AMERICAN KENNEL CLUB
CANINE HEALTH FOUNDATION®
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# RESEARCH PROGRESS REPORT SUMMARY

**Grant 02204-T:** Using Enhanced Imaging to Evaluate Tumor Margins for Canine Mammary Cancer and Soft Tissue Sarcoma

**Principal Investigator:** Laura Selmic, BVetMed

**Research Institution:** The Ohio State University

**Grant Amount:** $9,271.60

**Start Date:** 7/16/2018 **End Date:** 12/30/2018

**Progress Report:** FINAL

**Report Due:** 12/30/2018 **Report Received:** 12/31/2018

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**Original Project Description:**

Surgery is the primary treatment for many common tumors affecting dogs including mammary tumors and soft tissue sarcomas (STS). For these tumors, the best chance of cure is offered if the surgeon can fully remove both visible and microscopic traces of the tumor. Unfortunately, to do this, surgeons must rely on indirect and crude methods to assess the extent of the tumor during surgery. The success of the procedure will not be known until several days later, following sample assessment by the pathologist. After surgery, decisions regarding the necessity of further treatment and the patient's prognosis are often determined from the pathology results. For malignant tumors, if the disease is minimally or incompletely removed, further surgery or radiation therapy is often required. Additional treatments such as these can result in further risk and discomfort for the patient as well as present emotional and financial costs for owners. Optical coherence tomography (OCT) is an emerging diagnostic imaging tool that uses light waves to generate real-time, high-resolution images of tissue at a microscopic level. These images can be used to evaluate for residual disease at the time of surgery giving immediate feedback to the surgeon. This study will focus on validating this technology for the imaging of surgical margins of two important canine cancers - mammary tumors and STS. If successful, this technology can be used to assess for residual cancer during surgery to benefit patients by guiding accurate treatment recommendations and attempting to reduce the need for additional treatments or surgery, and thus advancing the standard of care for canine patients.

**Publications:**

Mesa KJ. Selmic LE, Paritosh P, Monroy GL, Reagan J, Samuelson J, Driskell E, Li J, Marjanovic M, Chaney E, Boppart SA. Intraoperative OCT for Soft Tissue Sarcoma Margin Identification. *Lasers Surg Med*. 2017; 49(3):240-248.

Selmic, L. E., Samuelson, J., Reagan, J. K., Mesa, K. J., Driskell, E., Li, J., ... Boppart, S. A. (2018). Intraoperative imaging of surgical margins of canine soft tissue sarcoma using optical coherence tomography. *Veterinary and Comparative Oncology*. https://doi.org/10.1111/vco.12448

Samuelson JP, Selmic LE, Driskell EA, Allender MC. Assessment of resected canine soft tissue sarcoma surgical margins using radial and tangential sectioning methods. Draft to be submitted to Vet Comp Oncol.

Selmic LE, Samuelson J, Reagan JK, Mesa KJ, Driskell E, Li J, Marjanovic M, Boppart SA. Diagnostic accuracy of intra-operative optical coherence tomography imaging of surgical margins of canine soft tissue sarcoma. In preparation.

**Presentations:**

Selmic LE. Optical coherence tomography for surgical margin imaging. ACVS Surgical Summit 2018, Phoenix.

Selmic LE. The quest for imaging to improve outcome in surgical oncology. ACVS Surgical Summit 2018, Phoenix.

Selmic LE. Intraoperative imaging of surgical margins. NAVC, Orlando, FL, February 2017.

Selmic LE, Reagan J, Driskell E, Samuelson J, Mesa KJ, Marjanovic M, Boppart S. Intraoperative optical coherence tomography for soft tissue sarcoma surgical margin assessment. Submitted for abstract presentation, ACVS Surgical Summit 2017, Indianapolis.

Selmic LE, Reagan J, Samuelson J, Driskell E, Mesa KJ, Marjanovic M, Boppart S. Evaluation of optical coherence tomography for surgical margin assessment in resected canine soft tissue sarcomas. Submitted for poster presentation, ACVP 2017.

Invited presentation in October 2016 at American College of Veterinary Surgeons Surgical Summit, Seattle, WA. Topic of optical coherence tomography for intraoperative cancer imaging.

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**Report to Grant Sponsor from Investigator:**

Thank you for supporting our project titled "Using Enhanced Imaging to Evaluation Tumor Margins for Canine Mammary Cancer and Soft Tissue Sarcoma". This project investigated an emerging diagnostic imaging tool, optical coherence tomography that uses light waves to generate real time high-resolution images of tissues for detection of residual cancer cells immediately following surgical removal. Our research team involved collaboration between veterinary medicine and engineering at University of Illinois and more recently The Ohio State University. We completed enrollment for first phase of this project where we have looked at imaging soft tissue sarcomas and mammary tumors after surgical removal in dogs. In the first phase we have performed initial comparisons between the images from optical coherence tomography with biopsy slides of these areas. This phase allowed us to identify features of the tissues and trained our imaging operators for the second phase of the project. To date, our assessments have been encouraging and we have seen good correlation between optical coherence tomography imaging features seen and biopsy results. We have also completed accrual for the second phase of the project where 25 cases with mammary tumors and 25 cases with STS were scanned with the imaging tool during surgery to assess for residual cancer. We have trained observers and are now finding out the observer assessments of our data to see how well the imaging is interpreted by different specialists: surgeons, optical coherence tomography specialists, pathologists and radiologists. Following receiving these results we will perform statistical analysis and report our findings in manuscripts.

We are very grateful for your support. Our team will continue to work hard to complete the final stages of this evaluation of this cutting-edge and promising technology for detection of residual cancer cells following surgery. Advancement of our knowledge of residual cancer cells at the time of surgery will help to improve options and outcome for dogs.