



RESEARCH PROGRESS REPORT SUMMARY

Grant 02389-MOU: Characterization of Ventricular Arrhythmias in Rhodesian Ridgebacks

Principal Investigator: Kathryn Meurs, DVM, PhD

Research Institution: North Carolina State University

Grant Amount: \$26,919.00

Start Date: 9/1/2017 **End Date:** 8/31/2020

Progress Report: Mid-Year 1

Report Due: 2/28/2018 **Report Received:** 2/23/2018

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Original Project Description:

The investigators recently identified a genetic mutation associated with heart arrhythmias in Rhodesian Ridgebacks. Dogs with the mutation appear to be at the most risk of developing an arrhythmia and suffering sudden death between 12-24 months of age, however, this timeline is variable, and some dogs appear to outgrow the arrhythmia. Due to the lack of knowledge of the specific at risk age, owners of dogs with the mutation must repeat the Holter monitor (a test to monitor heart rhythm) every few months to identify when their dog is at greatest risk and may need treatment. The objective of this study is to repeatedly perform regular Holter monitor testing on dogs with the mutation (including dogs with one copy and with two copies) every 4 months from 6-24 months of age with a final evaluation at 36 months to narrow in on the age when the arrhythmias appear to be the most severe. Gaining this increased clinical understanding of the disorder will decrease the risk of sudden death by helping owners and veterinarians in monitoring and providing treatment intervention for their dogs, and will further inform breeders and owners by characterizing the clinical and genetic manifestations of the disorder.

Funding for the research is provided through the collaborative efforts and generosity of Rhodesian Ridgeback Charitable Foundation. The AKC Canine Health Foundation supports the funding of this effort and will oversee administration of funds and scientific progress reports

Publications:

None yet.



Report to Grant Sponsor from Investigator:

We previously reported the identification of an inherited form of heart disease in the Rhodesian Ridgeback that has been associated with heart arrhythmias and sudden cardiac death. We identified a genetic mutation associated with the disease.

Dogs with the mutation appeared to be at the most risk of developing the arrhythmia and suffering sudden death between 12-24 months of age, however, some dogs appear to develop the disease earlier or later.

In this study, we proposed to study young Rhodesian Ridgebacks with the mutation starting at 6 months of age with a 24 hour Holter monitor. The objective of the study is to repeatedly perform Holter monitors on at least 30 dogs with the mutation (15 with one copy and 15 with two copies) every 4 months from 6-24 months of age with a final evaluation at 36 months.

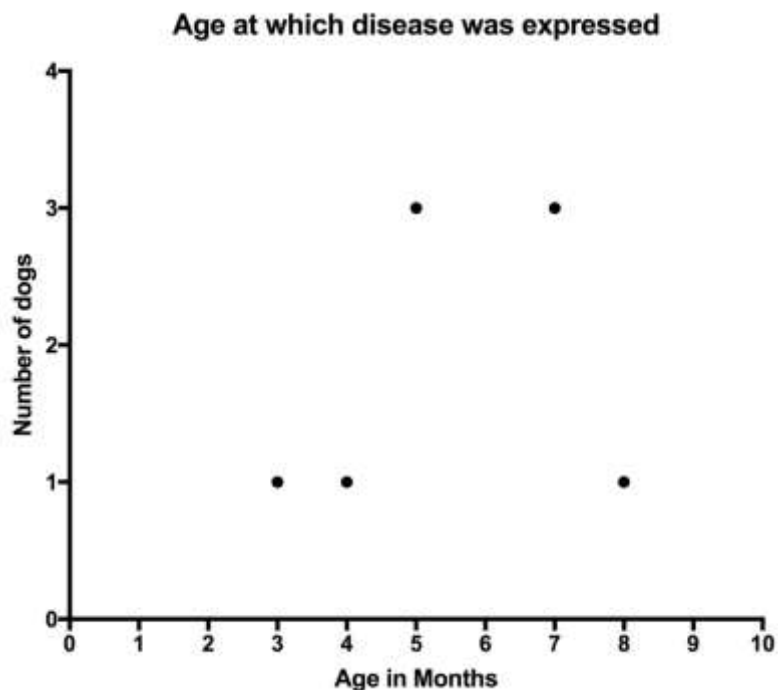
Progress to date:

At this time, we have 25 dogs participating, 12 homozygous positive and 13 heterozygous positive. We are continuing to recruit the last 5 dogs. Eight of the 25 dogs and (1 of the dogs that dropped out) have the arrhythmia (35% of the population developed the arrhythmia).

Of the 8 dogs with the arrhythmia

- Three dogs were homozygous (2 copies of the mutation) for the variant and 6 were heterozygous (one copy), this was not statistically different so it is unlikely that the genetic state (homozygous vs heterozygous) is more or less important in developing the arrhythmia.
- The mean age of arrhythmia identification was 6 months but ranged from 3-8 months.
- The average number of VPCs/24 hours was 1194 (range 8- 29,000)

Figure 1. Graph of number of dogs who expressed the arrhythmia and the age at which the arrhythmia was noted. On average, it was apparent by 6 months of age, although a few dogs developed it at 7 and 8 months of age.



This data is very preliminary but it does suggest that the arrhythmia may develop at a younger age than we previously thought. We had initially thought that it may develop between 12-14 months based on age of sudden death of a few reported dogs. However, this data suggests that the arrhythmia appears to start much younger.

Other findings:

- Two dogs were identified as having the arrhythmia as young as 12 and 16 weeks. This was initially detected by their veterinarian upon a puppy exam and we verified it with a Holter.
- It is important to note that NO dog showed any symptoms. Additionally concerning, is that we have been contacted by 4 owners whose Ridgeback died suddenly since January 1. All dogs were asymptomatic and died between 6 and 10 months of age.
- We do not know why some dogs with the mutation express the arrhythmia and others do not although this great variation in penetrance is a common finding in humans with inherited heart disease as well. We suspect that this is most likely due to an external modifier like level of daily exercise,



presence or absence of castrated state, possibly even diet. To help obtain additional information we have surveyed the owners for lifestyle information and are still analyzing this data.

Due to the risk of sudden death with this disease without any predictive symptoms we feel that owners of young Rhodesian Ridgebacks should be encouraged to genetically screen their dogs and if positive, Holters their dogs a few times before 12 months of age. If the arrhythmia is present, we would recommend discussing the need to treat the dog with their veterinarian since many dogs respond very well to treatment.