RESEARCH PROGRESS REPORT SUMMARY

Grant 02403-MOU: Microphthalmia and Delayed Growth Syndrome in the Portuguese Water Dog

Principal Investigator: Margret Casal, DVM, PhD

Research Institution: University of Pennsylvania

Grant Amount: $12,960.00

Start Date: 11/1/2017 **End Date:** 10/31/2022

Progress Report: FINAL

Report Due: 10/31/2022 **Report Received:** 5/3/2024

(The content of this report is not confidential and may be used in communications with your organization.)

Original Project Description:

Microphthalmia and delayed growth syndrome (aka "puppy eye syndrome") has been reported by Portuguese Water Dog breeders dating as far back as 1986. However, there is no information in the scientific literature and the majority of data concerning this syndrome has been obtained from records of breeders, which have anecdotal reports of the disease and little, if any, medical diagnostics. Affected dogs present with microphthalmia of varying severity, other eye abnormalities, short stature and other findings. To date, the investigators have been able to collect DNA from 24 affected dogs. Males and females can be affected, although females predominate (about 70%). Preliminary pedigree studies suggest an autosomal recessive inheritance. Human literature reports numerous syndromes associated with microphthalmia, and many genes have been identified as having a causative role. The goals of this investigation are to better characterize the clinical syndrome seen in Portuguese Water Dogs, confirm a suspected mode of inheritance, obtain additional samples for investigation into the genetic mutation, and develop a mutation based, genetic test for breeders to eliminate this syndrome from the Portuguese Water Dog breed.

Funding for the research is provided through the collaborative efforts and generosity of the Portuguese Water Dog Foundation, Inc., and the Portuguese Water Dog Club of America. The AKC Canine Health Foundation supports the funding of this effort and will oversee grant administration and scientific progress.

Publications:

Leonardo Murgiano, Esha Banjeree, Cynthia O'Connor, Keiko Miyadera, Petra Werner, Jessica K Niggel, Gustavo D Aguirre, Margret L Casal, A naturally occurring canine model of syndromic congenital microphthalmia, G3 Genes|Genomes|Genetics, 2024 https://doi.org/10.1093/g3journal/jkae067

Presentations:

A presentation for the Annual Association for Research in Vision and Ophthalmology in Baltimore, MD is being prepared.

A poster describing our findings was presented at the Annual Faculty Retreat in Bryn Mawr, PA in 2019
A presentation for the Annual Association for Research in Vision and Ophthalmology in Baltimore, MD was prepared and was to be presented but because of COVID this most important conference was canceled.

Report to Grant Sponsor from Investigator:

Through the generosity of the AKC-CHF and the POWD breeders, we have been able to find the genetic defect that causes puppy eye syndrome (microphthalmia syndrome) in the Portuguese Water Dog. The defect consists of a large insertion and deletion within a gene that is responsible for ocular development and bone marrow regulation. We have developed a genetic test that we have been offering through PennGen (www.vet.upenn.edu/PennGen) over the last few years. Since the beginning, we have tested 1757 POWDs of which 1460 were normal, 293 were carriers and 4 affected. This means that the defective allele (one copy of the defective gene) is still in the population at 8.8%, which in turn means that there are less than 0.7% affected dogs in the population. This number is probably lower now since breeders have been able to make informed breeding decisions because of the available testing. A paper has been written describing the findings and has been submitted for publication.