EXCRETORY PRODUCTS AND THEIR ELIMINATION HUMAN EXCRETORY SYSTEM

HUMAN EXCRETORY SYSTEM

In the human body, the excretory system is comprised of a pair of kidneys, one pair of ureters, a urinary bladder, and a urethra. The kidneys, crucial components of this system, exhibit a reddishbrown color and possess a bean-shaped structure. They are positioned between the levels of the last thoracic and third lumbar vertebrae, near the dorsal inner wall of the abdominal cavity. Each kidney in an adult human measures approximately 10-12 cm in length, 5-7 cm in width, and 2-3 cm in thickness, with an average weight ranging from 120 to 170 g.



Human Urinary system

Located towards the center of the inner concave surface of the kidney is a notch known as the hilum, serving as an entry point for the ureter, blood vessels, and nerves. Inner to the hilum is a broad, funnel-shaped space called the renal pelvis, which features projections termed calyces. The kidney's outer layer is encased in a resilient capsule.



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Internally, the kidney exhibits two distinct zones: an outer cortex and an inner medulla. The medulla is further divided into conical masses known as medullary pyramids, which extend into the calyces. Additionally, the cortex extends between the medullary pyramids as renal columns, referred to as Columns of Bertini.

Within each kidney, there are nearly one million intricate tubular structures known as nephrons, serving as the fundamental units of functionality. These nephrons consist of two essential components: the glomerulus and the renal tubule. The glomerulus is a tuft of capillaries that is created by the afferent arteriole, a delicate branch originating from the renal artery. Subsequently, blood from the glomerulus is transported away through an efferent arteriole.



A diagrammatic representation of a nephron showing blood vessels, duct and tubule

The renal tubule initiates with the formation of a double-walled, cup-like structure known as Bowman's capsule, enveloping the glomerulus. Together, the glomerulus and Bowman's capsule are referred to as the Malpighian body or renal corpuscle. The tubule extends further to create an intricately coiled network, identified as the proximal convoluted tubule (PCT).



Malpighian body (renal corpuscle)

Subsequently, the tubule takes the form of a hairpin-shaped structure known as Henle's loop, consisting of both a descending and an ascending limb. The ascending limb continues into another intricately coiled tubular segment termed the distal convoluted tubule (DCT).

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The DCTs of numerous nephrons open into a straight tube called the collecting duct, where many of these ducts converge and ultimately open into the renal pelvis through medullary pyramids in the calyces.

The Malpighian corpuscle, proximal convoluted tubule (PCT), and distal convoluted tubule (DCT) of the nephron are located in the cortical region of the kidney, while the loop of Henle extends into the medulla. In the majority of nephrons, the loop of Henle is short and only extends minimally into the medulla, classifying them as cortical nephrons. However, in some nephrons, the loop of Henle is long and penetrates deeply into the medulla, earning them the designation of juxtamedullary nephrons.

The efferent arteriole emerging from the glomerulus gives rise to a delicate capillary network surrounding the renal tubule, known as the peritubular capillaries. Within this network, a minute vessel runs parallel to Henle's loop, forming a 'U'-shaped structure called vasa recta. It is noteworthy that vasa recta is either absent or significantly reduced in cortical nephrons.