



# *X-Plain* *Kidney Failure*

## Reference Summary

### Introduction

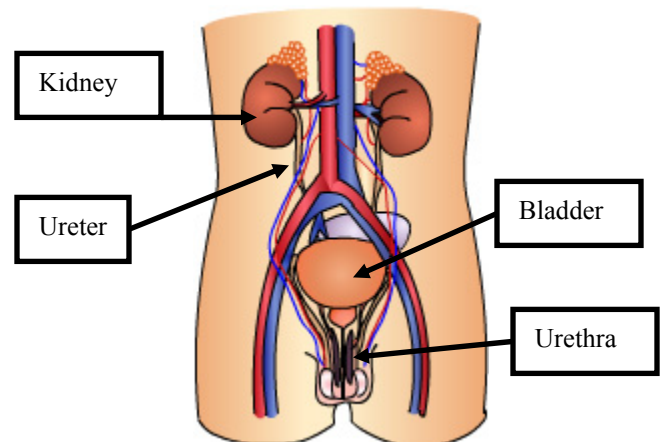
Kidneys are very important organs. They clean the blood and regulate the fluids in the body. Kidneys are vulnerable to many diseases. Some kidney diseases are life threatening, and others can lead to complete kidney failure and require dialysis.

This reference summary explains how the kidneys work, as well as a serious disease of the kidneys called end-stage renal disease, or ESRD.

### Anatomy

Kidneys are bean-shaped organs located in the middle to lower back, on both sides of the spine. The urine that is formed in the kidneys flows through tubes, called ureters, to be stored in the bladder.

When the bladder is full, a person feels the urge to urinate. Urine is emptied through the urethra. The main purpose of the kidneys is to make urine by filtering harmful chemicals, called toxins, out of the blood. The kidneys also help to keep necessary chemical substances *in* the blood, such as sodium, proteins, and sugars.



The kidneys control the amount of fluid we keep in our bodies. For example, when we drink more fluids than we need, the kidneys secrete extra urine. On the other hand, when we do not drink as much fluid as we need, the kidneys make less urine.

The kidneys help to regulate hormones that strengthen our bones and produce red blood cells. Since the kidneys constantly filter the blood, they are very sensitive to anything we eat or drink, or to any medications we take.

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The kidneys also help to keep our blood pressure regular; this is why many kidney diseases result in high blood pressure.

Damage to only 1 kidney is not usually a major problem, since the other kidney can take over for it. However, if both kidneys get damaged, a person will die within a few days if they do not get dialysis.

## **ESRD**

ESRD, short for end-stage renal disease, develops when both kidneys are not able to function. Sometimes it happens gradually and sometimes all at once. The following are diseases that can lead to ESRD:

- diabetes
- hypertension
- lupus
- repeated kidney infections
- kidney stones
- kidney cysts
- infection in the blood called sepsis

The constant use of painkillers, alcohol, or other medications can also lead to ESRD.

A kidney specialist, called a nephrologist, can sometimes help to slow the development of ESRD. This is usually done using medications and changes in the patient's diet.



It is very important to have kidney function checked regularly if you:

- have a disease that could lead to ESRD or
- take any medication regularly

To check on how the kidneys are functioning, blood tests and urine tests are needed.

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## Signs & Symptoms

When the kidneys are not working right, the body retains water, which leads to swelling in the face, ankles, legs, and throughout the body. The extra fluid can cause shortness of breath. Since toxins build up in the body when the kidneys are not filtering them out, patients with ESRD feel very tired and weak. They have no stamina or energy. This is partly due to the body not producing enough red blood cells, a condition called anemia.

Kidney failure patients sometimes feel pain below the rib cage. As kidney failure gets worse, blood pressure tends to rise and the body makes less urine.

With time, kidney failure causes the skin to become pale. If nothing is done to treat kidney failure, death can result from toxins building up in the body, as well as high levels of potassium in the blood.

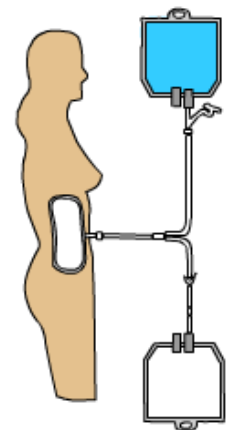


## Treatment

The main treatment for ESRD is dialysis. Dialysis is a process that replaces the function of the kidneys. More than 300,000 patients in the USA depend on dialysis in order to stay alive. In some cases, dialysis is temporary, and can be stopped as soon as the kidneys are able to function again. However, dialysis is usually a lifetime treatment.

There are 2 types of dialysis: hemodialysis and peritoneal dialysis. Each works differently to filter toxins out of the blood, as the kidneys normally do. Hemodialysis reroutes the blood to a dialysis machine. The machine cleans toxins from the blood and regulates the levels of essential chemicals, such as potassium.

Hemodialysis is done 3-4 times per week and each session takes around 4-5 hours. Special IVs are needed for good blood flow to and from the dialysis machine. Peritoneal dialysis uses the peritoneum, which is the lining of the abdominal cavity, to clean the blood. A tube, also known as a catheter, is surgically placed in the peritoneal cavity. A solution called “dialysate” is allowed to flow into the peritoneal cavity through it the catheter.



The dialysate solution interacts with the blood through the peritoneum, filtering out toxins and cleaning it over a period of several hours.

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After peritoneal dialysis, the fluid in the peritoneum is drained to the outside of the body into a special bag. The same cycle is repeated many times a week; it is sometimes started before the patient goes to bed and the fluid emptied in the morning.

For dialysis to be successful, patients have to follow strict dietary restrictions on the amount of salts, proteins, and fluids they eat and drink.

A kidney transplant can cure some cases of ESRD. Unfortunately, there are not enough kidneys available for all ESRD patients. In addition, a kidney transplant is not the best option for every ESRD patient. There are currently 35,000 people on kidney transplant waiting lists!

## Prevention

People who are at risk of getting ESRD should be closely monitored by a family doctor or nephrologist for early signs of it. People who have any of the following conditions are at risk of ESRD:

- known kidney diseases:
- diabetes
- hypertension
- lupus

Some dietary restrictions may be needed to slow down and possibly stop the process that leads to ESRD. Some of these restrictions include eating less:

- salt (or sodium)
- potassium
- proteins

Other general healthy lifestyles changes may also help, including:

- regular exercise
- not smoking
- maintaining an ideal weight



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## Summary

Kidneys are extremely important organs that filter harmful substances out of the body. The kidneys are susceptible to many diseases, some may be life threatening. Others can lead to complete kidney or renal failure, requiring dialysis. End-stage renal disease, or ESRD, is a very serious condition. Thanks to recent medical advances, patients with ESRD can live normal lives within the restrictions of their dialysis schedule.

Kidney transplant, if available and appropriate, can cure kidney disease.

The role of the patient in making lifestyle changes and keeping up with the dialysis schedule is very important for successfully treating ESRD.



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