CHRONIC KIDNEY DISEASE

WHO IS MORE AT RISK OF CHRONIC KIDNEY DISEASE?

You are more 'at risk' of chronic kidney disease if you:

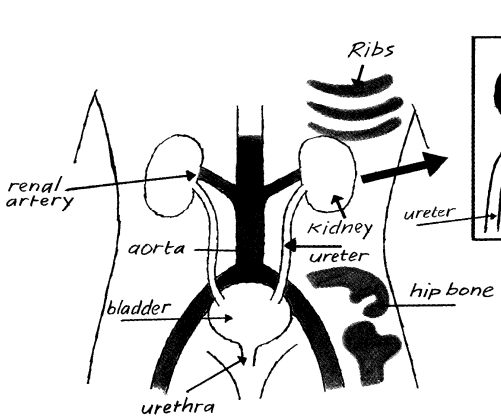
- Have diabetes
- Have high blood pressure
- Are obese
- Have a family history of kidney disease
- Are of Aboriginal or Torres Strait Islander descent
- Are over 50 years old
- Smoke

WHY DO KIDNEYS FAIL?

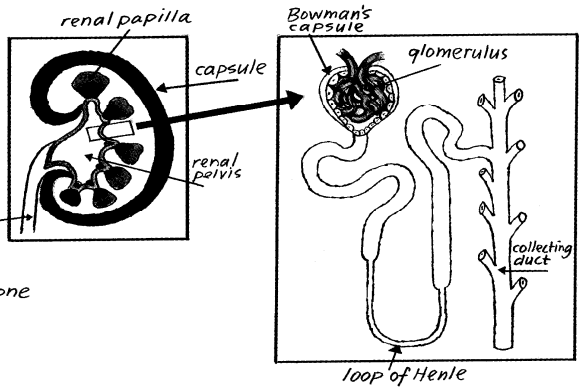
Inside each kidney there are about one million tiny units called nephrons. The nephrons are the part of the kidney, which filter the blood. Each nephron is made up of a very small filter called a glomerulus. As blood passes through the nephron, water and waste products are removed. Most of the water returns to the blood and the waste products collect in the bladder then leave the body as urine (wee). Most kidney diseases attack the nephrons.

Sometimes kidney failure can happen quickly, caused for example by a sudden loss of large amounts of blood or an accident. A sudden drop in kidney function is called Acute Kidney Failure and is often short lived but can occasionally lead to lasting kidney damage

More often kidney function worsens over a number of years. This is good news because if kidney disease is found early, medication, dietary and lifestyle changes can increase the life of your kidneys and keep you feeling your best for as long as possible. If you lose over 1/3 of your kidney function for over 3 months, it is called Chronic Kidney Disease (CKD). Sometimes kidney disease leads to Kidney Failure, which requires dialysis or a kidney transplant to keep you alive.



Location of the Kidneys and Bladder



Inside a Nephron

WHAT ARE THE SIGNS OF CHRONIC KIDNEY DISEASE?

Kidney disease is called a 'silent disease' as there are often no warnings. It is not uncommon for people to lose up to 90% of their kidney function before getting any symptoms. The first signs may be general and include:

- High blood pressure
- Changes in the amount and number of times urine is passed, e.g. at night
- Changes in the appearance of urine
- Blood in the urine
- Puffiness e.g. legs and ankles
- Pain in the kidney area
- Tiredness
- Loss of appetite
- Difficulty sleeping
- Headaches
- Lack of concentration
- Itching
- Shortness of breath
- Nausea and vomiting
- Bad breath and a metallic taste in the mouth

HOW IS CHRONIC KIDNEY DISEASE DIAGNOSED?

If kidney disease is suspected, you will have some kidney function tests to measure how well your kidneys are working and help plan your treatment, including:

- A blood pressure test as kidney disease causes high blood pressure, which can damage the small blood vessels in the kidneys. Uncontrolled high blood pressure can also cause kidney disease.
- A blood test to find out the level of waste products in the blood and calculate your glomerular filtration rate (GFR - see below).
- Special urine tests for protein, microalbuminuria and blood.
- An ultrasound or Computed Tomography scan (CT scan) to take a picture of your kidneys and urinary tract. These tests show the size of your kidneys, locate kidney stones or tumours and find any problems in the structure of your kidneys and urinary tract.

You may also visit a kidney specialist, a nephrologist, to help manage your care and decide if a biopsy is needed. During a kidney biopsy a small piece of kidney tissue is removed and looked at under a microscope to find out the type of kidney disease and check if the kidneys are damaged.

WHAT DO KIDNEY TEST RESULTS MEAN?

The results of these tests are called clinical values.

Creatinine is a waste product made by the muscles. It is usually removed from the blood by the kidneys and passes out in the urine. When the kidneys aren't working well, creatinine stays in the blood. The normal level for blood or serum creatinine is less than 120μmol/L for males and 90μmol/L for females. A blood test helps to work out how quickly your kidneys remove or 'clear' creatinine from the blood. Creatinine is a good measure of kidney function as it does not change with diet. However it does vary with age, gender and body weight so is not an accurate way of measuring overall kidney function.

Glomerular filtration rate (GFR) is the best measure of your kidney function and helps decide the stage of kidney disease. It shows how well your kidneys are cleaning the blood. GFR is reported in millilitres per minute. Your GFR is usually worked out from the results of the creatinine blood test with your age and gender. Your GFR helps the doctor plan your treatment. A normal GFR is greater than 90 mL/min. See *eGFR* fact sheet for more information.

Microalbuminuria can mean that your kidneys are damaged so albumin, a kind of protein, leaks into the urine in very small or 'micro' amounts. Microalbumin in the urine is often an early warning of kidney disease but can also be present for other reasons. The level can be measured by a special urine test either on a single urine sample or timed urine collection. Normal values on this test are less than 15 to 30 mg/l. A microalbumin test should be done at least yearly if you have diabetes.

Proteinuria occurs when there are abnormal levels of protein in the urine. Normally, protein is not removed when the kidneys filter waste from the blood. However, when the kidneys are damaged protein leaks through the damaged filters and leaves in the urine, along with the waste. The appearance of protein in the urine may be the first sign of an otherwise silent kidney condition.

Urea is a waste product made by the body as it uses protein from the food you eat such as meat. You need protein for every day growth, building muscles and repairing tissue. If you have lost some kidney function, your kidneys may not be able to remove all the urea from your blood.

Potassium is a mineral found in many foods. If your kidneys are healthy, they remove extra potassium from the blood. If your kidneys are damaged, the potassium level can rise and affect your heart. A low or high potassium level can cause an irregular heartbeat.

Percent of kidney function is an estimate of the level that each kidney is working. A GFR of 100 millilitres per minute (mL/min) is in the normal range so it is useful to say that 100 mL/min is about equal to '100% kidney function'. A GFR of 30 mL/min could be called '30% kidney function'.

Haematuria or blood in the urine occurs when red blood cells leak into the urine. It can turn urine a red or dark cola colour, which is visible to the eye or may only be found by a urine test, which is called microscopic haematuria. Blood in the urine is a common sign of urinary tract infections but can be the first sign of a problem with the kidneys or the bladder.

WHAT ARE THE STAGES OF CHRONIC KIDNEY DISEASE ?

Test results or clinical values can be grouped to show how well your kidneys are working. These groupings are only a guide and results may be outside these ranges.

- Stage 1: A small amount of kidney damage but GFR is often normal. Kidney function is between 50 – 100% of normal. A normal GFR is greater than 90 mL/min.
- Stage 2: Mild kidney damage so there is a slight drop in GFR to between 60 – 89 mL/min.

- Stage 3: Moderate kidney damage so blood pressure increases. Chronic kidney disease can be diagnosed as GFR falls to 30 - 59 mL/min.
- Stage 4: Severe kidney damage and GFR is very low at 15 - 29 mL/min. .
- Stage 5: Kidney failure occurs and GFR is less than 15 mL/min.

Many factors affect the progress of kidney failure and these are not completely understood. If you have kidney disease, it is important to work with your health care team and follow their advice to slow down its progress.

EARLY STAGES

In the early stages of kidney disease, there is only a small amount of damage to the kidneys. The early stages of kidney disease can cause scarring and blockages that change blood flow to parts of the kidneys so they are not working as well as they should. Even in the early stages of chronic kidney disease the risk of cardio vascular disease has been shown to increase so measures to reduce this risk are essential.

In the early stages you may have no symptoms and blood tests can be normal. However you can be at more risk of dehydration and have a higher sensitivity to medications. It is very important to talk to your doctor before starting any new medications. Maintaining a good blood pressure and following any suggested dietary changes, may delay or prevent progress to the next stage.

MIDDLE STAGES

People, who have kidney disease, sometimes discover it during this stage because the level of waste products in the blood rises. You may begin to feel unwell and notice changes in the number of times you wee. As the kidneys slow down, blood pressure rises. High blood pressure can increase the risk of cardio-vascular disease, eg a heart attack or stroke. Early signs of bone disease may also be present. It is very important to work with your health care team to treat these conditions and prevent other problems developing later on.

Anaemia can also appear during these stages. Anaemia is caused when there are not enough red blood cells in the blood. Red blood cells carry oxygen so anaemia makes you feel weak, tired and short of breath. Anaemia can be treated with erythropoietin (EPO) which is a body chemical (hormone) mainly made by the kidneys that tells the bone marrow to make red blood cells.

LATER STAGES

You will start to notice changes in the amount of urine you pass and high blood pressure almost always occurs. The amount of protein in the urine increases, as do the levels of creatinine and urea in the blood. You may need to make dietary changes including limiting your use of salt or reducing the amount of potassium or phosphorus in your diet.

End stage kidney disease is the last stage of CKD. The kidneys are only functioning at 10-15% and are unable to properly filter waste products, remove extra water from the body and help to maintain the blood’s chemical balance. Now it's time to begin preparing for dialysis or a kidney transplant.

For more information about kidneys health or this topic, please contact Kidney Health Australia: Kidney Information Line (free call) on 1800 4 KIDNEY (1800 4 543 639) or visit website www.kidney.org.au

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This is intended as a general introduction to this topic and is not meant to substitute for your doctor's or Health Professional's advice. All care is taken to ensure that the information is relevant to the reader and applicable to each state in Australia. It should be noted that Kidney Health Australia recognises that each person's experience is individual and that variations do occur in treatment and management due to personal circumstances, the health professional and the state one lives in. Should you require further information always consult your doctor or health professional.

Kidney Health Australia gratefully acknowledges the valuable contribution of the KHA Kidney and Urinary Advisory Group in the development of this information.

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