

Kidney Health Information

The Kidneys – a Basic Guide

- Most people have two kidneys, which are organs shaped like kidney beans, each one about 10-15cms long, located either side of the spine, deep in the abdomen. However, it is possible to live a healthy and active life with only one functioning kidney. In rare instances people can be born with three kidneys, and likewise remain healthy.
- Their main job is to cleanse the blood of toxins and transform the waste into urine.
- Each kidney weighs about 160 grams and gets rid of between one and one-and-a-half litres of urine per day. The two kidneys together filter 200 litres of fluid every 24 hours.

When the kidneys are not working properly, harmful toxins and excess fluids build up in the body, which may cause the symptoms of kidney failure. These symptoms can include high blood pressure, extreme tiredness or lethargy, persistent headaches, swelling in the face and ankles, fluid retention and / or lower back pain.

What do they do?

The kidneys are vital life-sustaining organs, performing many functions to keep the blood clean and chemically balanced. They have a number of important functions:

1. They filter the blood to get rid of waste products of metabolism
2. They keep the electrolytes (sodium and potassium being the most important) and water content of the body constant
3. They secrete a number of essential hormones

1. Waste products

After the body uses food for energy and self-repair, the waste is sent to the blood. The most common waste products are urea and creatinine, but there are many other substances that need to be eliminated. The kidneys act as very efficient filters for ridding the body of waste and toxic substances, and returning vitamins, amino acids, glucose, hormones and other vital substances into the bloodstream. The kidneys receive a high blood flow and this is filtered by very specialised blood vessels. The fluid that is filtered is then adjusted by a complex series of urine-disposing tubes called tubules. In this way, the substances necessary for the good functioning of the body are retained, and those that are not needed are excreted. This is vital to make the body function efficiently.

2. Water and electrolytes

All the cells in the body, apart from those of the outer skin, are surrounded by a fluid called the extracellular fluid. For the cells of the body to work properly, the extracellular fluid needs to have a stable composition of salts – such as potassium and sodium – and acidity (often referred to as pH). The kidneys are central to maintaining these correct balances and the effective functioning of all the cells of the body.

The salt and water balance is maintained by a series of hormones acting on the kidney. The kidneys recognise and act upon a series of messages that vary according to how much fluid is drunk. If a person does not drink enough, the body fluids become more concentrated and, as a result, the kidneys excrete a more concentrated urine. If an excess of fluid is drunk, the body fluids become more diluted, and the kidneys excrete a more dilute urine, getting rid of the excess that has been taken in.

These mechanisms are very efficient. If the body is in a satisfactory balance, approximately 80% of ingested fluid is excreted within an hour.

Salts are also maintained within very strict limits. If an excess of sodium is taken, the amount in the blood increases and the person will become thirsty and drink fluid. The body senses this increase in salt and water, and again, through a series of messages, the kidney excretes the excess. As with sodium, if an excess of potassium is taken, it is excreted by the kidneys, ensuring that the amount in the body's fluids remains within the correct limits.

3. Hormones

The kidneys secrete a number of hormones, which are important for normal functioning of the body.

One such hormone is *renin*, which keeps blood pressure normal. If blood pressure falls, renin is secreted by the kidneys to constrict the small blood vessels, thereby increasing blood pressure. If the kidneys aren't functioning correctly, too much renin can be produced, increasing blood pressure and sometimes resulting in hypertension (high blood pressure). This is why a number of people with kidney diseases also have high blood pressure.

Erythropoietin is another hormone that is secreted by the kidney, and acts on the bone marrow to increase the production of red blood cells. If kidney function diminishes, insufficient hormone is produced and

the number of red blood cells being produced will fall, resulting in anaemia. This is why many people with reduced kidney function will have anaemia – a low blood count.

Vitamin D is essential for a number of bodily functions. In the normal diet, Vitamin D is in an inactive form, and needs to be slightly altered by the kidney before it can act within the body. This ‘activated’ form of Vitamin D is essential for the absorption of calcium by the intestine, the normal structure of bones and effective muscle function. In people with impaired kidney function, there is often a low blood calcium and an inadequate amount of Vitamin D, resulting in muscle weakness and a softening of the bones (osteomalacia or rickets).

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