

FINAL REPORT



Understanding Why and How Canine Osteosarcoma Tumors Spread

Dr. Jaime F. Modiano, University of Minnesota, D15CA-047

RESULTS: Researchers identify key process in how osteosarcoma tumors spread in dogs.

Morris Animal Foundation-funded researchers from the University of Minnesota looked at how tumor cells are able not just to survive but thrive in new environments. Studies show that tumor cells regularly enter the circulation. Most of these cells die because they fail to adapt to conditions of growth outside the primary tumor niche. However, rare cells survive at distant sites such as the lungs and re-establish a new niche that is suitable for tumor growth. Because many cancer patients die not of the primary tumor but from metastatic disease, understanding how tumor cells establish themselves in distant tissues could provide a target for new cancer treatment.

The Minnesota team wanted to know why some cells survive and others don't in new tissue sites. They focused their study on canine osteosarcoma tumor cells, a cancer that preferentially spreads to the lungs. The team identified how exosomes (nano-sized cargo bags) carry genetic material via the bloodstream to new sites for tumor cell growth. Nearly all cells, including cancer cells, release exosomes. Exosomes carry critical information from the cells of origin, including some proteins as well as genetic material, DNA and RNA. This cargo essentially provides operating instructions for how the cancer can set up shop in distant locations in the body.

The team identified a gene signature within exosomes that may be useful to detect osteosarcoma early in the disease or detect relapse during treatment.

Together, these findings are helping researchers better understand metastatic disease in dogs and other animals with cancer. The next research steps would include identifying specific components in exosomes and the roles they play in altering the environment to favor tumor growth and metastasis. Understanding this process could help inform the discovery of new therapy targeting metastatic disease, the cause of most deaths from cancer.

Thank you to the Briard Club of America Health & Education Trust for their generous support.