

Difference Between Afferent and Efferent Arterioles

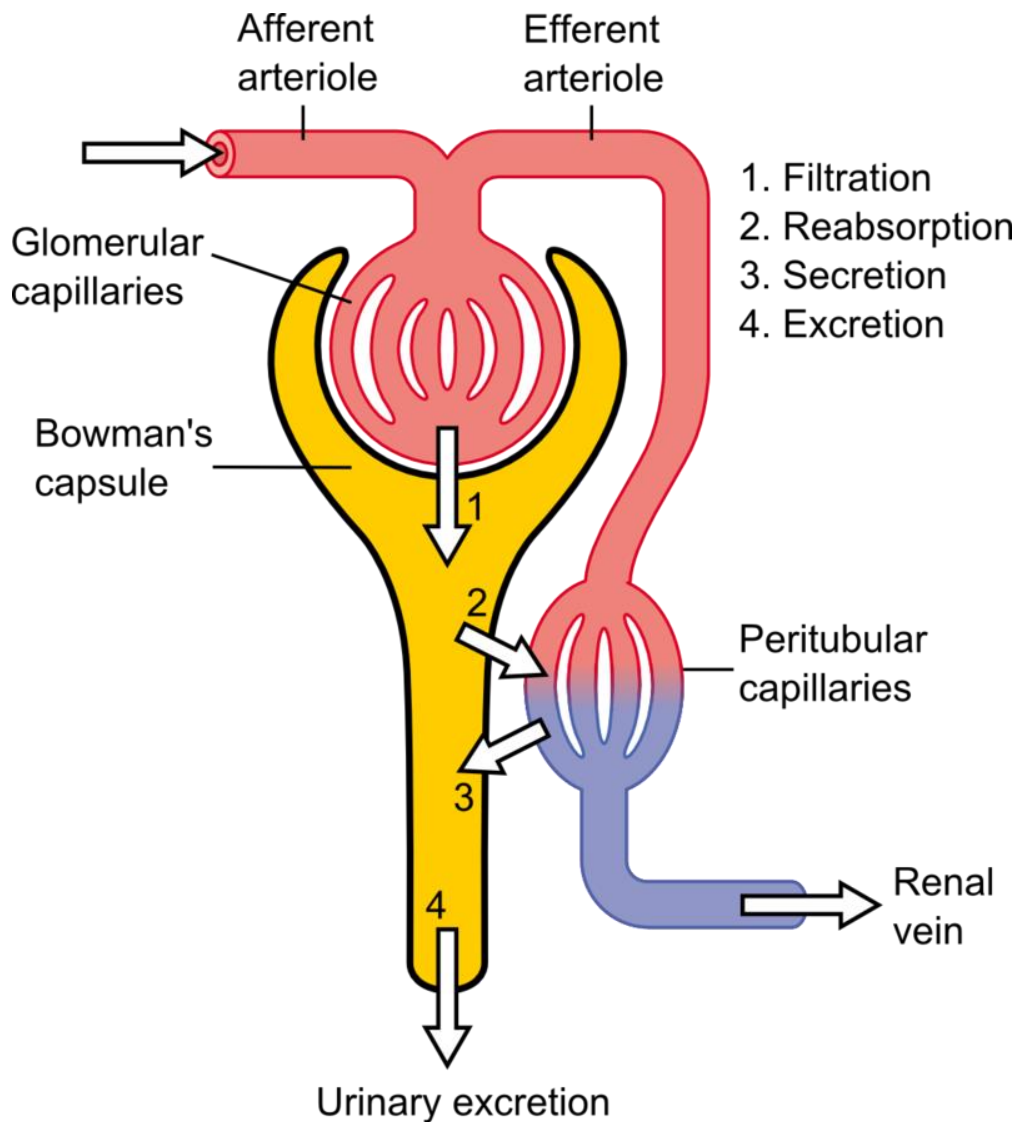
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Key Difference - Afferent vs Efferent Arterioles

[Blood](#) is supplied to the [kidney](#) via renal arteries. These [arteries](#) are branching directly from the aorta. They enter the kidney at the site of the hilus. The interlobular artery is the first branch of the renal artery. The arcuate arteries which arise from the interlobular arteries run along the cortical-medullary junction, and it can be observed in a histological renal section. Interlobular artery supplies the blood to the glomeruli via afferent [arterioles](#). The afferent and efferent arterioles are the main arteries that are responsible for the supply of blood into and out of the glomerulus of the kidney. An afferent arteriole is a part of the renal artery that carries blood containing nitrogenous wastes. An efferent arteriole is a part of the renal artery that carries filtered pure blood back to the [circulatory system](#). The key **difference** between afferent and efferent arterioles is, **the afferent arterioles bring the impure blood to the glomerulus whereas the efferent arterioles take away the pure filtered blood back to the circulatory system.**

What are Afferent Arterioles?

The renal artery normally arises from the side of the abdominal aorta. And it supplies the kidney with the blood. Renal artery is located above the renal vein. A large portion of the blood of the cardiac output can be passed through the renal artery. Interlobular arteries are the first branch of the renal artery. Interlobular artery supplies the blood to the glomeruli via afferent arterioles. The afferent arterioles are a group of blood vessels that carry the blood with nitrogenous wastes to the kidney. The [blood pressure](#) of the afferent arterioles is high. And the diameter of the afferent arterioles is changing according to the varying blood pressure of human body.



$$\text{Excretion} = \text{Filtration} - \text{Reabsorption} + \text{Secretion}$$

Figure 01: The Afferent and Efferent Arterioles

The afferent arterioles play a pivotal role in maintaining the blood pressure as a part of the tubuloglomerular feedback mechanism. Later, these afferent arterioles are diverging into the [capillaries](#) of the glomerulus. When there are reduced blood pressure and a decrease in sodium ion concentration, the afferent arterioles are stimulated to secrete renin by the prostaglandins which are released from the distal tube's macula densa cells. The renin can activate the renin-angiotensin-aldosterone system. In turn, this system activates the reabsorption of sodium ions from the glomeruli filtrate. This ultimately increases the blood pressure. The macula densa cell also can increase the blood pressure of the afferent arterioles by decreasing the synthesis of [ATP](#). If the afferent arterioles are constricted, the blood pressure in the capillaries in the kidney will be dropped.

What are Efferent Arterioles?

Efferent arterioles are blood vessels which are part of the renal system of the body. They carry blood out of the glomerulus. The efferent arterioles are formed from the convergence of capillaries in the glomerulus. They carry blood out of the glomerulus which is already filtered and devoid of nitrogenous wastages. They play a pivotal role in regulating glomerulus filtration rate despite the fluctuating blood pressure. The blood pressure of the efferent arterioles is lesser than that of the afferent arterioles.

In the cortical glomeruli, the efferent arterioles break into capillaries and become part of the rich plexus of vessels in the cortical portion of the renal tubules. But in the juxtamedullary glomeruli, though they break up, the efferent arterioles form a bundle of vessels (arteriole recti) which cross the outer part of the medulla and perfuse into the inner part of the medulla. In the descending arteriole recti forms well-organized **rete mirabile**. Rete marble is responsible for osmotic isolation of the inner medulla which permits hypertonic urine when circumstances arise.

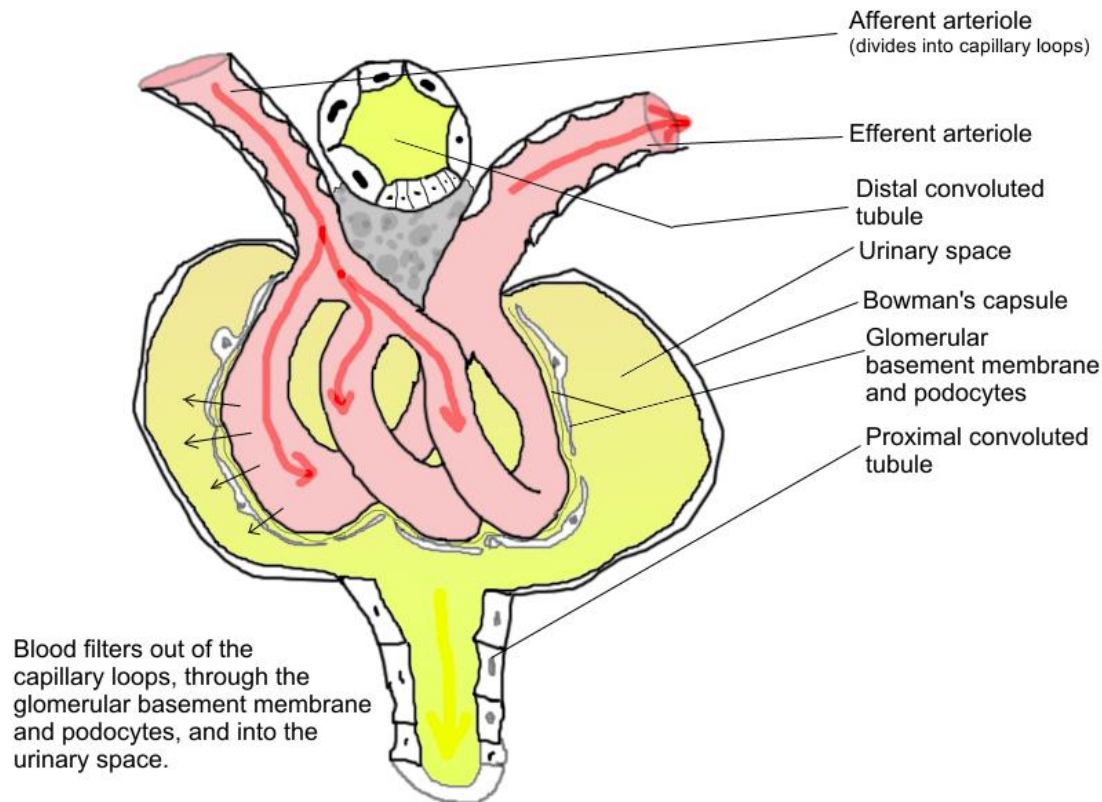


Figure 02: Efferent Arterioles

The red cells are shifted from arteriole recti into capillary plexus in the outer zone of the medulla and return to the renal vein again. The efferent arterioles are constricted to a greater degree in order to maintain the blood pressure due to increased release of angiotensin II. This process maintains the glomerular filtration rate.

What are the Similarities Between Afferent and Efferent Arterioles?

- Both are part of the renal artery.
- Both are located in the kidney.
- Both are containing [red blood cells](#).
- Both are playing a pivotal role in order to maintain the blood pressure.
- Both are important for ultrafiltration process in the kidney.

What is the Difference Between Afferent and Efferent Arterioles?

Afferent Arterioles vs Efferent Arterioles	
An afferent arteriole is a part of the renal artery that carries blood into the glomerulus.	An efferent arteriole is a part of the renal artery that carries blood out of the glomerulus.
Nitrogen Waste	
The blood carried by the afferent arteriole contains nitrogen waste.	The blood carried by the efferent arteriole is free from the nitrogen waste.
Blood Pressure	
Blood pressure is high in the afferent arteriole.	Blood pressure is low in the efferent arteriole.
Diameter	
The afferent arteriole has a larger diameter in the cortical nephron.	The efferent arteriole has a smaller diameter in the cortical nephron.
Other Functions	
Afferent arteriole maintains the blood pressure.	Efferent arteriole maintains the glomerular filtration rate.
Blood	
Blood in the afferent arteriole has blood cells, glucose, ions, amino acids and nitrogen wastes.	Blood in the efferent arteriole has blood cells, glucose, ions and lesser water.

Summary - Afferent vs Efferent Arterioles

The [nephron](#) is the functional unit of the kidney, and the major function (ultrafiltration) of the kidney is mainly carried out by nephrons. The nephron is composed of renal corpuscle having capillaries known as glomerulus and encompassing structure called as Bowman's capsule. The renal artery provides blood to the glomerulus which is to be filtered. The afferent and efferent arterioles are the main arteries that are regulating the supply of blood into and out of the glomerulus of the kidney. The afferent arterioles carry blood with nitrogenous wastes into the glomerulus. On the other hand, efferent arterioles take the filtered blood out of the glomerulus. This is the difference between afferent and efferent arterioles.

Reference:

1. Harmon, Barry. RENAL BLOOD FLOW. [Available here](#)
2. "Efferent arteriole." Wikipedia, Wikimedia Foundation, 15 Nov. 2017. [Available here](#)

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