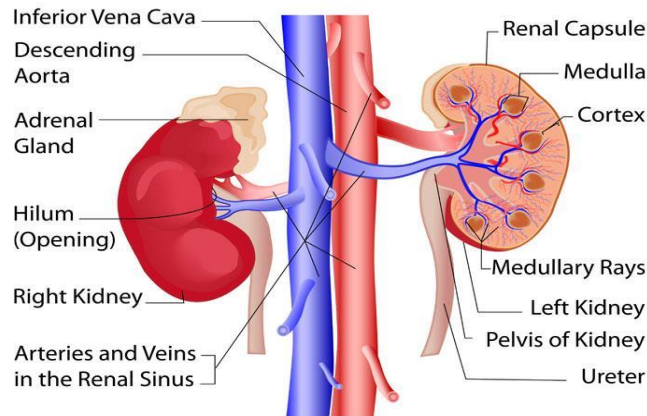


### 3.3 The Human Kidney

Essentially the human kidney is metanephros because humans belong to the Class Mammalia. It is bean-shaped and located bilaterally at the back of the peritoneum (retroperitoneal). Both kidneys are surrounded by connective tissue to prevent it from injuries and easy penetration of pathogenic microbes. One of its protective connective tissue covering is the adipose capsule which are fat deposits around the kidney that supports the location and position of the kidneys. Under the adipose capsule is the renal capsule that is intimately covering the renal parenchyma.



**Figure 1** Anatomy of the Kidney

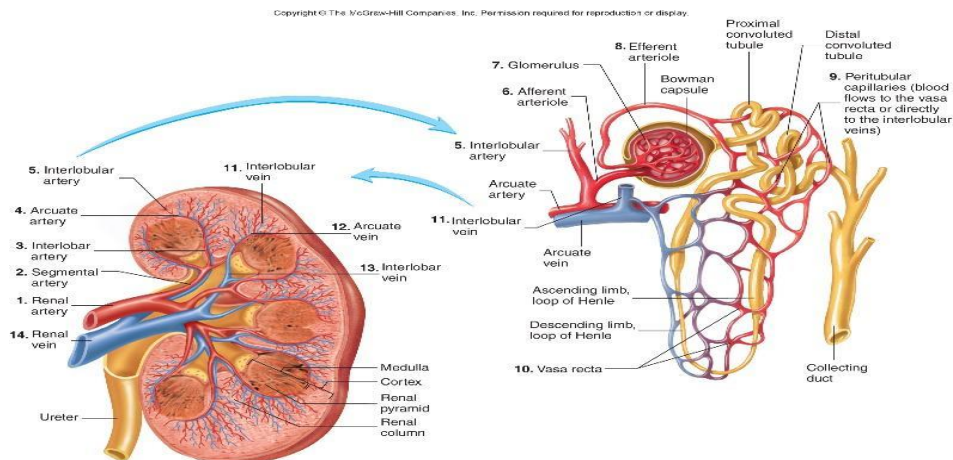
The only way in or out of the kidney is the depression that is found in the medial part called the renal hilum. This is where the renal artery, renal vein, nerves and the ureter are connected to as their point of entrance and exit.

Dissection of the kidney in mid-sagittal expose two parts of the renal parenchyma, the outer renal cortex and the inner renal medulla. Initially, the two regions are differentiated by texture, with the cortex smooth and the medulla rough.

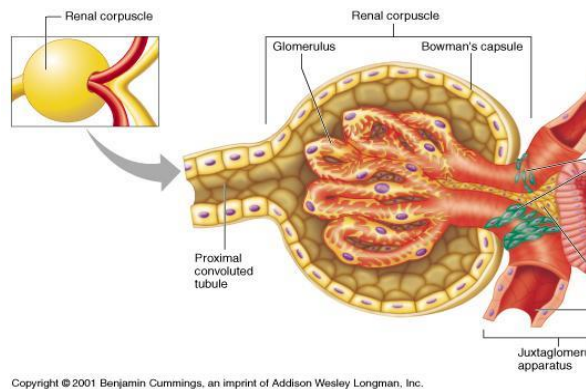
The renal cortex contains the microscopic nephrons. This causes the area to have a lighter red color compared to the medulla. The renal medulla, on the other hand, contains the collecting duct including the calyces and renal pyramids. Urine transported in here gives the medulla its darker color relative to the cortex.

### Microscopic Structure of the Human Kidney

The structural and functional unit of the kidney is called a **nephron**. Basically, a nephron is made up of the **glomerulus**, **renal tubule** and **collecting duct**.



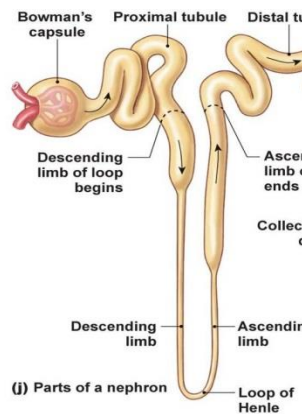
The glomerulus is a tuft of capillaries coming from the afferent arteriole. Blood flows continuously through them to filter out excess solutes in the body such as salts. These solutes are dissolved in water and diffuse from the glomerulus to the first part of the tubule shaped like a cup, Bowman's capsule. The Bowman's capsule is internally lined with podocytes that is similar to the endothelium lining capillaries like the glomerulus. Between these two linings, fi  
The glomerulus and the Bowman's capsule is  
the **renal corpuscle**.



As mentioned earlier, the Bowman's  
segment of the renal tubule. In humans, th  
straight but highly convoluted and long.  
tubule will curl to become the proximal convoluted tubule. This  
is followed by the loop of Henle and distal convoluted tubule.  
Along the length of the tubule reabsorption happens. Ions like  
Na and K are reabsorbing as well as water. The tubules are

surrounded and in very close proximity to the peritubular capillaries which branches out from the efferent arteriole. These capillaries accept the reabsorb water and solutes back to the blood and to the body. By the time the filtrate is in the distal convoluted tubule, the nitrogenous waste has been concentrated for excretion.

After the process of reabsorption of the nitrogenous waste follows. From the distal tubule the waste flows to the straight tubule found in the renal pyramid of the kidney. A large number of collecting ducts in a renal pyramid lead from the renal apex going to the minor calyx and finally, to the renal pelvis.



The human kidney has 1.3 million nephrons. It filters 1,600L of blood every day.