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PHARMACOLOGY

URINE FORMATION AND CONCENTRATION

Urine Formation – by filtering the blood the nephrons perform the following functions

(1) Regulate concentration of solutes in blood plasma; this also regulates pH

(2) Regulate water concentrations; this helps regulate blood pressure

(3) Removes metabolic wastes and excess substances

Urine Formation

Waste is excreted from the human body mainly in the form of urine. Our kidneys play a major role in the process of excretion. Constituents of normal human urine include 95 percent water and 5 percent solid wastes. It is produced in the nephron which is the structural and functional unit of the kidney. Urine formation in our body is mainly carried out in three phases namely

Glomerular filtration,

Reabsorption

Secretion.

Mechanism of urine Formation

The mechanism of urine formation involves the following steps:

Glomerular Filtration

Glomerular filtration occurs in the glomerulus where blood is filtered. This process occurs across the three layers- epithelium of Bowman’s capsule, endothelium of glomerular blood vessels, and a membrane between these two layers.

Blood is filtered in such a way that all the constituents of the plasma reach the Bowman’s capsule, except proteins. Therefore, this process is known as ultrafiltration.

Reabsorption

Around 99 percent of the filtrate obtained is reabsorbed by the renal tubules. This is known as reabsorption. This is achieved by active and passive transport.

Secretion

The next step in urine formation is the tubular secretion. Here, tubular cells secrete substances like hydrogen ion, potassium ion, etc into the filtrate. By this process, the ionic, acid-base and the balance of other body fluids are maintained. The secreted ions combine with the filtrate and form urine. The urine passes out of the nephron tubule into a collecting duct.

Urine

The urine produced is 95% water and 5% nitrogenous wastes. Wastes such as urea, ammonia, creatinine are excreted in urine. Apart from these, the potassium, sodium and calcium ions are also excreted.