

source: http://commons.wikimedia.org/wiki/File:Urinary_system.svg

Notes: Kidneys

Location and Structure

Humans have two kidneys. The kidneys are located in the superior lumbar region. Extending from T-12 to the L-3 vertebra, they receive some protection from the lower part of the rib cage.

Ever hear of adrenaline? Adrenaline is secreted by the adrenal glands that sit atop each of the two kidneys. The adrenal glands do not have anything to do with the production of urine. They produce hormones such as adrenaline that helps the body release large amounts of energy.

Due to the function of the kidneys it is necessary for them to be allowed a large supply of blood. That is the reason why large blood vessels connect them to the main arteries and veins, which in turn run directly to and from the heart. To avoid damage to the kidneys, for example in an accident, each one is bedded in fatty tissue acting as a shock absorber. Also, both kidneys are protected from the outside world by strong muscles and ribs at the back, and the abdomen with its muscle at

the front. Because the kidney contains so much blood, bleeding is a major hazard when it gets injured.

Take note of the way the body protects the kidneys.

Blood Supply

The kidneys continuously clean the blood and adjust the composition of the blood including the amounts of water, electrolytes, and acid and base.

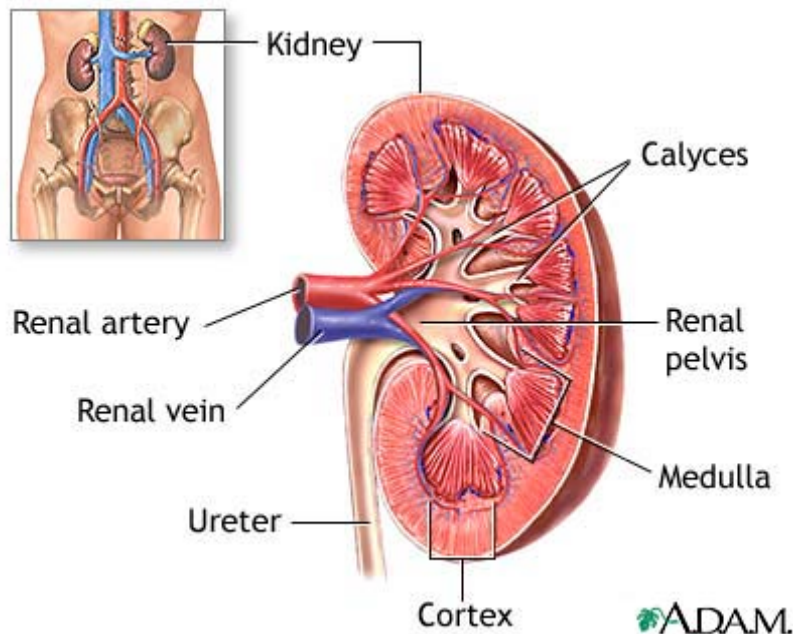
The kidneys have a very rich blood supply. In fact, 25% of the body's total blood supply passes through the kidneys each minute!!

Blood is carried to the kidneys through the renal artery. Blood is carried from the kidneys by the renal vein.

Why Are the Kidneys So Important?

Most people know that a major function of the kidneys is to remove waste products and excess fluid from the body. These waste products and excess fluid are removed through the urine. The production of urine involves highly complex steps of excretion and reabsorption. This process is necessary to maintain a stable balance of body chemicals.

The kidneys perform the critical regulation of the body's salt, potassium and acid content. The kidneys also produce hormones that affect the function of other organs. For example, a hormone produced by the kidneys stimulates red blood cell production. Other hormones produced by the kidneys help regulate blood pressure and control calcium metabolism.



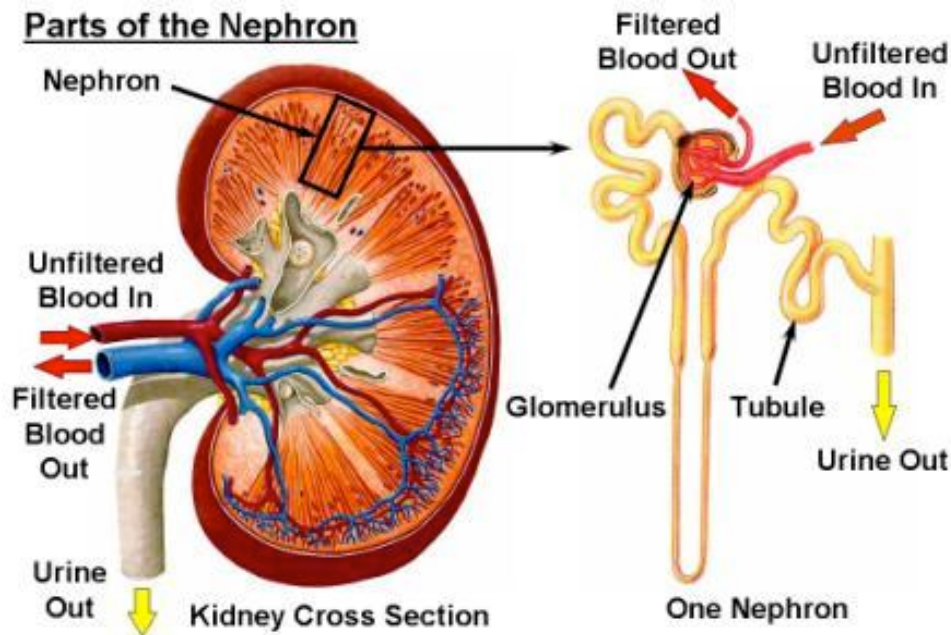
The kidneys are powerful chemical factories that perform the following functions:

- remove waste products from the body
- remove drugs from the body
- balance the body's fluids
- release hormones that regulate blood pressure
- produce an active form of vitamin D that promotes strong, healthy bones
- control the production

of red blood cells

Nephrons

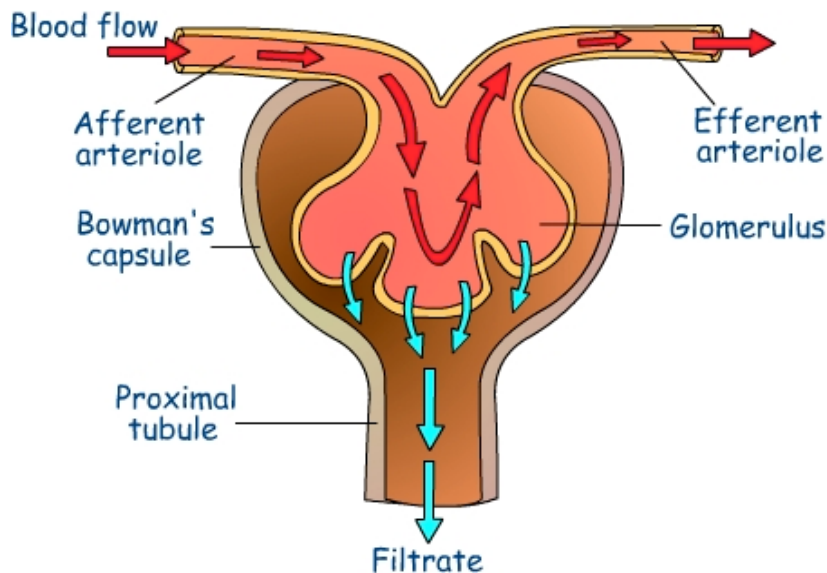
Parts of the Nephron



source: <http://www.unckidneycenter.org/images/glomerulus.jpg>

Nephrons are the structural and functional units of the kidneys. Each of the kidneys is composed over a million small structures called nephrons. Each nephron is composed of two main structures:

1. glomerulus -knot of capillaries that forms filtrate in urine.
2. renal tubule-receives fluids from kidney



source:
<http://www.hcc.uce.ac.uk/physiology/glomerulus3.jpg>

Nephrons are responsible for forming the urine product. The closed end of the renal tubule is enlarged and completely surrounds the glomerulus.