Question (Thread # 33)

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Thread # 33

# Explain how the kidney maintains an osmotic gradient in the renal medulla that enables the collecting duct to function

The primary function of kidneys is to regulate the osmotic pressure in a mammal by subjecting its blood to an extensive filtration and purification process. This function is known as the osmoregulation. During this process, urine i.e. the filtrate that eliminates waste from the body. Urine exits the kidneys through the ureter which empties it out into the bladder. Kidneys are capable of eliminating waste and maintaining the osmotic gradient to ensure that the body remains in homeostasis (Hoenig & Zeidel, 2014).

There are three parts of the kidney that are responsible for the maintenance of osmotic gradient for homeostasis. This includes the two types of nephrons and the loop of Henle. The two nephrons included are superficial cortical nephron and juxtamedullary nephrons. The cortical nephron is only able to penetrate as far as the outer medulla of the kidney. However, juxtamedullary nephrons go deep within the inner medulla to filter and purify the blood (Kardasz, 2015).

The mechanism of countercurrent multiplication begins with cortical nephron and juxtamedullary nephrons. They are tasked with regulating both the concentration of water, as well as solutes, in the blood. These two, coupled with the loop of Henle, are responsible for developing the osmotic gradients necessary to produce concentrated urine. The fluid descending through the loop of Henle enters the distal convoluted tubule where this composition is adjusted in the form of tubular fluid. This enables the collecting duct to function optimally. It enables the kidneys to reabsorb the water from tubular fluid, collecting within the renal collecting tubule or the collecting duct to produce concentrated urine. This mechanism is put into place to prevent the production of liters of diluted urine by returning water to the bloodstream if needed. Thus, one does not need to constantly rehydrate throughout the day (Marsh, Postnov, Sosnovtseva, & Holstein-Rathlou, 2019).

**References**

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