**The Excretory System**
As humans eat, drink, and breathe, the body is using chemicals to grow, repair, and function. Some of these chemical processes produce waste materials. The body must then get rid of this waste in order to remain healthy.

The liver, skin, lungs, and kidneys are the major organs of the excretory system. When humans inhale oxygen, their bodies use the oxygen and create carbon dioxide. This carbon dioxide must be exhaled. The skin releases sweat and dead skin cells, which are also considered waste products. The skin is also part of the integumentary system.

The ureter, bladder and urethra help the kidneys remove liquid waste from the body. The large and small intestines help remove solid waste from the body.

**Kidney Function**
The kidneys are responsible for removing liquid waste from the body. Humans have two kidneys. The kidneys are located toward the back, on either side of the spine, right at the bottom of the ribcage. The kidneys look somewhat like kidney beans and are the same color, only much larger. In a full-grown adult, a kidney is about the size of a fist.

The kidneys work all day, every day, without taking a break. When blood circulates through the kidneys, the kidneys filter out the extra water and minerals that the body does not need. The fluid created by the kidneys is called urine. The average human body produces up to 1.5 liters of urine a day.
Bodily processes and the digestion of some food create a product called urea, which is carried through the body in the bloodstream. Urea contains lots of nitrogen. Too much urea in the body can cause discomfort, such as nausea, and eventually lead to kidney failure. Measuring the urea concentration in blood and urine is one of the ways doctors test for healthy kidney function.

Each kidney passes the urine through tubes called ureters to the bladder. The bladder can hold urine for a few hours or until it gets full. Then the muscles in the bladder will force the urine out through another tube called the urethra.

**Kidney Disease**

If the kidneys are not working properly, there will be a buildup of waste in the body. This can lead to severe illness or even death. Medication can sometimes help treat mild kidney disease. Dialysis is another treatment option. During a dialysis treatment, a patient sits in a chair for an hour or more while connected to a machine. The machine collects the patient's blood and filters the blood just like a healthy kidney would. Some patients only require two treatments a week, while others may need dialysis for several hours each day.

**Kidney Transplantation**

In extreme cases of kidney failure, kidney transplantation is required. The human body is able to work with only one healthy kidney, which can allow a person to donate a kidney to another person. The donor must have two healthy kidneys. This allows both the donor and the recipient to survive with only one kidney. For a patient to successfully receive a donated kidney, the patient must be a similar genetic match. Otherwise the body will reject the new kidney. There are medications available that help the body accept the new kidney. Also, people can choose to
Advances in Kidney Transplantation

donate their organs after they have passed away. Some donated organs will continue to function for many years.

Typically, organs are removed from the donor and placed in a cooler of ice. The organ must then be transplanted in the recipient within a matter of hours. The longer an organ is kept on ice, the less likely it is to function after transplantation.

However, new technology is changing that. A machine is able to preserve organs at a warmer temperature and circulate fluids through the organs similar to how the human body would. This can extend the life of the transplanted organ. The machine also adds nutrients and oxygen to the organs, which the organs need to survive. The machine has been tested on more than 500 animal organs. Now several hospitals around the world have been testing this technology, and the results have been very successful. More than 38,000 organ donor surgeries have been completed to date using this technology.

There are thousands of patients in the United States with kidney failure who are waiting for a new kidney. The wait often takes many years. It is possible that this technology could make more organs available to more people and cut waiting lists significantly.