# RESEARCH PROGRESS REPORT SUMMARY

**Grant 02348:** Whole Blood Transcriptome Profiling of Dogs with Immune-Mediated Hemolytic Anemia (IMHA)

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| **Principal Investigator:** | Steven Friedenberg, DVM, PhD |
| **Research Institution:** | University of Minnesota |
| **Grant Amount:** | $53,471 |
| **Start Date:** 4/1/2018 | **End Date:** 9/30/2020 |
| **Progress Report:** | End-Year 2 |
| **Report Due:** 3/31/2020 | **Report Received:** 3/11/2020 |

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**Original Project Description:**

Immune-mediated hemolytic anemia, or IMHA, is a common autoimmune disease in dogs in which the body's immune system attacks its own red blood cells. Red blood cells are critical for transporting oxygen. Many dogs affected by IMHA require extensive hospitalization and blood transfusions, and often have fatal disease-related complications. While dogs of every breed can get IMHA, many spaniel breeds are overrepresented. Despite its high morbidity and mortality, IMHA and its triggers are still not well understood, which hinders the potential to develop treatments and stop this disease in its early stages. In this study, the investigators will use RNA sequencing to evaluate the genes that are active in the blood of dogs who have been newly diagnosed with IMHA. Comparing this data with that of healthy dogs without IMHA will allow the investigators to determine which genes are turned on in the early stages of IMHA. Additionally, this data may have future use in determining if any specific genetic changes are associated with activating these early onset genes. The investigators hope to identify genes which might be novel therapeutic targets for intervention in IMHA and identifying specific variants in these genes may improve understanding of which dogs are at risk for developing IMHA.

**Publications:** None at this time. That said, we have started to write a manuscript associated with this work and have begun our efforts on the introduction and methods. This manuscript will be written by one of the Internal Medicine residents (Corie Borchert) who is working with me on this project. We anticipate submitting this manuscript within the next 4-6 months.

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**Presentations:** None at this time. However, we submitted an abstract for the ACVIM Forum in 2020 in Baltimore, MD, which was accepted. Corie Borchert, the Internal Medicine resident working with me on this project, will present a 15-minute resident research talk on 6/13/2020.

**Report to Grant Sponsor from Investigator:**

We have completed the majority of the analyses associated with this project. We have identified approximately 1,500 genes that are significantly altered in dogs with a new onset of IMHA. We evaluated the function of these genes both individually and in groups. Some of these genes have important functions related to the expression of proteins on the surface of red blood cells. Altered expression of red blood cell surface proteins could be one of the triggers of the immune-mediated reaction observed in IMHA, so this would be a very novel and important finding.

We also used the gene expression data to identify genes that are associated with changes we often observe on complete blood counts in dogs with IMHA. These include genes that cause new red blood cells to be formed and genes that trigger inflammation in dogs with IMHA. Tracking changes in the expression of these genes over time may assist us in evaluating response to therapy and in providing information regarding tapering of the medications we typically use to treat IMHA.

We have several other analyses to complete regarding genetic variants that may cause some of the changes we have seen in our gene expression data, and we plan to complete these over the next 6 months.

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