



## Memorial-610 Hospital for Animals

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## Chronic Renal Failure

### HOW CAN MY PET BE IN KIDNEY FAILURE?

In chronic kidney failure, urine is usually produced in excessive quantities. What the kidneys are failing to do is conserve water (they are failing to make concentrated urine). The body produces numerous toxins on a moment by moment basis. These toxins circulate to the kidneys where, dissolved in water, they are filtered out and urinated away. An efficient kidney can make highly concentrated urine so that a large amount of toxin can be excreted in a relatively small amount of water.

When the kidneys fail over a long time period, they lose their ability to concentrate urine and more water is required to excrete the same amount of toxin. The animal will begin to drink more and more to provide the failing kidneys with enough water. Ultimately, the animal cannot drink enough and toxin levels begin to rise. Weight loss, listlessness, nausea, constipation, and poor appetite become noticeable. It is common for animals, especially cats, to have a long history of excessive water consumption when they finally come to the vet's office with one of the latter complaints.

### WHAT IS MY VET READING ON THE BLOOD PANEL?

If you wish to understand your pet's status with regard to kidney failure, it is important to understand some of the parameters being monitored.

**URINE SPECIFIC GRAVITY** - This is a measure of how concentrated a urine sample is. Water has a specific gravity of 1.000. A dilute urine sample has a specific gravity less than 1.020 (often less than 1.010). A concentrated urine sample would have a specific gravity over 1.030 or 1.040.

**BLOOD UREA NITROGEN (BUN)** - This is a protein metabolite excreted by the kidney (it is one of the toxins we are concerned about). In a normal animal, the BUN is 25 or so. A good goal for BUN in kidney failure is below 80. Often at the time of diagnosis, BUN is well over 150, 200, or even 300.

**CREATININE** - This is another protein metabolite (though this one is less dependent on dietary protein intake than is BUN). A normal creatinine is less than 2.0. A good goal in kidney failure is a creatinine of 4.5

or less. BUN and creatinine will be tracked (as will several other parameters) over time and in response to different treatments.

**PHOSPHORUS** - The calcium/phosphorus balance becomes deranged in kidney failure due to hormone changes that ensue as well as the inability of the failing kidney to excrete phosphorus. If calcium and phosphorus levels become too high, the soft tissues of the animal's body will develop mineralized deposits which are inflammatory and uncomfortable. The bones will weaken as well. If phosphorus can be maintained in the normal range (less than 7.5), a special medication called "calcitriol" can be used to help prevent or slow the progression of kidney failure. Medications and special diets can be used to help keep phosphorus levels down.

**POTASSIUM** - The failing kidney is unable to conserve potassium efficiently and supplementation may be needed. Signs of "hypokalemia" (the scientific name for low blood potassium) include weakness, especially drooping of the head and neck.

**PACKED CELL VOLUME/HEMATOCRIT** - This is a measure of red blood cell amount. More literally, it represents the percentage of the blood made up by red blood cells. The hormone that stimulates the production of red blood cells in the bone marrow is made by the kidney. The failing kidney does not make this hormone in normal amounts and anemia can result. Anemia is often worsened by the extra fluid administrations needed to manage the kidney toxins. Sometimes a blood transfusion is needed or, more commonly, the pet must receive hormone injections to boost the red blood cell count.

**BLOOD PRESSURE** - Blood pressure is not something measured off a laboratory result sheet but it is important to monitor in kidney patients as there is a tendency for hypertension to develop in kidney failure. Special medications may be needed to manage this problem should it arise.

### WHAT ARE THE TREATMENT OPTIONS

What one does to address this problem depends on its stage at the time of diagnosis. More advanced cases will require hospitalization for a cycle of "diuresis." Fluids are delivered intravenously for 48-72 hours and the above parameters are rechecked. The goal is to stabilize

the patient at a toxin level where good life quality can be indefinitely experienced.

Milder cases can be managed with fluid administration under the skin ("subcutaneous fluids") at home. This sounds scary at first but, in fact, it is not uncomfortable for the pet and is easy to learn.

Also available (but very expensive) is "dialysis," where a special machine is used to filter the toxins from the patient's blood, and kidney transplantation. Both these procedures involve transfer to the University of California at Davis.

### **WHAT SORT OF TREATMENTS MIGHT MY PET REQUIRE AT HOME?**

**SPECIAL DIET:** Most prescription diet companies produce a diet with restricted protein (so as to generate less BUN), restricted phosphorus, and with other important qualities to promote metabolic health in kidney patients. Our hospital stocks multiple diets formulated for kidney patients. In some cases, simply switching to this food may be adequate treatment. There is no preventive benefit that we know of in changing to these diets prior to the onset of kidney failure.

**AMPHOJEL/PHOSPHATE BINDERS:** Amphojel is an antacid caplet used for stomach upset in people. It also binds phosphates in the diet when it is given with food. This reduces the phosphorus intake from the GI tract and helps normalize the blood phosphorus level.

**CALCITRIOL:** This medication actually represents activated vitamin D. Vitamin D is not a vitamin in the way other vitamins are or in the way we think of vitamins. Vitamin D is actually a hormone. It plays a very important role in calcium and phosphorus balance and is beneficial in preventing the progression of kidney failure when it is administered when phosphorus levels are still normal. The doses that are used are exceedingly small and must be compounded by a special pharmacy. If your pet qualifies to take this medication, special instructions on how to obtain it will be given to you.

**TUMIL K:** This is a potassium supplement available in a powder, tablet, or gel. If a patient does not seem to be maintaining a normal potassium level, such a supplement may be prescribed.

**FAMOTIDINE (Pepcid A/C®):** This is an over-the-counter medication available to reduce stomach upset. This helps to counter-act the effects of the uremic toxins

in the stomach and small intestines and helps to improve the appetite.

**EPOGEN/ERYTHROPOEITIN:** With the advent of genetic engineering, the actual hormone the kidney has stopped producing can be given by injection. This is done usually 2-3 times a week along with an oral iron supplementation. This treatment has helped many patients dramatically as the anemia that goes with kidney disease can be very debilitating. The downside to this treatment is that the product commercially available for use is of human origin and pets will ultimately produce antibodies against it (and worse still against their own remaining hormone). For this reason, this hormone is not used until anemia is more advanced and the patient really needs this treatment.

**AMLODIPINE (BRAND NAME NORVASC):** It is difficult to find a blood pressure medication that is not also toxic to the kidneys. Amlodipine is a calcium channel blocker type medication commonly used in hypertensive cats with renal failure. It also must be compounded specially in cat sized doses.

**FLUIDS UNDER THE SKIN:** This technique is important to learn as most pets in kidney failure require this treatment either right away or following hospitalization. If this process is recommended for your cat, you will receive lessons on how this technique is performed.

*Kidney failure is a complicated disease with many facets. Please do not hesitate to contact your veterinarian should you have questions or problems at home. You will periodically be contacted when it is time for your pet to have monitoring tests.*

Please do not hesitate to ask your veterinarian if you have any questions or problems regarding your pet's condition.

Adapted from "Chronic Renal Failure" by Wendy C. Brooks, DVM, DABVP