ohio State University Wexner Medical Center

WU Nephrology Fellow, 1986-1988

Brad Rovin, MD, remembers a particularly vivid moment while he was a nephrology fellow at Washington University that led to a pioneering procedure being performed.

"I was called to see a young patient who was on ECMO and in renal failure," he recalls. "My senior fellow and I had just read an article on continuous renal replacement therapies (CRRT) in Kidney International and decided to try it on this patient. CRRT had never been done before at Barnes. We hooked up the artificial kidney through the ECMO lines. This worked very well, to the point that it caused so much ultrafiltration, we had to cobble together a system to decrease fluid removal. The patient survived!"

Rovin, now the Director of the Division of Nephrology at Ohio State University, was drawn to renal diseases while studying chemical engineering at Northwestern University. "Biomedical engineering was not yet a major there, but I wanted to apply engineering principles to artificial organ design," he says. "I thought developing an artificial kidney would be an engineering challenge. However, after I took my first immunology course in medical school, I realized this was my passion. Then I found out I could do immunology and nephrology if I focused on glomerular diseases."

As a fellow, Rovin joined the lab of George Schreiner, MD, PhD, who established the first renal immunology lab at the medical center. After fellowship, he joined the faculty, but six months later, in 1990, was recruited to Ohio State, where he has remained. In addition to being director of the nephrology division, Rovin oversees an advanced glomerular diseases fellowship and serves as vice chairman of research for the Department of Internal Medicine. He continues his own research investigating the transcriptome and proteome of the glomerular and tubulointerstitial compartments of kidney biopsies from lupus patients before and after treatment to try to develop molecular phenotypes of response and non-response to treatment.

"Clinically we also are interested in testing experimental therapeutics in patients with lupus nephritis (LN), and have just submitted a new proposal to repurpose an existing drug that we feel may be very effective for LN," he adds.

Dr. Rovin with a brown trout caught in Georgia (top) and getting ready for fishing trip in South America (bottom).

As for fun activities, he's an outdoors enthusiast, biking and hiking whenever he can. He's also an avid fisherman, saying, "I've fished in 18 states, including Missouri, as well as in Europe, Australia, Iceland, Brazil, Argentina, Panama, Belize, Canada and the Bahamas. I have a goal of fishing in every country to which I'm invited to lecture!"

Interventional Nephrology Clinic Opens

James Davis, MD

In a continuing effort to expand services directly into surrounding communities, Washington University interventional nephrologist James Davis, MD, FACP, FASN, has partnered with former nephrology fellowship alumnus Steven Bander, MD, and interventional radiologist Thomas Vesely, MD, to offer an interventional nephrology clinic in west St. Louis County.

The clinic, which opened in September, is located in the already established St. Luke's Vascular Access Center and focuses on maturation procedures for immature fistulae. "We will be performing endovascular stent implantation as well as endovascular thrombectomies for grafts and fistulae," says Davis. "Angioplasties for difficult cannulation and abnormal vascular pressures also will be available."

Davis has a special interest in home-based therapies and vascular access. Prior to joining the faculty earlier this year, he was in private practice at The Kidney and Hypertension Center in Cincinnati, Ohio.

"I have been doing these procedures for the past 13 years in Cincinnati," he says. "I have tremendous passion for access work and have developed a skill set to handle virtually any situation."

Davis anticipates adding a training program for fellows at the clinic as patient volume grows. "Training in interventional nephrology gives fellows an intimate understanding of hemodialysis vascular access, the lifeline of so many of our patients," he says. "By offering this additional training pathway, our fellows will be ready for certification and have a valuable skill by the end of their fellowship."

Program Spotlight

Inpatient Renal Biopsy Service & Training Program

By the end of this year, nephrologists at Barnes-Jewish Hospital will routinely be performing all steps of inpatient ultrasound-guided kidney biopsies as part of a new in-house renal biopsy service and training program.

Kidney biopsies are currently a two-step process, involving both a radiology technician, who uses ultrasound to locate the kidney, and a nephrologist, who then obtains the tissue sample. Once the new service gets under way, nephrologists will completely handle both steps in about half of all cases. Radiologists will be involved in the rest as part of their own training program.

"Most kidney biopsies in the community are performed by radiology, so only a handful of nephrology programs teach the procedure," says Fadi Tohme MD, a nephrology intensivist who will head the new service. "However, it's a valuable skill to learn because ultrasound is an indispensable tool in the diagnosis, prognosis and management of patients with renal diseases."

Fadi Tohme, MD, oversees ultrasound-guided kidney biopsies as part of a new inpatient service and training program at Barnes-Jewish Hospital.

Nephrologists have been doing ultrasound-guided biopsies in transplanted kidneys here for several years. It is easier to biopsy a transplanted kidney, however, because it is anteriorly placed. A native kidney, which is located against the back muscles and is much deeper requires learning extra skills, says Tohme, such as manipulating and reading the ultrasound.

Tohme has expertise in the use of ultrasound for the care of renal patients. In addition to a fellowship in nephrology, he completed a fellowship in critical care medicine. As a renal intensivist, he says, "When we perform a thoracentesis or paracentesis in the ICU to tap fluid in the lung or belly, we usually do it under ultrasound. When we do central lines, we do that under ultrasound, too. Because nephrologists are intimately involved in the care of these patients and already are familiar with why a biopsy is needed, how much tissue to obtain, and the contraindications for biopsy such as high blood pressure, being on blood thinners, having only one kidney, having very small kidneys, etc., it makes sense to know how to do these ultrasounds."

Along with Tohme, other faculty overseeing the training and certification of fellows for this procedure are: Anuja Java, MD, Andrew Malone, MD, BCh, and Seth Goldberg, MD.

New Transplant Nephrology Clinic at VA

In a collaborative effort between Washington University's Division of Nephrology and the John Cochran Veterans Administration (VA) Medical Center in St. Louis, the first transplant nephrology clinic is anticipated to be open at the VA by the end of this year.

The move brings a transplant nephrologist there to evaluate and care for both pre- and post-kidney transplant patients. "The kidney transplant patients at the VA are currently seen only by a general nephrologist," says WU transplant nephrologist Anuja Java, MD, who will lead the new clinic. "If they have specific concerns related to their transplant, they often are referred to other institutions. By having the clinic onsite, we can better serve these patients."

The opening of the clinic comes at a good time. In a study published last year by the Cleveland Clinic, Case Western Reserve School of Medicine, and the Louis Stokes VA Hospital, researchers noted that veterans have a higher rate of kidney disease as compared to the general population.

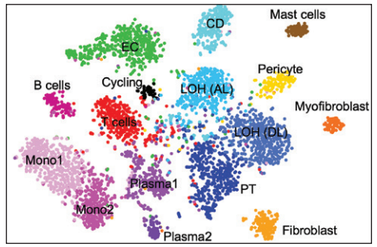
"The growth of the end stage kidney disease program at our VA has led to an increase in the number of veterans with transplants," says WU nephrologist Michael Rauchman, MD, Renal Section Chief for the St. Louis VA. "With the establishment of this clinic, we will now be able to provide high quality care to kidney transplant patients here. This will allow for better access and coordination of care for our veterans."

Michael Rauchman, MD, with Anuja Java, MD, at the VA Medical Center in St. Louis.

Java has been with Washington University since 2011, when she was a fellow in the transplant nephrology training program. She joined the faculty in 2016. "We already have a well-established transplant clinic at Washington University," she says. "These are typically high acuity patients who need more time allotted to their care to maintain their health. I'm hoping a weekly clinic at the VA will offer veterans appropriate screenings and timely laboratory tests so that we can monitor for the risk of infections, cancer or immunosuppressive concerns."

Research Highlights

Potential New Approach to Evaluate Kidney Biopsies



In what could be a transformative advance in the way kidney biopsies are evaluated, WU nephrology researchers Haojia Wu, PhD and Andrew Malone, MB, BCh, have published proof-of-principle research that single-cell transcriptional profiling can aid in disease subphenotyping and therefore improve diagnostic and prognostic accuracy of kidney disease.

"Despite impressive technological advances in genomics over the last decade, there have been few changes in renal biopsy processing and interpretation in decades," says Wu. "In our research, we used a massively parallel microfluidic droplet technology called inDrops to perform single cell RNA-sequencing of thousands of individual cells from a single kidney biopsy. This approach allowed us to measure the expression levels of thousands of different genes from thousands of individual cells. We then defined the heterogeneity of cell types and cell states in an allograft rejection biopsy at single cell resolution."

Transcriptional profiling has been performed in whole kidney before, but these approaches are limited in that cell-specific gene expression signatures may be lost within the integrated expression profiles of all the other kidney cell types. For example, bulk-tissue resolution profiling has established that endothelial cells play critical roles in ABMR. Single-cell resolution profiling revealed that there are actually three different EC states in ABMR. Scaling up the cell number further, says Malone, could aid in the detection of rare cell types and highlight finer distinctions among subtypes. The research appeared in the August 2018 edition of the Journal of the American Society of Nephrology.

Alhamad Awarded Transplant Innovation Grant

Tarek Alhamad, MD, medical director of transplant nephrology, was awarded a $350,000 Clinical Innovation Grant from Mid-America Transplant to evaluate the *Clinical and Economical Benefits of Organs from Hepatitis C-Positive Donors*.

The study will evaluate the safety of transplanting "non-standard" organs, such as those from donors infected with hepatitis C (DHCV+). Currently these organs are not considered; however, the use of Direct Acting Antiviral (DAA) agents could favorably impact the acceptability of DHCV+ organs for transplantation. "With the introduction of DAA agents, which offer more than a 95% cure rate for hepatitis C, we need to change the culture of discarding such valuable organs," says Alhamad.

As principal investigator, Alhamad will collaborate with colleagues at Saint Louis University School of Medicine and at Lahey Hospital and Medical Clinic in Massachusetts. The research is critical because of a nationwide shortage of donated organs. Currently, the wait for a kidney transplant in the St. Louis area is 3-5 years.

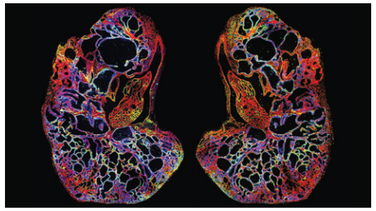
Excess Centrosomes Cause Cystic Kidney Disease

Building upon his previous groundbreaking research, Moe Mahjoub, PhD, has found that excess centrosomes are detrimental to renal development and are sufficient to trigger cyst formation independently of cystic gene mutations.

Dr. Mahjoub previously discovered that centrosome amplification (CA; the formation of excess centrosomes in a cell) was detrimental to ciliary signaling and cell physiology. CA has been reported in malignant lesions in a variety of tissues and was recently shown to be a feature of cystic kidney disease, yet whether it plays a causal role in disease progression remained unknown.

In research published in the July 2018 issue of the Journal of Cell Biology, Mahjoub and his research team examined the consequences of CA in both the developing embryonic kidney and in the adult kidney during homeostasis and after injury. They found that inducing CA disrupted cell proliferation and differentiation in the developing kidney. Significantly, CA induced rapid cyst growth and expansion shortly after birth. In the adult kidney, induction of CA caused ciliogenesis defects and resulted in cystogenesis upon ischemic renal injury. It was the first demonstration that CA is sufficient to cause a renal cystic disease phenotype in vivo.

Says Mahjoub, "Most of the studies regarding the consequences of CA have been focused on cancer (solid tumors), since it is well established that CA can induce genome instability and drive cell transformation. What our study shows is that we have to think about CA in human diseases other than cancer, specifically disorders such as polycystic kidney disease. Targeting these cells may provide a new avenue for therapy."



Kidneys of mice with induced centrosome amplification display rapid cyst formation within 2 weeks after birth.

McDonnell Genome Institute Award

Both Hani Suleiman, MD, PhD, and co-principal investigators Andrew Malone, MB, BCh, and Benjamin Humphreys, MD, PhD, were awarded pilot grants from the McDonnell Genome Institute (MGI).

Pilot grants enable researchers to use MGI's next-generation sequencing for genomic and translational research. Suleiman's project is titled *Altered tropomyosin isoform repertoire as a regulator of podocyte shape in kidney diseases*. Suleiman is studying tropomyosins (Tpms) in the kidney glomeruli and hopes to identify the changes in Tpm isoform patterns in podocytes after injury. Malone and Humphreys will focus on *Defining Host-Donor Chimerism in Kidney Rejection and Developing a Searchable Graphical User Interface Web Tool*. The two specifically will explore the role of the innate immune system in organ rejection, specifically the role of donor resident macrophages, which persist in the kidney after transplantation.

Faculty News and Awards

Nephrologist **Manasa M. Metireddy, MD,** joined the Division in October 2018. Metireddy will be based at Christian Hospital in north St. Louis County where she will assist in taking care of patients in the new outpatient dialysis unit. Previously she worked at St. Joseph Hospital West in Lake St. Louis, Mo. Metireddy earned her medical degree in India and completed a residency in internal medicine at the Greater Baltimore Medical Center in Maryland. She then pursued a fellowship in nephrology at the University of Michigan in Ann Arbor.

Benjamin Humphreys, MD, PhD, the Joseph Friedman Professor of Renal Diseases in Medicine and chief of the Division of Nephrology, has been elected Secretary-Treasurer of the American Society for Clinical Investigation. Humphreys, nationally recognized for his research on kidney fibrosis, stem cells and regenerative medicine, will serve a three-year term. Membership into the ASCI, one of the oldest nonprofit honor societies of physician-scientists, is by election only. Researchers who are 50 years of age or younger and who have achieved significant scientific contributions, are eligible for nomination to the ASCI. Humphreys has been a member since 2013.

Tarek Alhamad, MD, MS, FACP, FASN, is the Division's new Medical Director of Transplant Nephrology. As such he will oversee renal issues related to both kidney and pancreas transplantation. The kidney transplant program, in particular, is one of the largest programs in the country, with more than 5,000 kidneys transplanted since 1963. The team also helped to pioneer living donor kidney transplants.

"In addition to maintaining our successful outcomes, which are among the best in the world, one of my main goals is to grow the living donor kidney transplant program by establishing new methods of educating kidney transplant candidates on how to find donors and the importance of living donors," says Alhamad. "In addition, I want to broaden overall access to transplant nephrology services in both Missouri and Illinois."

Alhamad completed a general nephrology fellowship at Penn State College of Medicine and a transplant nephrology fellowship at the Mayo Clinic in Scottsdale, Ariz. Among his research activities, Alhamad is the principal investigator of several clinical trials investigating new medications and diagnostic measures for monitoring rejection and other complications after transplant.

Andreas Herrlich, MD, PhD, has been named director of the EMBO lecture course on "Molecular Mechanisms of Tissue Injury, Repair and Fibrosis." EMBO is a European organization of leading scientists who focus on life sciences research. The fibrosis lecture course will be held May 23-31, 2019 in Spetses Island, Greece and will bring together leading researchers with doctoral and postdoctoral students to review the latest insights into the molecular pathogenesis of injury-repair and fibrosis in different organ systems.

Herrlich, who joined the division in 2016 after serving on the faculty of Harvard Medical School, researches kidney injury and repair mechanisms, focusing on understanding the biology of metalloprotease-dependent cleavage of proligands that activate epidermal growth factor receptors. He earned his medical and doctorate degrees in Germany and completed a nephrology fellowship at Harvard Medical School.

Patricia Kao, MD, MS, has been named the new Associate Program Director of the Internal Medicine Training Program. Kao specializes in the care of acute kidney injury and chronic kidney disease as well as renal disease in pregnancy and electrolyte disorders. She also has a strong interest in teaching and curriculum development for clinician educators. Last year, she was honored with the Carol B. and Jerome T. Loeb Teaching Fellowship to continue her development of the Washington University Teaching Physician Pathway (WUTPP), the first structured resident teaching physician pathway at the university.

Anitha Vijayan, MD, is co-chairing a national collaborative effort to eliminate infections in dialysis facilities. The Nephrologists Transforming Dialysis Safety Project (NTDS) by the American Society of Nephrology and the Centers for Disease Control is focused on raising awareness of infection control issues in hemodialysis facilities and sharing best practices to prevent infections in dialysis patients. The project began two years ago and now includes webinars, conferences, journal articles and other activities focused on infection prevention. At this month's ASN Kidney Week, join Vijayan for the NTDS Annual Session, *21st Century Killers – How Nephrologists Can Fight Back.*

Escape to the White House!

For the second year in a row, our incoming fellows proved they were up to the task of figuring out clues and getting out of an escape room. As part of a fun get-together, fellowship program leaders Seth Goldberg, MD, and Steven Cheng, MD, have started an annual escape night out with new fellows — and it's a definite success!

This year, the group went to the "White House" to unlock multiple clues and puzzles so they could figure out how to deploy an anti-missile defense system before the building would be destroyed.

"This is the second time we've done something like this," says Goldberg. "Last year was a different location and our team won with about four minutes to spare. This year, we also won with about four minutes to spare, so we're keeping our record intact!"

Thanks for keeping the "White House" safe for us this time. We hope the Division's escape record continues next year!

From L to R: Andy Chuu, Aniesh Bobba, Christina Mariyam Joy, Steven Cheng, Seth Goldberg, Madhuri Ramakrishnan, Irene Nunuk.

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