Circle of Discovery
Morris Animal FOUNDATION
FINAL REPORT

Developing a New Tool to Study Viral Infections and Cancer in Dogs

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RESULTS: Researchers identify “infection signatures” that warrant further investigation

Morris Animal Foundation-funded researchers from North Carolina State University attempted to create a tetramer, an essential tool used in immunology research that is not currently available for dogs. In humans, tetramers are used to visualize changes in the numbers and activity of killer T-cells, which are critical cells to the body’s immune defenses against viruses and cancer.

Killer T-cells remove infected or cancerous cells from the body after recognizing a small signature (a peptide) that the affected cell displays on its surface to signal its abnormal condition. Because tetramers cleverly mimic this peptide signature, they can stick to a particular T-cell and cause it to “light up” when passed through a laser beam, making them visible to the researcher. This technology is very useful in monitoring killer T-cell responses to infections or cancer, or to vaccines for these diseases, and in understanding how such T-cell immunity can be maximally enhanced to produce the most potent immunotherapies for these diseases.

In this study, the North Carolina State University team attempted to construct the first canine tetramer that could identify the T-cells that recognize canine distemper virus (CDV), since most dogs have immune responses against this virus due to routine vaccinations. Ultimately, the intent was to use this model tetramer as an immune “benchmark” in the study of killer T-cell responses to tumors.

This discovery process did uncover, for the first time, the small peptide signatures of CDV that can be specifically recognized by canine killer T-cells. Importantly, peptides that are aberrantly made by cancer cells and presented for T-cell recognition also were found. Because these peptides can permit killer T-cells to target cancer cells and leave normal cells unharmed, they have potential to serve as components of a new anti-cancer vaccine. The final assembly of the tetramer is pending further study and confirmation of T-cell recognition of these viral and cancer peptides.