

Difference Between Renal Cortex and Renal Medulla

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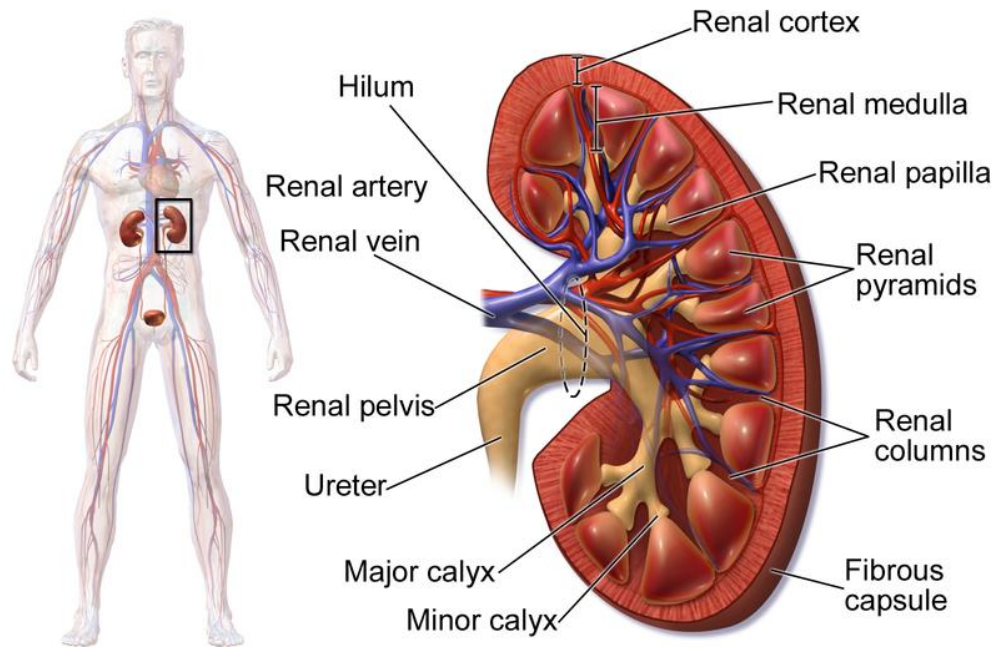
Key Difference - Renal Cortex vs Renal Medulla

The [kidneys](#) are bean-shaped organs in the human body. Either of them has the size of a fist. They are located just below the rib cage. Two kidneys can be seen on each side of the spine. The function of the kidney is to filter [blood](#) (about 150 quarts) each day to produce [urine](#) that contains waste and extra fluids. These waste materials will flow from kidneys to the [bladder](#) through [ureters](#). And from the bladder, the urine will be excreted from the body through the urethra. Renal cortex is the outer portion of the kidney which is located between renal capsule and renal medulla. It is a continuous smooth zone with projections like cortical columns. Renal medulla is the innermost part of the kidney. It is divided into smaller sections known as renal pyramids. The **key difference** between renal cortex and renal medulla is, **the renal cortex is the outer portion of the kidney while the renal medulla is the innermost part of the kidney.**

What is Renal Cortex?

In [mammals](#), the kidney has a granular outer most part known as the renal cortex. It forms continuous smooth outer zone with a number of projections known as cortical columns. The cortical columns are extending down between the renal pyramids. It contains renal corpuscles (glomerulus and [Bowman's capsule](#)) as well as renal tubules except in the loop of Henle. It also contains blood vessels and cortical collecting ducts.

The renal cortex is the part of the kidney where [ultrafiltration](#) of blood takes place. The blood flows into the glomerular capillaries in the Bowman's capsule through afferent [arterioles](#) and leaves out from the efferent arterioles. The [hydrostatic pressure](#) forces the smaller molecules in a tubular fluid such as [amino acids](#), water, glucose, sodium chloride, urea through the filter. These things are flowing from the blood in the glomerular capsule across the basement membrane of the Bowman's capsule into the renal tubules. This process is known as ultrafiltration. The glomerular filtrate or ultrafiltrate is free from large [proteins](#) and blood cells. The glomerular filtrate later becomes more concentrated due to the reabsorption of water and solutes. The solutes like glucose and amino acids leave the glomerular filtrate and combine again with blood.



Kidney Anatomy

Figure 01: Renal Cortex

Water and salts also return again to the [circulatory system](#). And glomerular filtrate is further modified by the process of secretion where blood removes waste materials into the urine. In this way, urine produces and excretes through the urethra. Urine excretion can be measured as follows,

$$\text{Urinary excretion} = \text{Filtration} + \text{secretion} - \text{reabsorption}$$

The erythropoietin which triggers producing red blood cells is synthesized in the renal cortex.

What is Renal Medulla?

Renal medulla is the innermost part of the kidney which is divided into smaller sections known as renal pyramids. The renal medulla contains the parts of the structures of the nephron which are responsible for maintaining the water and salt balance of the blood. These structures include vasa rectae, venular rectae, medullary capillary plexus, the loop of Henle and the collecting tubule. The renal medulla is [hypertonic](#) to the filtrate in the nephron that aids in maintaining water balance by the reabsorption of water.

Frontal section through the Kidney

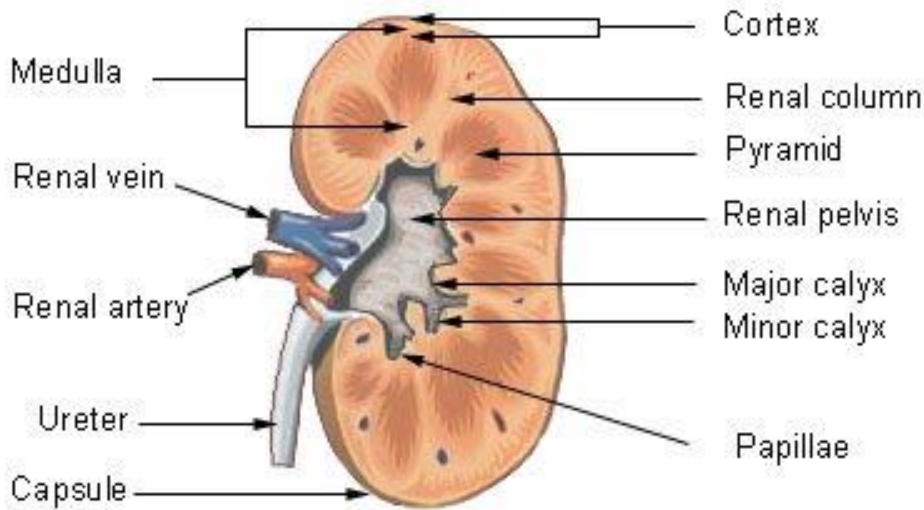


Figure 02: Renal Medulla

It is believed that the inner substance the medullar contains high concentration Na^+ ions. Due to this, the water will be extracted through the tubule walls into the medulla. It happens until the concentration of Na^+ equals in tubes and outside them. This process conserves most of the water in the body. So, the renal medulla is very important to maintain the salt and water balance in the body.

What are the Similarities Between Renal Cortex and Renal Medulla?

- Both are found in the kidney.
- Both help in process of maintaining plasma osmolarity ad ions composition.
- Both are important to maintain the blood constituents.
- Both are extremely important for the kidney's function (filtration).

What are the Differences Between Renal Cortex and Renal Medulla?

Renal Cortex vs Renal Medulla	
Renal cortex is the outer most portion of the kidney.	Renal medulla is the innermost part of the kidney.

Nephron	
The cortical nephron is in the renal cortex.	The juxtamedullary nephron is in the renal medulla.
Function	
Renal cortex involves in urine dilution.	Renal medulla involves in urine concentration.
Erythropoietin	
Renal cortex is the site of erythropoietin production.	Renal medulla does not involve in erythropoietin production.
Loop of Henle	
The loop of Henle is not found in the renal cortex.	The loop of Henle is found in the renal medulla.
Renal Corpuscles (glomerulus and Bowman's capsule)	
Renal corpuscles are found in the renal cortex.	Renal corpuscles are not found in the renal medulla.
Sections of Nephron	
Renal corpuscles, proximal and distal convoluted tubules present in the renal cortex.	The loop of Henle and collecting ducts are found in the renal medulla.

Summary - Renal Cortex vs Renal Medulla

The kidney is a bean-shaped, extremely important organ in the body. It is located just below the rib cage. The function of the kidney is to filter blood daily to produce urine that contains waste and extra fluids. These waste materials will flow from kidneys to the bladder through ureters. And from the bladder, these urines will be excreted out of the body through the urethra. Renal cortex is the outer portion of the kidney which is located between renal capsule and renal

medulla. Renal medulla is the innermost part of the kidney. It is divided into smaller sections called as renal pyramids. The difference between renal cortex and renal medulla is, the renal cortex is the outer portion of the kidney whereas renal medulla is the innermost part of the kidney.

Reference:

- 1.“Renal medulla.” Encyclopædia Britannica, Encyclopædia Britannica, inc., britannica.com/science/renal-medulla.
- 2.“Renal cortex.” Wikipedia, Wikimedia Foundation, 14 Nov. 2017. [Available here](#)

Image Courtesy:

- 1.'Blausen 0592 KidneyAnatomy 01' ByBlausen.com staff (2014). "Medical gallery of Blausen Medical 2014". WikiJournal of Medicine 1 (2). DOI:10.15347/wjm/2014.010. ISSN 2002-4436. - Own work, [\(CC BY 3.0\)](#) via [Commons Wikimedia](#)
- 2.'Illu kidney2' (Public Domain) via [Commons Wikimedia](#)

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