

Chronic kidney (renal) failure in cats

Chronic renal failure, sometimes referred to as kidney disease, is one of the most common conditions affecting older cats. In most cases, chronic renal failure is progressive over time so that there is a gradual advancement and worsening of the disease. The rate of progression of the disease varies considerably between individuals. Appropriate support and treatment can both increase the quality of life of affected cats and prolong life by slowing down the progression of the disease.

What causes chronic renal failure?

Chronic renal failure occurs where there is long-standing, irreversible damage to the kidneys that impairs their ability to filter and remove waste products from the blood. In most cases where chronic renal failure is diagnosed, the exact cause of the disease is unknown. Samples taken from the affected kidney (biopsies) often show considerable amounts of fibrous tissue replacing the normal kidney tissue, often with some inflammation (so called 'chronic interstitial nephritis'). These changes are common to a number of diseases. There are, however, some well-recognised causes of chronic renal failure, and these include:



Some cats develop severe muscle weakness as a result of kidney failure. Here the cat cannot lift its head or stand properly

- **Polycystic kidney disease** (an inherited condition seen mainly in Persian and Exotic cats where normal kidney tissue is gradually replaced by multiple fluid filled cysts that develop within the kidneys).
- Kidney tumours – for example lymphoma (a solid tumour of white blood cells) can affect the kidneys and cause renal failure.
- Infections – bacterial infection of the kidneys ('pyelonephritis') may occur as an extension of bladder infections and can lead to sufficient damage of the kidneys to cause renal failure.
- Other causes - eg, damage to the kidneys by toxins, defects in the development of the kidneys at birth, persistent inflammation such as glomerulonephritis.

In most cases a specific cause cannot be found for renal failure, and treatment is aimed at management of the disease. Where an underlying cause can be diagnosed, and if this is treatable, there may be the potential to halt progression of the disease.

How common is chronic renal failure?

Chronic renal failure can occur in cats of any age, but is most commonly seen in middle to old-aged cats, and it becomes increasingly common with age. It has been estimated that around one in five cats over 15 years of age has renal failure. In general, chronic renal failure is seen about three times more frequently in cats than it is in dogs.

What is the normal role of the kidneys?

The kidneys perform a wide variety of important roles, including removing toxins from the blood and maintaining water and salt balance in the body. Blood is constantly filtered through the kidneys to remove the toxic waste products of the body's metabolism. Urine is produced in this process. The kidneys also concentrate the urine by returning water to the body, preventing dehydration.

The kidneys have other important roles in maintaining the balance of electrolytes (potassium, sodium, calcium, phosphate, etc) in the body, regulating the amount of acid in the blood and controlling blood pressure. They are also responsible for producing a hormone called erythropoietin that stimulates red blood cell production by the bone marrow.

Fortunately, there is considerable 'reserve capacity' in the kidneys, and it is well recognised that in both healthy animals and humans, it is possible to remove a kidney (for example to provide a transplant) without any adverse consequences. In fact it requires around two thirds to three quarters of the total functioning kidney tissue to be lost before signs of renal failure will develop.



In severe kidney failure the kidneys can become very small and the functional tissue is replaced by fibrous tissue

What are the clinical signs and complications of chronic renal failure?

In most cases chronic renal failure is a progressive disease with a slow, insidious onset, although occasionally the signs may appear to develop quite suddenly. Many of the clinical signs are quite vague and non-specific – arising at least in part simply from the accumulation of toxins in the blood that would normally be excreted in the urine. The most common signs seen in affected cats are a poor appetite, weight loss, dehydration, lethargy and depression. There is often an increased thirst along with increased volumes of urine being produced (due to an inability to concentrate the urine in many affected cats). Other signs may include a poor coat, vomiting, bad-smelling breath, ulceration in the mouth and weakness. As chronic renal failure is a progressive disease (despite treatment) these signs tend to get worse over time.

With the diverse functions of the kidneys, a wide variety of complications can arise in affected cats. These include electrolyte abnormalities (eg, low blood potassium concentrations, high phosphate concentrations), the retention of too much acid by the body ('acidosis'), the development of high blood pressure (hypertension) and the development of anaemia (low red blood cell count).

How is renal failure diagnosed?

The clinical signs shown by a cat with chronic renal failure are not specific. They can be caused by other diseases too. Diagnosis of chronic renal failure is therefore made by collection of blood and urine samples for analysis. Two substances in the blood – urea and creatinine – are commonly analysed, as these are products of metabolism that are normally excreted by the kidneys. In renal failure the blood concentration of these two products will be increased. However, as there are some conditions other than chronic renal failure that can also elevate these concentrations, a urine sample is usually analysed at the same time. With chronic renal failure, typically in addition to appropriate clinical signs and increased urea and creatinine concentrations there will also be poorly concentrated urine. The urine 'specific gravity' is measured to assess its concentration, and in most cats with renal failure this is less than 1.030.

How is renal failure managed?

In some cases, a specific cause for the renal failure may be identified (eg, bacterial infection of the kidneys) and if this is the case, treatment for the cause may be possible. In most cases however, a cause will not be identified and treatment is aimed at managing the renal failure. Some cats may require initial intravenous fluids to correct dehydration (and perhaps electrolyte abnormalities), but once stable, treatment is aimed at supporting renal function and minimising the complications of renal failure. Chronic renal failure cannot be reversed, and in most cases, will progress over time despite appropriate therapy.

Optimal management of renal failure usually requires repeat investigations at regular intervals (including blood

pressure assessment, blood and urine tests) to identify treatable complications as they arise, eg, anaemia (a reduction in circulating red blood cells), low potassium, high phosphate, urinary infections, and hypertension.

Why is diet important in renal failure?

Dietary management is important for cats with chronic renal failure, and there are three main aspects to this:

Water intake

Cats with chronic renal failure are more likely to become dehydrated (due to the reduced ability of the kidneys to conserve water by concentrating urine). Maintaining a good fluid intake is very important, and as cats generally gain much of their water from their food, whenever possible, cats with chronic renal failure should be fed tinned (or sachet) foods rather than dry foods.

Protein content

An ideal diet for a cat with renal failure should have a low protein content – many of the toxic products that accumulate in the blood in renal failure are a result of protein breakdown, and feeding a low protein diet will therefore help to minimise this. However, protein restriction has to be performed with care. Too little protein in the diet can lead to excessive weight loss that would be extremely detrimental to general health. For this reason it is best to use specially designed commercial products rather than 'home made' diets.

Low protein diets tend to be less palatable for cats. For cats with chronic renal failure who find low protein diets unpalatable, it is better that they eat a normal diet rather than eat too little. Cats can sometimes be encouraged to eat a low protein diet by offering different varieties, feeding warmed food, and by mixing a low protein diet with their normal food for a period of time.

Low phosphate content

Restricting the phosphate content of the diet appears to be quite beneficial in protecting the kidneys from further damage in cats with chronic renal failure. Commercial diets designed to help manage renal failure are, therefore, both protein and phosphate restricted. If a cat is not eating a low phosphate (low protein) diet, or if blood phosphate concentrations are high despite being on a low phosphate diet, it is possible to add 'phosphate binders' (eg, aluminium hydroxide or calcium acetate) to the diet to reduce the amount of phosphate that is absorbed – this should only be done under veterinary advice.

Other dietary measures

Commercial diets for cats with renal failure are also often modified in other ways – for example, the addition of fibre and the addition of some polyunsaturated fatty acids, which may potentially have some additional benefits in the management of renal failure.

What other treatments are available for renal failure?

Adequate water intake, often intimately linked to the diet (see above), is certainly extremely important in cats with renal failure. There is a tendency for cats with chronic renal failure to become dehydrated and this will have significant adverse effects on kidney function. It is essential that a good supply of water is always available, and cats should be encouraged to drink by offering water from different bowls, using 'pet fountains', offering flavoured waters (chicken or tuna, for example), etc. In some cats, usually with advanced renal failure, there may be a benefit from intermittent administration of fluids either by intravenous drip, or given under the skin by injection. These procedures are usually performed by a veterinary surgeon, although in some circumstances it may be possible to administer fluids under the skin in the home environment (see **Giving subcutaneous fluids**).



A cat receiving intravenous fluid therapy which can be very important in managing dehydration

Other treatments are generally aimed at specific complications that can arise as a result of renal failure, for example:

Potassium supplementation

Some cats with renal failure develop low blood potassium levels, and this itself can worsen the renal failure. Where this is identified potassium supplementation (tablets, gel or powder added to the diet) is of benefit.

High blood pressure

Cats with chronic renal failure that develop **hypertension** are at risk of developing further problems (such as bleeding into their eyes and retinal detachment leading to blindness, or bleeding into the brain causing neurological signs) in addition to the high blood pressure probably further damaging the kidneys. It is important, therefore, to treat hypertension when it is diagnosed and this is usually straightforward in cats (with tablets).

Treatment of anaemia

In advanced renal failure, **anaemia** is quite common. If this is mild it may not be a major concern, but with advanced anaemia this can contribute to signs such as lethargy and weakness. Depending on the cause of the anaemia and its severity a number of treatment options may be available including the use of anabolic steroids, iron supplementation, management of any gastrointestinal ulcers and in some advanced cases supplementation with erythropoietin (the hormone that stimulates red cell production) may be of benefit.

Treatment of nausea and vomiting

Nausea and vomiting are more common in advanced renal failure and can significantly affect the quality of life and the appetite of the cat. Where this is a problem, various drugs can be used to control these signs.

Use of 'ACE inhibitors'

ACE-inhibitors, eg, benazepril, are a class of drugs that act predominantly as vasodilators (dilate blood vessels). In humans with renal failure they are commonly used to help manage the disease, as they appear to have beneficial effects on renal function and reduce protein loss through the kidneys (which can be elevated and can be harmful in renal failure).

There is some evidence that these drugs may be of some benefit in cats with renal failure too, but it is not certain whether all cats necessarily benefit from their use, and which cats are most likely to benefit. Current knowledge suggests that perhaps cats with elevated protein loss in their urine are most likely to benefit, and in all cats where this type of drug is used it is sensible to monitor blood and urine results as well as clinical signs to help determine what benefit is being derived.

What is the prognosis?

Once sufficient damage has been done to the kidneys to cause CRF, the compensatory changes and adaptations that occur to try to maintain normal kidney function usually eventually fail and progressive kidney damage occurs. The disease is usually therefore progressive over time and will eventually lead to the need for euthanasia. However the rate of progression of renal disease varies considerably between individuals and appropriate support and treatment can both increase the quality of life of affected cats and also potentially slow down the progression of the disease.

Book available: Caring for a cat with kidney failure by Dr Sarah Caney
(www.catprofessional.com/publications.html)

This is a book written in a way that everyone from a cat owner upwards can understand. Its been designed to be a complete guide to kidney failure in cats - from receiving the bad news and dealing with emotional issues, through to diagnosis, treatment and monitoring, to euthanasia and bereavement advice. There is also a glossary of veterinary terms and a case report.

'10% of the profits made from the sale of the book will be donated to the Feline Advisory Bureau to help them to continue the excellent work they do for cats'

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