MESSAGE FROM THE CHAIR

Dear Colleagues,

As we begin a new year, I am delighted to update you on the latest clinical and research news here at Wake Forest Baptist Health Urology. From a new clinical trial evaluating bioengineered penile tissue to continued advancements in surgical procedures, I am proud of the innovative, pioneering spirit of our faculty.

The clinical work of our faculty is complemented by their research endeavors with medical center colleagues, Urology Research Laboratory and the Wake Forest Institute for Regenerative Medicine.

Here at Wake Forest Baptist, innovation is viewed as an essential element of a learning health system. This belief extends throughout all we do in the urology department to provide the latest clinical therapies to our patients.

We are looking forward to a new year of continued growth and positive challenges.

Anthony Atala, MD
William H. Boyce Professor and Chair

Innovations in Urology

Bioengineered Tissue Constructs for Irreversibly Damaged Penile Corpora

Traumatic injuries in civilians and battlefield-related injuries in soldiers often require reconstructive procedures to restore the anatomy and functionality of the penis. However, these procedures are often limited by poor availability of functionally intact penile tissue. Various penile reconstructive procedures, such as penile prostheses and autograft implantation, have been attempted. While cosmetic appearance may be improved, restoration of spontaneous and natural erectile function may not be achieved. This is often due to a defect of the corpora cavernosa, which is critical for erectile function. The concept of a tissue engineering-based therapy has been proposed for reconstructing damaged penile corporal tissue.

An upcoming clinical trial sponsored by the Armed Forces Institute for Regenerative Medicine (AFIRM II) has been designed to evaluate the safety of autologous engineered corpora cavernosa + albuginea constructs for treatment of complex penile deformities. Autologous endothelial and smooth muscle cells, obtained from enrolled subjects’ corpora cavernosa biopsies, will be cultured, expanded in vitro and used to seed decellularized corpora cavernosa + albuginea obtained from cadaveric-donors to create autologous bioengineered constructs for repair of damaged penile tissues.

The proposed study design is a prospective non-randomized multicenter investigation. A total of 10 male patients will be recruited who are 18 to 60 years old with damage to penile tissue due to infection, inflammation or structural deformity caused by trauma.

“Advances in tissue engineering made by our colleagues at the Wake Forest Institute for Regenerative Medicine offer hope for men with damaged corpora and urethra,” said primary investigator Ryan Terlecki, MD.

Enrolled participants will undergo a corporal biopsy as an outpatient surgical procedure. Autologous corporal smooth muscle cells and endothelial cells will be isolated and then seeded on decellularized cadaveric corporal bodies. Approximately three to four weeks later, the engineered construct including corporal tissue with attached tunica will be transplanted into the surgically prepared site of penile injury. Participants will be followed through 36 months post-implantation to monitor for safety.
The MEDLIFT Study, An Extension

Daniel Rukstalis, MD, presented the positive findings of the multicenter prospective MedLift trial as a late-breaking abstract presentation at the 2018 American Urological Association meeting. Median prostatic lobe obstruction can be treated with prostatic urethral lift implants safely and effectively and is a new FDA indication for this therapy.

The research team found that prostatic urethral lift is a safe and effective treatment for obstructive middle prostatic lobes in men with benign prostatic hyperplasia, a condition for which treatment options historically have been limited. UroLift is a minimally invasive device that pulls back obstructing prostatic lobes pressing on the urethra to improve urine flow. Urolift was cleared by the FDA in 2013 to treat blocked urine flow in men aged 50 years and older with BPH.

“None of the patients reported new-onset erectile or ejaculatory dysfunction,” Rukstalis said, “and we found that ejaculatory function was significantly improved throughout follow-up.”

The study, which enrolled 45 men with BPH-related lower urinary tract symptoms at nine sites, was conducted as an FDA Investigational Device Exemption extension of the LIFT randomized trial. Inclusion criteria included patients age 50 years or older, AUA Symptom Index of 13 or higher, peak flow rate 12 mL/sec or less, and prostate volume no greater than 80 cc.

Robotic Surgery Updates

Image-guided surgery involves the utilization of various adjunctive technologies that assist the surgeon in real time. An example of image-guided surgery in the field of robotic urology is molecular-guided surgery, utilizing indocyanine green (ICG) and near-infrared fluorescence. ICG is a nontoxic molecule that can be injected into the patient’s bloodstream or pathologic organ of interest to delineate special properties of the tumor. For example, in patients undergoing partial nephrectomy, ICG greatly facilitates the procedure and has been shown to decrease the amount of time the kidney is clamped during the operation. In addition, it has shown several other benefits in upper tract urothelial carcinoma, adrenal cancer, bladder cancer, prostate cancer and cancers of the retroperitoneum.

Recently, Ashok Hemal, MD, and Ram Pathak, MD, published a video presentation that delves into the role of fluorescence-guided surgery in robotic uro- oncologic cases. They showcased current publications in the field and showed sample surgical clips with accompanying narration to demonstrate the benefits of image-guided surgery.

Urothelial carcinoma of the ureter can be a potentially difficult diagnosis with a wide variety of treatments offered. Both Hemal and Pathak offer minimally invasive alternatives to the traditional open surgery and have co-authored several publications about the subject.

“Traditional open surgery and even pure laparoscopy has its limits,” said Pathak. The key to the success of robotic surgery lies in the management of the distal ureter as mentioned in a recent publication. The procedure, as it stands today, was pioneered by Hemal at Wake Forest Baptist and has since been refined with the newer generations of the robot.


Wake Forest Publications are Top Downloaded Papers

Ashok Hemal, MD, and Ram Pathak, MD, co-authored two papers that received top honors for being included in the list of 10 most downloaded papers, per the Journal of Endourology, at the 2018 international meeting of the Society of Endourology.

One of the papers allows surgeons to review and familiarize themselves with port placement for robotic surgery. The comprehensive template for various genitourinary surgeries includes robotic partial nephrectomy, prostatectomy, nephroureterectomy, cystectomy and female pelvic surgery. The publication includes graphic representations of ideal port placement strategies with an accompanying narrative to describe subtle nuances in different patient populations. The second publication investigates the role of newer generation robots in the management of upper tract urothelial carcinoma. Hemal found that with the da Vinci Xi® robot operative times were significantly shorter compared to older generation robots.

Prostate Cancer Diagnosis Tools

Improved imaging capability for diagnosis and management of prostate cancer, whether it be Magnetic Resonance Imaging or ultrasound, is a good thing. Daniel B. Rukstalis, MD, was a co-author of the AUA policy statement on the use of multiparametric Magnetic Resonance Imaging (mpMRI) in the diagnosis, staging and management of prostate cancer. Improved imaging capabilities such as MRI has made a difference in treatment of prostate cancer, and there’s “an energy around it,” Rukstalis said.

The policy statement concludes that the information obtained by mpMRI “represents a significant addition to traditional imaging techniques for the management of prostate cancer. mpMRI has the potential to improve the timely identification of clinically significant prostate cancer. Enhanced targeting approaches have the potential to reduce the cost of care through the reduction of unnecessary or inaccurate prostate biopsy procedures.”

Current evidence supports the performance of mpMRI in men with a rising PSA following an initial negative standard prostate biopsy procedure. It is likely that a targeted biopsy, using a combination of mpMRI and ultrasound-guided transrectal or transperineal biopsy, will become the preferred method for an initial prostate biopsy in biopsy naïve men with abnormal digital rectal exams or elevated PSA values. It is also likely that mpMRI can be beneficial to men with a presumed clinically localized prostatic adenocarcinoma prior to selecting definitive therapy. The information obtained from advanced imaging appears to offer some useful information for surgical planning with both extirpative and ablative treatments.

Stem Cell Therapy for Erectile Dysfunction

The prevalence of erectile dysfunction is substantial and continues to rise. While current therapeutic options may manage the disease state, none of these modalities restores function. Stem cell therapy has been evaluated for erectile restoration in animal models. These cells have been derived from multiple tissues, have varied potential, and may function via local engraftment or paracrine signaling. Bone marrow-derived stem cells and adipose-derived stem cells have both been used in these models with noteworthy effects. After reviewing the literature, Ryan Terlecki, MD, and co-authors found that placental-derived stem cells and urine-derived stem cells possess many similar properties as the aforementioned, but the collection methods are easier. Human clinical trials have already demonstrated successful use of stem cells for improvement of erectile function.


Feasibility of Minimally Invasive Therapy for Erectile and Urinary Dysfunction

Persistent urinary incontinence (UI) and/or erectile dysfunction (ED) occur in 30-50 percent of post-radical prostatectomy patients regardless of nerve sparing approaches. Identification of potential treatment options for these patients requires testing in a non-human primate model (NHP) that develops these chronic conditions. The objective by co-authors Ashok Hemal, MD, and Gopal Badlani, MD, was to characterize a NHP model of persistent post-prostatectomy ED and UI and then test the feasibility of periurethral injection of the chemokine CXCL-12.

The anatomy, innervation and vascular supply to the prostate and surrounding tissues of these male NHPs are substantially similar to those of human beings. Open radical prostatectomy (ORP) resulted in complete removal of the prostate gland along with both neurovascular bundles and seminal vesicles while permitting stable restoration of vesico-urethral patency. ORP in NHPs produced persistent erectile and urinary tract dysfunction. Periurethral injection of CXCL-12 was feasible and improved both urinary incontinence and erectile dysfunction and suggests that this model can be used to test new approaches for surgical planning with both extirpative and ablative treatments.


Mini-PCNL Study Shows Quality Improvement

Jorge Gutierrez, MD, published a quality improvement study to investigate if mini-PCNL would reduce postoperative analgesic use, blood loss, operative time, and/or hospital stay relative to conventional PCNL while maintaining stone-free rates. The outcomes of 29 consecutive mini-PCNLs were compared to 27 conventional PCNLs for stones 1-3.5 cm. There was no significant difference in residual stone burden, operative time or postoperative analgesic use between groups. There was significantly less blood loss (p=0.02) in the mini-PCNL group. Conventional and mini-PCNL are effective methods of removing renal stones 1-3.5 cm in greatest dimension. There is no difference in residual stone volume, postoperative analgesic use or operative time between the two modalities, but blood loss was less in the mini-PCNL group.

News Update

Congratulations

Brenner Children’s Hospital was named one of the 2018-19 Top 50 U.S. Hospitals for pediatric urology by U.S. News and World Report! Brenner Children’s Hospital is ranked in urology in the Best Children’s Hospital category. These results are based off clinical data and an annual survey.

Robert Evans, MD, was named “2018 Doctor of the Year” for the fourth consecutive year, as part of an Interstitial Cystitis Awareness Month campaign conducted by the Interstitial Cystitis Society.

Jorge Gutierrez, MD, received a 2019 American Urological Association (AUA) Commendation for Global Leadership for his role in expanding collaborations between the American Confederation of Urology (CAU) and the AUA to further advance urologic education.

Gopal Badlani, MD, has been conferred an honorary Fellowship of the Royal Colleges of Surgeons (FRCS) degree by the Royal College of Surgeons of England.


Catherine A. Matthews, MD, has been appointed an adjunct professor in the Department of Obstetrics and Gynecology at Kasturba Medical College, Manipal Academy of Higher Education, Manipal, Karnataka, India.

Offering National Clinical Trials

- **Anchorsure vs. capio for sacrospinous ligament fixation**
  A randomized, controlled single-blind study to determine if there is an improvement in the intensity and rate of buttock and posterior thigh pain one day, seven days and six weeks after sacrospinous ligament fixation with a new device, the Anchorsure® Suture Anchoring System (Neomedic), compared to the widely utilized Capio™ Slim (Boston Scientific) device. A total of 60 patients will undergo sacrospinous ligament fixation for treatment of pelvic organ prolapse and randomized into two study groups. The patient’s pain will be recorded via the numerical rating scale (NRS), a validated pain evaluation tool. Catherine A. Matthews, MD, serves as the PI.

- **Muscle fiber fragment treatment for Urinary Incontinence**
  This study, sponsored by the Wake Forest Institute for Regenerative Medicine, is designed to evaluate the safety of autologous muscle fiber fragments for the treatment of urinary incontinence due to incompetent outlet (bladder neck/urethra). Eligible patients with a diagnosis of urinary incontinence will undergo a biopsy of the muscle from the inner thigh under anesthesia; muscle fiber fragments will be obtained from the sample and then delivered into the bladder neck sphincter region using an endoscopic needle via cystoscopy or under ultrasound guidance. All patients will be followed at one week, six weeks, three months, six months and 12 months post-treatment injection. Gopal Badlani, MD, serves as the PI.

- **Retropubic vs. single-incision mid-urethral sling**
  A multicenter randomized trial will look at 280 women undergoing native tissue vaginal repair and compare a single incision sling vs. a retropubic sling to determine if there are equivalent outcomes in terms of stress incontinence and voiding dysfunction. Single-incision slings are the latest iteration in sling development that build upon the benefits of slings but avoid passage through the muscles of the inner thigh. The hypothesis for this study is that single-incision slings (Altis™) are non-inferior to Retropubic mid-urethral slings when placed at the time of native tissue vaginal repair. Catherine A. Matthews, MD, serves as the PI.

- **Human penile tissue allotransplantation**
  A four year, nonrandomized, single-center, patient self-controlled, clinical trial for patients seeking allotransplantation of the male external genitalia, or penile tissue, as a feasible reconstructive strategy for the treatment of devastating and irreversible injuries to the genitalia. In addition to receiving penile allotransplantation and postoperative monitoring and support, enrolled patients will receive an innovative and clinically proven immunomodulatory protocol that combines lymphocyte depletion of the recipient with donor bone marrow cell infusion. Patients will be treated with lymphocyte depleting induction therapy, donor bone marrow cell infusion and tacrolimus. After the first year, maintenance immunosuppression will be modified gradually and cautiously (tapered dose reduction or spaced frequency dosing of tacrolimus) in selected patients based on a critical evaluation of clinical and immunologic outcomes. Anthony Atala, MD, serves as the PI.
BCG Blood Test Proves Beneficial

by Ronald L. Davis, MD, and Michael B. Rothberg, MD, Resident Physician

Bladder cancer is the fourth most common cancer in men and fifth most common malignancy overall. In the developed world, the vast majority of bladder cancer is urothelial carcinoma. Nonmuscle invasive bladder cancer (NMIBC) is of a lower stage and is treated by transurethral resection. If multiple and/or high-grade tumors are identified, resection may be followed by a six-week course of intravesical Bacillus Calmette-Guerin (BCG). This treatment is performed using live bacillus bacteria that have been weakened. The bacteria are instilled within the bladder. The temporary presence of the bacteria stimulates the patient’s immune system to fight the bladder cancer. This is the most effective therapy for NMIBC, with response rates reported as high as 75 percent since its first documented use over 40 years ago. However, the actual mechanism by which BCG is able to stimulate a patient’s immune system to fight urothelial cancers in the bladder remains unknown.

The Wake Forest team is using a novel blood-based assay to quantify a patient’s immune system functionality. This test is largely based on the ability of granulocytes, a sub-type of white blood cells, to kill cancer cells in a laboratory setting. This assay was developed by biochemist Zheng Cui, MD, PhD, associate professor of pathology at Wake Forest Baptist Health.

Nineteen patients diagnosed with NMIBC had blood samples analyzed before they underwent intravesical BCG treatment. These blood samples were run through the laboratory assay to calculate individualized “cancer-killing activity” scores for each patient. Of the 19 patients enrolled, 13 had a definitive clinical response to intravesical BCG, while six patients were definitive nonresponders. The preferred assay was able to give a correct prediction of response to intravesical BCG for 14 of 19 patients. Based on these preliminary results, the clinical response to intravesical BCG treatment may be predictable using this novel blood-based assay. Planning for future investigations is currently underway.

New Magnifying Technology for OR

Ryan Terlecki, MD, was the first in the world to use ORBEYE, a video microscope, for vasectomy reversal, testicular sperm extraction, oral graft harvest for urethral reconstruction and testicular denervation.

The ORBEYE microscope magnifies images up to 26 times onto two 55-inch monitors in real-time in the operating room. The precise 3-D digital images from the ORBEYE microscope can provide more accurate surgery by providing large, clear views of tissue, nerves, blood vessels and the surgeon’s instrument movements. The technology enables the entire OR staff to view the surgery on the monitors and lets surgeons stand upright and use 3-D glasses instead of microscope eyepieces called loupes. Terlecki likened it to a tiny camera that can be positioned to magnify the operating field.

“Using the new video microscope for a delicate procedure and being able to see the high-definition images of the surgical field in real time is simply incredible,” Terlecki said. “Use of the ORBEYE is just a great example of how technology can improve patient outcomes.”

This new technology also improves medical education and training at Wake Forest Baptist by allowing trainees to have improved views of the anatomy and surgery. ORBEYE was developed by Sony Olympus Medical Solutions Inc. (SOMED), a joint venture between Olympus Corp. and Sony Imaging Products & Solutions Inc.

Doctor Invents Solution to Aid Patients

An incremental syringe invented by Majid Mirzazadeh, MD, is now available from Merit Medical Systems Inc., a leading manufacturer and marketer of disposable medical devices used in interventional, diagnostic and therapeutic procedures.

The Medallion IZOFF™ Incremental Syringe was developed by Mirzazadeh in response to the difficulty of accurately measuring medication when delivering multiple measured doses from a single syringe, such as with botulinum toxin for bladder dysfunction. The syringe has ribs at each mL along the syringe barrel, providing an audible and tactile indication that 1mL of fluid has been injected. These ribs, at every 1mL, help to ensure accurate and precise medication delivery.

“This syringe can be beneficial to both clinicians and their patients and may reduce the potential of medication errors,” Mirzazadeh said.
Anthony Atala, MD, FACS, professor and chair, is editor of Scientific American Urology and Therapeutic Advances in Urology, and is section editor for the Journal of Urology. He is a recipient of the Ramon Gutieras Award from the AUA and the Barringer Medal from the American Association of Genitourinary Surgeons for his contributions to the field of urology. He is a member of the National Academy of Medicine and is one of 98 innovators named a charter fellow of the National Academy of Inventors. Atala directs a team of more than 450 researchers at the Wake Forest Institute for Regenerative Medicine, which works to engineer replacement tissues and organs for more than 40 different areas of the body. He serves on the American College of Surgeons Board of Regents.

Gopal Badlani, MD, FACS, professor of urology and vice chair for urology clinical affairs, directs the Female Pelvic Health Service and fellowship program. He is director of urology at the Salisbury VA Medical Center, secretary of the American Association of Genitourinary Surgeons and a member of the Urology Foundation Board. His NIH-funded research focuses on urinary incontinence, a field in which he is recognized as a world expert.

Ronald L. Davis, MD, MBA, FACS, associate professor, specializes in adult urology with an emphasis on urologic oncology. Davis is an experienced clinical investigator. He was part of one of the first teams in the nation to offer modern ultrasound-directed brachytherapy for prostate cancer. His expertise and research interests include minimally invasive prostate cancer surgery and novel therapies for bladder cancer. He is a board member of the N.C. Urological Society. He has been appointed by the American Association of Clinical Urologists as liaison to the American College of Surgeons and is a member of the AUA Legal Action Committee.

Robert J. Evans III, MD, FACS, professor, directs the department’s clinic operations. He specializes in pelvic pain syndrome and serves on the medical advisory boards of the Interstitial Cystitis Association and the Interstitial Cystitis Network. He is involved in several clinical trials and NIH-funded studies evaluating new treatments for painful bladder syndrome, as well as directing a study to determine the optimum injection site for botulinum toxin. In addition, he is part of a genomics study looking at differences in subsets of IC patients. He was selected by the American Urological Care Foundation to provide oversight on patient education materials related to bladder pain.

Jorge Gutierrez-Aceves, MD, professor, heads the department’s endourology and stone disease program and co-directs the fellowship program on Endourology and Laparoscopy/Robotic Surgery. He is editor of the Spanish edition of AUA News. He is a member of various urological associations, including the American Association of Genitourinary Surgeons, and serves on the board of directors of the Endourological Society. He is secretary general of the Confederacion Americana de Urologia. His main research interest is on minimally invasive endoscopic surgery for treatment of renal and urinary tract stones and on prevention of urinary tract infections related to kidney stones.

Ashok K. Hemal, MD, MCh, FACS, professor and director of the Robotic and Minimally Invasive Urologic Surgery Program, is internationally known for his pioneering work in minimally invasive surgery, specializing in uro- oncology, robotic and pure laparoscopic surgery. He is principal or co-investigator on several research projects at the Wake Forest Comprehensive Cancer Center and the Institute for Regenerative Medicine. He has published more than 400 papers in peer-reviewed journals and written seven books, including the second edition of Robotics in Genitourinary Surgery. He is the recipient of many academic distinctions and awards. He currently serves as associate editor of the Journal of Endourology and serves on the editorial board of several urological journals. He is a member of the Endourology Society Board of Directors and serves as president of the Society of Urologic Robotic Surgeons.

Steve Hodges, MD, associate professor, specializes in pediatric urology. His research interests include the prevention of luminal strictures and scar disease throughout the urinary tract and body, and dysfunctional elimination. He is an associate editor of the Scientific World Journal and serves on editorial boards of the Indian Journal of Urology and BMC Urology. He has developed several new treatments, including drug-coated catheters and stents designed to prevent or treat urethral strictures, and disposable wipes designed to prevent vulvitis and urinary tract infections in females. He has co-authored four books on toilet training and voiding dysfunction.

Stuart Howards, MD, FACS, professor, is a nationally recognized expert in male infertility. He specializes in microsurgery for varicocele repair, vasectomy reversal and sperm retrieval. Howards has edited four editions of the textbook Infertility in the Male and has performed more than 1,500 vasectomy reversals. He serves on the executive committee of the American Society of Reproductive Medicine. Howards served as executive secretary of the American Board of Urology for 15 years, and as the NIH as the urologic advisor to the director of the National Institute of Diabetes and Digestive and Kidney Diseases. He is the recipient of the AAGUS Keyes Medal for “outstanding contributions in the advancement of urology.” He serves as a mentor for the one-year fellowship in Urologic Reconstruction, Prosthetics and Infertility.

Raleigh G. Humphries, MD, FACS, clinical associate professor, joined the Department of Urology in 2017. He specializes in diseases of the urinary tract and the male reproductive system and treats patients at the Veterans Affairs Medical Center in Salisbury, N.C. He holds membership in American Urology Association and American Board of Urology. Humphries served on the M.H. Cone Hospital Executive Committee for a decade and was president of the M.H. Cone Hospital Medical and Dental Staff. Throughout his 30 years in medicine, he has been an active member of International Volunteers in Urology, providing surgical instruction to Ugandan doctors.

Stanley Kogan, MD, FACS, clinical professor, is a nationally recognized expert in pediatric conditions that can subsequently affect fertility. He directs a program for patients with Kliefel syndrome that focuses on early identification and fertility restoration. He also developed several surgical procedures for children with disorders of sex development, including various modifications of feminizing genitoplasty techniques. During his career, he served on the executive committee of the urology section of the American Academy of Pediatrics and on the editorial board of the Journal of Urology.
Catherine A. Matthews, MD, professor of Urology and Obstetrics/Gynecology, co-directs Female Pelvic Health Services at Wake Forest Baptist Health. She specializes in conditions such as urinary and bowel incontinence, pelvic organ prolapse, fistulae, sexual dysfunction and postobstetric perineal injury. She is internationally recognized for her expertise in robotic surgery and vaginal surgery. On the national level, she serves as a board examiner for the American Board of Obstetrics and Gynecology. Matthews is board-certified in Female Pelvic Medicine and Reconstructive Surgery by the American Board of Obstetrics and Gynecology. She has received numerous awards for her research and for excellence in surgery and patient care and is extensively published in fecal incontinence and pelvic organ prolapse surgery.

John D. McConnell, MD, FACS, became CEO emeritus of Wake Forest Baptist Medical Center in 2017. He is a noted urologist and international authority on prostate disease. He received the American Association of Genitourinary Surgeons’ Barrington Medal for his contributions to the urology field. McConnell’s research in the field of prostate disease and related health policy contributions led to his 2004 election to the National Academy of Medicine. He has served on the board of directors of the American Urological Association and as a member of the Council of the National Institute of Diabetes and Digestive and Kidney Diseases of the NIH. He is now executive director for Wake Forest Healthcare Ventures, an entity that develops and commercializes innovative products and services.

Majid Mirzazadeh, MD, assistant professor, is a referral surgeon for a wide variety of complicated urologic reconstructive surgeries. He has held fellowships at UCLA and at the Institute of Urology and Nephrology, London, in reconstructive surgery. He is director of the urology teaching clinic. His primary research focuses on treatments for kidney stones causing urinary tract infections and using stem cells from myoblasts to improve incontinence in women. His other research interests center on improving the design and safety of clinical and surgical instruments. A leader in device development, he invented a syringe capable of safely delivering multiple doses of injection products to patients.

Robert G. Moore, MD, clinical associate professor, specializes in endourology and minimally invasive techniques to treat urologic cancers and kidney stones at the Salisbury VA Medical Center. Moore is a well-recognized expert in minimally invasive urologic procedures. He has authored more than 200 published articles, book chapters and books.

Ram A. Pathak, MD, assistant professor, specializes in the oncologic management of kidney, bladder and prostate cancers. He completed his fellowship in minimally invasive robotic surgery under Ashok Hemal, MD. He leads the GU oncologic initiative at the Salisbury VA Medical Center and takes an active role with clinical trials at the Wake Forest Baptist Comprehensive Cancer Center. He serves as reviewer of various major urologic journals. His research interests lie in the treatment of kidney, ureteral, bladder and prostate cancers in minimally invasive fashion. He has first-authored over 15 publications since 2017 and has been invited to speak at national and international meetings.

Daniel Rukstalis, MD, professor, directs the urology residency program and specializes in novel therapeutics in urologic diseases. He is an international authority on minimally invasive surgery, having described the first laparoscopic retroperitoneal lymph node dissection for testicular cancer. He is also a leader in the field of tissue ablation, having participated in the first kidney cryoablation in the United States. He is active in evaluating novel approaches in the use of urologic ultrasound and endoscopic therapy for prostate cancer and BPH.

Hooman Sadri-Ardekani, MD, PhD, assistant professor, specializes in male reproductive medicine and has been a fellowship-trained clinician in male infertility since 2003. He is an active member of the American Society of Andrology (ASA), the American Society for Reproductive Medicine (ASRM) and the American Urological Association (AUA). Sadri-Ardekani’s clinical service involves clarifying the importance of genetics, endocrine and imaging (including scrotal elastography and transrectal ultrasounds) studies in the evaluation of men with infertility and in the interface of male factor treatment with novel assisted reproductive technology (ART). His expertise includes Electro Ejaculation (EEJ) and Microsurgical Testicular Sperm Extractions (Micro-TESE).

Marshall Z. Schwartz, MD, FACS, professor, joined the faculty in late 2017. He is a pediatric surgeon whose career has included leadership positions at several universities and teaching children’s hospitals including Children’s National Medical Center in Washington, D.C, and the Pediatric Surgery Research Laboratory at St. Christopher’s Hospital for Children. He has held leadership positions in several national and international surgery organizations as well as the American Board of Surgery. This research and other academic activities have led to more than 155 publications, over 235 presentations at national and international meetings including several named lectureships, and four patents on specific intestinal growth factors.

Allston J. Stubbs, MD, clinical associate professor, specializes in urinary incontinence, voiding dysfunction and benign prostatic hyperplasia. He directs the urodynamics lab at the Veterans Affairs Medical Center in Salisbury, N.C. Certified by both the American Board of Urology and the American Board of Surgery, Stubbs has been practicing urology for 35 years.

Ryan Terlecki, MD, FACS, associate professor, is director of the Men’s Health Clinic, the Urologic Cancer Survivorship Program and the department’s fellowship in urologic reconstruction, prosthetic urology and male infertility. He is also an active member of the American Society of Andrology (ASA), the American Society for Reproductive Medicine (ASRM) and the American Urological Association (AUA). Sadri-Ardekani’s clinical service involves clarifying the importance of genetics, endocrine and imaging (including scrotal elastography and transrectal ultrasounds) studies in the evaluation of men with infertility and in the interface of male factor treatment with novel assisted reproductive technology (ART). His expertise includes Electro Ejaculation (EEJ) and Microsurgical Testicular Sperm Extractions (Micro-TESE).
Offering Four Fellowship Programs

Wake Forest Baptist Urology offers four fellowship programs rich in both clinical care and academic research. As part of a high-volume tertiary referral center, the department is a leading program for index cases for both adult and pediatric urology. Training advantages also include a surgical skills learning center with mock ORs and simulated patients.

**Endourology/Robotic Surgery:** Two-year program offering an intensive clinical and research experience to prepare fellows for a career in academic medicine. Fellows obtain advanced experience in all aspects of endourologic, laparoscopic and robotic surgery, and gain research experience, including the option for a master's degree. Accredited by the Endourological Society.

**Laparoscopic/Robotic Surgery:** One-year fellowship designed to prepare fellows for a career in robotic urologic surgery, laparoscopic and urology and urologic oncology. Fellows participate in a wide range of urologic procedures, from radical prostatectomy and cystectomy to partial nephrectomy and reconstructive procedures. A variety of research opportunities are available. Accredited by the Endourological Society.

**Female Pelvic Medicine and Reconstructive Surgery:** Two-year program for urology physicians versus a three-year program for Ob/Gyn graduates. The program includes 12 months of research. The curriculum is designed to comprehensively train pelvic surgeons to develop clinical independence through mastery of a broad range of diagnostic and surgical techniques. Accredited by the Accreditation Council for Graduate Medical Education.

**Genitourinary Reconstructive Surgery:** One-year clinical program in male genitourinary reconstructive surgery, prosthetic urology and infertility. Fellows are exposed to the most up-to-date surgical techniques to equip them to serve as an educator and leader in the field. Fellows can participate in research at the Wake Forest Institute for Regenerative Medicine. Verified by the Society of Genitourinary Reconstructive Surgeons.

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