Chronic Kidney Disease in Cats – Causes and Diagnosis

Chronic kidney disease (CKD) is the name now used to refer to cats with kidney failure (or chronic kidney failure).

CKD is one of the most common conditions affecting older cats, and in most cases is progressive over time so that there is a gradual decline and worsening of the disease. The rate of decline varies considerably between individual cats.

The kidneys are responsible for helping maintain fluid balance in the body, for producing certain hormones, for regulating many electrolytes in the body and for excreting waste products (via urine). In CKD, all these regulatory processes can be interfered with causing a wide range of different signs.

Although CKD is not a curable or reversible disease, appropriate support and treatment can both increase the quality of life, and also prolong life by slowing down the progression of the disease.

What causes chronic kidney disease?

CKD occurs where there is long-standing, irreversible damage to the kidneys that impairs their ability to function and remove waste products from the blood. In most cases, the exact cause of CKD is unknown. Samples (biopsies) from affected kidneys (biopsies) often show a mixture of fibrosis and inflammation termed ‘chronic interstitial nephritis’. These are non-specific ‘end stage’ changes though, and do not tell us anything about the underlying cause. Although most cases of CKD are idiopathic (have an unknown underlying cause), some causes are well recognized. These include:

- **Polycystic kidney disease (PKD)** – this is an inherited disease seen mainly in Persian and related cats where normal kidney tissue is gradually replaced by multiple fluid filled cysts
- **Kidney tumors** – for example lymphoma (a solid tumour of white blood cells) can affect the kidneys
- **Infections** – bacterial infection of the kidneys (known as ‘pyelonephritis’) may lead to sufficient damage to cause CKD
- **Toxins** – certain toxins and drugs can damage the kidneys
- **Glomerulonephritis** – this refers to inflammation of the glomeruli (individual units within the kidneys that filter the blood) — they may become inflamed for various reasons and if prolonged this can lead to CKD

Other conditions such as birth defects affecting the kidneys, trauma, hypokalaemia (low blood potassium), and hypercalcaemia (high blood calcium) may also cause CKD, but work is still going on to discover the underlying cause(s) of most cases of this disease.

If an underlying cause can be identified, in some cases this may be treatable and so progression of the condition may be halted. In most cases though, treatment is aimed at management of the disease and complications that arise from it.

How common is CKD?

CKD can be seen in cats of any age, but is most commonly seen in middle- to old-aged cats (those over 7 years), and it becomes increasingly common with age. It has been estimated that around 20-50% of cats over 15 years of age will have some degree of CKD present. CKD is seen about three times more frequently in cats than in dogs.

What is the normal role of the kidneys?

Like all mammals, cats have two kidneys located in the abdomen, which perform a wide variety of important roles, including:

- Removing toxins from the blood
- Maintaining water balance
- Maintaining salt balance (and other electrolytes)
- Maintaining the acid balance of the body
- Maintaining normal blood pressure
- Producing hormones

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.

Fortunately, there is considerable ‘reserve capacity’ in the kidneys. It is well-recognized that in healthy animals and humans, it is possible to remove one kidney completely without any adverse consequences. In fact it requires around two thirds to three quarters of the total functioning kidney tissue (of both kidneys) to be lost before signs of CKD will develop.

What are the signs of CKD?

In most cases CKD is a progressive disease. Initially, clinical signs are often very subtle and mild, but will gradually get worse over a long period of time. More rarely, signs may appear to develop quite suddenly (often as a result of decompensation or sudden worsening of
the condition, for example if a cat with CKD is deprived of water).

Many of the signs are vague and non-specific — some arise from the accumulation of toxins in the blood while others may arise as complications from the body trying to adapt to the disease. The most common signs are:

- Weight loss
- Poor appetite (anappetence)
- Lethargy
- Increased thirst (polydipsia)
- Increased urination (polyuria)

The increased production of urine occurs because cats begin to lose the ability to concentrate their urine with CKD, and they begin to drink more to compensate for this.

Other signs may include:

- Poor coat
- Hypertension (high blood pressure)
- Vomiting
- Bad-smelling breath (halitosis)
- Weakness
- Anaemia

**How is CKD diagnosed?**

A diagnosis of CKD is usually made by collection of blood sample and a urine sample at the same time for analysis. Two substances in the blood — urea and creatinine — are commonly analyzed, as these are by-products of metabolism that are normally excreted by the kidneys. In CKD the blood concentration of these two products will increase. However, as some other conditions can also cause elevation of these substances, a urine sample is usually analyzed at the same time. With CKD, typically there will increased urea and creatinine concentrations and the blood and at the same time there will be poor concentration of the urine. The urine ‘specific gravity’ is measured to assess its concentration, and in most cats with renal failure this is less than 1.030.

Blood tests may also show any important complications that have developed as a result of CKD such as hypokalaemia (low blood potassium), anaemia, and hyperphosphataemia (high blood phosphate). As hypertension (high blood pressure) is a relatively common complication of CKD, your vet will also want to measure your cat’s blood pressure where possible. Sometimes other investigations such as X-rays, ultrasound or even biopsies may be indicated depending on individual circumstances.

Measuring the quantity of protein being lost in urine (usually through a simple urine test called the ‘protein to creatinine ratio’) can be important in cats with CKD. Increased loss of protein in the urine (proteinuria) may be a marker of progressive CKD. In humans, using drugs to reduce proteinuria may significantly slow down progression of the CKD — it is not certain if the same is true in cats, but it could be.

**Early diagnosis of CKD**

Because CKD is such a common disease in cats, routine screening of all mature and older cats can help early diagnosis, which in turn may prolong a good quality of life. Yearly or twice yearly routine veterinary check-ups are important, and as your cat begins to get older it is important that urine samples, and body weight, are monitored at each visit. A declining urine concentration or body weight may be early signs that CKD is developing and that further investigations should be done.