Development of a Novel Blood-Based Diagnostic for Canine Lymphosarcoma

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Lymphosarcoma (LSA) is the most common malignant neoplasia in dogs. BIN1 is a 20 exon, ubiquitous membrane-associated protein that, in cancer cells, is alternatively transcribed to include exon 13. As a membrane-associated protein that is released in microparticles, BIN1 is also blood available. The aim of this proof of principle study was to determine whether the cancer isoform of plasma BIN1 (BIN1+13) is in the blood, can be used to diagnose LSA, and will correlate with induction of remission in dogs treated with chemotherapy. Samples were taken from 28 normal dogs and 17 dogs with LSA. Of the 17 dogs with LSA, there were 14 pre-treatment samples, 10 post-treatment samples, and 7 that had match pairs of pre and post treatment. Using an ELISA assay with BIN1+13 specific antibodies, I determined that BIN1+13 average concentration for the normal group versus the LSA pre-treatment group was 0.087 ng/ml versus 2.313 ng/ml, respectively ($p<0.00000005$). The average BIN1+13 concentration for the paired experimental group of 7 dogs prior to chemotherapy was 3.144 ng/ml, which reduced to an average of 0.618 ng/ml ($p < 0.005$) after chemotherapy. The highly significant increase in plasma BIN1+13 levels in dogs with LSA, and the highly significant decrease in plasma BIN1+13 in dogs treated with chemotherapy, suggest that BIN1+13 could be an effective biomarker to diagnose and guide treatment of canine LSA. My results support additional clinical studies to explore the role of BIN1+13 as a novel blood based biomarker that can guide lymphoma therapy in both dogs and humans.

Awards Won:
Third Award of $1,000