

# ALL ABOUT CHRONIC KIDNEY DISEASE

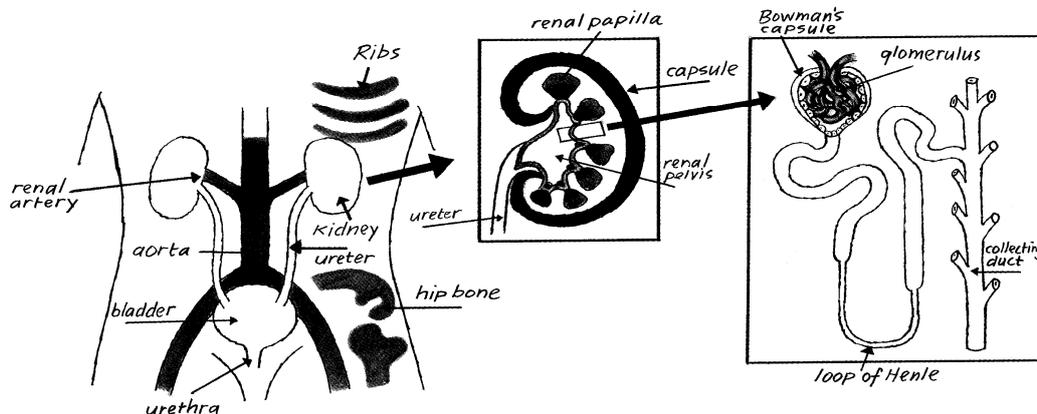
## WHY DO KIDNEYS FAIL?

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. For example, kidney failure can be caused by a sudden loss of large amounts of blood or by 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.

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:

- Tests for albumin/protein and/or blood in your urine.
- A blood test to find out the level of waste products in the blood and calculate your glomerular filtration rate (GFR - see below).
- A blood pressure test as kidney disease causes high blood pressure, which can damage the small blood vessels in the kidneys. High blood pressure can also cause kidney disease.
- 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 (called a nephrologist) to help manage your care and decide if a kidney 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 following blood and urine tests are commonly performed to assess 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. Your GFR is usually estimated (eGFR) from the results of the creatinine blood test. eGFR is reported in millilitres per minute per  $1.73\text{m}^2$  (mL/min/ $1.73\text{m}^2$ ).



Your eGFR can also be used to work out your **percent of kidney function**. This is an estimate of the level that each kidney is working. A GFR of  $100\text{ mL/min}/1.73\text{m}^2$  is in the normal range so it is useful to say that  $100\text{ mL/min}/1.73\text{m}^2$  is about equal to '100% kidney function'. A GFR of  $50\text{ mL/min}/1.73\text{m}^2$  could be called '50% kidney function' and a GFR of  $30\text{ mL/min}/1.73\text{m}^2$  could be called '30% kidney function'. See the 'eGFR' fact sheet for more information.

**Albuminuria** can mean that your kidneys are damaged so albumin, a kind of protein, leaks into the urine. A small or 'micro' amount of albumin in the urine is called microalbuminuria, and a larger 'macro' amount is called macroalbuminuria. Albuminuria is often an early warning of kidney disease but can also be present for other reasons. Albuminuria can be detected by a

special urine test called a urine:creatinine ratio (ACR). An ACR is performed on a single sample of urine. See the '*Albuminuria/Proteinuria*' fact sheet for more information.

**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. Sometimes the blood in the urine is not visible to the eye, but may be found on a urine test. This is called microscopic haematuria. Blood in the urine is a common sign of urinary tract infections but can also be the first sign of a problem with the kidneys or the bladder.

**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. 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.

**Urea** is a waste product made by the body as it uses protein from the food you eat. 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.

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## WHAT IS THE DEFINITION OF CHRONIC KIDNEY DISEASE?

To be diagnosed with chronic kidney disease you must have a GFR less than 60 mL/min/1.73m<sup>2</sup> for more than three months

OR

Evidence of kidney damage for more than three months, regardless of your GFR.

Kidney damage can be any of the following:

- albuminuria
- haematuria
- pathological abnormalities (such as an abnormal kidney biopsy result)
- structural abnormalities (such as an abnormal kidney ultrasound result)

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## WHAT ARE THE STAGES OF CHRONIC KIDNEY DISEASE?

Kidney function can be classified into stages depending on your eGFR.

<b>Stage 1:</b>	A normal GFR greater than or equal to 90 mL/min/1.73m <sup>2</sup>
<b>Stage 2:</b>	Slightly decreased GFR between 60-89 mL/min/1.73m <sup>2</sup> <i>If your kidney function is at stage 1 or 2, you only have CKD if you have albuminuria, haematuria, a pathological abnormality or a structural abnormality.</i>
<b>Stage 3a:</b>	Mild-moderate decrease in GFR between 45-59 mL/min/1.73m <sup>2</sup>
<b>Stage 3b:</b>	Moderate-severe decrease in GFR between 30-44 mL/min/1.73m <sup>2</sup>
<b>Stage 4:</b>	Severe decrease in GFR between 15-29 mL/min/1.73m <sup>2</sup>
<b>Stage 5:</b>	Kidney failure as GFR decreases to less than 15 mL/min/1.73m <sup>2</sup> or dialysis is started

Your eGFR and albuminuria results are combined to provide an overall picture of how well your kidneys are working. Your doctor uses this information to decide which treatment is best for you. Treatment also depends on the cause of your kidney damage. Controlling diabetes and high blood pressure can help to slow or prevent further kidney damage. It also reduces the risk of other health problems, such as heart attacks and strokes.

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.

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## 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 cardiovascular disease (such as a heart attack or stroke) 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.

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## MIDDLE STAGES



In the middle stages of kidney disease symptoms may begin to appear as 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 cardiovascular disease. 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. See the '*Anaemia*' fact sheet for more information.

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## LATER STAGES

In the later stages of CKD you will start to notice changes in the amount of urine you pass and high blood pressure almost always occurs. The amount of albumin 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.

## WHO IS MORE AT RISK OF CHRONIC KIDNEY DISEASE?

You are at increased risk of chronic kidney disease if you:

- are 60 years or older
- are of Aboriginal or Torres Strait Islander origin
- have diabetes
- have a family history of kidney disease
- have established heart problems (heart failure or past heart attack) and/or had a stroke
- have high blood pressure
- are obese (Body mass index  $\geq 30$ )
- are a smoker

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

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If you are deaf, or have a hearing impairment or speech impairment, contact the National Relay Service [www.relayservice.com.au](http://www.relayservice.com.au):

- TTY users phone 1800 555 677 then ask for 1800 454 363
- Speak and Listen users phone 1800 555 727 then ask for 1800 454 363
- Internet relay users - [www.relayservice.com.au](http://www.relayservice.com.au) - "Make an internet relay call now" then ask for 1800 454 363