



GLICKMAN UROLOGICAL & KIDNEY INSTITUTE

2020 Year in Review



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ON THE COVER:

Xiangling Wang, MD, PhD, leads Cleveland Clinic's Renal Genetics Program, a new collaboration of Glickman Urological & Kidney Institute and Cleveland Clinic's Center for Personalized Genetic Healthcare. "Today genetic testing is more affordable and is better directing kidney disease diagnosis and treatment," she says.

AT A GLANCE

Glickman Urological & Kidney Institute

Glickman Urological & Kidney Institute's activities encompass a unique combination of high-volume and challenging clinical cases, extensive basic and translational scientific efforts, and innovative laboratory research conducted in an environment that nurtures the future leaders of its specialties.



BY THE NUMBERS

(through November 2020)

122,123
OUTPATIENT VISITS

12,478
SURGICAL CASES

21,757
DIALYSIS TREATMENTS

2,712
ADMISSIONS

11,299
PATIENT DAYS

4.2
AVG. LENGTH OF STAY
(DAYS)

VITAL STATISTICS & RANKINGS

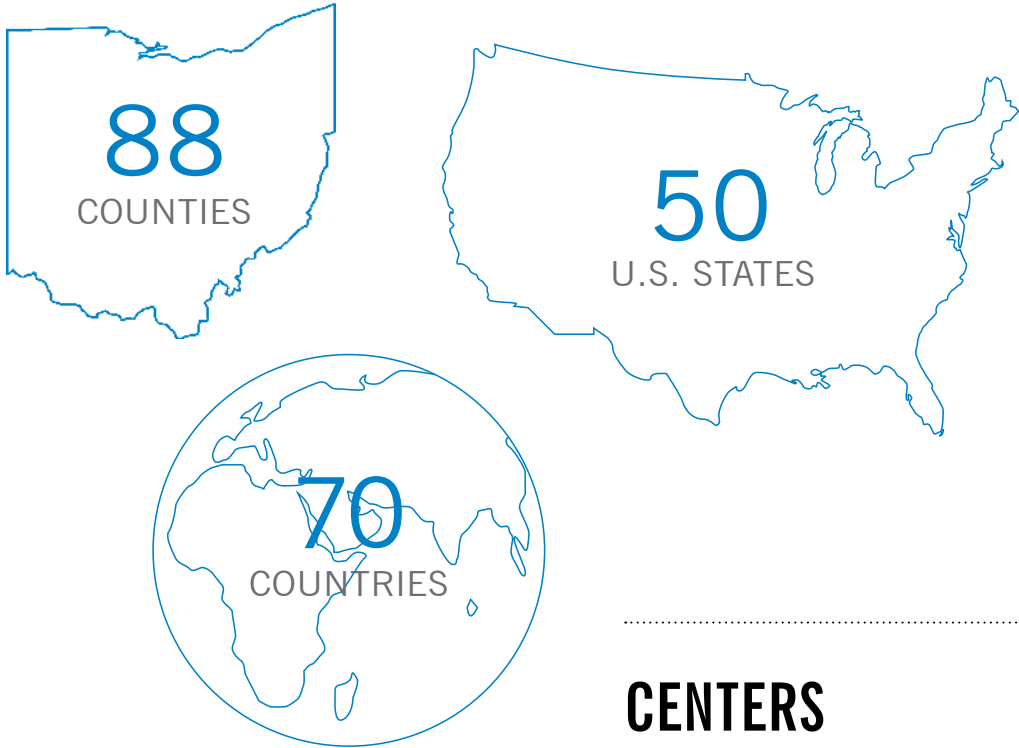
INSTITUTE VITAL STATISTICS	
62	Urologists
26	Nephrologists
43	Advanced Practice Providers
29	Urology Residents
16	Urology Fellows
10	Nephrology Fellows
444	Caregivers

SURGICAL CASES (through November 2020)	
384	Benign Prostatic Hypertrophy
1,474	Endourology and Stone Disease
1,212	Female Pelvic Medicine and Reconstructive Surgery
201	Male Fertility
442	Pediatric Urology
365	Genitourinary Reconstruction
277	Renal and Pancreas Transplant
2,571	Urologic Oncology



U.S. News & World Report has consistently ranked Cleveland Clinic urology and nephrology among the country’s top programs for the past two decades.

PATIENT ORIGINS



CENTERS

DEPARTMENT OF NEPHROLOGY

- › Blood Pressure Disorders
- › Chronic Kidney Disease
- › Dialysis
- › Renal and Pancreas Transplant
- › Renal Diseases

DEPARTMENT OF UROLOGY

- › Endourology and Stone Disease
- › Female Pelvic Medicine and Reconstructive Surgery
- › Genitourinary Reconstruction
- › Male Fertility
- › Men’s Health
- › Minority Men’s Health
- › Pediatric Urology
- › Robotic and Image-Guided Surgery
- › Urologic Oncology

MESSAGE FROM THE CHAIRMAN

DEAR COLLEAGUES,

I am eager to once again share with you Glickman Urological & Kidney Institute's *Year in Review*.

In a year that brought significant challenges to our global and national health, I am exceedingly proud of our staff and trainees, who embraced a new normal and above all remained committed to the tenets of our mission: advancing urological and kidney care through clinical achievement, innovative research and robust training.

A few highlights you will read about in this issue include:

- › The newly available IsoPSA™ test, designed to improve prostate cancer screening and reduce unnecessary prostate biopsies. (Cleveland Clinic became the first center to offer this technology to patients in July 2020.)
- › Our Renal Genetics Program, founded in October 2019, which is using genetic testing to better direct kidney disease diagnosis and treatment.
- › Single-port robotic surgery, which has transformed radical prostatectomy into an outpatient procedure.
- › Ongoing investigations into the urinary tract microbiome and its role in urinary stone disease.

It also has been a year of tremendous growth across both urology and nephrology departments in key clinical areas. This growth is a testament to continuous investment done in the service of our patients and our reputation as a destination for urological and kidney care. Notably, the generosity of patients has added nearly \$4 million

in philanthropic gifts (since 2018) to support genitourinary cancer research. On page 16, you'll read about some recent breakthroughs in prostate and kidney cancer, led by the team in our Genitourinary Malignancies Research Center.

As we look ahead to 2021 and the celebration of Cleveland Clinic's centennial year, I am certain there will be more opportunities to address unmet clinical needs and improve outcomes for our patients.

Thank you for your interest in our program.

Sincerely,



Eric A. Klein, MD

Chairman, Glickman Urological & Kidney Institute
Professor, Cleveland Clinic Lerner College of Medicine

2020 HIGHLIGHT

THE ISOPSA TEST IS AVAILABLE, AND IT COULD CHANGE THE DIAGNOSTIC PARADIGM FOR PROSTATE CANCER

Cleveland Clinic is now offering the IsoPSA® test, a novel prostate-specific antigen assay, for patients with a PSA > 4 ng/mL who are facing a decision on prostate biopsy.

This blood-based diagnostic test has demonstrated superiority over conventional tests in predicting the presence of high-grade prostate cancer, according to Eric Klein, MD, Chair of Cleveland Clinic's Glickman Urological & Kidney Institute.

“Our data show that the IsoPSA test reduces unnecessary prostate biopsies by about 45% by reliably differentiating between the risks of high-grade vs. low-grade cancer or benign biopsies,” says Dr. Klein, who recently received the Richard D. Williams, MD, Prostate Cancer Research Excellence Award from the Society of Urologic Oncology (SUO) as well as the 2020 SUO Medal, for his achievement in urologic oncology.

Accelerated research to improve clinical care

This most recent development in the availability of the assay follows two multicenter, prospective clinical trials. These studies validate the superiority of this test compared with the prostate-specific antigen (PSA) assay.^{1,2}

Developed by biotechnology company Cleveland Diagnostics, Inc.* in partnership with Glickman Urological & Kidney Institute, the technology received breakthrough device designation from the U.S. Food & Drug Administration in late 2019. This distinction recognizes the clinical significance of the biomarker and should help accelerate regulatory processes, getting tests into the hands of physicians quicker.

Filling an important need in diagnostic testing for prostate cancer

Conventional PSA testing has demonstrated value as a test for men with higher risk factors, such as age, race and family history.

“Large, randomized trials show that it’s a clinically valuable screening test, proven to reduce mortality rates and also reduce the need for treatment of

metastatic disease,” remarks Dr. Klein. “But it does have limitations, most notably its imprecision when detecting the aggressiveness of the malignancy.”

IsoPSA is a reflex test, and it also takes a different biological approach. It interrogates broader structural changes in a patient’s PSA levels as a result of disease pathogenesis, rather than assessing the concentration of the protein. Because the PSA biomarker protein is tissue-specific, and not cancer-specific, it commonly misrepresents protein levels associated with noncancerous conditions. This leads to an overdiagnosis of low-grade cancers and an overtreatment of low-mortality tumors. The IsoPSA test overcomes these shortcomings.

Integrating the test into clinical practice

Designed to stratify risk of biologically significant prostate cancer (Gleason grade > 7 prostate cancer), IsoPSA is intended to be used in men who are age 50 and older with a total PSA > 4 ng/mL with no previous prostate cancer diagnosis and not under active surveillance.

The test will be available commercially as a Lab Developed Test in 2021. Dr. Klein stresses that if used as intended, the test will offer new clinical data points to guide the physician-patient conversation about prostate cancer biopsy.

Questions about the test can be directed to Dr. Klein (kleine@ccf.org) or Bob Rochelle, MBA, Chief Commercial Officer, Cleveland Diagnostics (bob.rochelle@clevelanddx.com).

* Cleveland Clinic has an equity position in Cleveland Diagnostics. Dr. Klein has no direct or indirect personal financial interests in the company.

REFERENCES

1. Klein EA, Chait A, Hafron JM, et al. *Eur Urol.* 2017;72(6):942-949.
2. Stovsky M, Klein EA, Chait A, et al. *J Urol.* 2019;201(6):1115-1120.



RIGHT — Eric Klein, MD, says the blood-based IsoPSA test is better than conventional diagnostics at predicting the presence of high-grade prostate cancer.

2020 HIGHLIGHT

CONSENSUS IS KEY IN ADVANCING THE SCIENCE OF MICROBIOME-ASSOCIATED URINARY STONE DISEASE

Heightened interest in microbiome-associated urinary stone disease (USD) in the last several years has led to new investigations in laboratories around the world.

Aaron Miller, PhD, who leads the Stones Translational Research Laboratory at Cleveland Clinic's Lerner Research Institute, has published extensively on this topic.

In a consensus paper soon to be published in *Nature Reviews Urology*, Dr. Miller and collaborators set out to identify consistent risk factors or bacteria associated with microbiome-associated USD to understand how specific factors may play a pathogenic or protective role in the context of the disease.

To better understand potential associations, the team analyzed all of the published clinical data from microbiome-wide association studies (MWAS) involving USD. Interestingly, the data were inconclusive — they were not able to show that sex, history of USD or frequency of antibiotic use, as examples, played a predictive role.

Rather, the most significant driver of variables among the studies was the lab where the data originated.

Dr. Miller remarks that this underscores the need to better define what has been published and standardize workflow and processes for future investigations.

Building consensus to advance the science

Dr. Miller and his team then led outreach efforts to other research teams involved in MWAS of microbiome-associated USD, which eventually culminated in an international consortium to develop guidelines. The scientists worked together to standardize protocols on everything from initial sample collection and storage to DNA extraction, sequencing and data analysis.

“Our goal was to establish a better foundation in conducting this work to create biologically meaningful interpretations down the road,” he says.

Standardizing the process also serves as a blueprint for other labs to conduct this type of work, even if they do not have direct expertise. “Clinically, this is important because it increases sample size and broadens geographic regions and patient populations to further refine these sorts of analyses and interpretations,” asserts Dr. Miller.

Previous findings and future implications

Last year, Dr. Miller and his collaborators published a study in *Scientific Reports* that validates the claim that antibiotics influence a long-term shift in the microbiome that may increase the risk for USD. They also established the urinary tract microbiome — and not the gut microbiome — as a pathogenic target for USD.

These contributions, and others of their kind, are changing the landscape of microbiome research across the fields of urology and nephrology. There is early interest in exploring this work in the context of benign prostatic hyperplasia, chronic pelvic pain and a number of other conditions.

Ultimately, the recent review recognizes the breadth of research that has already been published within the field, aims to create continuity for how it's being approached and breaks down the silos that contribute to a lack of uniformity in the work.

“We can't really advance the science in microbiome if everyone is producing their own individual set of interpretations,” says Dr. Miller. “There needs to be a team-based approach to this work, and that is exactly the direction in which we are headed.”

LEFT — To advance the study of microbiome-associated urinary stone disease (depicted here), scientists set protocols for sample collection and storage, DNA extraction, sequencing, and data analysis.

2020 HIGHLIGHT

ENTERING A NEW ERA IN CHRONIC KIDNEY DISEASE

“Dialysis was a game changer for kidney care, but that was nearly 80 years ago,” says John Sedor, MD, a nephrologist and physician-scientist at Cleveland Clinic.

Investing in innovation

Today, new federal initiatives are playing pivotal roles in fueling new efforts for kidney disease research and therapies. In July 2019, President Trump announced the Advancing American Kidney Health Initiative, an executive order administered by the Department of Health and Human Services (HHS) to improve preventive care, increase accessibility to and education about affordable treatment, and modernize the transplant program.

The Kidney Innovation Accelerator (KidneyX), which launched the year prior, is a public-private partnership between HHS and the American Society of Nephrology. The organization prioritizes funding for high-impact prevention, diagnostics and treatments for kidney diseases through prize competitions. Dr. Sedor chairs the steering committee for KidneyX. The group just announced the six winners of the Redesign Dialysis Phase 2.

He explains, “The goal of this round of KidneyX prizes was to accelerate innovations in dialysis. Kidney replacement therapy is an area poised for improvements in terms of safety, accessibility, efficacy and patient experience.” These six innovative technologies will facilitate development of wearable or implantable artificial kidneys, which would permit treatment at home rather than in centers.

An influx of research studies

In addition to new innovations, there’s been an influx of multicenter studies funded by the National Institutes of Health (NIH). Last year, Cleveland Clinic began enrolling its first patients in two of these trials, the Kidney Precision Medicine Project

(KPMP), led by Dr. Sedor along with colleagues Emilio Poggio, MD, and John O’Toole, MD, and the APOL1 Long-term Kidney Transplantation Outcomes Network (APOLLO) study, led by Dr. Poggio.

Jonathan Taliercio, DO, will be leading a new NIH-funded study that will leverage data-sharing and collaboration between two major studies, the Chronic Renal Insufficiency Cohort and the KPMP.

Alongside these studies are basic research programs at Cleveland Clinic’s Lerner Research Institute in the laboratories of Drs. Sedor and O’Toole and Leslie Bruggeman, PhD. This includes work investigating the mechanisms by which *APOL1*, a genetic variant with origins in West African countries, causes progressive kidney disease.

Additionally, Robert Fairchild, PhD, staff in the Department of Inflammation and Immunity, developed pioneering models to mediate heart and kidney transplant rejection that are now used by many laboratories. He and collaborators developed a noninvasive method using RNA in urine to detect kidney graft injury.

A new path forward

With new funding mechanisms and robust research and innovation programs in place, Dr. Sedor is hopeful about the future of kidney care. “Change agents at local and federal levels are talking about tackling kidney disease with the same energy as seen with cancer funding and activism,” he says. “It’s been a long time coming, but this is all really exciting for us.”



RIGHT — Nephrologists John O’Toole, MD, and John Sedor, MD, are hopeful about the future of kidney care due to new funding mechanisms and robust research and innovation programs.

2020 HIGHLIGHT

RENAL GENETICS PROGRAM: THE BEGINNING AND THE FUTURE

A young patient with focal segmental glomerulosclerosis (FSGS), a condition that can cause kidney failure, was being treated with a standard regimen of steroid and other immunosuppressive drugs. His mother had died from kidney failure after being on dialysis for years.

After a few months with no improvement, the patient came for an evaluation in Cleveland Clinic's Renal Genetics Program, a new collaboration between Glickman Urological & Kidney Institute and Cleveland Clinic's Center for Personalized Genetic Healthcare. Genetic testing revealed that the patient's FSGS was inherited, due to a mutation in one gene.

This diagnosis led to a markedly different approach to therapy. Steroids and other immunosuppressive drugs were discontinued as they would not work for inherited FSGS. Instead, the patient was recruited into a clinical trial targeting the genetic form of FSGS with a novel small-molecule drug.

30% of patients have changes in disease management

This patient is among 30% to have changes in the management of their kidney disease since coming to Cleveland Clinic's Renal Genetics Program, which began in October 2019. In addition, 58% of patients in the program have learned that the genetic cause of their disease could also affect their family members.

"Nearly 400 genes — plus other chromosome anomalies — are associated with kidney disease," says Xiangling Wang, MD, PhD, Director of Renal Genetics at Cleveland Clinic. "Today genetic testing is more affordable and is better directing kidney disease diagnosis and treatment."

The most common conditions evaluated in the program include:

- **Cystic kidney diseases.**
- **Glomerular diseases,** such as FSGS and systemic genetic disorders involving glomeruli (e.g., Alport syndrome, Fabry disease).

- **Electrolyte disturbances,** such as Gitelman syndrome, Bartter syndrome, Gordon syndrome, Liddle syndrome, renal tubular acidosis, familial hypocalciuric hypercalcemia and hypophosphatemic rickets.
- **Early onset kidney stones and nephrocalcinosis.**
- **Congenital anomalies of the kidneys and urinary tract (CAKUT).**

One of few programs in the U.S.

Although the demand is growing, there are still very few renal genetics programs in the U.S. Cleveland Clinic's program, now with more than 140 patients, grew sevenfold in less than a year.

In addition to Dr. Wang, a double-trained medical geneticist and nephrologist, the program includes a team of experienced medical geneticists, nephrologists and genetic counselors. They see patients referred from across the nation for diagnosis, genetic counseling and disease management.

"Genetic kidney disease centers are changing the practice of nephrology, making genetic testing and service more accessible to patients, as well as inspiring research," says Dr. Wang.

Collaborating with national researchers

The nascent program at Cleveland Clinic has been collaborating with national researchers to conduct clinical and basic studies to advance the understanding of mechanisms of genetic kidney disorders and develop targeted therapies.

"The ultimate aim of renal genetics is to deliver care tailored to individual patients," says Dr. Wang. "With the rapid progress in research, I'm optimistic that genetically targeted therapy for inherited kidney disease will be a reality in the near future."

2020 HIGHLIGHT

TWO YEARS LATER: PROGRESS IN THE GENITOURINARY MALIGNANCIES RESEARCH CENTER

In the two years since the Genitourinary (GU) Malignancies Research Center was created, Director Nima Sharifi, MD, has seen a flurry of bench studies become clinical studies, as well as clinical questions spark new bench research.

A joint initiative of Cleveland Clinic's Glickman Urological & Kidney Institute and Lerner Research Institute, the center is a hub for urologists, oncologists, pathologists and basic scientists working to transform the care of patients with kidney, bladder or prostate cancer.

"We're transcending disciplines, so lab researchers and clinicians increase and optimize their interactions, reaching into the clinic in a way that is really meaningful," says Dr. Sharifi.

AR antagonists alter metabolism in prostate cancer patients

Take for example the center's recent study of prostate cancer patients taking androgen-receptor (AR) antagonists. Published in *Annals of Oncology*, the study found that levels of biologically active glucocorticoids in these patients — while known to be elevated in tumor tissue — were elevated systemically as well.

"Although we identified the metabolic change in the lab, it's not something that just happens in mouse models," says Dr. Sharifi. "The clinical findings were quite clear: AR antagonists can alter a patient's metabolism."

That may be most concerning for men with earlier stage prostate cancer who take AR antagonists long term. Elevated glucocorticoid levels aren't without consequence. One subset of patients in the study developed hypertension. Immunosuppression and central nervous system effects may be other repercussions.

"More research is needed to determine how best to treat hypertension and other adverse effects in patients taking AR antagonists," says Dr. Sharifi.

Transporter protein may be new therapeutic target for kidney cancer

Others in the center are making remarkable progress in understanding kidney cancer. Abhishek A. Chakraborty, PhD, Assistant Staff in the Department of Cancer Biology at Lerner Research Institute, is studying a specific protein that regulates amino acid metabolism in both normal and malignant kidney cells. The work is supported by a \$1 million Early-Career Investigator Award that Dr. Chakraborty received in 2020 from the U.S. Department of Defense's Kidney Cancer Research Program.

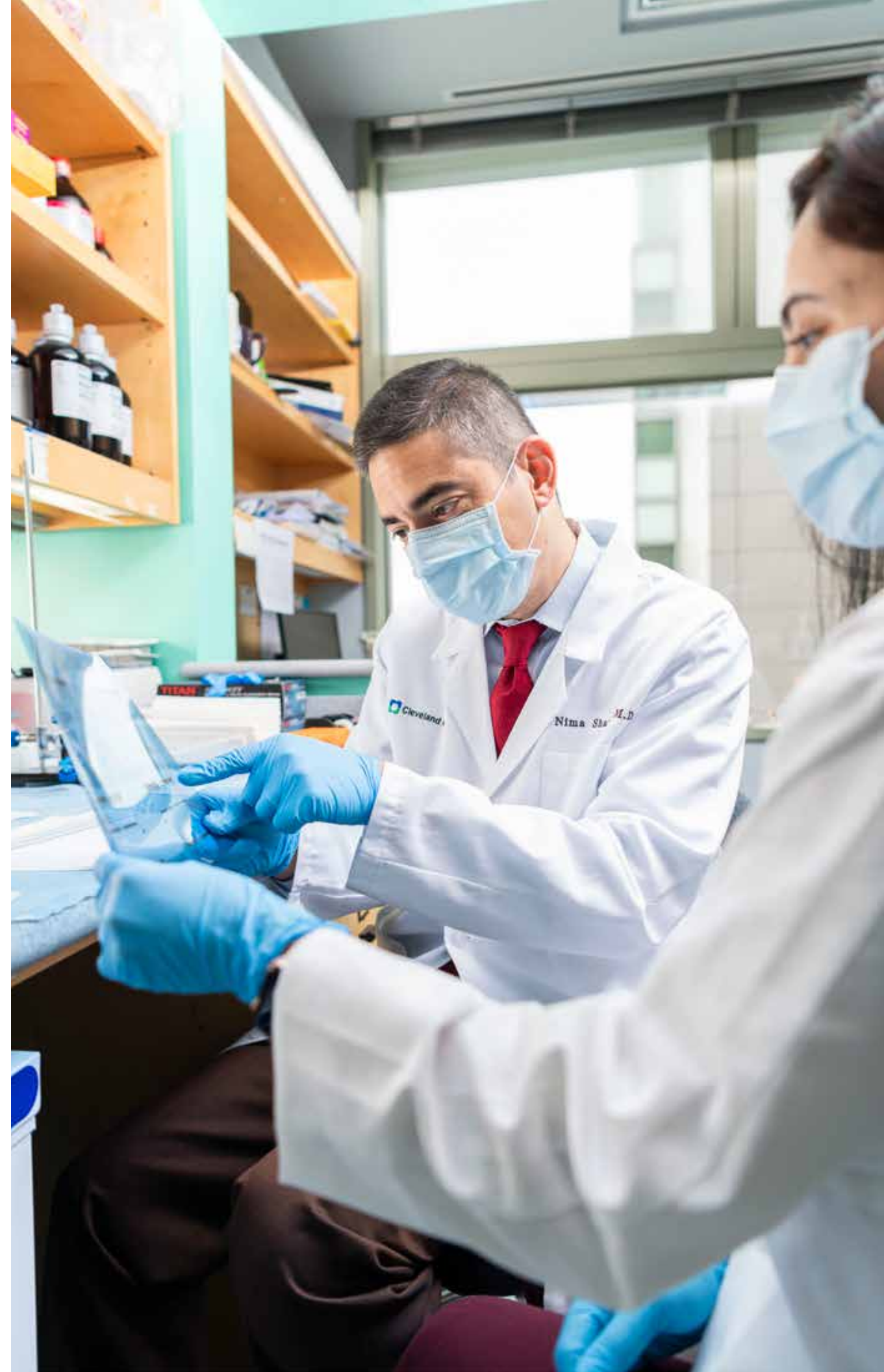
"In kidney cancer cells, the protein is upregulated, picking up more than its normal share of amino acids," says Dr. Chakraborty. "It's like cancer cells are addicted to these nutrients, which keep the cells growing and spreading."

Dr. Chakraborty's lab will study how blocking the protein affects kidney cancer development and progression. They also will explore the effects of nearly 100 potential oncogenes — like the one that hijacks the amino acid absorption process.

Changing practice takes a sustained effort

Understanding the fundamental biology of cancer is the first step in finding new and better therapies, says Dr. Chakraborty. But making the leap from discovery to changing practice takes a sustained effort, sometimes over five to 10 years, adds Dr. Sharifi.

"Good working relationships across disciplines, where people understand each other's language, are helpful," he says. "Could it happen if we didn't have a GU Malignancies Research Center? Maybe. But having the center formalizes those interactions and ensures that we do much more with what we already have at hand."



2020 HIGHLIGHT

TRAINING THE NEXT GENERATION OF UROLOGISTS AND NEPHROLOGISTS

“Interview season” within residency and fellowship programs was a little different this year as program directors moved applicant interviews into virtual spaces amid the COVID-19 pandemic.

These challenges aside, Cleveland Clinic’s urology residency and nephrology fellowship directors say that both programs continue to offer the same high-volume clinical and surgical experiences, while incorporating new and innovative features.

Unparalleled surgical and research experience for urology residents

Steven Campbell, MD, PhD, Director of Cleveland Clinic’s Urology Residency Program, remarks that the program has always been surgically robust, but recent focus on minimally invasive and robot-assisted techniques has created a unique surgical experience for trainees.

“We offer weekly surgical skills and simulation training, where junior residents can practice various open, laparoscopic and robotic techniques,” he says. “On average, residents spend about one day in the clinic and the rest of the time in the operating room.”

A fertile research program also has been a central tenet of training. During the fourth year of residency, trainees have a protected year of research, when they are not expected to cover clinical or on-call responsibilities and can devote their time fully to a faculty-mentored research program.

Current research residents are investigating genetic sequencing of bladder cancer in various subpopulations, electrical stimulation of the pudendal nerve in the treatment of stress urinary incontinence, the safety and feasibility of a catheter-free ambulatory cystometry device, and the utility of remote patient-monitoring devices in cystectomy patients. A formal curriculum for trial design and statistics also has been added to complement the research experience.

Robust academic, clinical and multispecialty training for nephrology fellows

Cleveland Clinic’s Nephrology and Hypertension Fellowship Program is known for its robust academic, clinical and multispecialty training, offering trainees a unique learning experience while caring for a diverse patient population from throughout the local community and around the globe.

The patient volume, spectrum of disease pathology and a commitment to finding new discoveries enable trainees to be involved in large-scale, federally funded trials alongside experienced faculty mentors. For the first time in the history of the program, the National Institutes of Health has awarded a T32 grant to a second-year nephrology fellow to prepare for a career in research.

“Our fellowship program integrates traditional and innovative learning models that support any trainee’s learning style,” remarks Jonathan Taliercio, DO, Director of the Nephrology and Hypertension Fellowship Program.

The 2019-2020 academic year saw expansion of the number of fellowship positions, the launch of a new in-house night float system, the addition of an interventional nephrology experience, and a new clinical and research partnership with the Louis Stokes Cleveland VA Medical Center.

Despite a nontraditional format this year, program leadership is confident that the enduring qualities of Cleveland Clinic’s training programs will continue to attract the best talent around the world, with the ultimate goal of training the next generation of physician leaders to provide the best possible care to patients.

2020 HIGHLIGHT

NOVEL APPROACHES TO PELVIC FLOOR DISORDERS OFFER IMPROVED TREATMENTS IN FEMALE UROLOGY

The Center for Female Pelvic Medicine and Reconstructive Surgery diagnoses and treats complex conditions of the female pelvis.

This year, the team made important strides as the first center in the U.S. to implant a patient with an MRI-safe and recently Food and Drug Administration (FDA)-approved sacral neuromodulation (SNM) device. The center also announced its involvement with a national study exploring patient-derived cells as treatment for stress urinary incontinence (SUI).

Improvements in sacral neuromodulation

For patients who are refractory to lifestyle modifications and medications, SNM has been the gold-standard treatment over the last 20 years for loss of bladder and bowel control.

The implantable device works by stimulating the sacral nerves in the lower back, thereby “hacking” into the neural system that controls bladder-to-brain and bowel-to-brain communication, allowing resumption of normal voiding and bowel function.

Historically, to comply with FDA regulations, patients needing an MRI had to have their SNM device surgically removed — both disruptive to care and exorbitant in cost.

Howard Goldman, MD, Vice Chairman of the Urology Department in Glickman Urological & Kidney Institute, says that MRI-safe technology may be a game changer for patients with neurological conditions, particularly those with multiple sclerosis, who may experience overactive bladder and also may need more frequent MRI scans.

Newer iterations of SNM devices also provide an extended battery and manufacturing life and may require a less-invasive implant procedure. Dr. Goldman says that efforts to scientifically evaluate these devices are ongoing and will continue as new devices become available.

Sandip Vasavada, MD, Section Head of Female Pelvic Medicine and Reconstructive Surgery, who

led the first SNM procedure in the U.S. with the Medtronic InterStim™ II system, emphasizes, “This is a new resource to add to our toolkit for effective long-term management of bladder and bowel dysfunction.”

A call for cell-based therapies

Cleveland Clinic also announced it has joined a national clinical trial sponsored by Cook Myosite® to evaluate the safety and efficacy of a patient’s muscle-derived stem cells in the treatment of SUI.

The double-blind randomized study will compare the results of a medical procedure using autologous muscle-derived cells for urinary sphincter repair in women to those of placebo intervention. After an in-office muscle biopsy of the participant’s thigh, the cells are processed and purified for progenitor cells, which are later injected into the patient’s urinary sphincter.

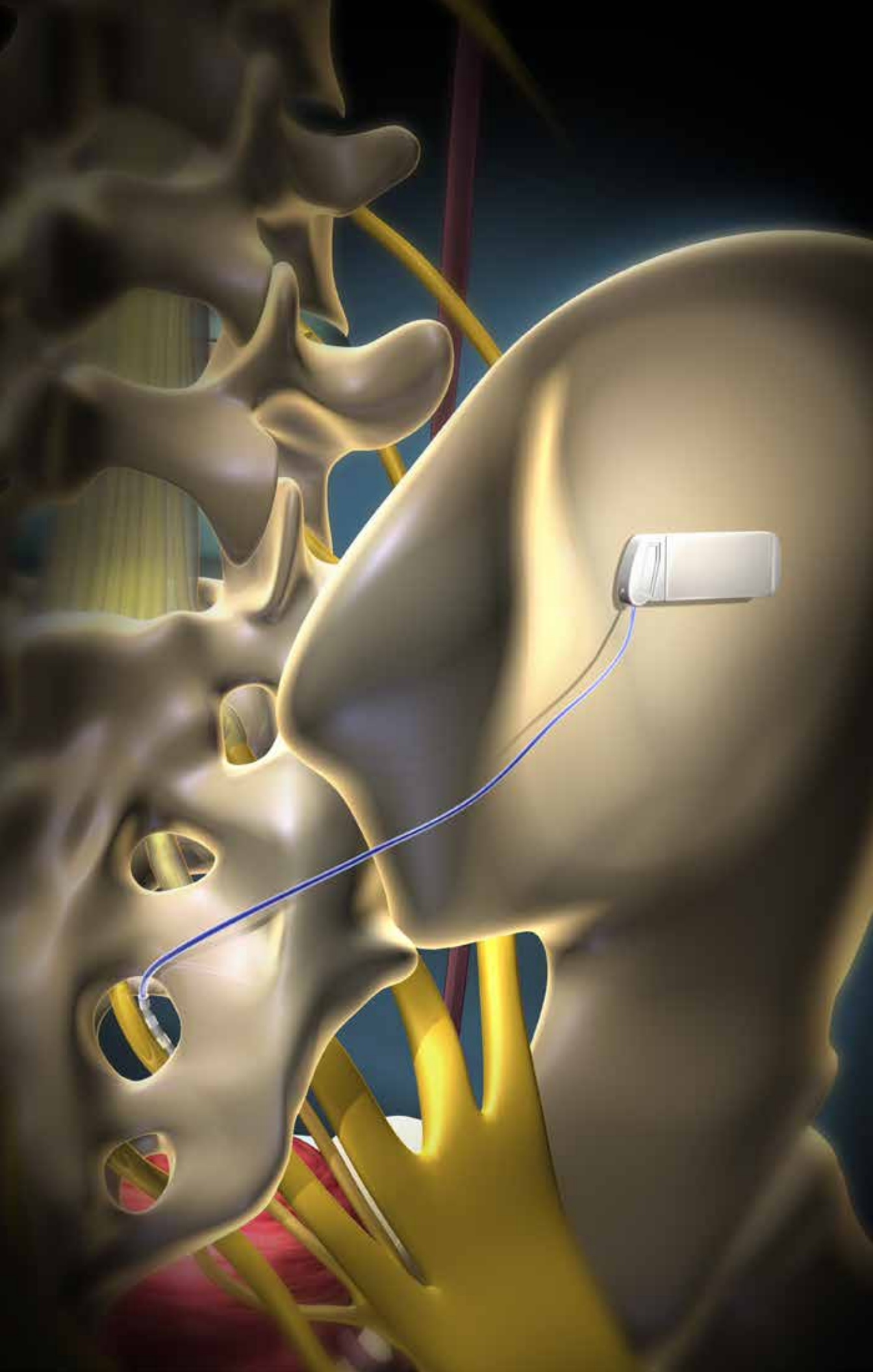
While medical consensus continues to favor the midurethral sling procedure to treat SUI, the controversy surrounding the use of synthetic materials has led to a dialogue about new treatment options. The minimally invasive procedure requires only local anesthesia and typically takes less than 15 minutes.

Innovative solutions for complex abnormalities

Neuromodulation and cell-based therapies are two modalities that illustrate the complexity of pelvic floor dysfunction. Dr. Goldman adds that getting the right diagnosis first is essential to determining whether the abnormality stems from the bladder muscle, the urethra or somewhere else entirely.

He concludes, “Diverse pathology within pelvic medicine requires fervent clinical and surgical innovations to meet patients’ needs. We are committed to that pursuit.”

RIGHT — Sacral neuromodulation devices — now smaller, rechargeable and MRI-safe — can relieve bladder-control symptoms long term.





2020 HIGHLIGHT

RADICAL PROSTATECTOMY BECOMES OUTPATIENT PROCEDURE WITH SINGLE-PORT ROBOT

Robotic radical prostatectomy used to require five incisions in a patient’s abdomen. Today at Cleveland Clinic it requires only one, using the da Vinci® SP Surgical System.

Cleveland Clinic was the first U.S. medical center to begin using the single-port robot for urology procedures in late 2018. Since then, experts at Glickman Urological & Kidney Institute have used it to perform extraperitoneal prostatectomy in approximately 250 patients. It’s especially beneficial in patients for whom procedures would be challenging, such as in those who are obese and those who have breathing problems.

Benefits of an extraperitoneal approach

“Performing the procedure extraperitoneally has several advantages,” says Jihad Kaouk, MD, Director of the Center for Robotic and Image-Guided Surgery and the Zegarac-Pollock Endowed Chair in Laparoscopic and Robotic Surgery. “By avoiding the sac in which the bowel is contained, the surgery is compartmentalized, limited to the area just around the prostate. The gas bubble in which the robotic arms work expands the peritoneum, pushing the bowel out of the way, allowing better visibility.”

In addition to reducing bowel-related complications, the single-port robotic technique also prevents adverse effects, such as optic nerve edema, congestion and respiratory problems during surgery, that can come from steep Trendelenburg positioning. Patients having single-port robotic prostatectomy lie flat.

“Thanks to these advances, radical prostatectomy has been transformed into an outpatient procedure,” says Dr. Kaouk. “Most patients go home a few hours after surgery.”

Outcomes are comparable to the multiport robotic approach, but with less pain and no drain except a Foley catheter. More than two out of three patients require no narcotics after surgery and are able to manage pain with only ibuprofen or acetaminophen, or no pain medication at all (Table).

Recent studies on single-port prostatectomy

While many centers are beginning to adopt this approach to radical prostatectomy,

	Single-port robotic prostatectomy	Multiport robotic prostatectomy
Hospital stay	4.3 hours	26.1 hours
Time in the operating room	195 minutes	190 minutes
Blood loss during surgery	190 mL	200 mL
Percentage of patients who used narcotics after surgery	32%	63.60%
Morphine equivalent	7.5 mg	15 mg
<i>Lenfant L, Sawczyn G, Aminsharifi A, et al. Pure single-site robot-assisted radical prostatectomy using single-port versus multiport robotic radical prostatectomy: a single-institution comparative study (published online ahead of print, 2020 Nov 4). Eur Urol Focus. 2020;S2405-4569(20)30290-X.</i>		

Cleveland Clinic has been among the first to publish findings on step-by-step techniques¹ and cost comparisons.² In the study published in 2020 in *European Urology Focus*, a Cleveland Clinic team reported that the overall surgical care cost of single-port prostatectomies is comparable to multiport prostatectomies. The higher cost of surgical materials in single-port procedures is offset by the lower cost of shorter hospital stays.

Single-port robotic procedures also are available for partial nephrectomy, radical cystectomy and even kidney transplant. Since 2018, Cleveland Clinic has completed eight single-port kidney transplants, with no complications so far.

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2. Lenfant L, Sawczyn G, Kim S, Aminsharifi A, Kaouk J. Single-institution cost comparison: single-port versus multiport robotic prostatectomy. *Eur Urol Focus.* 2020;S2405-4569(20)30168-1.

LEFT — A Cleveland Clinic team led by Jihad Kaouk, MD, uses a single-port robot to perform extraperitoneal radical prostatectomy. Most patients go home a few hours after the procedure.

2020 UPDATES

CENTER FOR BLOOD PRESSURE DISORDERS

Recognized as a Comprehensive Hypertension Center by the American Heart Association (AHA), the Center for Blood Pressure Disorders is actively developing protocols to increase use of self-measured blood pressure in patients, in line with AHA and American Medical Association (AMA) policy statements. Center Director George Thomas, MD, is participating in an independent review committee for blood pressure device validation — part of an AMA initiative. In addition, the center is partnering with the newly formed Multicultural Kidney and Hypertension Center, recognizing that minorities suffer a disproportionate burden of hypertension and empowering underserved men and women to take steps to improve their health.

CENTER FOR CHRONIC KIDNEY DISEASE

The Cleveland Kidney Precision Medicine Project began enrolling participants in late 2019. The goal of this National Institutes of Health (NIH)-funded project is to define molecular pathways that will help identify specific drug targets and ultimately enable individualized care for people with chronic kidney disease. Cleveland Clinic is one of six recruiting centers and is focused on people with kidney disease as well as diabetes and/or hypertension.

For more information, visit kpmp.org.

CENTER FOR ENDOUROLOGY AND STONE DISEASE

One of the highest-volume kidney stone centers in the U.S., the Center for Endourology and Stone Disease has five endourologists focused on stone disease. In addition to offering totally tubeless percutaneous nephrolithotomy (PCNL), outpatient mini-PCNL and ultrasound-guided renal access, the center is active in multicenter clinical trials, including studies on using lasers in stone surgery and PCNL techniques. As part of the Urinary Stone Disease Research Network, the center also is enrolling patients in a randomized clinical trial evaluating innovative methods to improve compliance with fluid intake for stone prevention. Other research projects are focused on point-of-care ultrasound and understanding ergonomics in kidney stone surgery.



One of the highest-volume kidney stone centers in the U.S., the Center for Endourology and Stone Disease has five endourologists focused on stone disease.



CENTER FOR DIALYSIS

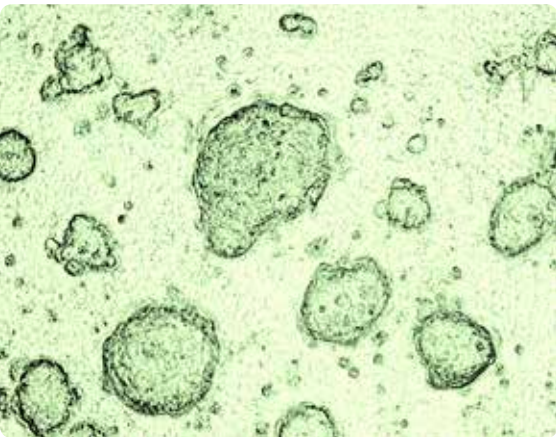
Michael Lioudis, MD, The Shvidler Endowed Chair in Nephrology and Hypertension Research, is the new Director of End-Stage Kidney Disease (ESKD) at Cleveland Clinic. Under his leadership, the Center for Dialysis will focus on the Advancing American Kidney Health Initiative, working to reduce the number of Americans progressing to ESKD, guide more individuals to home dialysis therapies and increase referrals for kidney transplant evaluation.

In partnership with Fresenius Kidney Care, the center has developed a transitional care unit to continue the education of patients new to dialysis.

Additionally, the center has established a full complement of interventional nephrology care under the leadership of Tushar Vachharajani, MD. Dr. Vachharajani implemented a program that has standardized dialysis line placement within Cleveland Clinic's intensive care unit.

CENTER FOR FEMALE PELVIC MEDICINE AND RECONSTRUCTIVE SURGERY

Patients are enrolling in a trial evaluating the safety and efficacy of autologous muscle-derived stem cells in the treatment of stress urinary incontinence. “The hope is that this injection will help rejuvenate, repair and restore function to the damaged cells in the sphincter,” says Howard Goldman, MD, lead investigator at Cleveland Clinic.



CENTER FOR GENITOURINARY RECONSTRUCTION

This center continues to be a regional and national resource for patients with routine and complex urological problems requiring reconstructive surgery. Resident and fellow education remains a priority as evidenced by cooperation on publications and book chapters, and the number of residents choosing reconstructive urology as a career.

In October 2019, Center Director Kenneth W. Angermeier, MD, presented in Athens, Greece, at the Society of Genitourinary Reconstructive Surgeons Academic Congress and the Joint SIU-ICS Symposium. In January 2020, staff urologist Hadley M. Wood, MD, was a visiting professor at University Medical Center Hamburg-Eppendorf and presented at the Pediatric Urology Working Group of the German Society for Pediatric Surgery. In addition, Dr. Wood received an American Academy of Pediatrics Quality Improvement Grant (in conjunction with pediatric neurology) to improve transition from pediatric to adult care for patients with spina bifida.



CENTER FOR MALE FERTILITY

This center, led by Sarah Vij, MD, continues to offer a full range of male infertility diagnostic and therapeutic services. A sperm banking program for oncologic patients has been formalized to streamline the process and increase use at Cleveland Clinic. The center also has established a postmortem sperm retrieval policy.

Among many research efforts, a team led by Ashok Agarwal, PhD, used proteomic and computation tools to demonstrate a novel pathway showing abnormal redox homeostasis against chronic hypoxic insult in unilateral varicocele leading to sperm dysfunction. In another study, Dr. Agarwal's team used an in vitro approach to identify the physiological range of oxidation reduction potential in human sperm. This information can help identify patients with reductive stress or male oxidative stress infertility.

CENTER FOR MEN'S HEALTH

In the HoLEP program, average prostate size is over 100 grams. More than half of patients were catheter dependent prior to surgery, and 98% of all patients are now able to urinate normally.

This center continues to offer a broad range of therapies for benign prostatic hyperplasia, erectile dysfunction, low testosterone, and chronic pelvic and genital pain. For prostate enlargement, interventions include minimally invasive treatments (UroLift®, Rezum™) done under local anesthetic, holmium laser enucleation of the prostate (HoLEP), standard transurethral approaches and robotic removal. In the HoLEP program, average prostate size is over 100 grams. More than half of patients were catheter dependent prior to surgery, and 98% of all patients are now able to urinate normally.

Noteworthy publications this year by Cleveland Clinic researchers reported that men who develop polycythemia on testosterone therapy are likely to have untreated or occult obstructive sleep apnea, and that comorbidities such as obesity, sleep apnea and cardiac diseases are often the reason men on testosterone therapy fail to have improvement of symptoms. Outcomes of a study on microscopic spermatic cord denervation for chronic orchialgia were published in *Translational Andrology and Urology*, reporting that the strongest predictor of a man's failure to improve was pelvic floor spasm.

CENTER FOR MINORITY MEN'S HEALTH

Although postponed in 2020 due to COVID-19, the Minority Men's Health Fair has provided health and wellness information and health screenings to more than 35,000 men — in mostly minority and underserved populations — since it began in 2003. The Center for Minority Men's Health continues to inspire other equity initiatives at Cleveland Clinic, such as the Minority Stroke Center, Multicultural Kidney and Hypertension Center, and Multicultural Skin & Hair Center of Excellence.

In 2020, Center Director Charles Modlin, MD, MBA, chaired the Education, Outreach & Communications Subcommittee for Ohio Gov. Mike DeWine's COVID-19 Minority Strike Force. The Minority Strike Force presented the governor with recommendations for better educating, caring for and otherwise mitigating the spread of COVID-19 within communities of color. The center then helped organize a group of 16 Black physicians from Cleveland Clinic to create a video and public service announcement raising awareness of COVID-19 risks and how to reduce them in the Black community.

35,000 men have received health and wellness information and health screenings at the Minority Men's Health Fair since 2003.

CENTER FOR PEDIATRIC UROLOGY

Pediatric urologic fetal care continues to advance. “Having posterior urethral valves is a lifelong condition that we have shown to be not merely a pediatric disorder, but one that can decline in adulthood,” says Center Director Audrey Rhee, MD. “This necessitates close follow-up.”

Most notably in 2020, the COVID-19 pandemic changed the practice algorithm for both prenatal and postnatal congenital anomalies and timing of imaging.

CENTER FOR RENAL DISEASES

The APOLLO study is examining implications of *APOL1* gene mutations in the outcomes of kidney transplant recipients. “We know the *APOL1* genetic variant has origins in West African countries and is associated with chronic and progressive kidney disease,” says investigator Emilio Poggio, MD. Enrollees to date include 11 recipients of kidneys from deceased African American donors and one recipient from a living African American donor.

Enrollees in the APOLLO study to date include 11 recipients of kidneys from deceased African American donors and one recipient from a living African American donor.



CENTER FOR ROBOTIC AND IMAGE-GUIDED SURGERY

Approximately 250 patients have had extraperitoneal prostatectomy since 2018, when Cleveland Clinic became the first U.S. medical center to use the da Vinci single-port robot for urology procedures. Not only do most patients have less pain with single-port robotic prostatectomy, but most can go home a few hours after surgery, essentially turning prostatectomy into an outpatient procedure. In addition, the center has performed eight kidney transplants with the single-port robot to date. All surgical instruments and the donor kidney are placed through one small abdominal incision.

CENTER FOR RENAL AND PANCREAS TRANSPLANT

The kidney transplant program had another record-breaking year, completing more than 270 transplants involving 70 living donors and 20 paired exchanges. The number of single-port robotic transplantations continues to increase. One was performed on a transplant recipient with a body mass index of 40. In 2020, nearly 1,000 patients were evaluated for kidney or pancreas transplant and 350 patients were listed. The Center for Renal and Pancreas Transplant continues to be part of four multicenter, NIH-sponsored studies and recently completed two double-blind studies on decreasing opioid use after transplant and donor surgery.



CENTER FOR UROLOGIC ONCOLOGY

Researchers in this center published more than 100 scientific articles in the past year, including a study that found African Americans are more likely to mistrust healthcare providers and, therefore, have more decisional regret in prostate cancer. Center Director Christopher Weight, MD, led an international artificial intelligence challenge, segmenting kidneys and kidney tumors. His team, which coordinated 20,000 hours of kidney cancer research on five continents, received the top prize at MICCAI 2019 in Shenzhen, China. Another research team led by Dr. Weight has been awarded a multimillion-dollar R01 grant to study how environmental exposures may lead to kidney cancer. In addition, Byron Lee, MD, PhD, and Georges-Pascal Haber, MD, PhD, continue to help lead the field in the management of muscle-invasive bladder cancer, rapidly expanding the number of referrals to the center.

For his contributions to the study of kidney cancer, Steven Campbell, MD, PhD, received the Kidney Cancer Association’s Andrew C. Novick Award and the American Urological Association (AUA) Distinguished Contribution Award. Dr. Campbell also has been named Chair of the AUA Guidelines Committee for Renal Neoplasms.

More than 270

kidney transplants were completed in 2020, involving 70 living donors and 20 paired exchanges.

NEW STAFF

Glickman Urological & Kidney Institute welcomed these new staff members in 2020.

NEPHROLOGY

- Roulan Abu Hweij, MD
- Amir Alamir, MD
- Cassandra Kovach, MD
- Rhyan Maditz, DO
- Jerin Mathew, MD
- Matthew McGuire, MD
- Ali Mehdi, MD
- Roman Shingarev, MD


UROLOGY


- Nima Almassi, MD
- Petar Bajic, MD
- Emily Slopnick, MD
- Christopher Weight, MD
- Anna Zampini, MD


RESOURCES FOR PHYSICIANS


Stay Connected with Cleveland Clinic's Glickman Urological & Kidney Institute

Consult QD *Urology & Nephrology*
News, research and perspectives from Cleveland Clinic experts:
consultqd.clevelandclinic.org/urology-nephrology

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[@CleClinicUro](https://twitter.com/CleClinicUro)
[@CleClinicNeph](https://twitter.com/CleClinicNeph)

 clevelandclinic.org/MDlinkedin

 clevelandclinic.org/kidney

24/7 Referrals

855.REFER.123
clevelandclinic.org/refer123

Outcomes Data

View Outcomes books at
clevelandclinic.org/outcomes.

CME Opportunities

Visit ccfcmec.org for offerings from Cleveland Clinic's Center for Continuing Education.

Glickman Urological & Kidney Institute

The Glickman Urological & Kidney Institute is a world leader in treating complex urologic and kidney conditions in adults and children. Our internationally recognized staff has pioneered laparoscopic and robotic surgical techniques and developed innovative procedures for urologic cancers and transplantation. We provide advanced management of kidney disease, hypertension, infertility and congenital malformations to help patients worldwide.

About Cleveland Clinic

Cleveland Clinic is a nonprofit, multispecialty academic medical center integrating outpatient and hospital care with research and education for better patient outcomes and experience. More than 4,500 staff physicians and researchers provide services through 20 patient-centered institutes. Cleveland Clinic is a 6,026-bed healthcare system with a main campus in Cleveland, 18 hospitals and over 220 outpatient locations. The health system includes five hospitals in Southeast Florida with more than 1,000 beds, a medical center for brain health in Las Vegas, a sports and executive health center in Toronto and a 364-bed hospital in Abu Dhabi. Cleveland Clinic London, a 184-bed hospital, will open in 2022. Cleveland Clinic is currently ranked as one of the nation's top hospitals by *U.S. News & World Report*.

clevelandclinic.org

Year in Review is written for physicians and should be relied on for medical education purposes only. It does not provide a complete overview of the topics covered and should not replace the independent judgment of a physician about the appropriateness or risks of a procedure for a given patient.

Year in Review

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GLICKMAN UROLOGICAL & KIDNEY INSTITUTE

2020 Year in Review

