

RENAL ANATOMY AND PHYSIOLOGY



FUNCTION OF THE KIDNEYS

Kidneys function as the washing machines of the body. The body excretes waste and cleans the body by putting the waste in the potty.

A: Acid Base balance

W: Water removal/ waste removal BUN

E: Erythropoiesis

T: Toxin removal

B: Blood pressure control

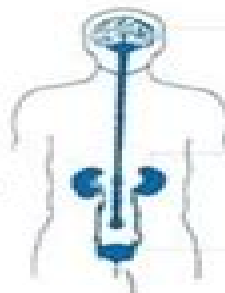
E: Electrolyte balance

D: D vitamin activation



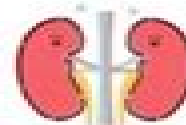
KIDNEY STRUCTURE & HOW PEE IS MADE

- ◆ The kidneys are located to either side of the body at the level of the last thoracic vertebra to the first three lumbar vertebrae.
- ◆ On top of each kidney are adrenal glands. These help maintain blood pressure and influence sodium and water balance.
- ◆ The kidneys are enclosed in a renal capsule.
- ◆ The renal cortex makes up the outer layer of the renal capsule. The renal capsule contains the glomeruli.
- ◆ The renal medulla is the inner aspect of the kidney. The renal medulla contains the renal pyramids & renal tubules. This constitutes the parenchyma.
- ◆ **Glomerulus:** A gathering of capillaries that filter large plasma proteins and blood cells. Blood flows into the glomerulus via the afferent arterioles and out via efferent arterioles.
- ◆ **Bowman's Capsule:** Houses the glomerulus. Electrolytes, waste, glucose, and amino acids are filtered into Bowman's space from the glomerular membrane and enters the proximal convoluted tubule PCT.
- ◆ **Nephrons:** The functional part of the kidney. Located in the parenchyma. Made of glomerulus and tubules. Selectively secretes and reabsorbs ions, electrolytes and water.
- ◆ **Tubules:** Proximal convoluted tubules, distal convoluted tubule and loop of henle. The PCT receives filtrate from the glomerular capsule and reabsorbs water and electrolytes. The descending loop of henle reabsorbs water. The Ascending loop of henle reabsorbs sodium and chloride to maintain osmolality. The DCT removes sodium and water. Filtered fluid is converted to urine in the tubules and urine moves into the Renal pelvis of the kidney. Urine then moves into the ureters down to the urinary bladder.
- ◆ **Bladder:** A detrusor muscle composed of smooth muscle. distends when the bladder is filled and contracts upon micturition (emptying of the bladder). Total bladder capacity is 1 L/ day. Normal adult urine output is 1500-2000 mL/ day.



RISK FACTORS FOR RENAL DISORDERS

- ◆ Chemical exposure
- ◆ Contact sports
- ◆ Family history
- ◆ Frequent UTI
- ◆ Heart failure
- ◆ High Sodium diet
- ◆ Hypertension
- ◆ Medications
- ◆ Trauma
- ◆ Urolithiasis
- ◆ Nephrolithiasis



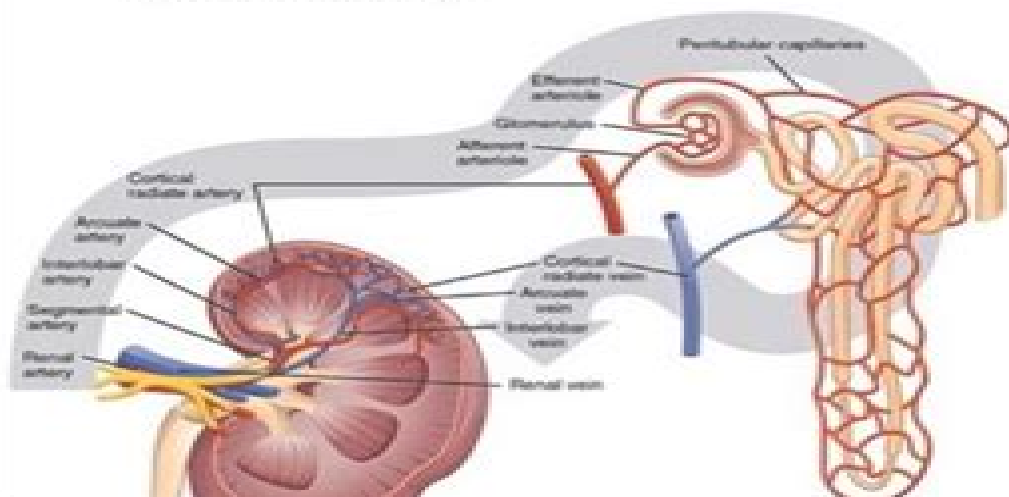
PH AND ELECTROLYTE BALANCE

- ◆ Increases in serum potassium levels stimulate the production and release of aldosterone. Aldosterone signals the tubules to secrete potassium causing potassium levels normalize.
- ◆ PH levels are controlled by buffer systems. Sodium bicarb is controlled by the kidneys. Normal PH levels are 7.35-7.45. When acids become too high in concentration the kidneys release sodium bicarb to neutralized by ammonia and excreted as ammonia and potassium salts. If alkalosis is occurring then more bicarb and NH_3 are excreted.



RENAL FUNCTION STUDIES

- ◆ **BUN: 8-25 mg/ dL** Elevated bun could indicate dehydration. as long as creatinine is normal think "Burnt BUNS"
- ◆ **Serum Creatinine: 0.7-1.4 mg/dL** : Body is burning muscle. If your washing machines are broken serum creatinine will be elevated, serum creatinine and elevated BUN can indicate renal failure.
- ◆ **Uric Acid : 2.5-8.0 mg/dL**



Renal Nursing

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