

Urology

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Urology (from Greek οὖρον *ouron* "urine" and -λογία *-logia* "study of"), also known as genitourinary surgery, is the branch of medicine that focuses on surgical and medical diseases of the male and female urinary tract system and the male reproductive organs. The organs under the domain of urology include the kidneys, adrenal glands, ureters, urinary bladder, urethra, and the male reproductive organs (testes, epididymis, vas deferens, seminal vesicles, prostate, and penis).

The urinary and reproductive tracts are closely linked, and disorders of one often affect the other. Thus, a major spectrum of the conditions managed in urology exists under the domain of genitourinary disorders. Urology combines the management of medical (i.e., non-surgical) conditions, such as urinary tract infections and benign prostatic hyperplasia, with the management of surgical conditions such as bladder or prostate cancer, kidney stones, congenital abnormalities, traumatic injury, and stress incontinence.

Urology has traditionally been on the cutting edge of surgical technology in the field of medicine, including minimally invasive robotic and laparoscopic surgery, laser-assisted surgeries, and a host of other scope-guided procedures. Urologists are trained in open and minimally invasive techniques, employing real-time ultrasound guidance, fiber-optic endoscopic equipment, and various lasers in the treatment of multiple benign and malignant conditions.^[1] In addition, urologists are pioneers in the use of robotics in laparoscopic surgery. Urology is closely related to (and urologists often collaborate with the practitioners of) oncology, nephrology, gynaecology, andrology, pediatric surgery, colorectal surgery, gastroenterology, and endocrinology.

Urology is one of the most competitive and highly sought-after surgical specialties for physicians, with new urologists comprising less than 1.5% of United States medical school graduates each year.^{[2][3]} In Canada, urology is an exceedingly difficult specialty to match, with less than 0.1% of the position dedicated to it.

Urologic surgeons, or **urologists**, undergo a post-graduate surgical training period for a minimum of five years, of which 12 months must be completed in general surgery and 36 months must be completed in clinical urology. The remaining 12 months are spent in general surgery, urology, or other clinical disciplines relevant to urology.^[4] Upon successful completion of a residency program, many urologists choose to undergo further advanced training in a subspecialty area of expertise through a fellowship lasting an additional 12 to 36 months. Subspecialties may include: urologic surgery, urologic oncology and urologic oncological surgery, endourology and endourologic surgery, urogynecology and urogynecologic surgery, reconstructive urologic surgery (a form of reconstructive surgery), minimally invasive urologic surgery, pediatric urology and pediatric urologic surgery (including adolescent urology, the treatment of premature or delayed puberty, and the treatment of congenital urological syndromes, malformations, and deformations), transplant urology (the field of transplant medicine and surgery concerned with transplantation of organs such as the kidneys, bladder tissue, ureters, and, recently, penises), voiding dysfunction, neurourology, and androurology and sexual medicine. Additionally, some urologists supplement their fellowships with a master's degree (2–3 years) or a Ph.D. (4–6 years) in related topics to prepare them for an academic as well as a focused clinical job.

Urologist

	Occupation
Names	Urologist
Occupation type	Specialty
Activity sectors	Medicine, surgery
	Description
Competencies	surgery of urinary tract and male genitalia
Education required	Doctor of Medicine
	Doctor of Osteopathic Medicine

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Training

United States

In 2014, there were 126 residency programs that offered 296 categorical positions.^[5] Urology is one of the early match programs, with results given to applicants by late January (6 weeks before NRMP match). Applications are accepted starting Sep 1, with some programs accepting applications until early Jan.^[6]

It is a relatively competitive specialty to match into, with only 68% to 77% of US seniors matching between 2012 and 2015.^[7] Thankfully, the number of positions has grown over the past few years, from 278 in 2012 to 296 in 2015. Matching is significantly more difficult for IMGs and students who have a year or more off before residency - match rates were 27% and 55% respectively in 2012.^[8]

The medical school environment may also be a factor. A study in 2012 also showed after an analysis of match rates from schools between 2005-09 that 20 schools sent more than 15 students into urology (1 sd above median), with Northwestern University sending 44 students over those 5 years.^[9]

After urology residency, there are 7 subspecialties recognized by the AUA (American Urological Association):

- Oncology
- Calculi
- Female Urology
- Infertility
- Pediatrics
- Transplant (renal)
- Neurourology.^[10]

Subdisciplines

As a medical discipline that involves the care of many organs and physiological systems, urology can be broken down into several subdisciplines. At many larger academic centers and university hospitals that excel in patient care and clinical research, urologists often specialize in a particular subdiscipline.

Endourology

Endourology is the branch of urology that deals with the closed manipulation of the urinary tract.^[11] It has lately grown to include all minimally invasive urologic surgical procedures. As opposed to open surgery, endourology is performed using small cameras and instruments inserted into the urinary tract. Transurethral surgery has been the cornerstone of endourology. Most of the urinary tract can be reached via the urethra, enabling prostate surgery, surgery of tumors of the urothelium, stone surgery, and simple urethral and ureteral procedures. Recently, the addition of laparoscopy and robotics has further subdivided this branch of urology.

Laparoscopy

Laparoscopy is a rapidly evolving branch of urology and has replaced some open surgical procedures. Robot-assisted surgery of the prostate, kidney, and ureter has been expanding this field. Today, many prostatectomies in the United States are carried out by so-called robotic assistance. This has created controversy, however, as robotics greatly increase the cost of surgery and the benefit for the patient may or may not be proportional to the extra cost. Moreover, current (2011) market situation for robotic equipment is a de facto monopoly of one publicly held corporation^[12] which further fuels the cost-effectiveness controversy.

Urologic oncology

Urologic oncology concerns the surgical treatment of malignant genitourinary diseases such as cancer of the prostate, adrenal glands, bladder, kidneys, ureters, testicles, and penis, as well as the skin and subcutaneous tissue and muscle and fascia of those areas (that particular subspecialty overlaps with dermatological oncology and related areas of oncology). The treatment of genitourinary cancer is managed by either a urologist or an oncologist, depending on the treatment type (surgical or medical). Most urologic oncologists in western countries use minimally invasive techniques (laparoscopy or endourology, robotic-assisted surgery) to manage urologic cancers amenable to surgical management.

Neurourology

Neurourology concerns nervous system control of the genitourinary system, and of conditions causing abnormal urination. Neurological diseases and disorders such as a stroke, multiple sclerosis, Parkinson's disease, and spinal cord injury can disrupt the lower urinary tract and result in conditions such as urinary incontinence, detrusor overactivity, urinary retention, and detrusor sphincter dyssynergia. Urodynamic studies play an important diagnostic role in neurourology. Therapy for nervous system disorders includes clean intermittent self-catheterization of the bladder, anticholinergic drugs, injection of Botulinum toxin into the bladder wall and advanced and less commonly used therapies such as sacral neuromodulation. Less marked neurological abnormalities can cause urological disorders as well—for example, abnormalities of the sensory nervous system are thought by many researchers to play a role in disorders of painful or frequent urination (e.g. painful bladder syndrome also known as interstitial cystitis).

Pediatric urology

Pediatric urology concerns urologic disorders in children. Such disorders include cryptorchidism (undescended testes), congenital abnormalities of the genitourinary tract, enuresis, underdeveloped genitalia (due to delayed growth or delayed puberty, often an endocrinological problem), and vesicoureteral reflux.

Andrology

Andrology focuses on the male reproductive system. It is mainly concerned with male infertility, erectile dysfunction and ejaculatory disorders, along with some issues regarding pediatric such as growing so much that your body cannot handle. Since male sexuality is largely controlled by hormones, andrology overlaps with endocrinology. Surgery in this field includes fertilization procedures, vasectomy reversals, and the implantation of penile prostheses. Vasectomies may also be included here, although most urologists perform this procedure.

Reconstructive urology

Reconstructive urology is a highly specialized field of urology that restores both structure and function to the genitourinary tract. Prostate procedures, full or partial hysterectomies, trauma (auto accidents, gunshot wounds, industrial accidents, straddle injuries, etc.), disease, obstructions, blockages (e.g., urethral strictures), and occasionally, childbirth, can necessitate reconstructive surgery. The urinary bladder, ureters (the tubes that lead from the kidneys to the urinary bladder) and genitalia are other examples of reconstructive urology.

Female urology

Female urology is a branch of urology dealing with overactive bladder, pelvic organ prolapse, and urinary incontinence. Many of these physicians also practice neurourology and reconstructive urology as mentioned above. Female urologists (many of whom are men) complete a 1–2-year fellowship after completion of a 5–6-year urology residency.^[13] Thorough knowledge of the female pelvic floor together with intimate understanding of the physiology and pathology of voiding are necessary to diagnose and treat these disorders. Depending on the cause of the individual problem, a medical or surgical treatment can be the solution. Their field of practice heavily overlaps with that of urogynecologists, physicians in a sub-discipline of gynecology, who have done a three-year fellowship after a four-year OBGYN residency.^[13]

Journals and organizations

There are a number of peer-reviewed journals and publications about urology, including *The Journal of Urology*, *European Urology*, the *African Journal of Urology*, *British Journal of Urology International*, *Indian Journal of Urology*, *Nature Reviews Urology*, and *Urology*.

There are national organizations such as the American Urological Association, European Association of Urology, and The Society for Basic Urologic Research. Urology is also included under the auspices of the International Continence Society.

Teaching organizations include the European Board of Urology, as well as the Vattikuti Urology Institute in Detroit, which also hosts an annual International Robotic Urology Symposium devoted to new technologies. The American non-profit IVUMed teaches urology in developing countries.

Urology-associated issues

- Benign prostatic hyperplasia

- Bladder stones
- Bladder cancer
- Cystitis
- Development of the urinary and reproductive organs
- Epididymitis
- Erectile dysfunction
- Interstitial cystitis
- Kidney transplant
- Kidney cancer
- Medical specialty
- Kidney stone
- Prostatitis
- Prostate cancer
- Retrograde pyelogram
- Retrograde ureteral
- Testicular cancer
- Urolithiasis
- Vasectomy
- Vasectomy reversal

See also

- Category:Urology journals
- Category:Urology organizations

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