

Hypertension and Your Greyhound

As more Greyhounds are placed in adoptive homes and receive mainstream veterinary care, we learn more about the medical nuances of the breed. Certain medications, such as barbiturate anesthetics, are almost never used on Greyhounds. Some laboratory results for Greyhounds (for example, packed cell volume, creatinine and platelet count) fall outside the “normal” range for other breeds but are considered normal for Greyhounds. Syndromes not associated with other breeds are being observed in Greyhounds. One of these syndromes is hypertension, or high blood pressure.

Dr. Guillermo Couto at The Ohio State University has described a hypertension syndrome in Greyhounds. This syndrome involves underlying high blood pressure of unknown causes. Left untreated, it can lead to kidney failure or a thromboembolic event (stroke). The syndrome occurs in female Greyhounds five times more than in male Greyhounds, and in dogs as young as three years of age.

As a Greyhound lover, this probably leaves you wondering how this syndrome is diagnosed, and what the treatment would be. To understand the syndrome, let's first discuss the kidney and its functions of filtering the blood and managing blood pressure.

The main function of the kidney is to filter waste products from the blood. The kidney's filtration apparatus is the glomerulus. The glomerulus resembles a kitchen colander. The pores in the glomerulus allow certain size molecules or proteins to pass through, while others are kept in the blood stream. When damage to the glomerulus occurs, these pores become larger, allowing proteins that should remain in the blood pass to the urine. These proteins can be detected with laboratory tests to help determine the extent of damage to the kidneys.

The loss of proteins can lead to a thromboembolic (stroke) event. When the glomerulus leaks proteins, a specific protein is lost that regulates the coagulation of the blood. A blood clot may form as a result. (This is called a hypercoagulable state; that is, blood clots form when they should not.) The clot becomes lodges in a blood vessel. The location of the clot determines the clinical signs, which may include the dragging of a limb, inability to walk or sudden death.

The kidney also helps regulate blood pressure. The kidney produces a protein called renin, which is released into the bloodstream in response to low blood pressure. The renin is converted to aldosterone, which acts on the blood vessels to constrict them. This constriction causes an increase in blood pressure.

Caring People Helping Pets

2082 Cheyenne Court, Grafton, WI 53024 • phone: 262-375-0130 • fax: 262-375-4196 • www.bestfriendsvet.com



As blood pressure increases, less renin is released and less aldosterone is made; in a healthy dog, this results in blood pressure regulation.

In hypertension, there is a failure of the negative feedback on renin release. As a result, renin continues to be released and converted to aldosterone. The underlying hypertension caused by the kidney's production of renin eventually leads to kidney damage and failure.

How is hypertension diagnosed and managed? The first step in diagnosis is to measure the Greyhound's blood pressure. There is a simple non-invasive method to determine blood pressure. The dog is brought into a quiet room and placed on his side. The Greyhound is allowed to relax before the pressures are measured. A cuff is placed on the upper front leg either above the wrist or above the elbow. At least three blood pressure measurements are obtained for consistency. If the measurements are greater than 140 to 160 mmHg, the Greyhound is considered hypertensive. The veterinarian may repeat the test in a few minutes to confirm that the reading is not simply a result of the stress of the test itself or being in an unfamiliar environment. If the second measurements indicate hypertension, further diagnostic tests need to be taken.

The next step is to check kidney function with blood tests. This also gives the veterinarian a baseline value for future monitoring. However, since kidney function numbers are not elevated until two-thirds of kidney function is lost, even if the results are normal, there could be damage.

A urine sample is then obtained for two very important tests. The first is a routine urinalysis. The protein levels are checked to determine if the glomerulus is leaking the albumin it should be keeping in the blood. If urine protein is elevated, this indicates the glomerular pores are enlarged and there is some kidney damage. Next, a urine-protein-to-creatinine (UP:C) ratio test is performed to check for smaller proteins in the urine. The UP:C is a more accurate test than a simple urinalysis in determining early glomerular damage. If the UP:C is greater than 1.5, there is kidney damage. The extent of the kidney damage is indicated by the level of the UP:C.

The definitive diagnosis of kidney damage is accomplished with a kidney biopsy. There are two methods for performing the biopsy. The first involves insertion of an ultrasound-guided needle into the outer layer of the kidney. This is done with a local anesthetic and a sedative. The limitations of this method are the skill and experience of the veterinarian performing the procedure, and the small sample size that can be obtained. There is also the risk of bleeding caused by the procedure, which can be difficult to control.

The second method is to fully anesthetize the Greyhound and surgically remove a small wedge of the kidney. The advantages of this approach are several: A larger sample size can be obtained; the surgeon can visually assess where to obtain the biopsy; and if bleeding occurs, it can be stopped. The disadvantages include anesthesia itself, which always involves some risk and even more risk if the kidneys are already compromised; and the extent of the surgery itself.

Once a diagnosis of hypertension with secondary kidney damage is obtained, how is the syndrome managed and monitored?

The first step is to address the underlying hypertension. The best method is to alter the conversion of the renin to aldosterone. This is accomplished with a

class of medications called ACE-inhibitors. The most common medication in this group is Enalapril. Enalapril is dosed at 5 to 10mg/kg every 12 to 24 hours. The Greyhound is started on the initial dose, and blood pressure is monitored every two to three weeks. Some Greyhounds need much higher doses than what is reported in the literature. The Enalapril is adjusted until the blood pressure is below the 140 to 160mmHg on two or three repeat visits.

The next step is to address the hypercoagulable state. The Greyhound is started on spironolactone. This is a diuretic (diuretics promote the formation of urine by the kidney) and is dosed at 1 to 2mg/kg every 12 to 24 hours. The spironolactone serves two functions: It helps to regulate blood pressure and is thought to prevent the loss of protein involved in regulating the blood's clotting function. This second function is extrapolated from tests on humans; it is still unclear if the same result can be obtained in dogs.

Hypertension in Greyhounds is a new and little understood syndrome. The cause is not known, so the goal is to medically manage the Greyhound to reduce kidney damage and to reduce stroke. This is achieved by determining blood pressure, addressing any pressing medical issues secondary to hypertension, and adjusting medications to maintain good health.