Functions

- Regeneration/repair
- Blood filtration
- Excretion of waste products
- Hormone synthesis

Regulation of:

- Extracellular fluid volume
- Extracellular fluid electrolyte composition
- Total body water volume
- Arterial blood pressure

To excrete:

- Endogenous waste products; for example, urea, creatinine, uric acid, and bilirubin
- Exogenous waste products; for example, drugs and drug metabolites

Anatomy

- Each kidney has its own fibrous capsule.
- Retropertitoneal location in upper abdomen.
- In each pararenal fat gutter adjacent to T12 to L3.
- Apex = 12 cm long and 10 cm wide.
- Right kidney is slightly lower than the left (river)

The kidneys receive blood (renal artery) via the abdominal aorta (1/4 individuals have 2 renal arteries on each side).

The kidneys receive arterial blood pressure.

To produce:

- The active form of vitamin D (1,25-dihydroxycholecalciferol)
- Renin
- Erythropoietin
- Glucose

The most basic unit in the kidney

Glomerulus and Bowman's capsule

- Each nephron has a glomerulus located near the corticomedullary junction.
- The glomerulus is made of capillary loops that form a network of capillaries.
- The glomerulus is surrounded by Bowman's capsule.

Proximal Tubule

- Produces an ultrafiltrate of plasma which enters the nephron tubule lumen at the Bowman's capsule.

The Bowman's capsule is an onion-like structure of the nephron that contains the glomerulus.

The convoluted portion of the proximal tubule is where most reabsorption occurs.

The loops of Henle

- The ascending limb comprises two distinct sections; thin and then thick.
- Descends from the renal cortex into the medulla, then ascends again into the cortex.

Loop of Henle in the regulation of fluid secretion.

Proximal convoluted tubule

- Reabsorbs most of the filtered sodium chloride and glucose.

The convoluted portion of the proximal tubule is where most reabsorption occurs.

Renin

- The juxtaglomerular apparatus is located near the afferent arteriole.
- Regulates blood pressure.

The renin-angiotensin-aldosterone system (RAAS) is involved in the regulation of blood pressure.

Circulation

- Blood via renal artery via abdominal aorta (1/4 individuals have 2 renal arteries on each side).
- Venous drainage → single renal vein → IVC.

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