

DETECTING AND TREATING EARLY KIDNEY DISEASE IN CATS



Kidney disease is the number one killer of cats over 14 years of age. Unless they develop another life-threatening disease first, all cats will eventually die from kidney failure. In heart disease in humans, the plaque build-up in the arteries starts many years before a heart attack occurs. Similarly, kidney disease in cats starts years before illness occurs. The kidneys begin to deteriorate from day one, just as your brand new car starts to age and depreciate as soon as you drive it off the lot.

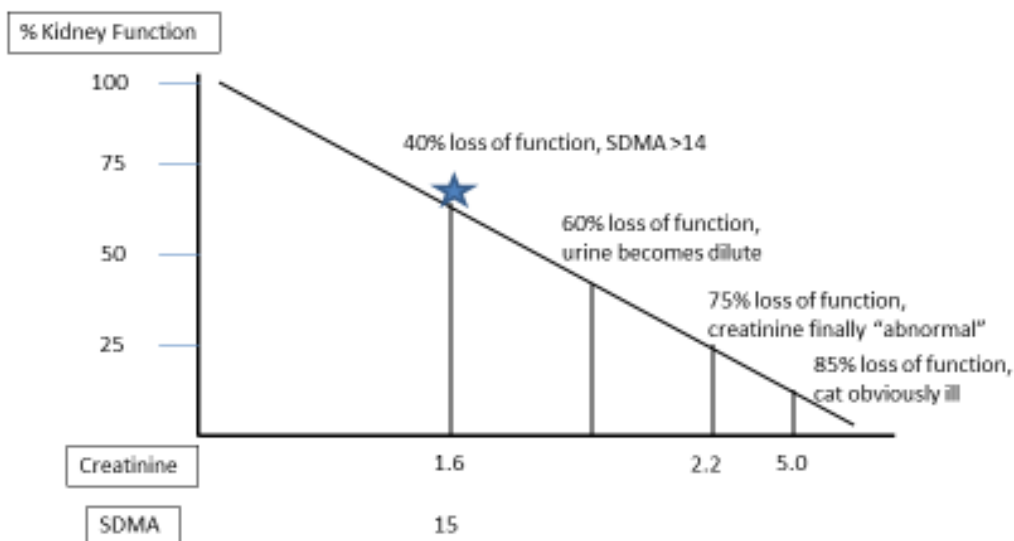
Blood Testing for Kidney Disease

Recent studies reveal that treating kidney decline at an earlier stage than we have in the past can increase life expectancy by several years. A new laboratory test called SDMA helps us to detect kidney disease at its earliest stage. This test lets us find kidney damage when only 40% of the kidney function has been lost, so we can intervene early and slow the decline of kidney function from then on. This is called stage 1 of the four stages of chronic kidney disease.

Almost half of cats aged 6-9 years old are already showing signs of kidney deterioration on wellness blood testing, and some reach 40% function loss as early as age 3. For this reason, we want to start screening for kidney disease annually beginning when a cat is a young adult. If we wait until the cat is a senior before we start testing, we lose our opportunity to slow disease progression early, when we can be the most effective.

A test called creatinine is the most accurate indicator of kidney function as the kidneys decline but SDMA has turned out to be the better early warning sign. Our previous early warning sign for kidney disease was when the kidneys lost their ability to concentrate urine. This doesn't

Progression of Kidney Disease



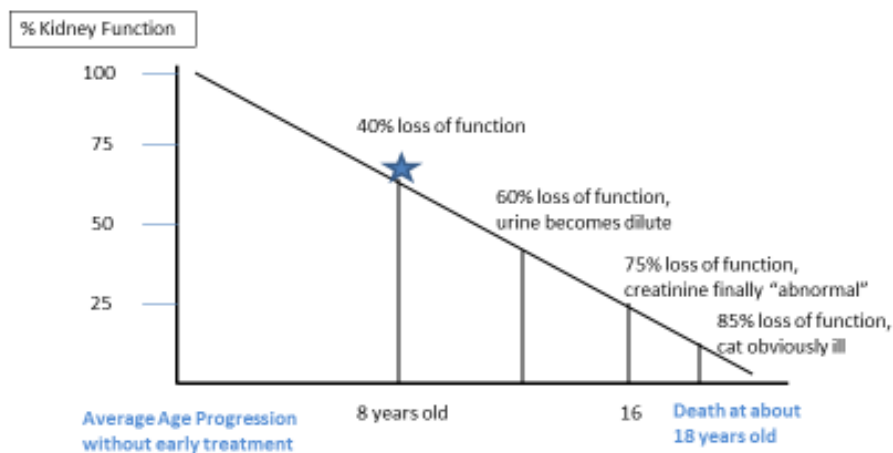
occur until 60% of kidney function has been lost. At this stage the cat will have no symptoms of kidney disease other than increased thirst and urination. At that point, the kidneys can no longer pull water back from the urine into the body but they can still adequately filter out toxins.

Creatinine is one of the toxins that the kidneys are supposed to filter from the blood. In the past, the creatinine level has not been considered abnormal until it was above 2.2 - but by the time it reaches that level 75% of kidney function is already damaged.

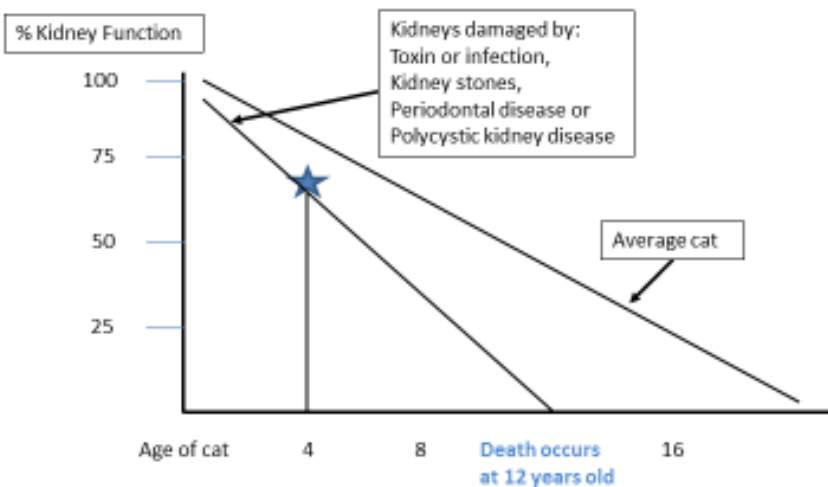
Kidney Disease Slowly Progresses with Age

The research that went into the development of the new SDMA test showed that we need to diagnose kidney disease when the SDMA goes above 14, which happens several years before the creatinine level gets to 2.2. This is usually about the time the creatinine reaches 1.6, a level previously thought not to be a problem. **SDMA reaches 15 at an average age of 6-9 years.** Kidney failure and death follow 8-10 years later.

Average Progression of Kidney Disease with Age

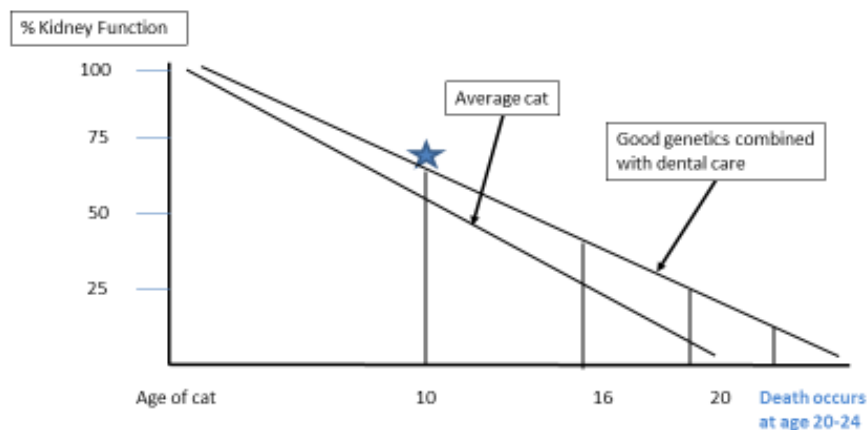


Rapid Progression of Kidney Disease



Anything that causes kidney damage can accelerate kidney deterioration. Genetic diseases such as polycystic kidney disease can cause kidney failure at an early age, as can kidney damage from other causes. This leads to early kidney failure and death.

Slow Progression of Kidney Disease

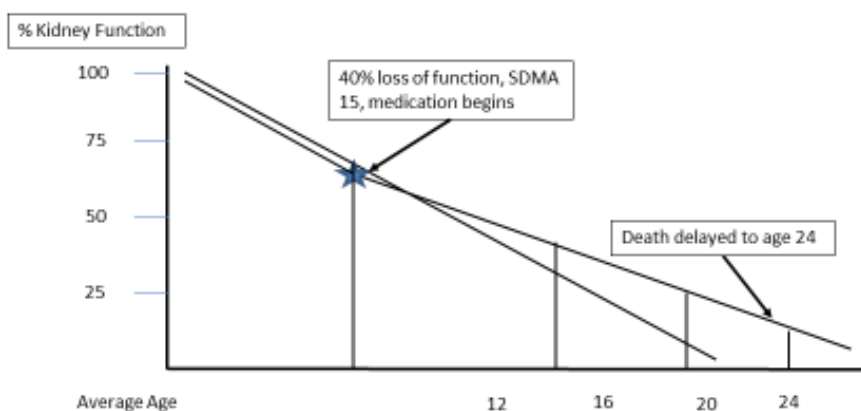


Conversely, some cats have genetics that program them for slower kidney decline and a longer life. Good nutrition, veterinary care and especially timely and appropriate dental care make this scenario more likely. Infected teeth shorten life expectancy by 2-3 years.

Early Intervention Slows the rate of Decline

A newly released long term study shows that we can counteract Mother Nature somewhat if we intervene early. Beginning medication to support the kidneys and reduce damage over time at the time the SDMA reaches 15 or the creatinine reaches 1.6 prolongs life expectancy by over 1100 days – more than three years!

Slowed Progression of Kidney Disease



Treating Early Kidney Disease with Calcitriol

Stage 1 CKD treatment: The medication we use for stage 1 chronic kidney disease (CKD) is calcitriol. Calcitriol is the active form of Vitamin D, and it is made only in the kidneys. Active Vitamin D controls or is necessary for the function of over 2000 different types of protein molecules in the body. It is also part of the system that regulates the amount of the calcium and phosphorus in the urine. As the kidneys age, their ability to convert Vitamin D to its active form slows and then stops. Without active Vitamin D, the kidneys lose their ability to move excess

phosphorus from the blood into the urine so that it can be excreted. The amount of phosphorus in the blood starts to rise.

The body needs to maintain twice as much calcium in the bloodstream as phosphorus. In other words we need a Calcium:Phosphorus ratio of at least 2:1. When there isn't enough active vitamin D to keep calcium and phosphorus levels in balance via the kidneys, the parathyroid glands, which are also part of the system that regulates these levels, tries to step in to correct the problem. Parathyroid hormones can't lower the phosphorus level like active Vitamin D can. The way the parathyroid gland maintains the 2:1 ratio is to increase the calcium level in the blood instead. It does this in three ways: by removing calcium from the bones; by increasing absorption of calcium from the intestines; and by inhibiting the kidneys from releasing calcium into the urine.

Increasing the calcium level fixes the problem of the ratio between calcium and phosphorus being too low, but now there is too much calcium in the bloodstream. Calcium starts to be deposited into tissues, especially into the kidneys themselves. This clogs the filtration system inside the kidneys, further worsening kidney disease.

Meanwhile, the parathyroid glands are now functioning without a control system to tell them to slow down or stop pulling calcium into the blood. They are like a runaway train – until they, too, start to fail. By this time, the cat in this situation is losing weight, eating poorly and showing all the other signs of kidney failure that happen as the filtration system fails.

In order to stop this whole cascade of kidney-parathyroid gland dysfunction we need to provide active Vitamin D (calcitriol) as soon as the kidneys begin to decline - when the SDMA is above 14 or when the creatinine level is between 1.6 and 2.2. Calcitriol is given as a small dose of fish-flavored liquid twice a week.

We also start fish oil supplements at this time, to help reduce any inflammation inside the kidneys that is contributing to kidney damage.

Urine testing should be done to look for any infection or sign of kidney stones that may be contributing to kidney disease.

Stage 1 CKD treatment summary: Calcitriol; fish oil; urine testing; blood pressure monitoring

Stage 2 CKD treatment: As the kidneys slowly decline, we will need to continue to monitor so we can add additional treatments when needed. We will want to start a kidney disease diet and a drug called benazepril when the urine becomes dilute, the creatinine gets to about 2.2, high blood pressure develops or we detect protein loss into the urine. This is stage 2 of chronic kidney disease.

Benazepril reduces blood pressure both throughout the body and inside the kidneys themselves, which improves kidney function and decreases risk for strokes and blindness from hypertension (high blood pressure). We also try to increase water consumption at this stage, by feeding canned food (but not cheap grocery store food full of low quality protein that makes the kidneys work harder!) or using a water fountain.

Stage 2 CKD treatment summary: Add benazepril and renal diet, increase water intake

Stage 3 CKD treatment: When the creatinine reaches about 2.5-3 we add a potassium supplement to our regimen. This is stage 3. Poorly functioning kidneys release too much potassium into the urine, depleting the potassium in the bloodstream and in the muscles. Too little potassium leads to muscle weakness and poor heart function (because the heart is a muscle too).

Stage 3 CKD treatment summary: Add a potassium supplement to the diet

Stage 4 CKD treatment: When the creatinine is about 3.5 or higher, stage 4 of the four kidney disease stages, it's time to start fluid support at home and to consider changing back from a kidney disease diet to one higher in protein. Elderly cats don't absorb protein very well from the intestinal tract and when this happens we need to provide more. If we don't, the body will break down muscle, leading to weight loss, weakness and muscle atrophy.

Currently, we have no kidney diet for this stage of age and disease. The kidney diets now available are lower in protein, so the kidneys don't have to work as hard getting rid of protein waste products, and they are restricted in phosphorus to reduce the risk for the phosphorus blood level becoming too high. They also have extra potassium to correct for loss into the urine, and are low in sodium to help keep the blood pressure down. We would like to see one of our prescription diet manufacturers come out with a diet that does all this but with more protein – especially high quality protein, such as from eggs, that would need less waste product removal after digestion. Right now, switching back to a higher protein food means adding extra potassium, a phosphorus binder to decrease phosphorus absorption from food, and often additional blood pressure medication because the sodium level is too high.

Stage 4 CKD treatment summary: Add subcutaneous fluid administration, change diet again, phosphorus binder and other support medications if needed for poor appetite or nausea

In summary, to catch kidney disease early in order to prolong your cat's life expectancy by several years:

- 1) Let us do blood testing on your cat every year, beginning at least by age 6.
- 2) Once the SDMA is above 14, start calcitriol and fish oil. Test the urine to look for underlying causes we could fix and monitor it yearly.
- 3) Once the creatinine reaches 2.2, start benazepril and kidney diet, and start testing blood pressure and urine at least once a year.
- 4) More treatments will be added as kidney disease progresses but our goal is to delay this as long as possible.

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