RESEARCH PROGRESS REPORT SUMMARY

Grant 02318: Genetic and Environmental Risk for Lymphoma in Boxer Dogs

Principal Investigator: Lauren Trepanier, DVM, PhD

Research Institution: University of Wisconsin, Madison

Grant Amount: $112,861.00

Start Date: 1/1/2017 **End Date:** 6/30/2019

Progress Report: End-Year 2

Report Due: 12/31/2018 **Report Received:** 12/31/2018

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Original Project Description:

Lymphoma is a fatal cancer of the blood cells that can occur in any dog. Lymphoma is more common in Boxers, Golden Retrievers, and several other purebreds, which suggests involvement of inherited genes. Recent research has focused on gene mutations in the tumors of dogs with lymphoma. However, we do not understand why these mutations accumulate in certain dogs, and this understanding is essential for disease prevention. Canine lymphoma resembles Non-Hodgkin lymphoma (NHL) in humans, which is more common in industrialized countries and is associated with chemicals found in tobacco smoke, certain household products, pesticides, herbicides, and fungicides. Glutathione-S-transferases (GSTs) are enzymes that can break down toxic chemicals in the body and prevent tumor mutations. Inherited gene defects in the 3 major GST enzymes, GST-theta, GST-pi and GST-mu, each increase NHL risk, and simultaneous defects in more than one enzyme further increase NHL risk.

The investigators have characterized two GST-theta enzymes in dogs, and both have defective gene variants. So far, their findings suggest one variant is a risk factor for lymphoma in dogs of varying breeds. However, the genes for canine GST-pi and GST-mu enzymes have not yet been explored. This research will determine whether defective GST genes along with certain household and yard chemicals are associated with lymphoma in dogs, with a focus on the high-risk Boxer breed. The overall goal of this study is to identify combinations of genes and environmental chemicals that contribute to the development of lymphoma in dogs, so that better cancer prevention strategies can be developed.

Publications: None at this time.

Presentations:

Brianna Lynch, Joanne Ekena, Stephanie Wong, Lauren Trepanier. "*Genetic polymorphisms in GST-pi in boxer dogs, a breed at high risk for lymphoma*." Poster presentation at the UW-Madison Undergraduate Research Symposium, April 2018.

Kyle Granger, Nate Latus, Kaitlyn Craun, Lauren Trepanier. "*Polymorphisms in glutathione-S-transferase (GST) genes in boxers with lymphoma versus unaffected older boxers*." Veterinary Scholars Program National Symposium, Texas A&M University, August 2018.

Report to Grant Sponsor from Investigator:

GST genes defend against environmental chemicals that could cause cancer. Our goals for this study are to determine whether defective GST genes are more common in the boxer breed, which has a high risk of lymphoma, and are associated with lymphoma in boxers in combination with environmental exposures.