



## RESEARCH PROGRESS REPORT SUMMARY

**Grant 02146-A:** Development of a Novel Drug Delivery System to Prevent Vision Loss in Canine Cataract Patients

**Principal Investigator:** Dr. Heather Chandler, PhD

**Research Institution:** Ohio State University

**Grant Amount:** \$12,960.00

**Start Date:** 9/1/2014

**End Date:** 2/29/2016

**Progress Report:** FINAL

**Report Due:** 2/29/2016

**Report Received:** 2/29/2016

### **Recommended for Approval:**

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*(Content of this report is not confidential. A grant sponsor's CHF Health Liaison may request the confidential scientific report submitted by the investigator by contacting the CHF office. The below Report to Grant Sponsors from Investigator can be used in communications with your club members.)*

### **Original Project Description:**

Cataracts are the most common cause of treatable blindness in dogs. Surgery is the only way to restore normal vision and although every effort is made to remove as much lens material as possible during cataract surgery, it is inevitable that some lens cells are left behind within the eye. These lens cells will move and multiply, resulting in the most common complication to cataract surgery, posterior capsule opacification (PCO). PCO interferes with light transmission and results in secondary vision loss in 80-100% of canine cataract patients. Unfortunately, there is no consistently effective treatment for PCO. Studies performed in laboratory animals have found that use of a commonly prescribed drug, Cyclosporine, can decrease PCO formation. We believe that Cyclosporine may provide a safe and reliable option to prevent PCO. Using a rabbit model, this study will evaluate the effectiveness of a novel drug delivery device to release Cyclosporine at the correct dose and time needed to prevent PCO. All eyes will undergo cataract surgery; some eyes will be treated with the delivery device releasing Cyclosporine while other eyes will be treated with the delivery device and no Cyclosporine. We expect that our novel drug delivery device will be able to release Cyclosporine for at least one week at the correct dose to prevent PCO. If successful, future studies will focus on incorporating Cyclosporine drug delivery in clinical trials, potentially providing ophthalmologists a new method of restoring and maintaining excellent vision in dogs that have been blinded by cataracts.



## **Report to Grant Sponsor from Investigator:**

This study evaluated the effectiveness of a novel drug delivery device to release Cyclosporine at the correct dose and time needed to prevent PCO. All eyes underwent cataract surgery; some eyes were treated with the delivery device releasing Cyclosporine while other eyes were treated with the delivery device and no Cyclosporine. Animals were observed over a 7-week time period. Our novel drug delivery device was able to release Cyclosporine for one week; however, the release kinetics in the living eye did not match the release kinetics observed in the laboratory. While drug was detected in the eye on day 7, the levels were not at levels sufficient to prevent PCO. Within the first 21 days, a non-significant delay in PCO was found in the Cyclosporine treated eyes although by study end, all eyes developed a similar amount of PCO. No other eye tissues were damaged by either the drug or the drug delivery device. Collectively, our data indicates that a burst of Cyclosporine was released shortly after cataract surgery and this was enough to delay early formation of PCO. Unfortunately, because the drug release did not extend long enough at the required doses, long-term PCO could not be prevented or delayed. This supports the continued use and refinement of this drug delivery device to improve its effectivity. Due to the unexpectedly poor drug release rates in the living eye, we have reformulated our drug delivery device to allow for more precise control. Future studies will focus on characterizing our new drug delivery formulation with the hopes of ultimately incorporating Cyclosporine drug delivery in clinical trials. This will provide ophthalmologists a new method of restoring and maintaining excellent vision in dogs that have been blinded by cataracts.