Horses, Dogs and Flying

John E. Martin
University of Pennsylvania
Penn Hypertensive Dogs

Hypertension, or high blood pressure as it is commonly called, is a medical problem frequently seen in humans. “In people, high blood pressure causes disruption of blood vessels, peripheral vascular disease, and damage to kidneys, heart, and brain,” said Dr. Kenneth Bovee, Professor of Surgery at the University of Pennsylvania School of Veterinary Medicine. “In animals we have not seen the extensive damage to organs or the peripheral vascular disease. But hypertension can cause blindness in dogs due to bleeding in the eyes and to retinal detachment.”

Dr. Bovee explained that there are two kinds of hypertension. “Essential hypertension, which is probably hereditary, has no apparent underlying cause and appears during middle age. There is also secondary hypertension, which is due to primary disease such as abnormal metabolism of the kidneys or endocrine organs.” Secondary hypertension can be caused by a dog’s kidneys being unable to filter blood properly and treat it. High blood pressure takes a toll on the body and its organs. Blood vessels undergo a continual pounding, they scar, break down, and become stiff, making it difficult for the blood to be well-oxygenated and its organs to function properly.

The damage caused by hypertension appears to be more severe in man than in animals. “We have found some damage, but not nearly as extensive as can be seen in humans.”

At VHP, dogs with endocrine and kidney diseases are now screened for secondary hypertension. Dr. Bovee and Dr. Meryl Littman are also in the process of characterizing diseases which cause secondary hypertension in dogs.

For a number of years now, Dr. Bovee has been studying hypertension in dogs with an emphasis on primary hypertension. “I have been working with a five-year-old German shepherd/Labrador retriever mix dog was presented because of acute blindness,” he said. “The dog had bleeding in the eyes and retinal detachment. His blood pressure was 275/160.”

The dog had no other disease and it was concluded that his hypertension was primary. “We studied him and found that the pressure could be reduced through medication. Unfortunately, the disease has progressed too far, and his vision could not be saved.” The dog was donated, and he was the beginning of the Penn Hypertensive Dogs, a colony of animals with spontaneously occurring primary hypertension. A female with a similar condition was located at Michigan State University, and the mating between the pair resulted in seven puppies. A number of these had hypertension. They were bred back to their parents and offspring with hypertension resulted. “The disorder is hereditary, and we now have an animal model of spontaneously occurring primary hypertension which will allow the study of the disease.” Dr. Littman said. “There is only one other animal model: rats which have been bred for 30 generations in Japan. A dog model will allow researchers to extend the study of the disease further and perhaps open avenues for new approaches to diagnosis and treatment.”

Dr. Bovee explained that it is difficult to measure blood pressure in dogs as it is extremely labile. "Strange surroundings or a visit to the veterinarian can raise it. To get proper readings, the animal has to be trained to tolerate the pneumatic cuff or the fine needle used to measure direct pressure," he said. "Also the cuff presents a problem because the dog's leg is shaped irregularly, not permitting even pressure which must be applied." The technique used at VHP is to take direct pressure measurements. "A fine needle, containing equipment, is inserted into the femoral artery. This gives us the blood pressure. In order to do this, the dogs have to be trained to lie still. "Usually, when the puppies are about six months old, they are trained enough for us to take pressure readings. It is a quick procedure and it is painless."

Dr. Bovee explained that a dog is regarded hypertensive when the systolic pressure is at least 160 mm Hg and the diastolic pressure at least 120 mm Hg when dogs are untrained. "In the dog, clinical signs will not manifest themselves until the animal is at least three years old," he said. "The one begins to see the retinal changes." He pointed out that if hypertension is diagnosed early enough, the dog can be treated with drugs to avoid excessive damage to the retina and the eyes.

Hypertension in dogs is poorly understood. Blood pressure is controlled by 20 to 30 different factors. "When people take medication, only a few factors are affected, and some adversely. That's why blood pressure medications have undesirable side effects."

Dr. Bovee's study, which is supported by funding from NIH, should shed light more on primary hypertension. "He feels that the Penn Hypertensive Dogs can contribute much to the knowledge about the disease and that this may lead to better diagnostic and treatment methods for man and dog."

Dr. Kenneth C. Bovee is the Corinne R. and Henry Bower Professor of Medicine (Nephrology) and Chief, Section of Small Animal Medicine, at the University of Pennsylvania School of Veterinary Medicine.