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Canine Heart Disease

Investigators: Dr. N Sydney Moise, Dr. Mario Delmar and Eva Oxford

Cornell University

Status: Year 2 of 3

This research team is looking at the genetics of a specific cardiac disease that affects boxers called arrhythmogenic right ventricular cardiomyopathy, or ARVC. The investigating the connections of the heart muscle cells in this disease include Dr. Moise, Professor of Medicine and the chief of cardiology at Cornell University; Dr. Delmar, Professor of Pharmacology at Upstate Medical University, and Eva Oxford, the Ph.D. candidate student who has focused her efforts to find evidence to explain the underlying mechanism that cause the dangerous arrhythmias associated with this disease. Dr. Philip R. Fox at the Animal Medical Center is performing the confirming pathological diagnosis on the affected boxers.

What is ARVC?

Dr. Moise: ARVC stands for arrhythmogenic right ventricular cardiomyopathy. This is one possible name given to the specific cardiac disease that affects boxers. Other names that have been used include arrhythmogenic right ventricular dysplasia or boxer cardiomyopathy. In the past the disease was called dilated cardiomyopathy, but this name is really not representative of the disease. Finally, the name that is currently used does not really explain the disease either. Although the right ventricle is the most severely affected region of the heart, the left ventricle can also be affected in many cases. The name is borrowed from the one used in people as the diseases are very similar.

How is it diagnosed and traditionally treated? How effective is treatment?

Dr. Moise: Boxers most frequently have arrhythmias (abnormal heart beats) that can be present with or without clinical signs. Some boxers faint and can even die suddenly. Others go into heart failure later as the disease progresses. Treatment is for the arrhythmias and then for the signs of a failing heart. Medications can control the arrhythmias and clinical signs in many dogs, but they do not cure the disease. We also don't know if medications increase the lifespan of the dogs or not. Studies need to be done to answer these questions.

How common is it?

Dr. Moise: When asked the question of defining 'common' the answer is in the eye of the beholder. A breeder of boxer dogs who has had three dogs die with ARVC would say it is extremely common. This disease in the general population of dogs is not as

common as degenerative valve disease, but in boxers, ARVC would likely be termed a common heart disorder by veterinary cardiologist.

What do you hope to learn from these studies?

Dr. Moise: Ideally, we hope to identify the structural and functional defect at a subcellular level. By doing this we can be more precisely let to potential defective genes involved in this disease. Discovering the abnormal gene is not an easy task; therefore, understanding the pathways that are disrupted by a genetic mutation is important. We are studying both – to learn the underlying mechanism of the disease.

Results so far that you wish to share?

Dr. Moise: Briefly, we have discovered that the proteins that 'connect' the heart cells together are abnormal in their expression. Such a disruption could serve as the substrate (cause) for the arrhythmias.

Why should the average animal lover care about your study?

Dr. Moise: This is clearly an inherited disorder that could potentially be understood. With this knowledge there is hope for success. Also, understanding the real mechanistic reason for one disease will definitely not only help one breed and its problems, but the information provides insight and ideas for tackling other cardiac arrhythmic diseases.

Additional benefits occurring from this study?

Dr. Moise: Eva Oxford, who is working on this study as part of her Ph.D., has learned many scientific techniques to study fundamental disease abnormalities and she is applying for veterinary school this year. Therefore, she will have all the tools to really contribute to studying and treating disease of animals in a significant way. She will understand basic science and clinical medicine. It is only through both of these that progress can truly be made. Not only is discovery of one problem's solution important, but vital is the training of the next generation of veterinary scientists critical to the future and all the challenges that will be faced. It is necessary that we have a source of individuals with a complement of tools that span the worlds of clinical and basic science. Only in this way can true progress be made from the age of description to true understanding.