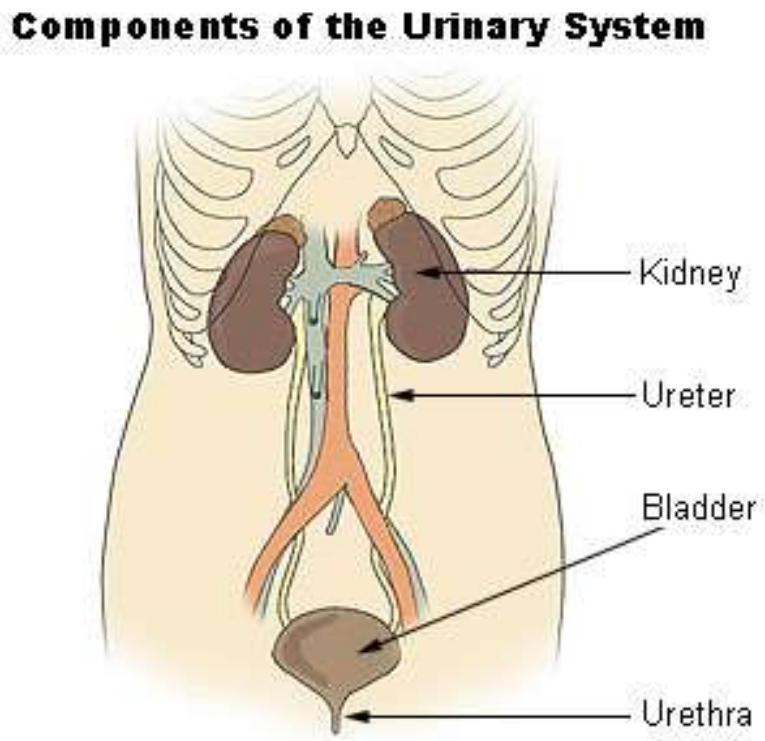
URINARY SYSTEM

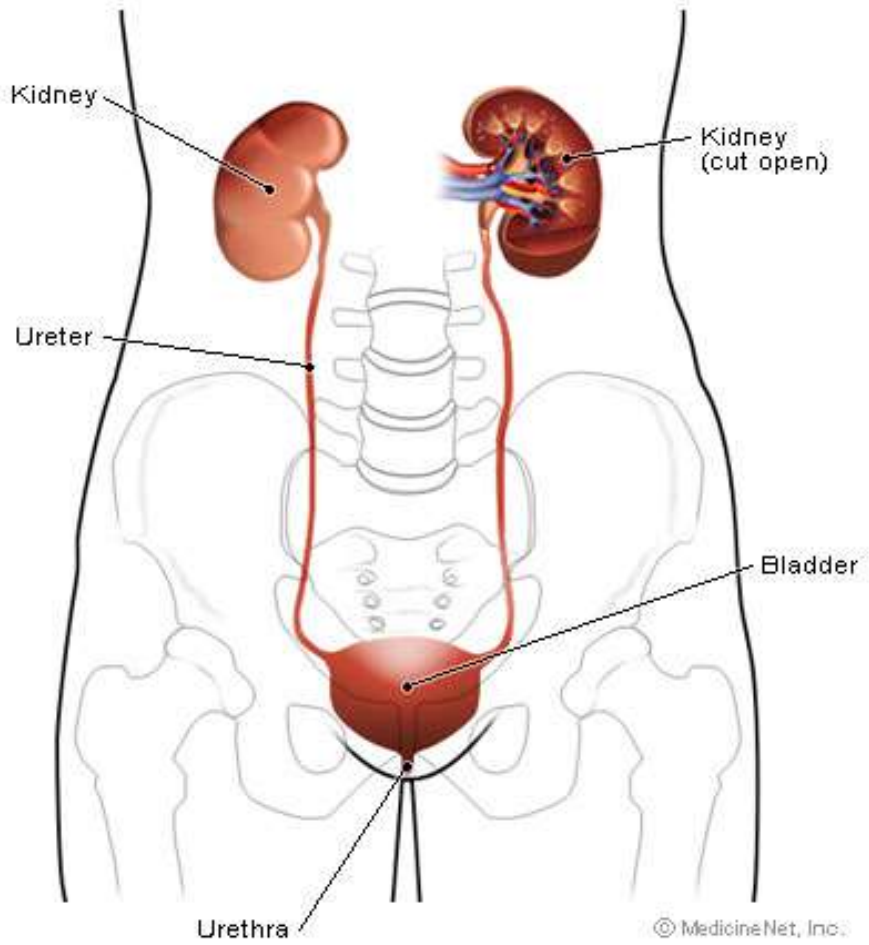
URINARY SYSTEM

- AKA EXCRETORY SYSTEM
- REMOVES CERTAIN WASTES AND EXCESS WATER FROM BODY
- MAINTAINS ACID-BASE BALANCE



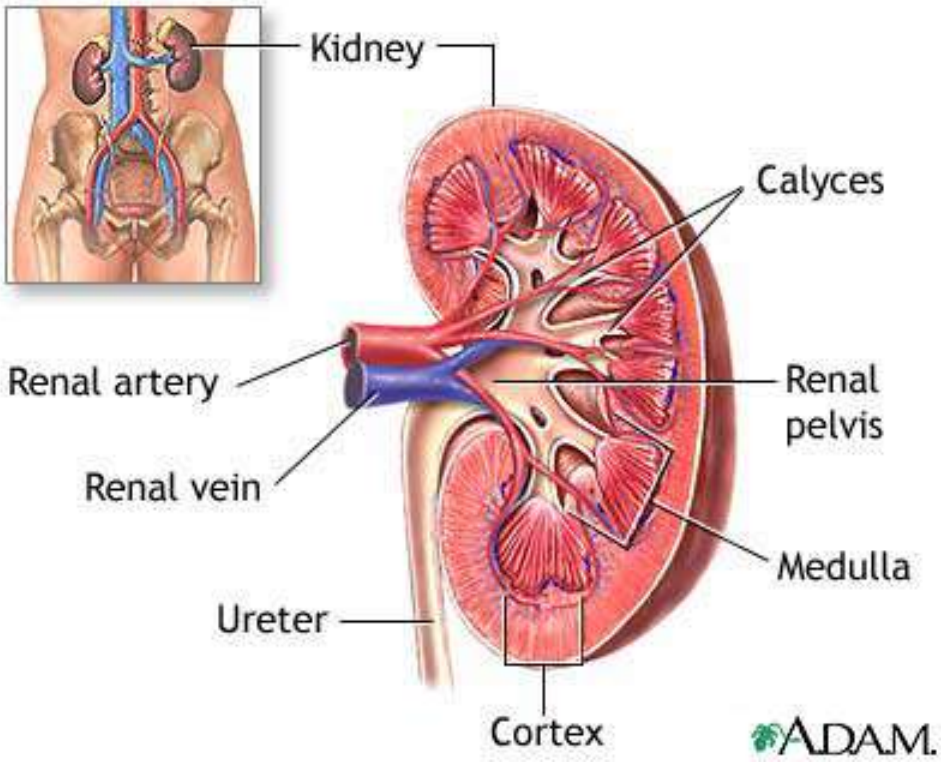
URINARY STRUCTURES

- 2 KIDNEYS
- 2 URETERS
- BLADDER
- URETHRA



KIDNEYS

- 2 BEAN-SHAPED ORGANS



KIDNEYS

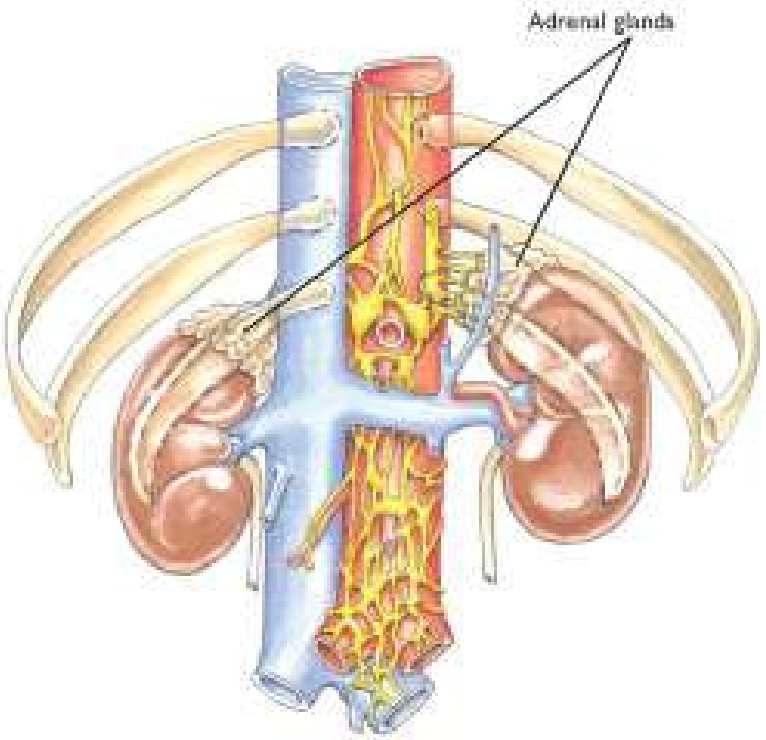
LOCATION:

-BESIDE VERTEBRAL COLUMN

-BEHIND ABDOMINAL CAVITY

KIDNEYS

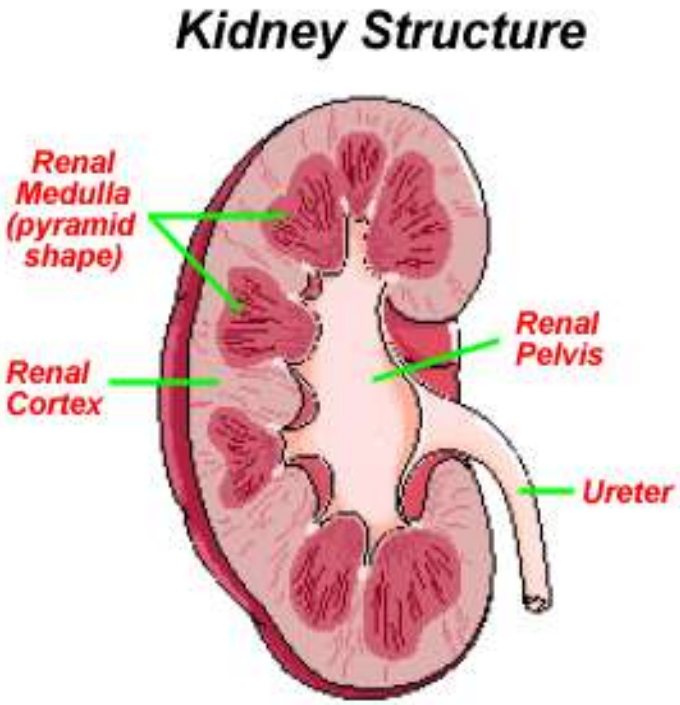
- PROTECTED BY RIBS ANI CUSHION OF FAT
- HELD IN POSITION BY CONNECTIVE TISSUE
- ENCLOSED IN ADIPOSE CAPSULE
- COVERED BY RENAL FASCIA OR FIBROUS CAPSULE



KIDNEYS

DIVIDED INTO 3 MAIN SECTIONS:

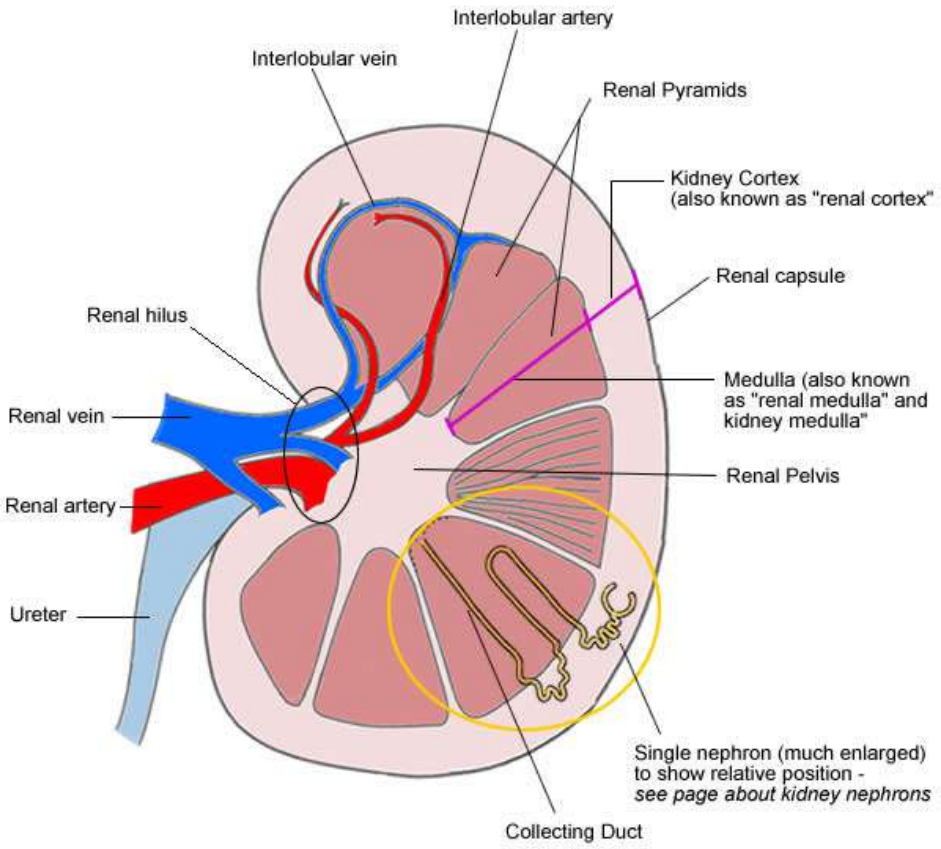
-Medulla, Cortex, and Renal Pelvis



CORTEX

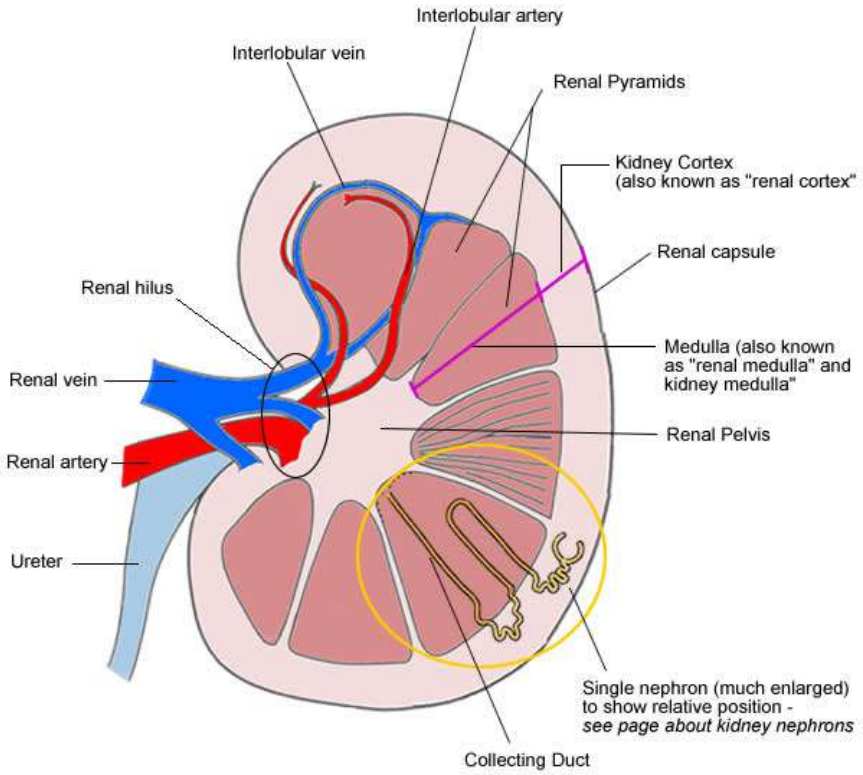
- OUTER SECTION OF KIDNEY
- CONTAINS MOST OF THE NEPHRONS

  (WHICH AID IN PRODUCTION OF URINE)



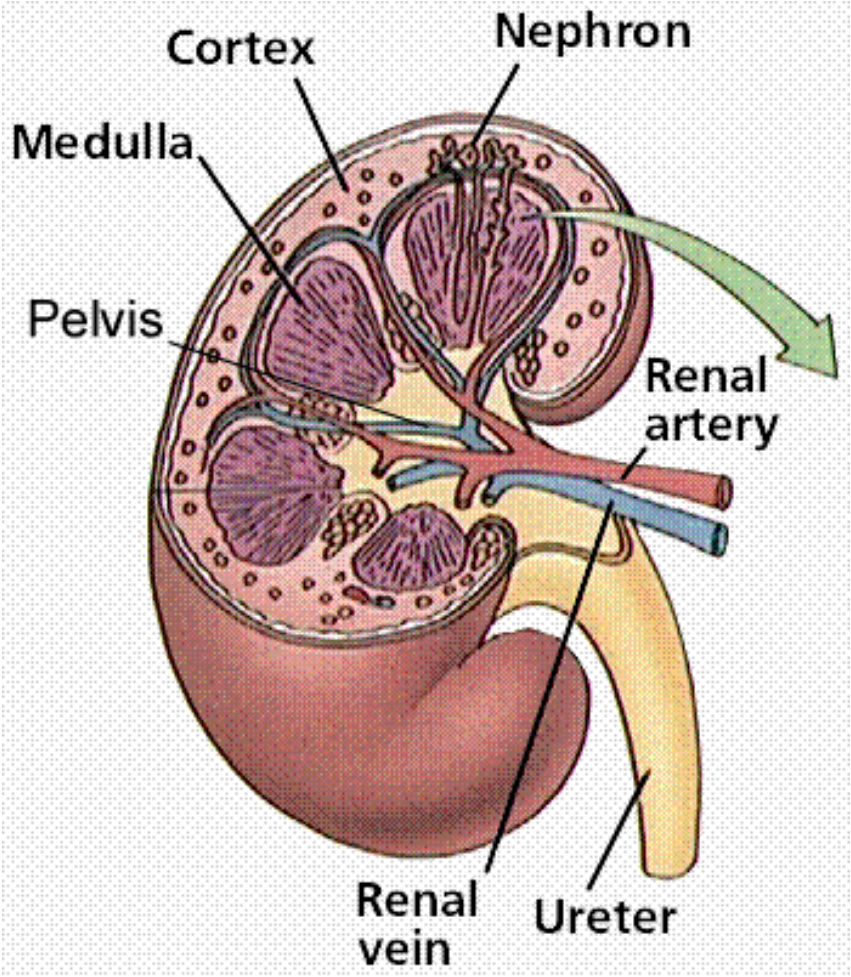
MEDULLA

- INNER SECTION OF KIDNEY
- CONTAINS MOST OF THE COLLECTING TUBULES (WHICH CARRY THE URINE FROM THE NEPHRONS THROUGH THE KIDNEYS)



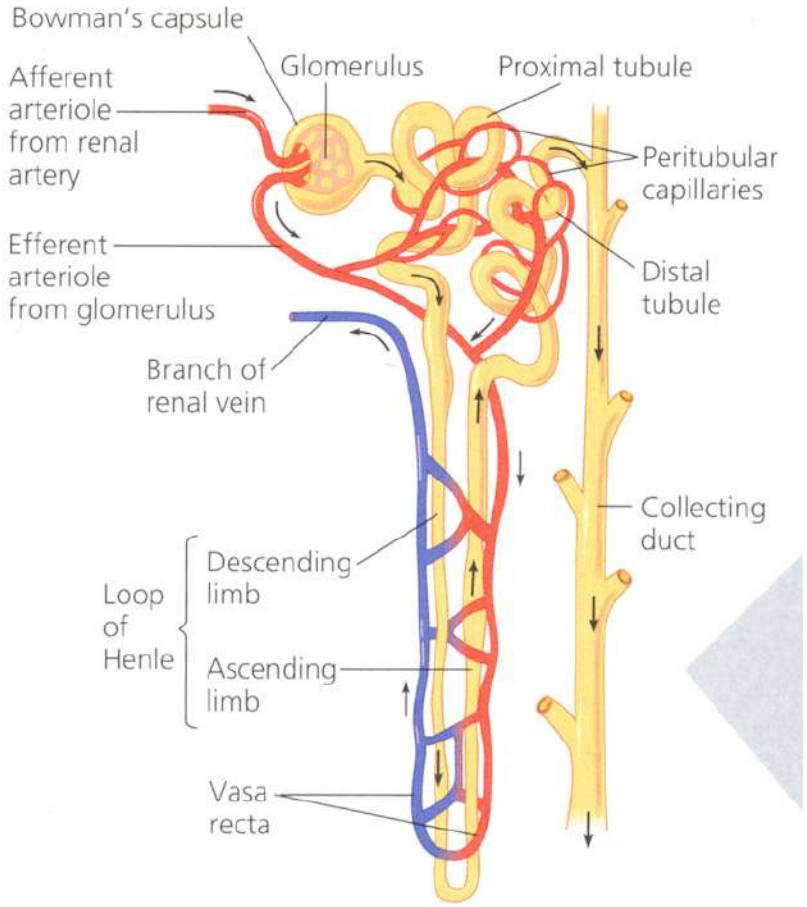
NEPHRONS

- MICROSCOPIC FILTERING UNITS IN THE KIDNEYS
- OVER ONE MILLION PER KIDNEY



NEPHRONS

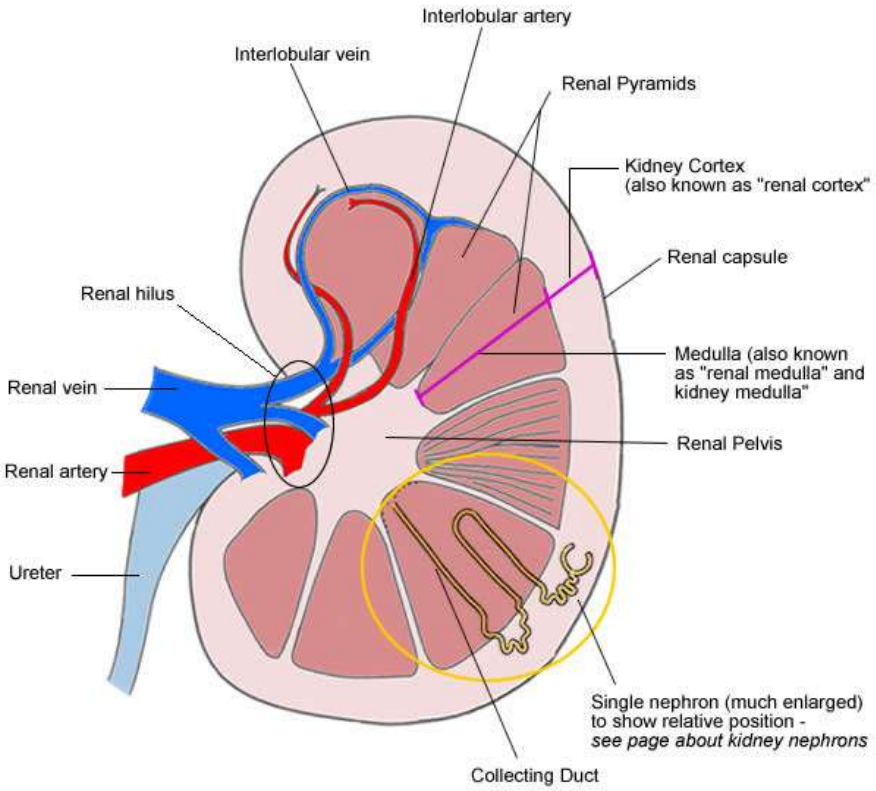
- CONSISTS OF:
  - -GLOMERULUS
  - -BOWMAN'S CAPSULE
  - -PROXIMAL CONVOLUTED TUBULE
  - -DISTAL CONVOLUTED TUBULE
  - -COLLECTING DUCT



RENAL ARTERIES

CARRY BLOOD TO KIDNEYS

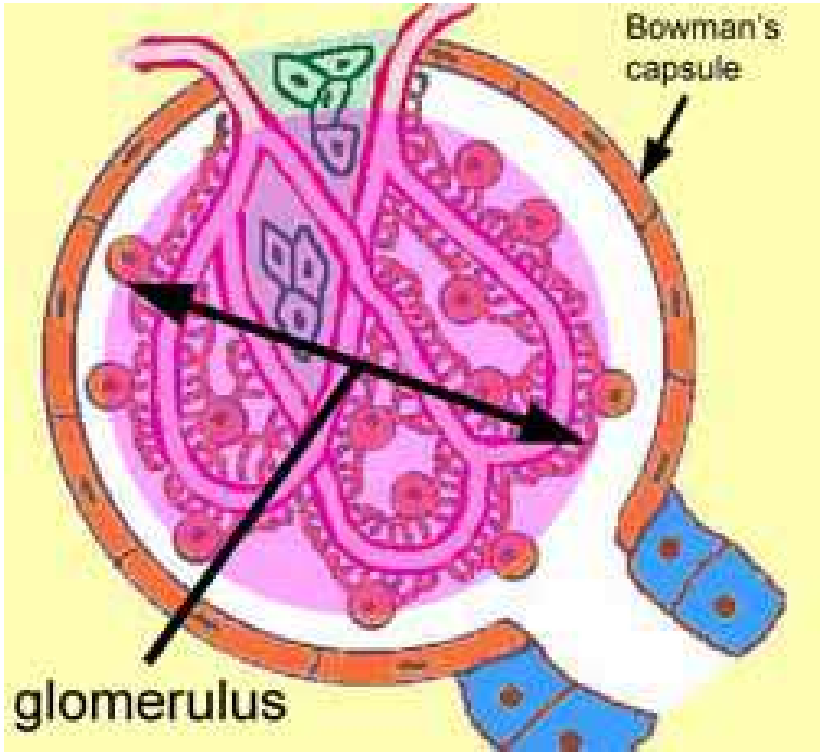
BRANCHES PASS THROUGH THE MEDULLA TO CORTEX WHERE BLOOD ENTERS THE GLOMERULUS



GLOMERULUS

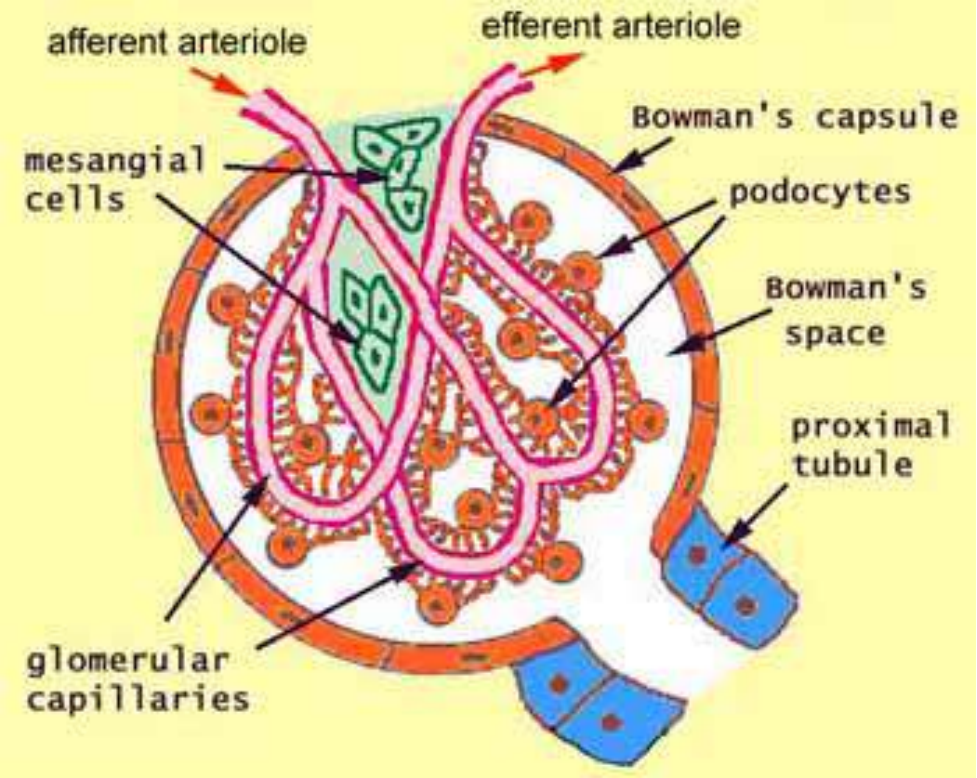
- A CLUSTER OF CAPILLARIES
- FILTERS FROM THE BLOOD:

  WATER, SALT, SUGAR, METABOLIC PRODUCTS AND OTHER SUBSTANCES
- DOES NOT FILTER PROTEIN AND RBC
- SUBSTANCES FILTERED OUT ENTER BOWMAN'S CAPSULE



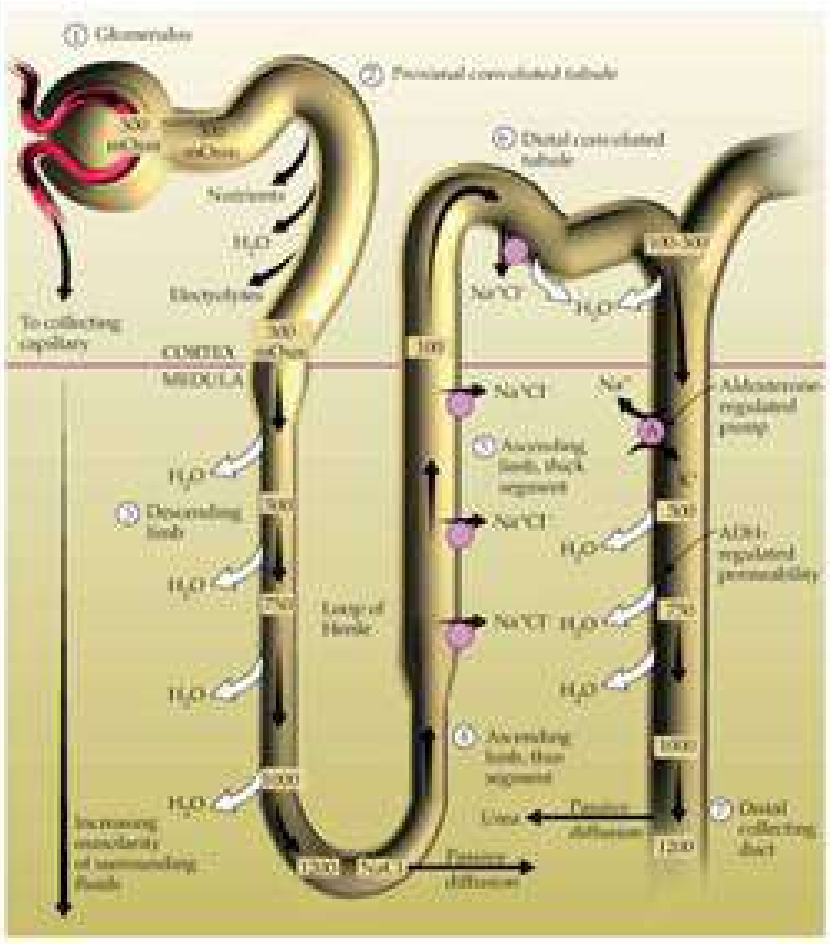
BOWMAN'S CAPSULE

- C-SHAPED STRUCTURE
- SURROUNDS GLOMERULUS
- IS THE START OF THE PROXIMAL TUBULE
- PASSES THE FILTERED MATERIALS INTO THE CONVOLUTED TUBLE



TUBULES

- FILTERED SUBSTANCES NEEDED BY THE BODY ARE REABSORBED AND RETURNED TO THE BLOOD CAPILLARIES
- MOST OF THE SUGAR, WATER AND SALTS ARE REABSORBED
- UREA, URIC ACID AND CREATININE REMAIN IN THE TUBULES

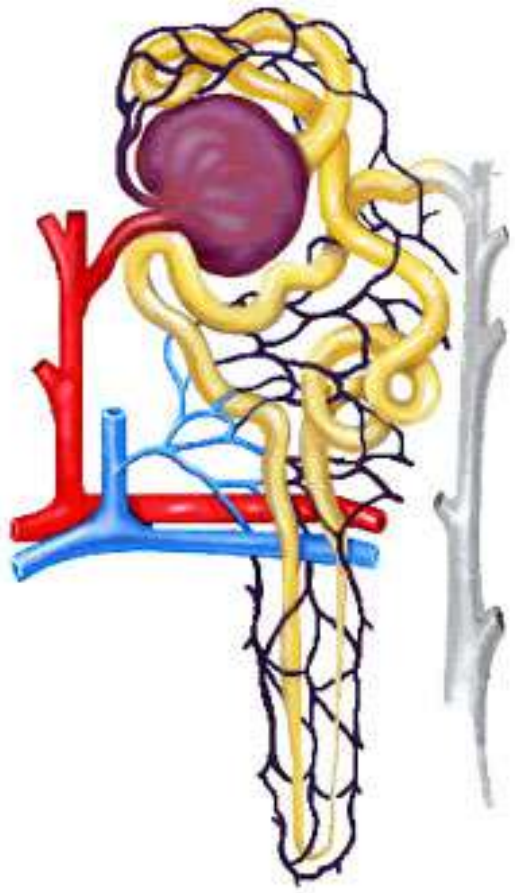


URINE

- MADE UP OF OF A CONCENTRATED LIQUID OR UREA, URIC ACID, CREATININE, MINERAL SALTS, PIGMENTS AND 95% WATER
- LIQUID WASTE PRODUCT PRODUCED BY URINARY SYSTEM
- PRESENCE OF SUGAR USUALLY INDICATES DISEASE

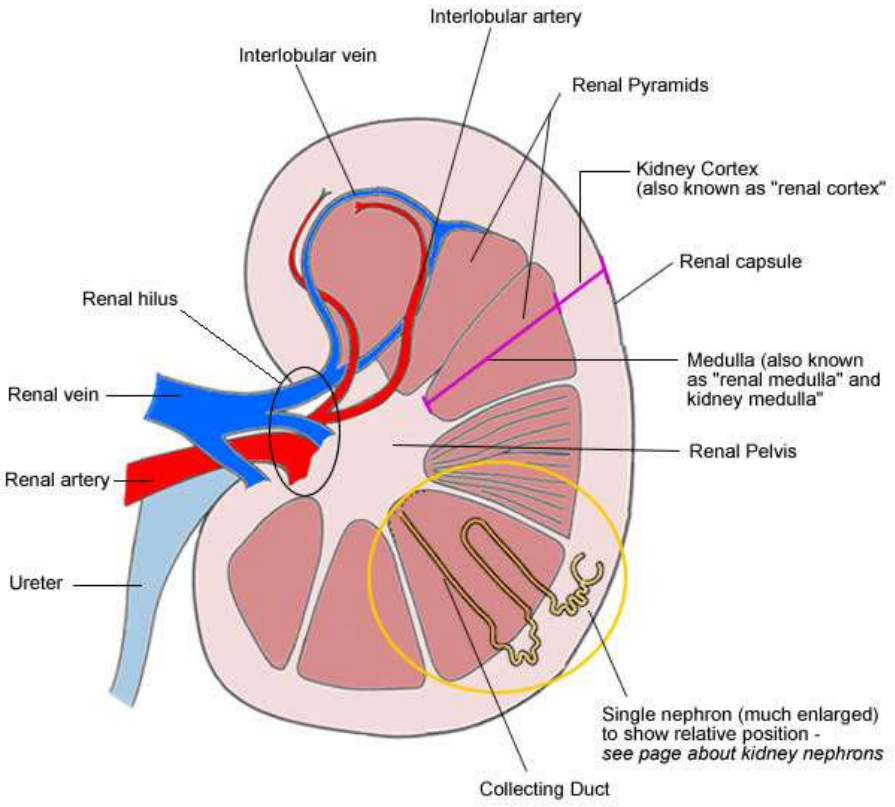
URINE

- ABOUT 1500 TO 2000CC (1 1/2 - 2 QTS) PRODUCED DAILY
- 150 QUARTS OF LIQUID FILTERED THROUGHT KIDNESY DAILY
- FROM BOWMAN'S CAPSULE URINE ENTERS COLLECTING DUCTS OR TUBULES LOCATED IN MEDULLA



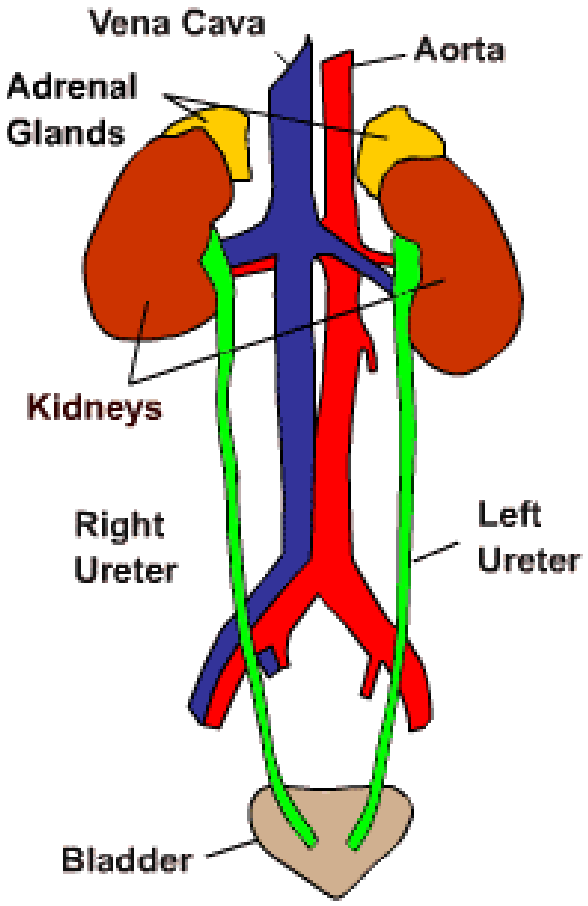
COLLECTING DUCTS

- LOCATED IN MEDULLA
- AKA TUBULES
- EMPTY INTO THE RENAL BASIN OR PELVIS (WHICH IS FIRST PORTION OF URETER)



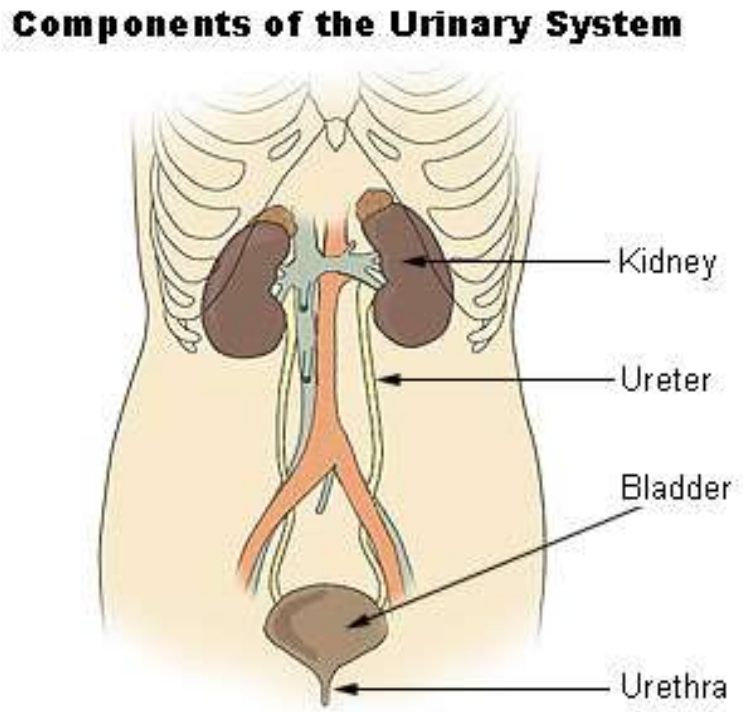
URETERS

- TWO MUSCULAR TUBES
- 10 - 12 INCHES LONG
- EXTENDS FROM RENAL PELVIS TO BLADDER
- PERISTALSIS MOVES URINE



BLADDER

- HOLLOW MUSCULAR SAC
- LOCATED BEHIND SYMPHYSIS PUBIS
- MIDLINE IN PELVIC CAVITY
- LINED WITH MUSCOUS MEMBRANE



BLADDER

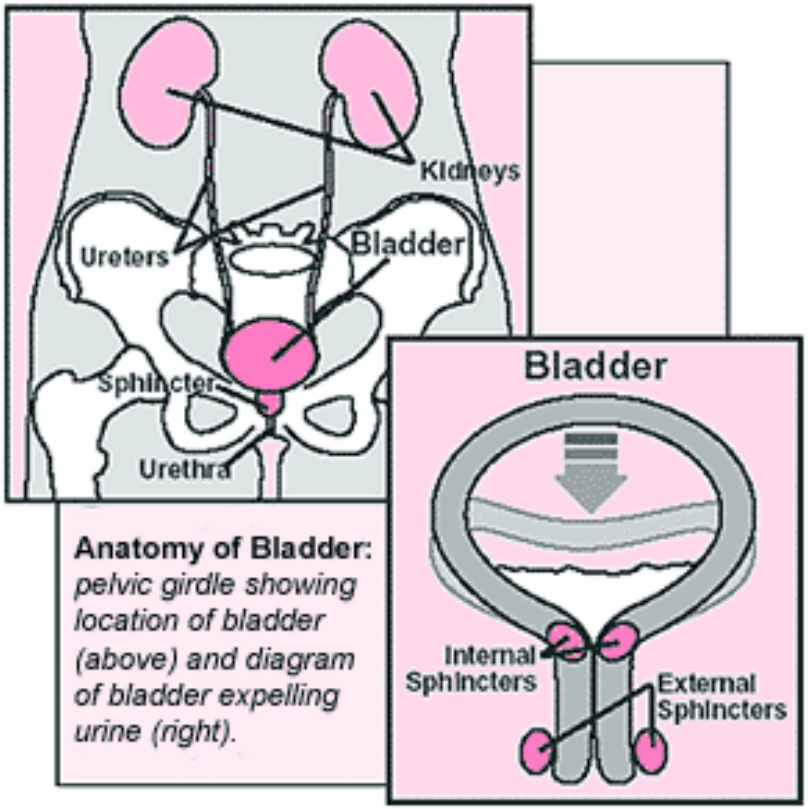
- MUCOUS MEMBRANE ARRANGED IN FOLDS CALLED RUGAE
- RUGAE DISAPPEARS AS BLADDER EXPANDS

BLADDER FUNCTIONS

- RECEIVES URINE FROM URETERS
- STORES URINE UNTIL EXPELLED FROM BODY

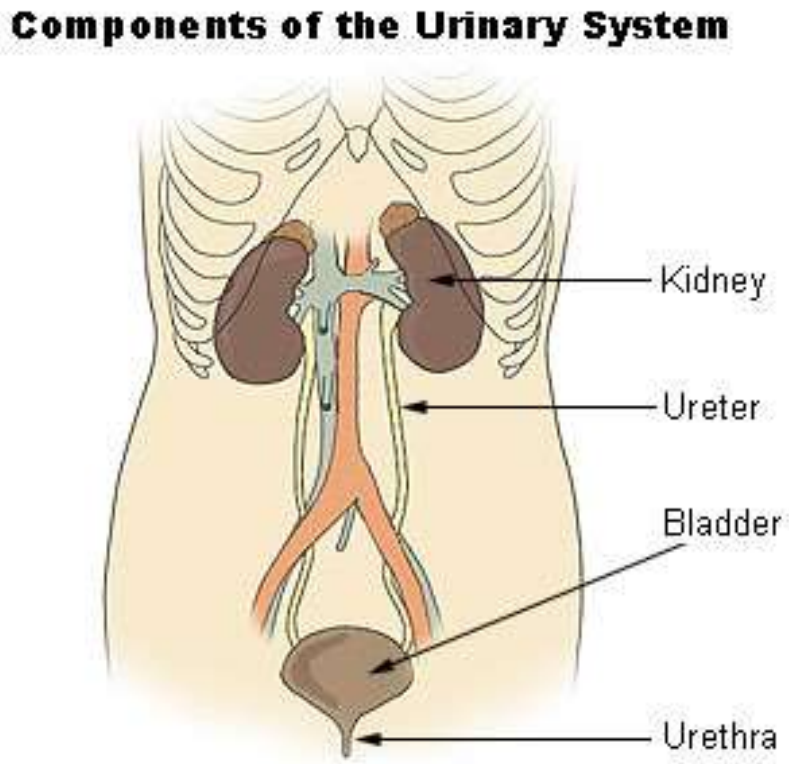
BLADDER MUSCLES

- CIRCULAR SPHINCTER MUSCLES CONTROL BLADDER OPENING TO PREVENT EMPTYING
- WHEN BLADDER IS FULL, RECEPTORS IN WALL SEND MESSAGE TO BRAIN
- BRAIN SENDS MESSAGE TO RELAX SPHINCTER



URETHRA

- TUBE THAT CARRIES URINE FROM BLADDER TO OUTSIDE
- EXTERNAL OPENING CALLED URINARY MEATUS
- DIFFERENT IN MALE AND FEMALE

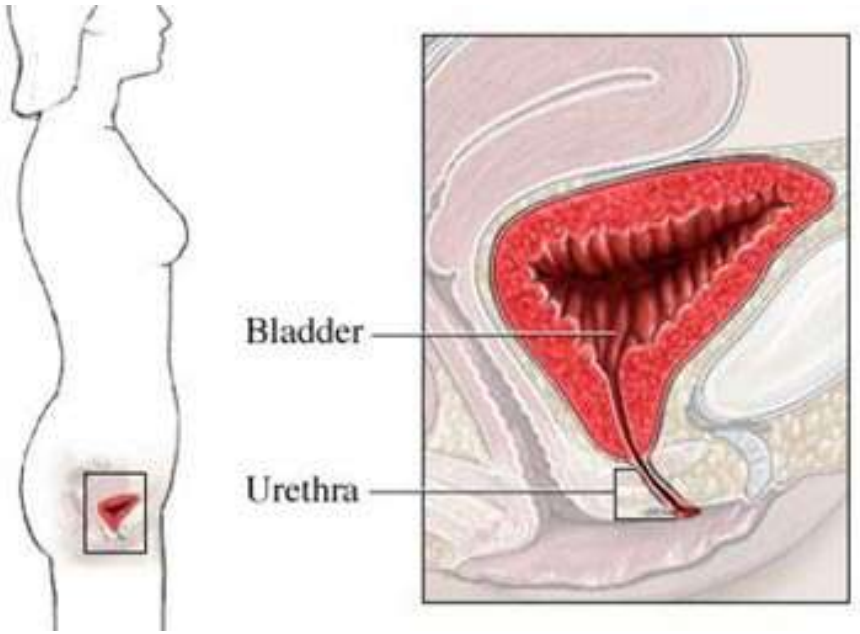


FEMALE URETHRA

-FEMALES: URETHRA ABOUT 1 1/2” LONG

-OPENS IN FRONT OF VAGINA

-CARRIES ONLY URINE



MALE URETHRA

-MALES: ABOUT 8” LONG AND S-SHAPED

-PASSES THROUGH PROSTATE GLAND AND THROUGH THE PENIS

-CARRIES BOTH URINE AND SEMEN

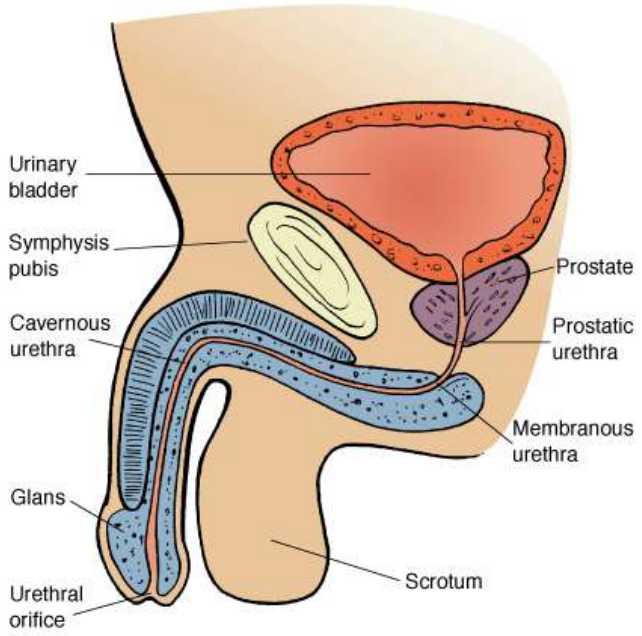


Figure 43-2 Parts of the male urethra.

POLYURIA

EXCESS URINATION

OLIGURIA

BELOW NORMAL AMOUNT OF URINE

ANURIA

ABSENCE OF URINE

HEMATURIA

BLOOD IN URINE

NOCTURIA

URINATION AT NIGHT

DYSURIA

PAINFUL URINATION

RETENTION

INABILITY TO EMPTY BLADDER

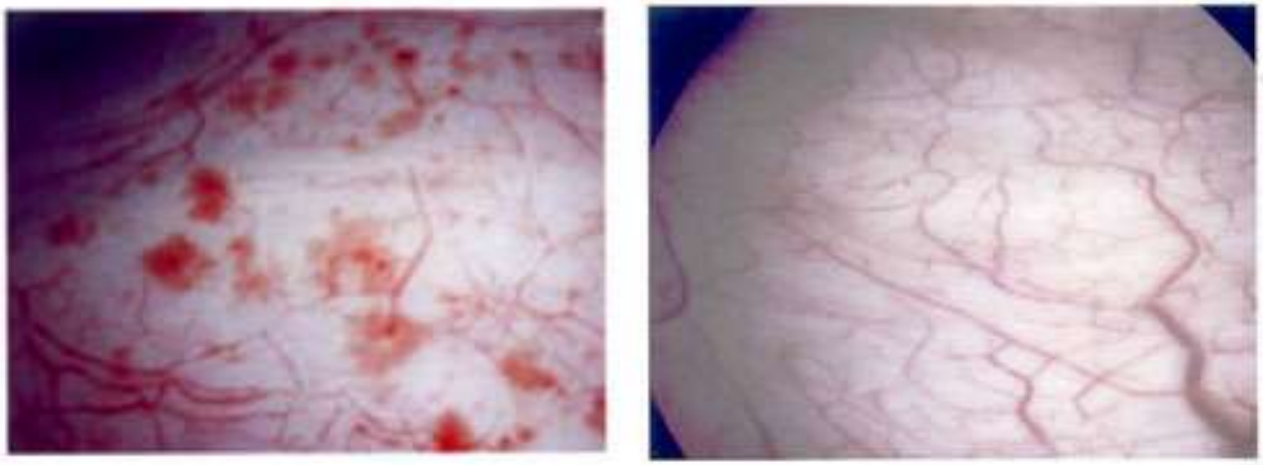
INCONTINENCE

INVOLUNTARY URINATION

DISEASES OF THE URINARY SYSTEM

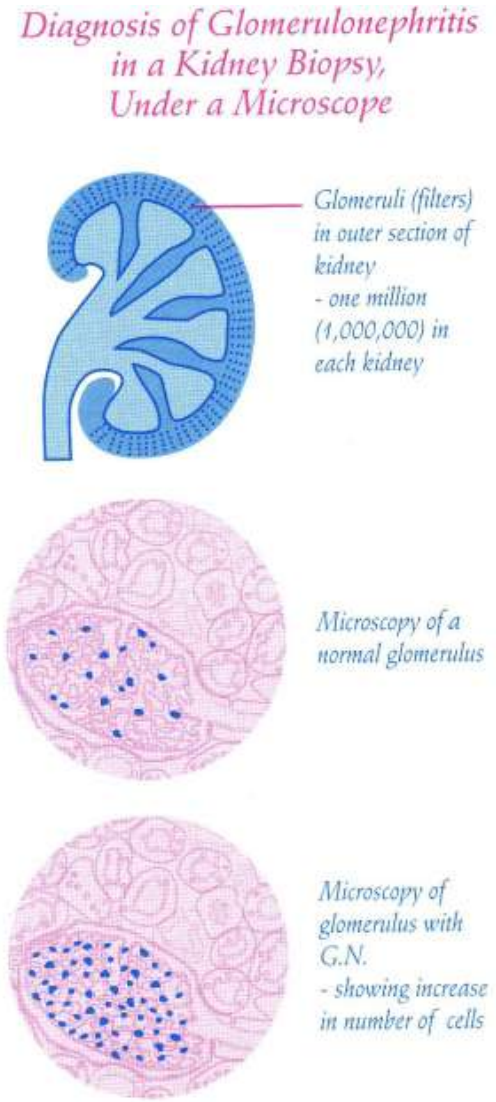
CYSTITIS

- Inflammation of the urinary bladder usually due to an ascending urinary tract infection.
- Symptoms: decreased bladder capacity, an urgent need to urinate frequently day and night, feelings of pressure, pain, and tenderness around the bladder and pelvis.
- Treatment: antibiotics



NEPHRITIS

- Nephritis is a term used to clinically denote a group of renal disorders associated with hypertension, decreased renal function, hematuria, and edema.
- Nephritis is a noninfectious inflammatory process involving the nephron; glomerulonephritis (GN) generally is a more precise term.



PYELONEPHRITIS

- Pyelonephritis is a kidney infection, usually from bacteria that have spread from the bladder.
- Possible causes of kidney infection include the following:
  - -infections in the bladder
  - -use of a catheter to drain urine from the bladder
  - -use of a cystoscope to examine the bladder
  - -surgery on the urinary tract
  - -conditions such as prostate enlargement and kidney stones that prevent the efficient flow of urine from the bladder
  - -efects or abnormalities in the urinary tract that block the flow of urine

Symptoms of Pyelonephritis

-back, side, and groin pain

-urgent, frequent urination

-pain or burning during urination

-fever

-nausea and vomiting

-pus and blood in the urine

RENAL CALCULUS

- **Kidney stones**, also called **renal calculi**, are solid concretions (crystal aggregations) of dissolved minerals in urine; calculi typically form inside the kidneys or bladder. The terms *nephrolithiasis* and *urolithiasis* refer to the presence of calculi in the kidneys and urinary tract, respectively.

- **Symptoms of kidney stones include**:
  - **Colicky pain**: "loin to groin". Often described as the "the worst pain I've ever experienced"
  - **Hematuria**: blood in the urine, due to minor damage to inside wall of kidney, ureter and/or urethra
  - **Dysuria**: burning on urination when passing stones (rare). More typical of infection.
  - **Oliguria**: reduced urinary volume caused by obstruction of the bladder or urethra by stone, or extremely rarely, simultaneous obstruction of both ureters by a stone.
  - **Nausea/vomiting**

Renal Calculus (stones)

RENAL FAILURE

- **Renal failure** or **kidney failure** is a situation in which the kidneys fail to function adequately. It is divided in acute and chronic forms; either form may be due to a large number of other medical problems.
- **Acute renal failure** (ARF) is a rapidly progressive loss of renal function, generally characterized by oliguria (decreased urine production, quantified as less than 400 mL per day in adults; body water and body fluids disturbances; and electrolyte derangement. An underlying cause must be identified to arrest the progress, and dialysis may be necessary to bridge the time gap required for treating these fundamental causes. ARF can result from a large number of causes.
- **Chronic renal failure** can either develop slowly and show few initial symptoms, be the long term result of irreversible acute disease or be part of a disease progression. There are many causes of CKD. The most common cause is diabetes mellitus.

Dialysis – treatment of Renal Failure

Uremia

- Toxic condition where urinary waste is in bloodstream
- Caused from any condition that affects proper function of kidneys
- Symptoms: n/v, ammonia breath, anuria, headache and confusion, coma/death
- Treatment: restrictive diet,

  dialysis, transplant

Urethritis

- Inflammation of the urethra
- Caused by bacteria, viruses or chemicals
- Symptoms: painful urination, redness, itching at meatus, ?discharge
- Treatment: sitz baths or warm compresses, antibiotics, increased fluid intake

The END of the Urinary System