

## CHRONIC KIDNEY (RENAL) FAILURE IN CATS

There are many different diseases that can affect the kidneys in the cat. Chronic renal failure (CRF) is the end point of a number of different disease processes. All animals have a large amount of reserve kidney function hence signs of renal failure are not usually seen until more than 75% of the kidney's functional capacity have been lost. Even at this point, changes may be very subtle with few if any outward signs, the kidney disease only being apparent on blood testing. As CRF is primarily a degenerative disease, it is most common in old cats. It has been estimated that around 16% of cats over 15 years of age have significant renal dysfunction. By the time a cat is showing signs of CRF, the underlying cause is often of little importance the disease having advanced beyond the point at which treatment of the cause is likely to be possible or helpful.

What are the signs of CRF?

In the early stages, signs of CRF are very non-specific and can be difficult to distinguish from the general signs of ageing. Unlike dogs in whom an increase thirst (polydipsia) and increased urination (polyuria) is common, polydipsia/polyuria is only reported in 30-40% of cats. The most common signs are dullness, anorexia, weight loss and halitosis. Halitosis can be a useful indication of renal disease, however, it is also associated with dental disease which is very prevalent in older cats. Cats with kidney disease will often have a poor hair coat and a stiff gait. Some cats may vomit due to the build up of waste products within the blood stream. Occasionally, cats will present with sudden onset blindness associated with bleeding into the eye or retinal detachment as a result of high blood pressure (hypertension). Hypertension is commonly associated with CRF.

Although the loss of the kidney's functional ability is a slow and gradual process, some cats seem to present with a very sudden onset of signs. It is likely that these cats have been coping (compensating) by an increase in fluid throughput enabling them to excrete their waste products over a larger volume as they are no longer able to concentrate their urine adequately. Eventually a threshold is reached when they are no longer able to compensate and clinical signs appear suddenly. The deterioration may be triggered by a relatively minor event such as a short period of starvation or vomiting causing mild dehydration with which the diseased kidneys are unable to cope.

How is CRF diagnosed?

Renal failure is usually diagnosed on blood biochemistry tests that show an increase in substances that should normally be excreted by the kidneys in the urine. Urea and creatinine are the most common substances that are measured. An increase in urea and creatinine in the blood is termed azotaemia.

However, increases in urea, in particular, can be the result of non-renal factors such as dehydration or blood loss which reduce blood flow to the kidneys. An inadequate blood supply means the kidneys cannot fulfil their functions and toxins build up in the circulation. Pre-renal azotaemia (increase in urea) is usually relatively easily managed by restoring circulating volume with fluid therapy.

Post-renal azotaemia is caused when urine can't leave the body and again toxins build up in the blood stream. This is especially common in 'blocked' male cats with feline lower urinary tract disease (FLUTD) and needs emergency treatment.

Acute renal failure occurs when there is a sudden, severe insult to the kidneys. This can be caused by toxins e.g. antifreeze poisoning or severely reduced blood flow to the kidneys. Urea and creatinine levels will increase rapidly. Emergency treatment is needed to save the cat's life.

What other tests may need to be done to improve management?

Besides the excretion of nitrogenous waste, the kidneys have a number of other important functions. Kidney disease in an individual is unique, as the disease will have affected the different kidney functions to varying degrees. It is important, therefore, to gain as much information in all of these areas so that management can be optimised. This may require further blood tests, urinalysis, radiographs, ultrasound or even biopsy of the kidney.

Major roles of the kidney

- Excretion of waste products
- Excretion of bioactive substances such as gastrin which causes acid secretion in the stomach
- Regulation of water balance
- Regulation of blood acidity
- Regulation of electrolytes - calcium, phosphorus, potassium, sodium and chloride
- Production of hormones - renin (involved in water balance and blood pressure regulation) and erythropoietin (causes the bone marrow to produce red cells)
- Activation of vitamin D (involved in calcium regulation)

Management of chronic renal failure

Management will vary with the precise problems of an individual cat, the ease with which the patient can be medicated and financial considerations. Possible treatments that may be necessary include :-

- Rehydration
- Correction of blood acidity
- Appetite stimulation
- Management of nausea and vomiting
- Treatment of hypertension
- Treatment of anaemia
- Potassium supplementation
- Control of increased blood phosphate levels (hyperphosphataemia)
- Treatment of reduced blood calcium (hypocalcaemia)

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- Antibacterial (antibiotic) therapy

In cats that present with severe disease, prompt and aggressive treatment may be necessary to stabilise their kidney function. In the longer term, much can be achieved with dietary management. A number of tinned and dry diets are available, specifically designed to help in the management of cats with chronic renal failure.

#### Dietary therapy for CRF

The major aim of dietary therapy is to normalise blood phosphate levels, phosphate restricted diets have been shown to increase the survival time in a group of cats from around 250 days to 633 days. Specialised diets also have reduced protein which will lower blood urea levels one of the major toxins making the cat feel unwell. Dietary potassium levels are increased, as low blood potassium is a common complication of CRF in cats.

#### How and when to start dietary therapy

- Above everything else it is important to get a cat with CRF to eat something. Breakdown of body protein (starvation) has a number of detrimental effects and should be avoided at all costs. Many cats obtain the majority of their fluid from their food and will become dehydrated if they do not eat worsening pre-renal failure
- A new diet should not be introduced in a very sick cat as the cat is likely to associate the new diet with feeling unwell and quickly refuse to eat it.
- Acceptance of a new diet can be improved by making the feeding environment and food presentation as attractive as possible. Force feeding should be avoided as it increases food aversion. In some circumstances the introduction of a new diet can be aided by the short term use of appetite stimulants
- Some cats will not accept any change of feeding in which case other measures need to be taken to try and control phosphate levels.
- There is no good evidence to support a particular starting time for dietary therapy, this can be as soon as kidney disease is identified, at a set point of urea and creatinine increases or when hyperphosphataemia develops.

#### Management of hypertension

Hypertension can be a serious complication for cats with CRF and drugs may be required to normalise the pressure.

#### Management of anaemia

Many cats with CRF have a non-regenerative anaemia that can make a significant contribution to their unwellness. The anaemia occurs as the result of a variety of processes including gastrointestinal bleeding, effects on the red cells by the uraemic toxins and bone marrow failure due to the lack of erythropoietin production by the kidneys. Some cases will respond to dietary and anti-ulcer treatments, others will require direct intervention. This may be in the form of blood transfusions or attempts to stimulate the bone marrow. Anabolic steroids have long been used for this purpose (they also have some appetite stimulatory activity), but they are relatively

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ineffective. Erythropoietin therapy is highly effective but is quite expensive and can be associated with long term problems as the erythropoietin used is from man and not cats.

Angiotensin converting enzyme (ACE) inhibitors in the management of CRF

Recently benazepril (Fortekor®) an ACE inhibitor has been licensed for use in the management of cats with CRF. This group of drugs has already been shown to be beneficial in man and dogs with certain forms of kidney disease particularly where there is excessive loss of proteins in the urine (protein losing nephropathy). ACE inhibitors are not suitable for all cats with CRF and their introduction in a case needs to be carefully monitored.

Can we spot renal disease earlier before failure has occurred?

If we could spot renal disease earlier before it had progressed into failure, management may be more successful. At present there is a lack of readily available tests to measure kidney function in cats that are capable of identifying early renal disease. A number of projects around the world are addressing this problem and in the near future it is hoped that screening to spot early disease will become possible.