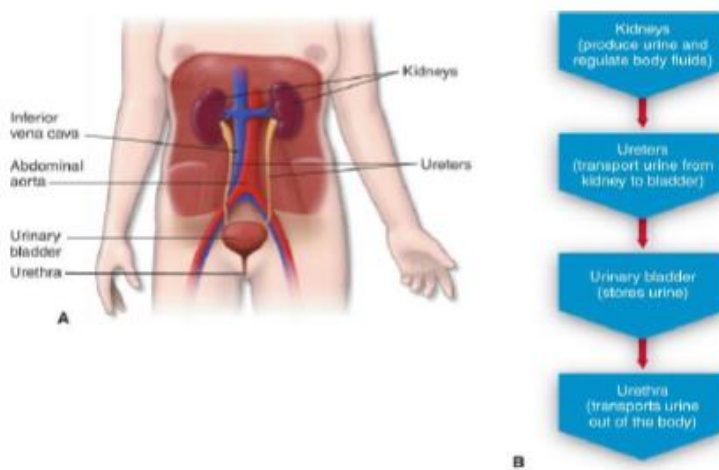


Urinary System

Introduction

The **urinary system** is composed of the *kidneys*, *ureters*, *urinary bladder*, and *urethra*. These organs are responsible for the formation, storage, and removal of urine. These processes start with the **kidneys**, paired structures that remove wastes from the bloodstream, reclaim important electrolytes like sodium and potassium, help regulate blood pressure and fluid balance, and aid in red blood cell production. The kidneys then form **urine**, which is fluid containing water and dissolved substances. The **ureters** are tubular structures that transport urine from the kidneys to the **urinary bladder**, an organ that stores urine. The urine is then eliminated through the **urethra**, a canal leading from the urinary bladder to the exterior. This process regulates the amount of water in the body and maintains the proper balance of acids and electrolytes, which is necessary for human survival.



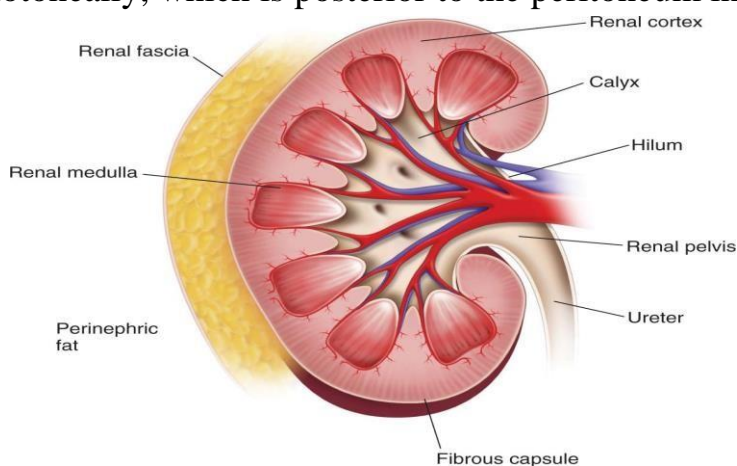
Word Parts Related To The Urinary System

Word Parts Related to the Urinary System							
Word Part	Meaning	Word Part	Meaning	Word Part	Meaning	Word Part	Meaning
cyst/o	bladder	ur/o, urin/o	urine	pyel/o	pelvis	poly-	much, many
glomerul/o	glomerulus	nephro/o, ren/o	kidney	ureter/o	ureter	py/o	pus
-iasis	condition, state	noct/o	night	urethr/o	urethra	lith/o	stone
olig/o	few, little						

Structure and Function

The kidneys are bean-shaped organs (hence the source for the name of the kidney bean) and are about the size of a deck of cards. They lie retroperitoneally, which is posterior to the peritoneum in the abdominopelvic cavity, along each side of the spinal column. Each kidney is covered by a thin membrane called the **fibrous capsule**. A thicker layer of fatty tissue, called the **perinephric fat** or **pararenal fat body**, surrounds the fibrous capsule and thus provides protection for this vital organ. Finally, a thin layer of connective tissue, called the **renal fascia**, forms each kidney's outer covering. The two regions of the kidney are the outer **renal cortex** and the inner **renal medulla**.

The hilum is the indented and narrowest part of the kidney, where blood vessels and nerves enter and leave. The flattened funnel-shaped expansion of the upper end of the ureter where urine collects in the kidney is called the **renal pelvis**. The cup-like structure that drains into the renal pelvis is the **calyx**. The kidneys form urine and remove two



natural products of metabolism, **urea** and **uric acid**, along with other wastes from the blood. The kidneys also filter, reabsorb, and secrete non waste products back into the bloodstream. Filtration and the urine production begin in the **nephrons**, which are the functional units of the kidneys. Each kidney has approximately 1 million nephrons, and each nephron consists of a *renal corpuscle* and the *renal tubule*. The **renal corpuscle** is a structure composed of the *glomerulus* and the *glomerular (Bowman's) capsule*. The **glomerulus** consists of a cluster of capillaries through which blood and wastes are filtered. The **renal tubule** consists of the *proximal convoluted tubule*, *nephron loop (loop of Henle)*, and the *distal convoluted tubule*. Fluid not returned to the bloodstream becomes urine, is collected in the *collecting duct*, and moves into the renal pelvis before ultimately entering the ureter. The ureters carry the urine to the urinary bladder, where it is stored.

The urinary bladder stores the urine until a sufficient volume causes an increase in pressure and triggers the urge to urinate via the *micturition reflex*. The **micturition reflex** is a contraction of the walls of the urinary bladder and relaxation of the urethral sphincter in response to the rise in urinary bladder pressure. Urination is regulated by two sphincters, the circular muscles that surround the urethra. They are the *internal urethral sphincter*, which is located at the entrance to the urethra and is involuntarily controlled, and the *external urethral sphincter*, which is located at the distal end of the urethra and is under voluntary control.

Abbreviation Table (Urinary System)					
<i>Abbreviation</i>	<i>Meaning</i>	<i>Abbreviation</i>	<i>Meaning</i>	<i>Abbreviation</i>	<i>Meaning</i>
ARF	acute renal failure	ESRD	end-stage renal disease	UTI	urinary tract infection
BUN	blood urea nitrogen	GFR	glomerular filtration rate	KUB	kidneys, ureter, and bladder
CRF	chronic renal failure	IVP	intravenous pyelogram	UA	urinalysis
CT	computed tomography			CAPD	continuous ambulatory peritoneal dialysis

Practice and Practitioners

A physician who specializes in the diagnosis and treatment of urinary disorders is called *a urologist*, and the specialty practice is *urology*. A physician who treats the kidney and kidney disorders is called a *nephrologist*. This area of specialty is named *nephrology*.

Term Table (Urinary System)					
Term	Meaning	Term	Meaning	Term	Meaning
micturition	urination; <i>uresis</i> ; <i>voiding</i>	urinate	passing of urine	uric acid	natural waste product of metabolism that is excreted in urine
cystocele	hernia of the urinary bladder	cystolith	urinary bladder stone	nocturia	excessive urination at night
nephritis	inflammation of the kidney	dysuria	difficult or painful urination	nephropathy	any disease of the kidney
albuminuria	presence of the protein, albumin, in the urine, typically a sign of kidney disease	hematuria	presence of blood in the urine	nephroptosis	prolapse (slipping out of position) of the kidney
anuria	failure of the kidneys to produce urine	glycosuria	presence of carbohydrates (sugar) in the urine	pyuria	pus in the urine
calculus	a kidney stone	enuresis	bedwetting	oliguria	diminished urine production
cystalgia	pain in the urinary bladder	incontinence	inability to control urination	polyuria	excessive urine production
cystitis	inflammation of the urinary bladder	nephralgia	pain in the kidneys	pyelonephritis	inflammation of the renal calyces and renal pelvis due to local bacteria infection
Glomerulonephritis	inflammation of the glomerulus	nephrolithiasis	the presence of renal calculi	urinary tract infection	microbial infection of any part of the urinary tract
renal calculus	a kidney stone	retention	the inability to empty the bladder	urethritis	inflammation of a urethra
Urgency	Feeling the need to urinate immediately.	uremia	an excess of urea in the blood	renal failure	impairment of renal function, either acute or chronic
Diagnostic Tests, Treatments, and Surgical Procedures for Urinary System					
Term	Meaning	Term	Meaning	Term	Meaning
antibiotic	medicine that inhibits the growth of bacteria	catheter	a flexible tube that enables passage of fluid from or into a body cavity	lithotripsy	treatment in which a stone in the kidney, urethra, or urinary bladder is broken up into small particles
Diuretic	drug that promotes urination	cystectomy	excision of the urinary bladder	cystoscopy	visual inspection of the urinary bladder by means of an instrument called a cystoscope
dialysis	filtration to remove colloidal particles from a fluid; a method of artificial kidney function	ureteroscope	instrument used to visually examine the ureter	hemodialysis	removal of unwanted substances from the blood by passage through a semipermeable membrane;
urinalysis	analysis of urine by physical, chemical, and microscopic means to test for the presence of substances or disease	kidney transplant	operation in which a donor kidney is placed into a recipient	nephrolithotomy	incision into the kidney to remove a kidney stone
nephrectomy	removal of a kidney				

References:

- Nath, Judi ; Lindsley, Kelsey: *A short course in medical terminology*, Fourth edition , Philadelphia : Wolters Kluwer Health, 2019, P.p : 511-534.