

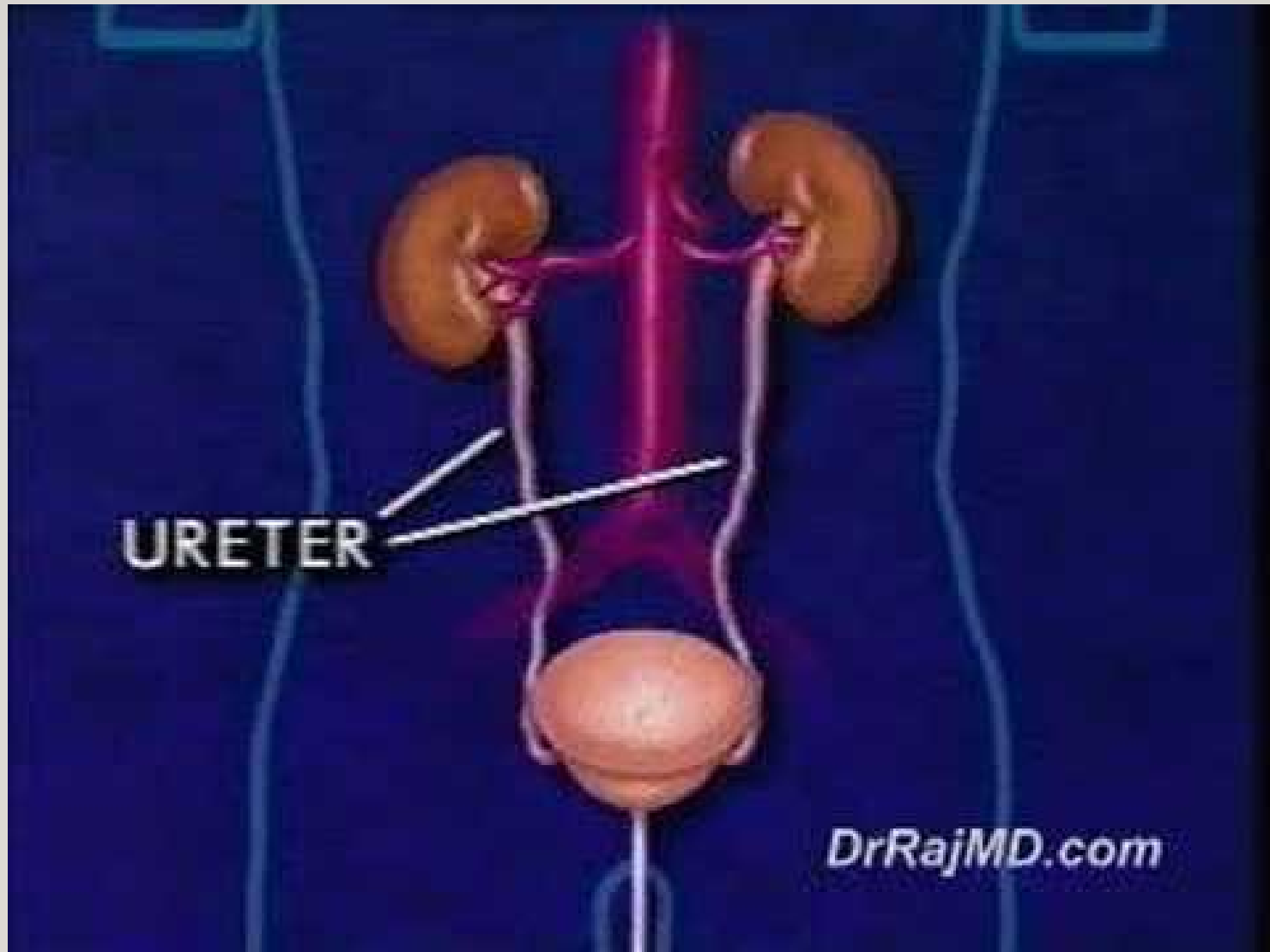
# THE URINARY SYSTEM

## CHAPTER 15

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# Quick Overview of the Urinary System

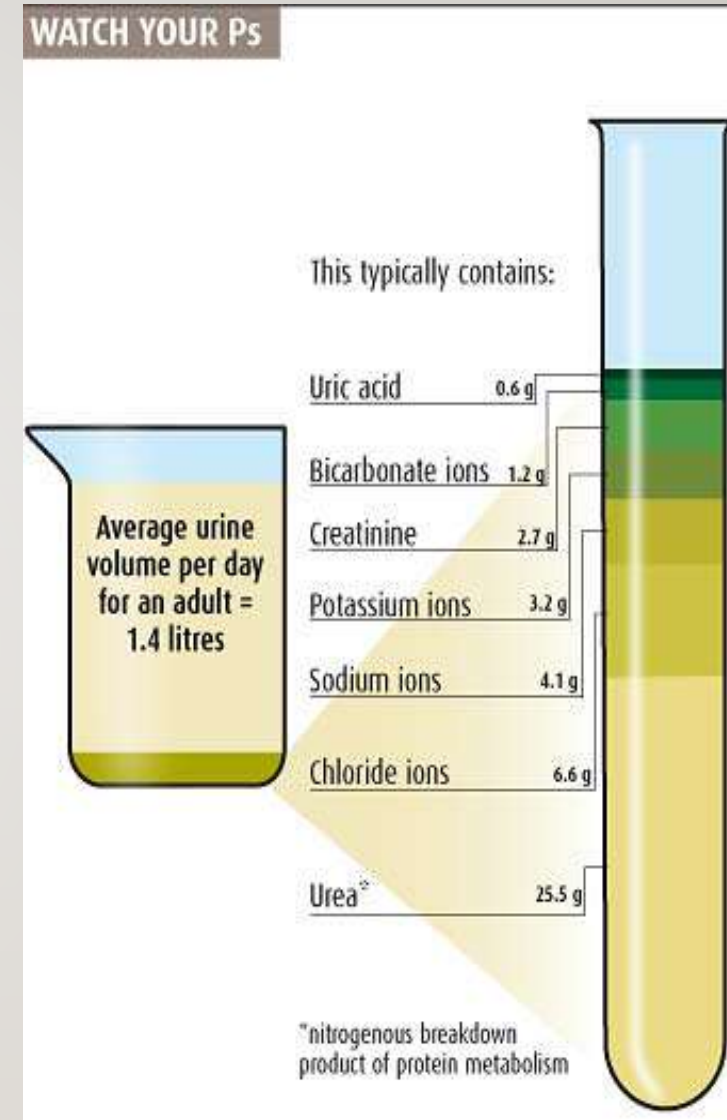


# INTRODUCTION

-Cells produce waste that can become toxic if they accumulate

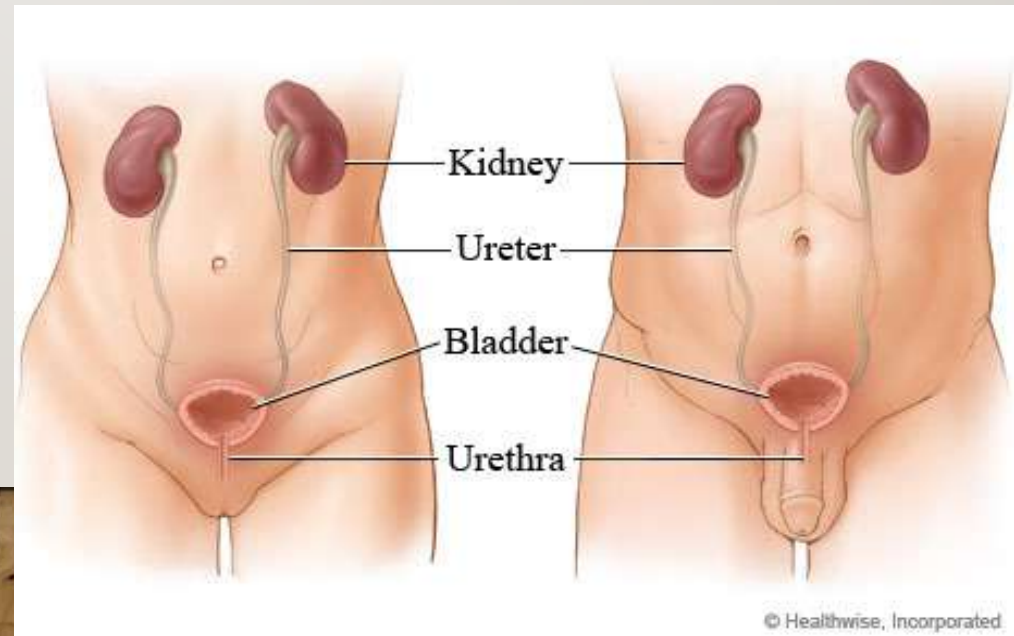
## Functions

- the urinary system removes salts and nitrogenous wastes
- maintains normal concentration of water and electrolytes
- maintains pH, controls red blood cell production and blood pressure



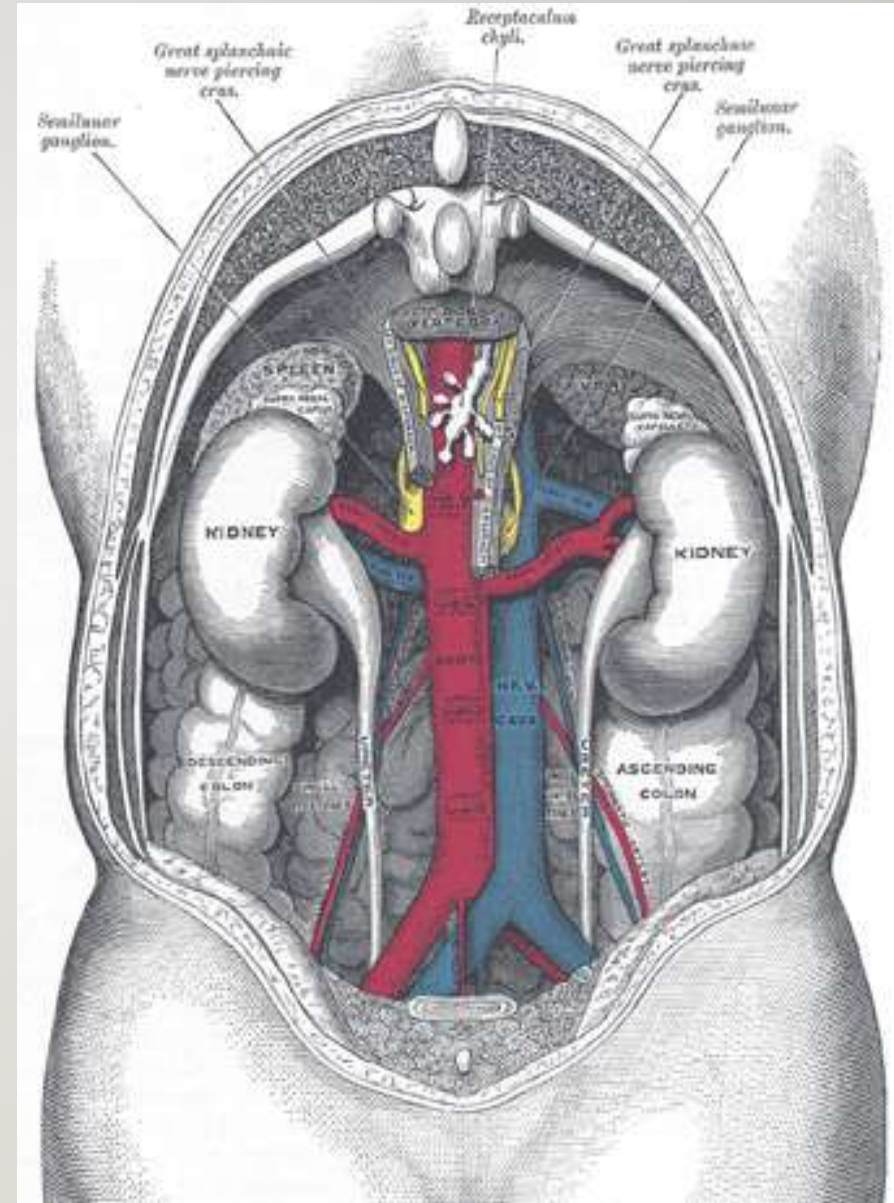
# COMPOSITION

- CONSISTS OF A PAIR OF KIDNEYS WHICH REMOVE SUBSTANCES FROM THE BLOOD
- URETERS WHICH TRANSPORT URINE FROM THE KIDNEYS TO THE BLADDER
- URINARY BLADDER STORES URINE
- URETHRA CONVEYS URINE TO THE OUTSIDE OF THE BODY



# KIDNEYS

- LIE ON EITHER SIDE OF THE VERTEBRAL COLUMN DEEP IN THE ABDOMINAL CAVITY
- LATERAL SIDE IS CONVEX, MEDIAL IS CONCAVE, KIDNEYS SIT IN A DEPRESSION CALLED THE RENAL SINUS
- ENTRANCE IS CALLED THE HILUM

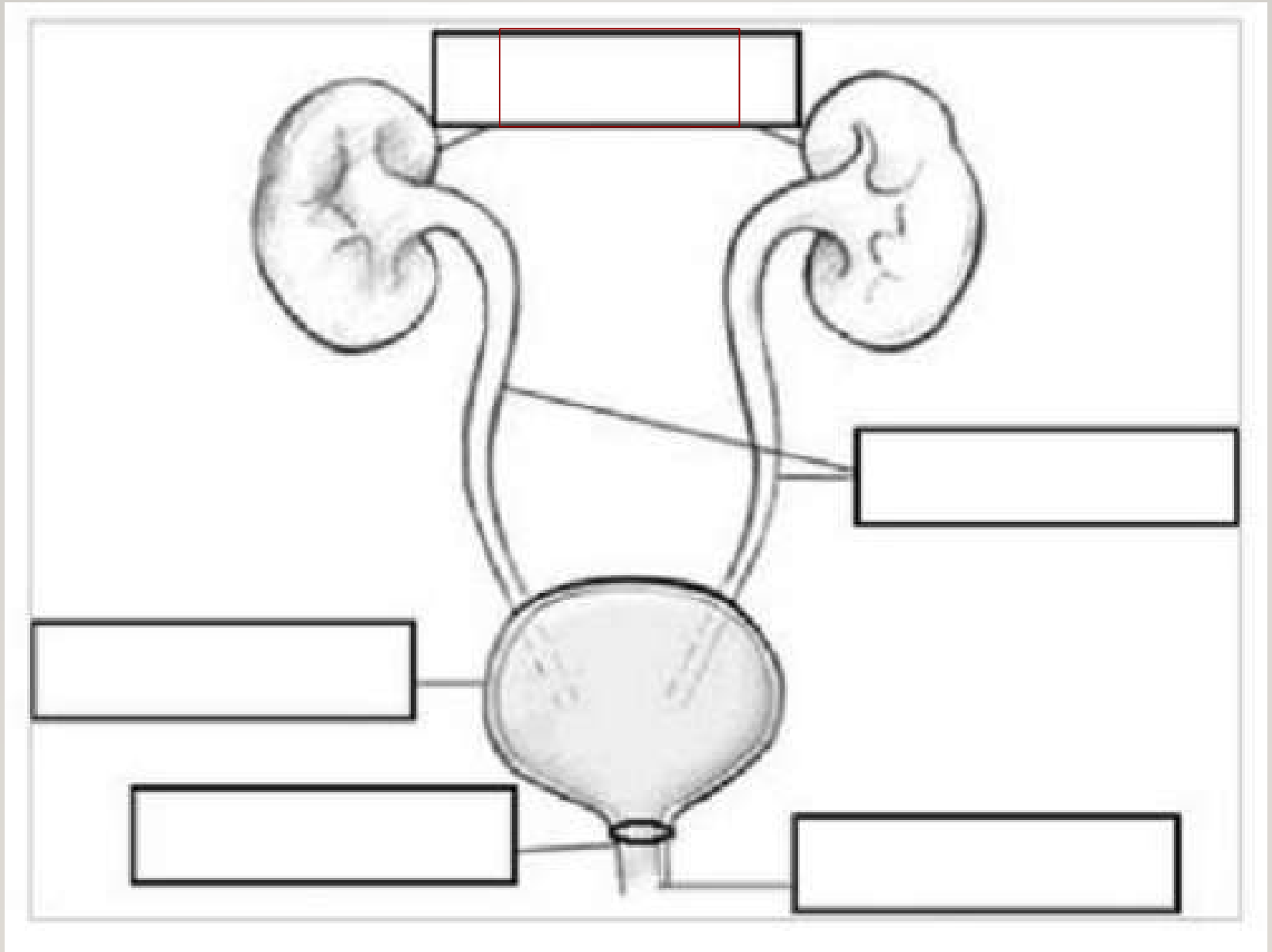


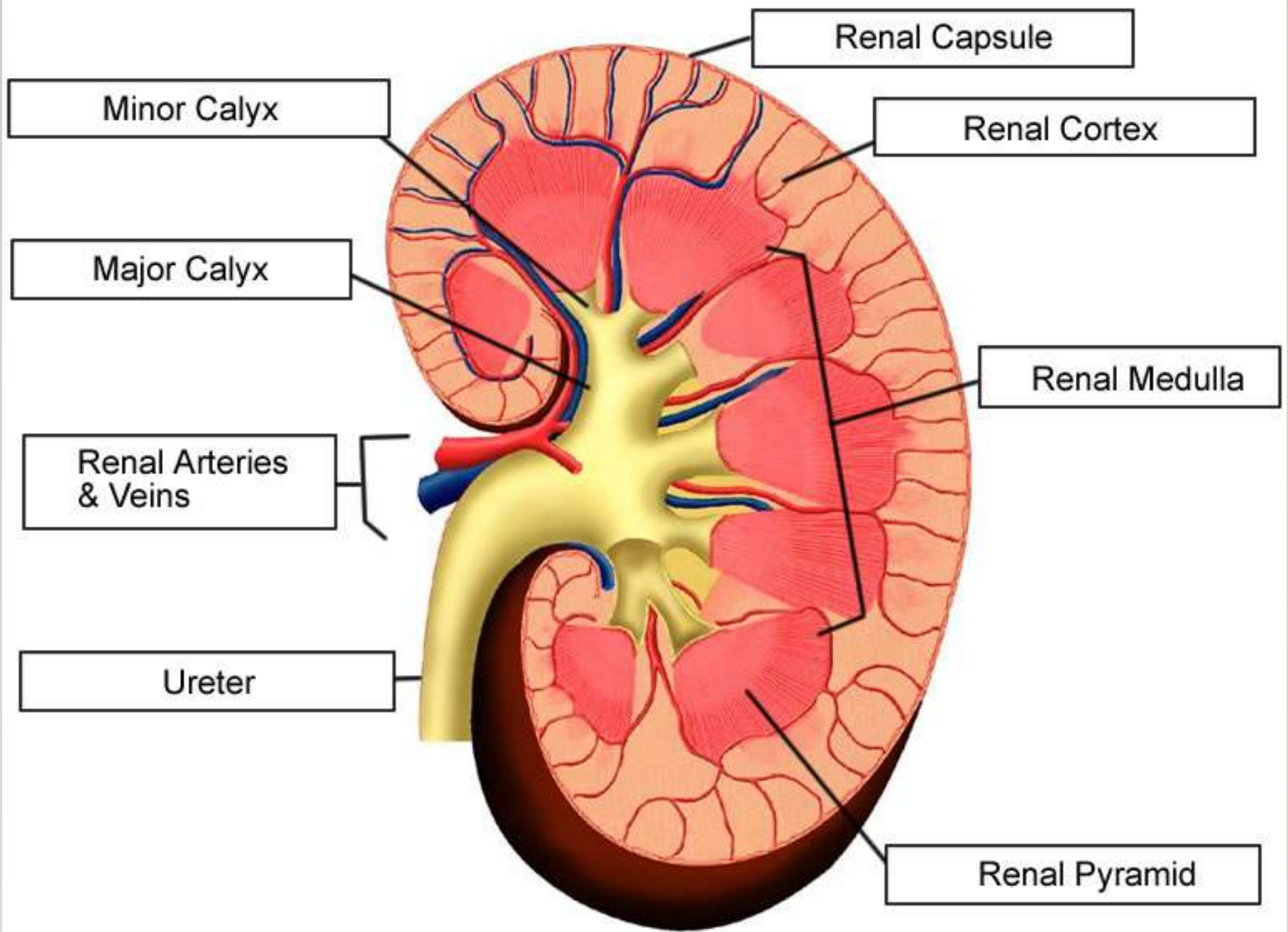
# NEPHRONS

-RENAL ARTERIES AND  
VEINS SUPPLY BLOOD TO  
THE KIDNEYS

The nephron is  
the functional  
unit of the kidney









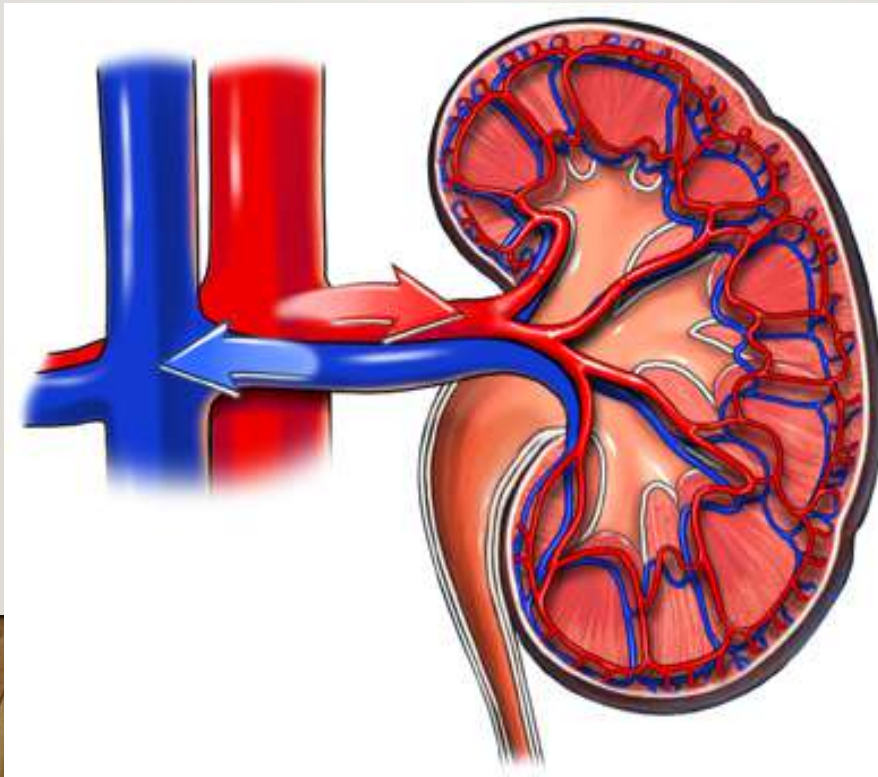
# Myth or Fact?

1. Urinating on a jellyfish sting will help alleviate the pain.
2. It is safe to drink your own urine.
3. If someone is sleeping and you put their hand in warm water, they will pee their pants.
4. Holding your urine can cause a bladder infection.
5. There is a fish that will follow a urine stream and enter the urethra.

# RENAL ARTERIES & VEINS

- Arteries attach to the abdominal aorta
- Veins attach to the inferior vena cava

Interlobar arteries pass between the renal pyramids  
Afferent arterioles lead to the nephrons

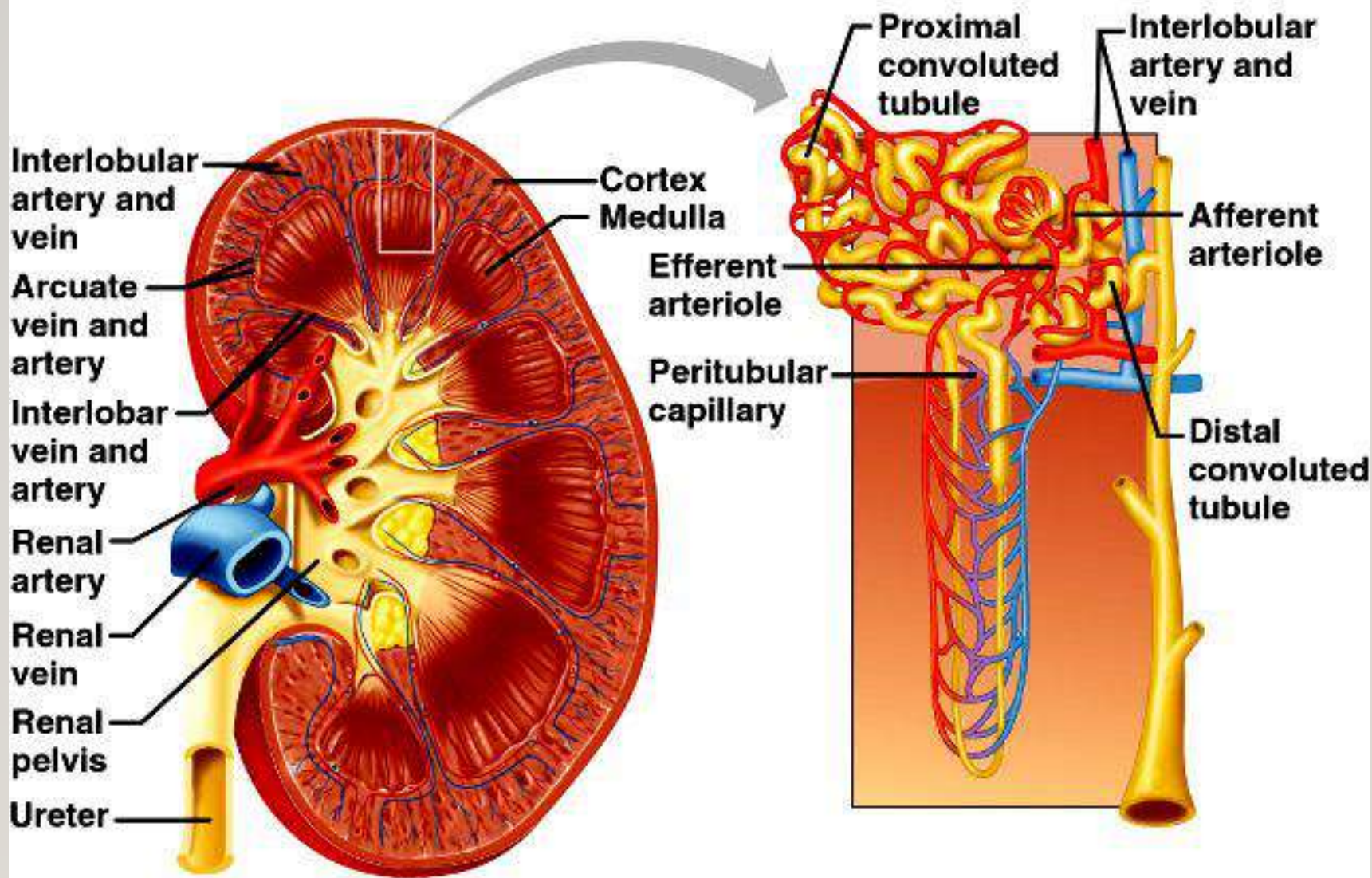


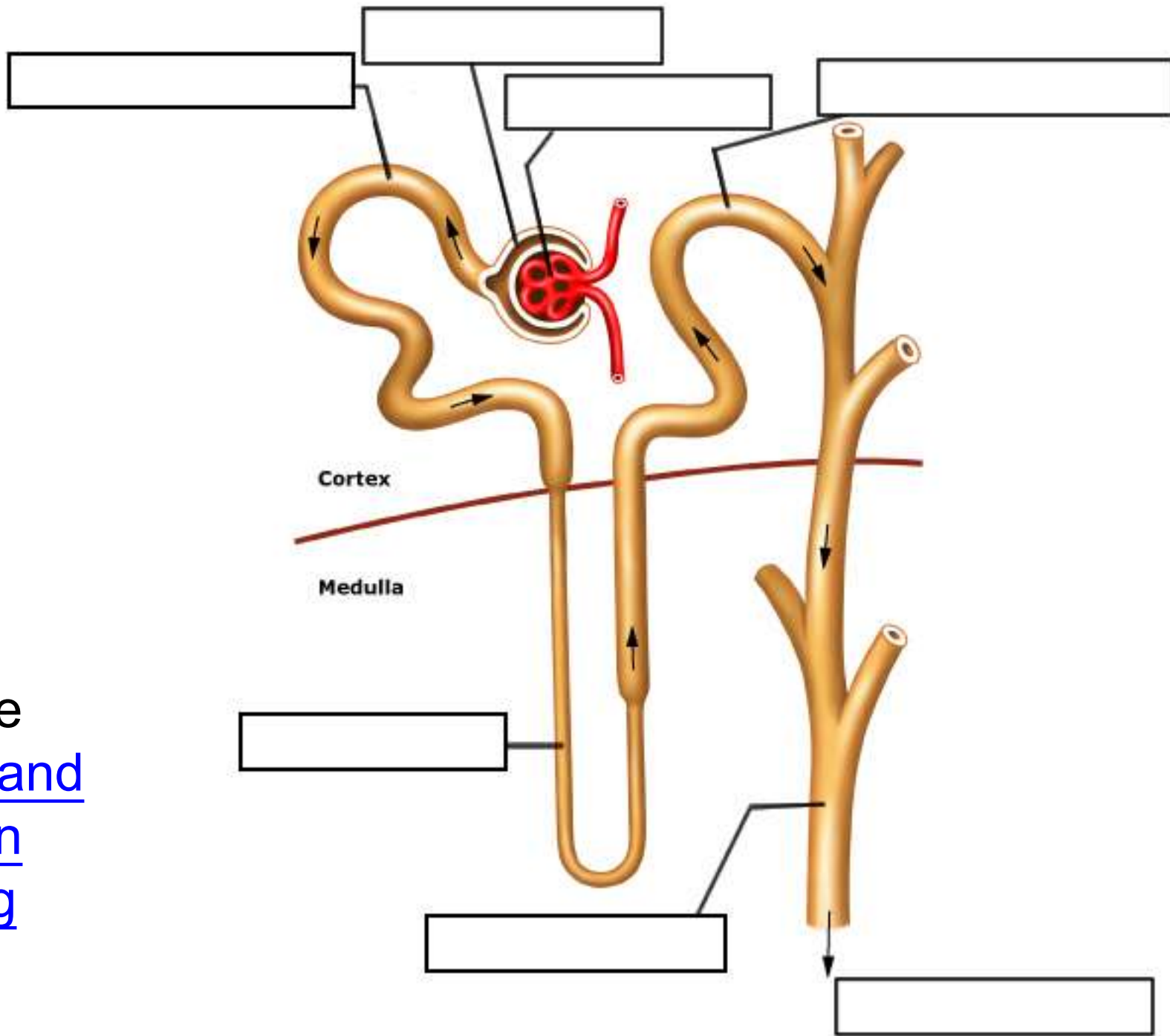
# NEPHRONS - FUNCTIONAL UNIT OF THE URINARY SYSTEM

Quick Analogy: A nephron is to the urinary system as the \_\_\_\_\_ is to the nervous system

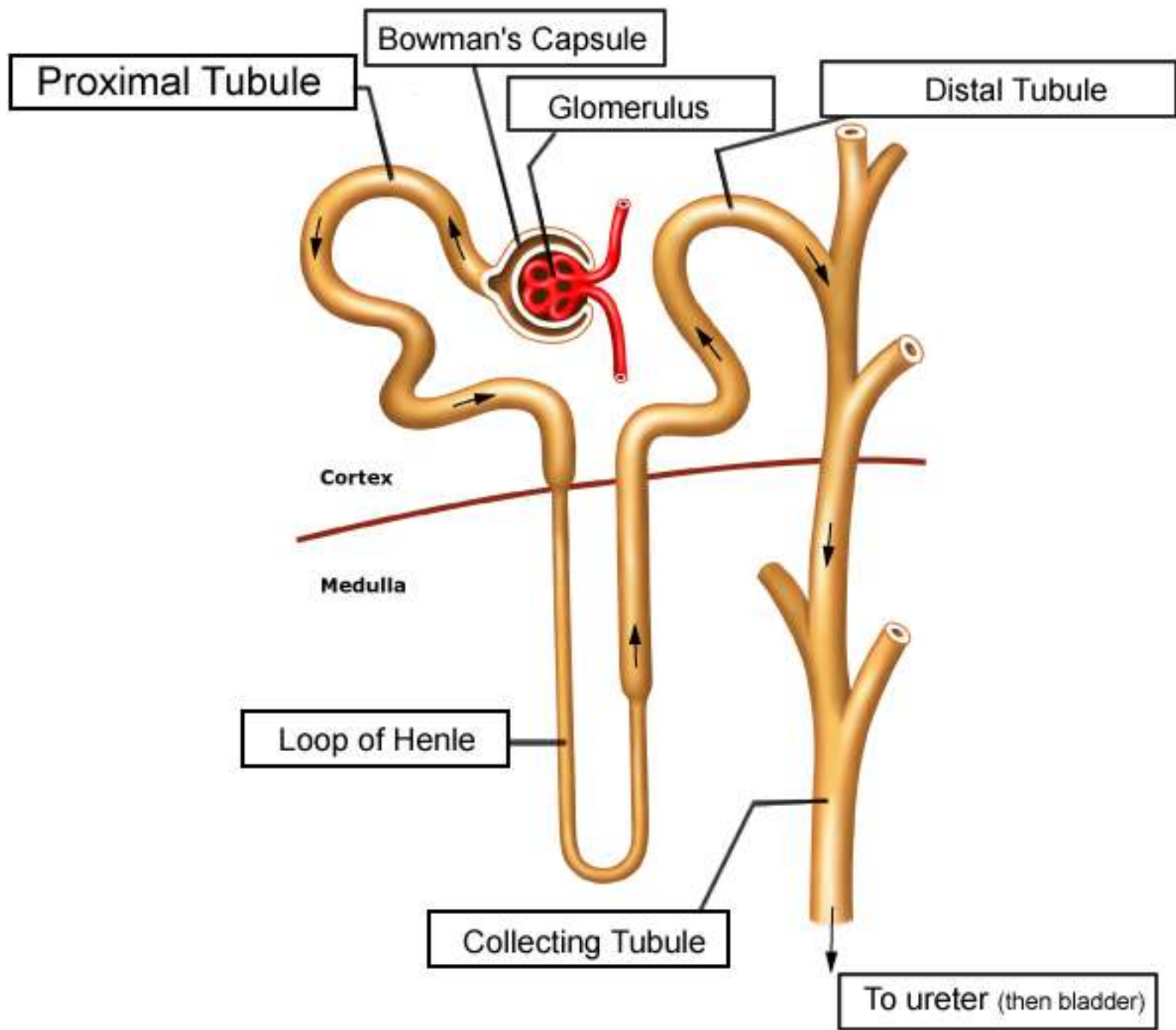
- each kidney contains about 1 million nephrons
- renal corpuscle: composed of a tangled cluster called a glomerulus which filters fluid

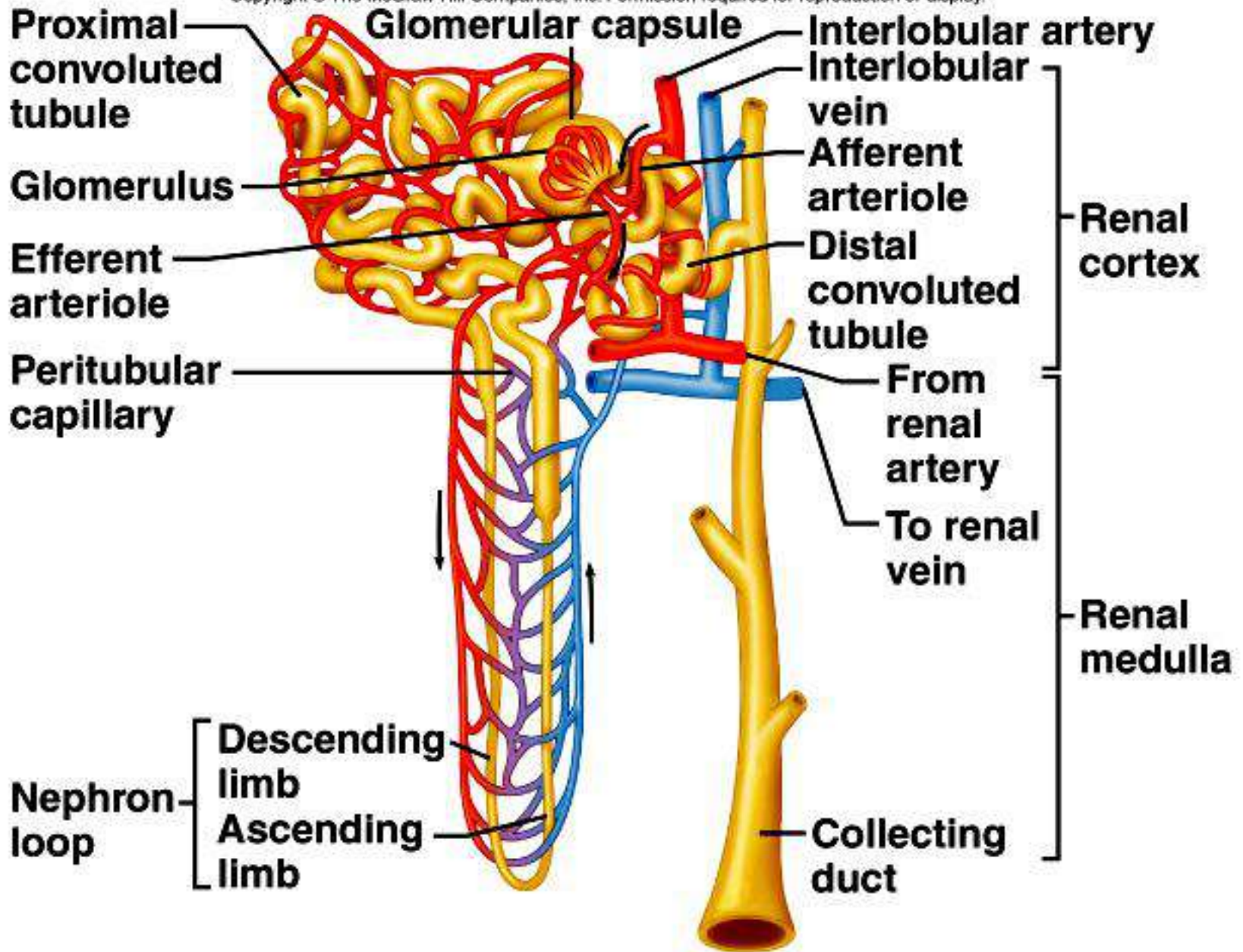
Pathway = glomerulus -> proximal tubule --> nephron loop (also called loop of henle) --> distal tubule --> collecting duct --> ureter --> bladder



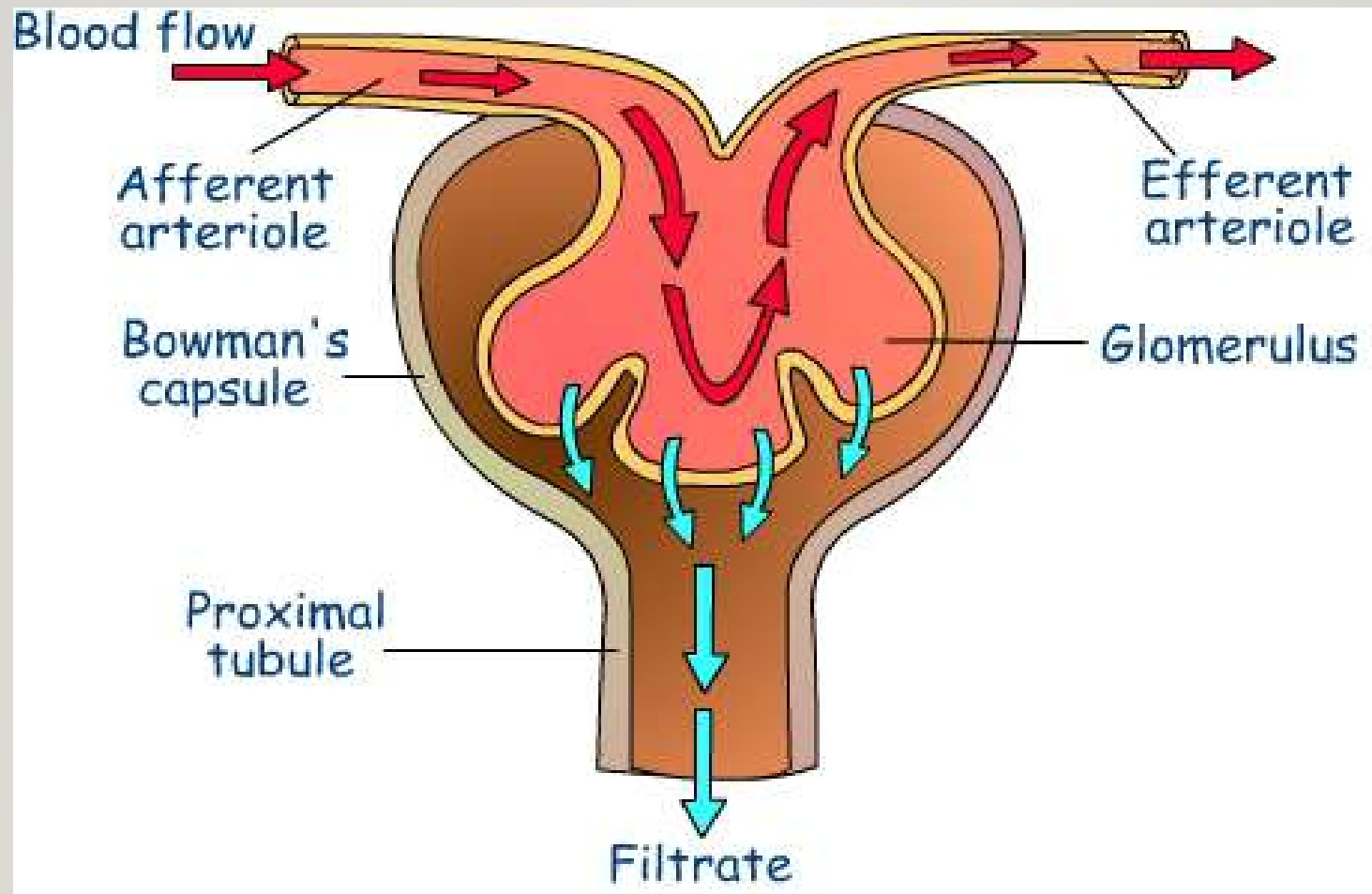


Also see [Kidney and Nephron Coloring](#)





# WHAT BLOOD VESSEL ENTERS THE GLOMERULUS?





# Urine Formation

glomerular filtration - urine formation begins,  
plasma is filtered

- tubular reabsorption - returns most of the fluid to the body
- tubular secretion - removes what is not needed; produces urine

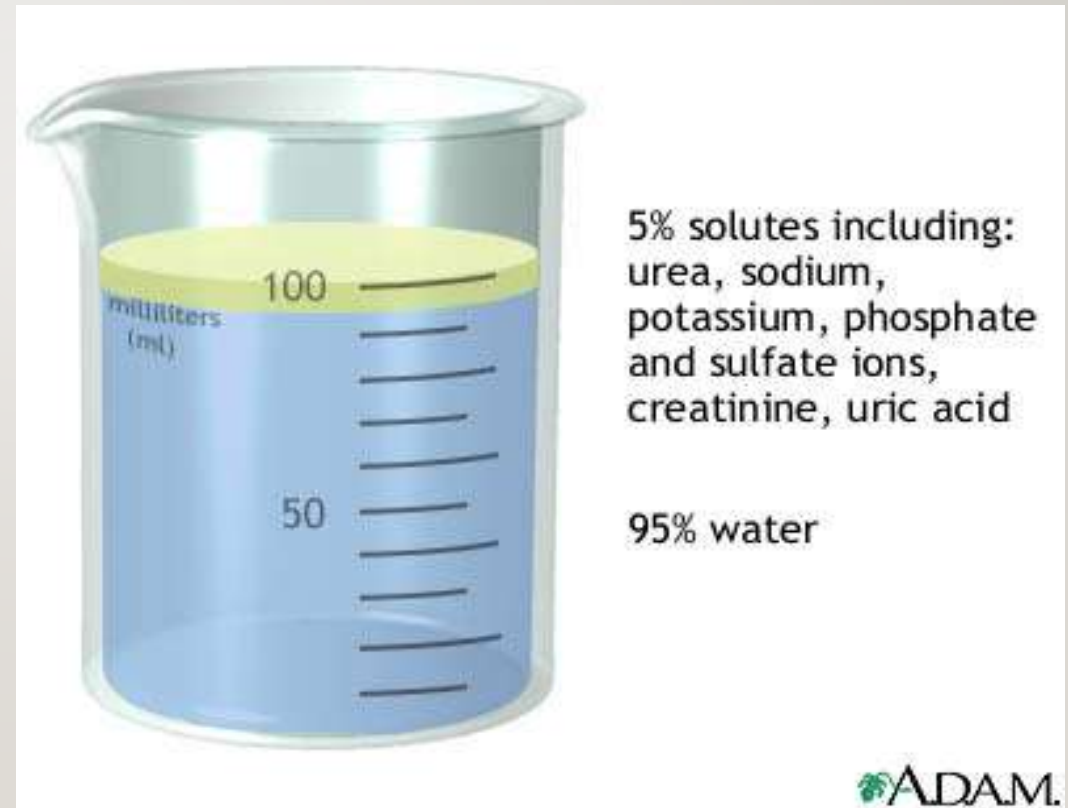


# URINE COMPOSITION

95 % Water

Contains urea and uric acid (characteristic smell)

Can contain trace amino acids



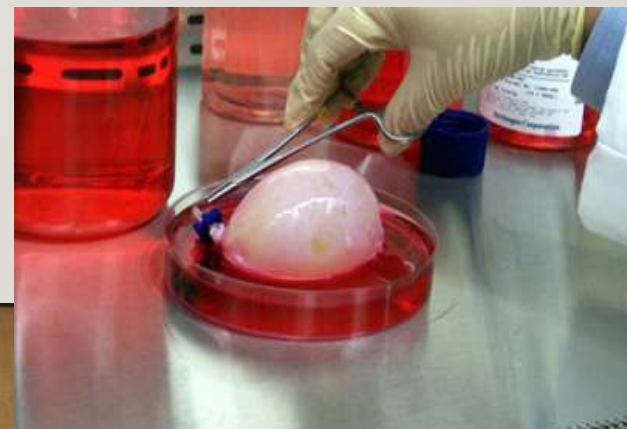
Urine may also contain other chemicals that can be detected.

Hormones present in a pregnant woman are detectable in urine



# URINE ELIMINATION

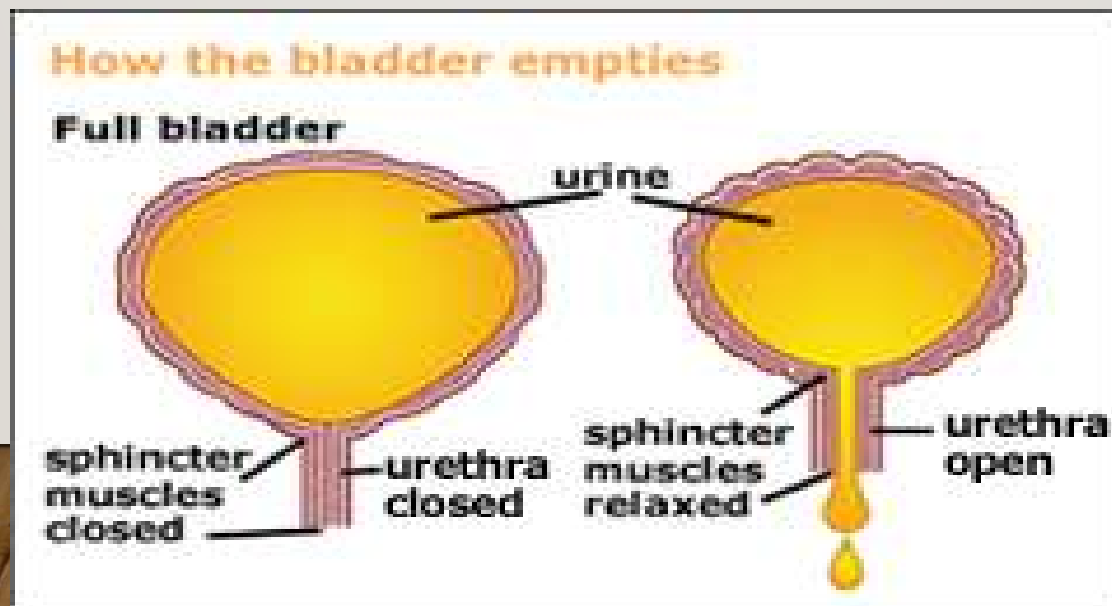
- AFTER URINE FORMS IN THE NEPHRONS, THE URETERS CARRY THE URINE AWAY TO THE BLADDER
- BLADDER IS AN EXPANDABLE STRUCTURE THAT STORES URINE BEFORE IT IS ELIMINATED FROM THE BODY.
- TRANSITIONAL EPITHELIAL CELLS CHANGE SHAPE TO ALLOW FOR EXPANSION AND CONTRACTION.



MICTURATION = URINATION; AS THE BLADDER FILLS THIS REFLEX OCCURS THOUGH IT IS ALSO UNDER VOLUNTARY CONTROL

URETHRA = TUBE CARRIES URINE TO THE OUTSIDE OF THE BODY

DETRUSOR MUSCLE - ATTACH TO BLADDER AND SPHINCTER, CONTROL URINATION



# DISORDERS OF THE URINARY SYSTEM

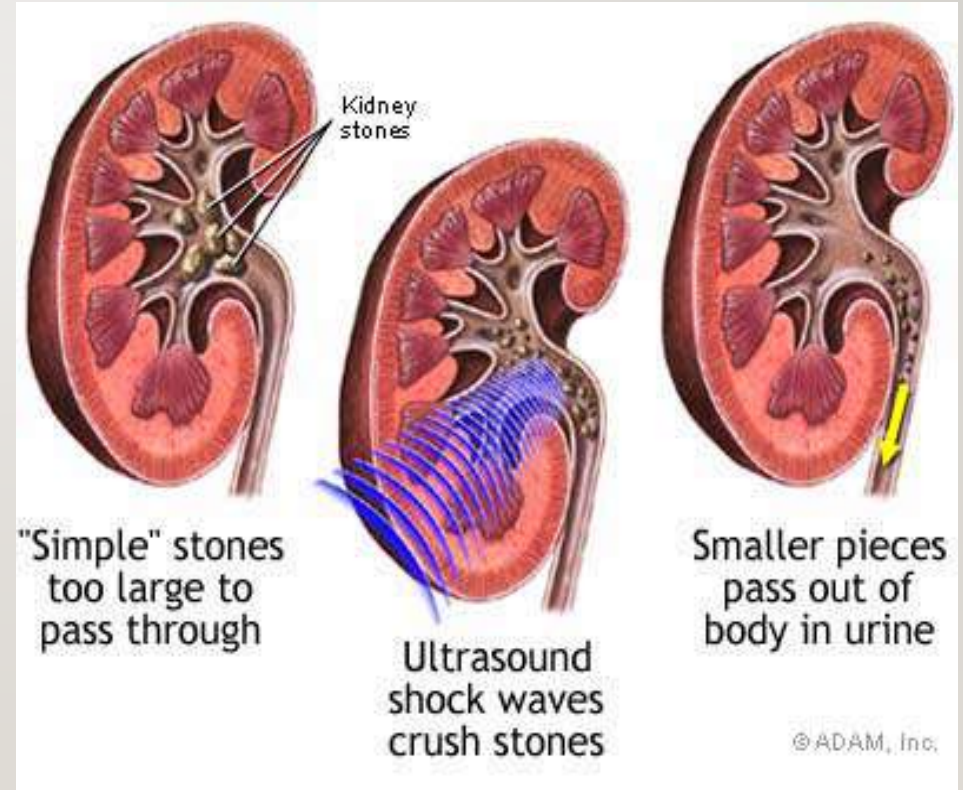
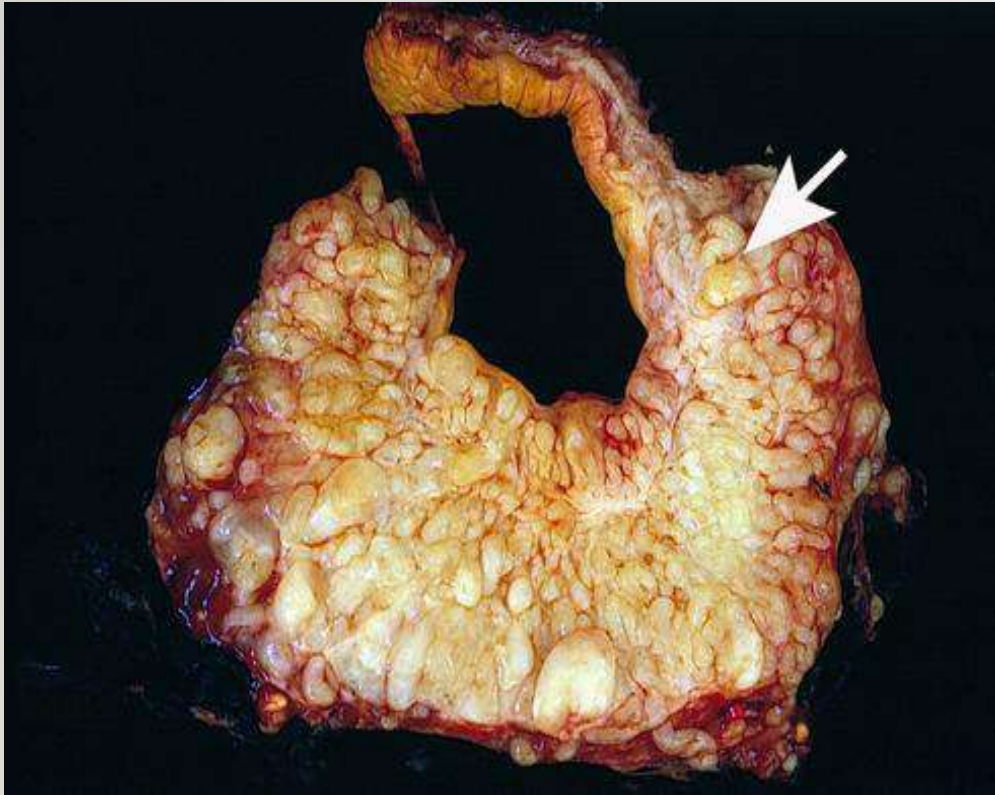
Many urinary problems can be solved by drinking enough water.

So how much fluid does the average, healthy adult living in a temperate climate need? The Institute of Medicine determined that an adequate intake (AI) for men is roughly 3 liters (about 13 cups) of total beverages a day. The AI for women is 2.2 liters of total beverages a day.



# Kidney Stones

Extracorporeal shock wave lithotripsy (ESWL) is a procedure used to shatter simple stones in the kidney or upper urinary tract. Ultrasonic waves are passed through the body until they strike the dense stones, and make them smaller

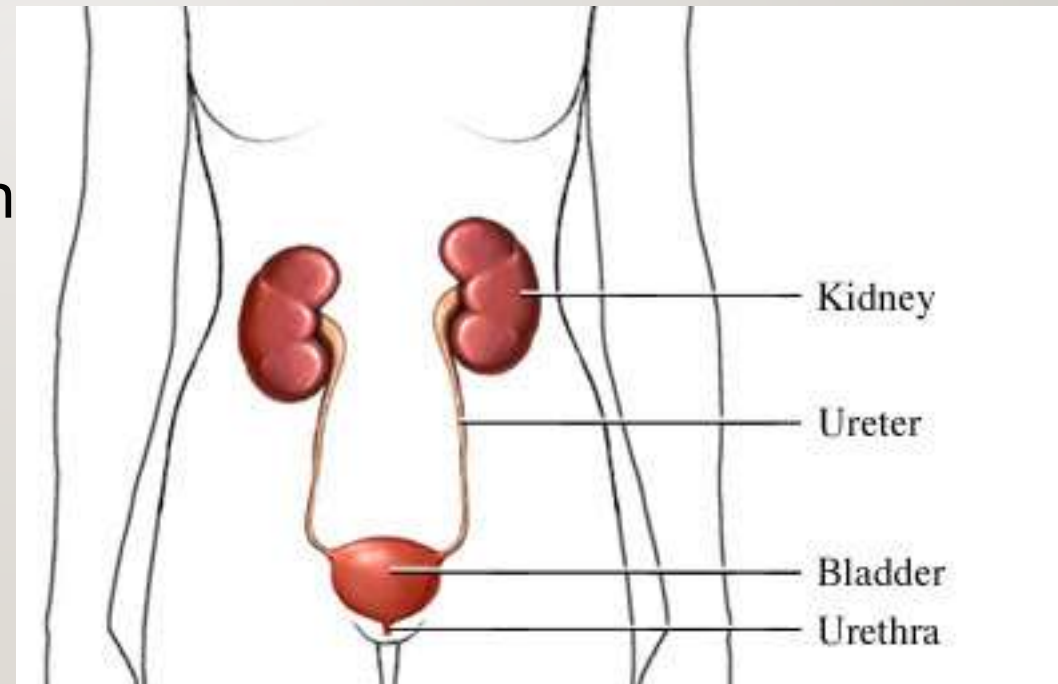


Cystitis = bacteria enters the bladder or kidneys (kidney infection); more common in women because the urethra is shorter (2" vs 8")

Commonly known as a "bladder infection"

UTI = urinary tract infection

- Frequent need to urinate
- Pain in the abdomen
- Burning sensation during urination
- Cloudy, bad-smelling urine
- Blood in the urine
- Leaking urine
- Low back pain
- Fever and chills
- Nausea and poor appetite

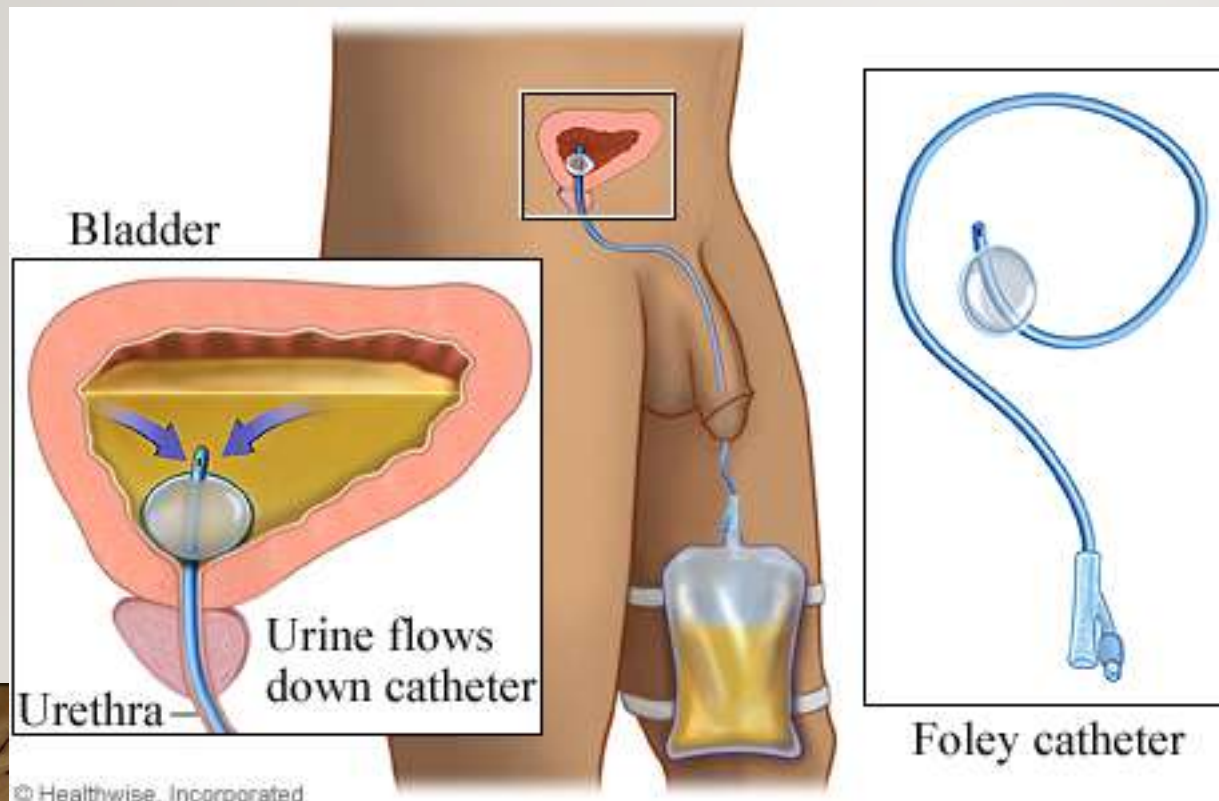




# CATHETERS

In medicine, a **catheter** is a tube that can be inserted into a body cavity, duct, or vessel.

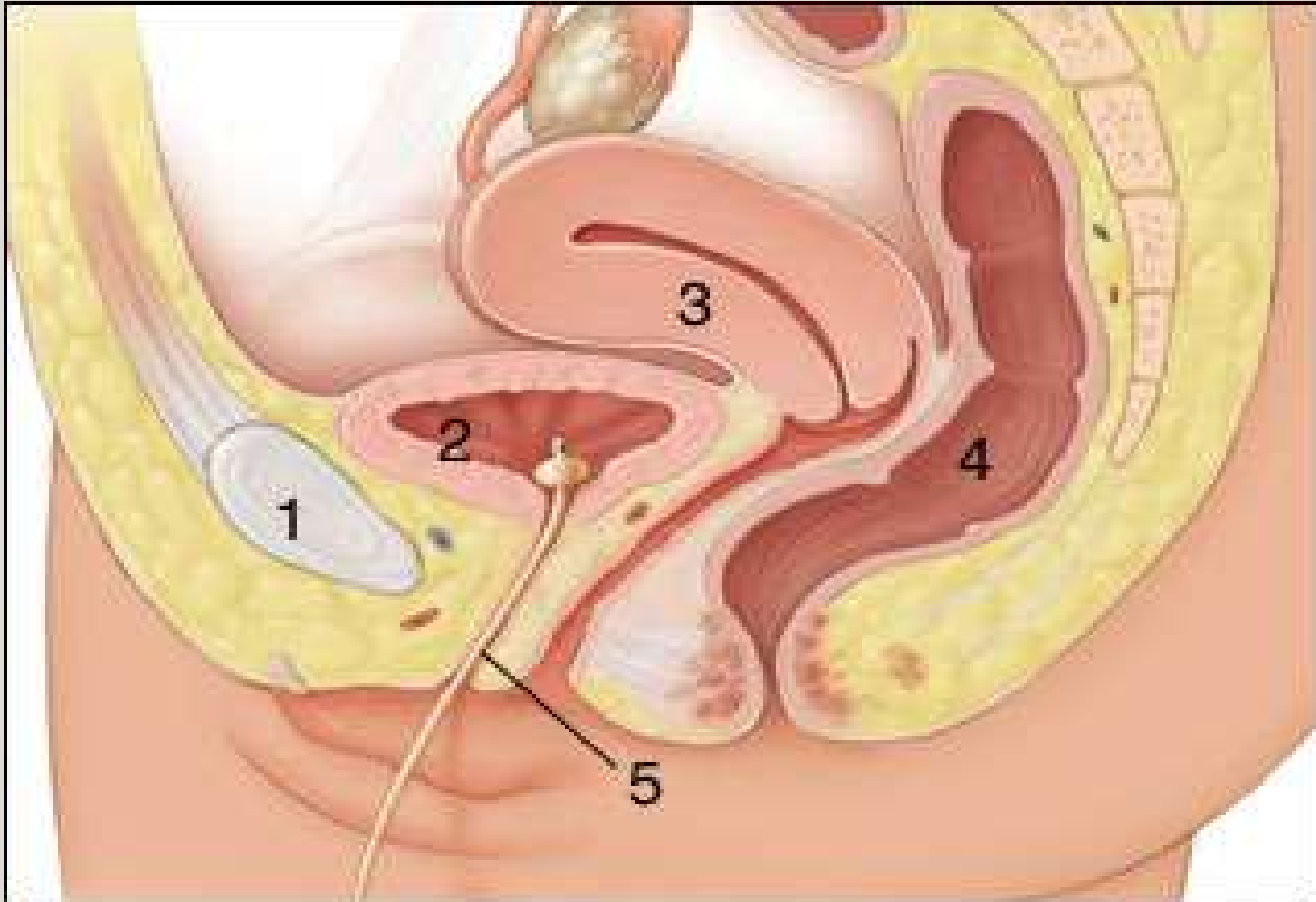
The process of inserting a catheter is **catheterization**.



Catheterization of the bladder is a common medical procedure, often performed by nurses

# WHEN ARE CATHETERS USED?

- Urethra blocked (bladder stones)
  - Surgery (pre/post) – Consciousness
  - Trauma – Nerve damage (neuropathic bladder)
  - Incontinence (loss of bladder control)
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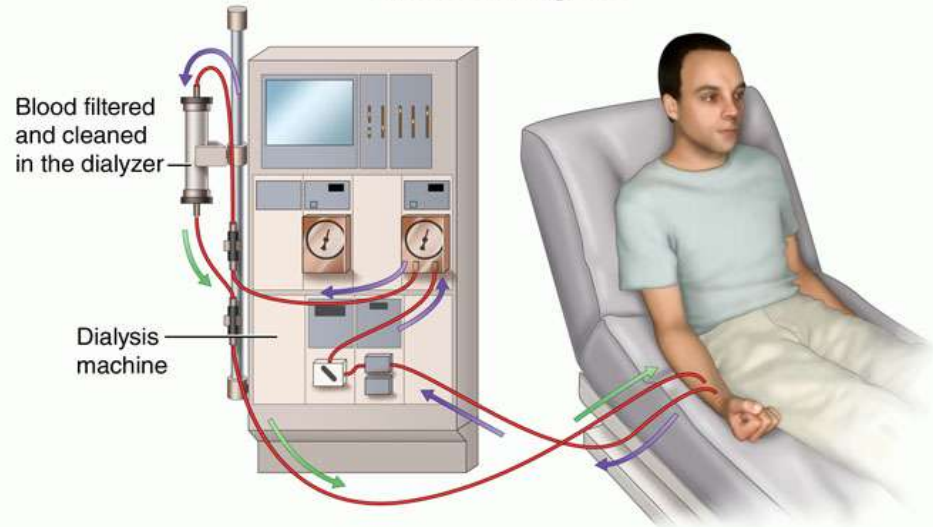
When Kidneys Fail....

Dialysis may be used to clean the blood (hemodialysis)

4 hours, 3 times a week

Patients will eventually need a new kidney

## Hemodialysis



## Types of Access for Dialysis

