WINN FELINE FOUNDATION
For the Health and Well-being of All Cats
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FELINE RETROVIRAL EXPRESSION AND IMPACTS ON FELV SUSCEPTIBILITY

PROJECT STUDY: Relationship of feline endogenous retroviral expression to individual genotype and impacts on FeLV susceptibility.

Principal Investigators: Elliot Chiu, PhD, Sue VandeWoude DVM, Professor; Colorado State University

Final report summary, W18-013

The investigators have conducted two studies supported by this grant. **Aim 1** focused on FeLV-infection in peripheral blood cells as a comparison to skin cells from domestic cats. Previously they have shown that FeLV can infect and replicate in fibroblast cultures. Furthermore, they determined that the ability for cells to replicate the virus appears to related to the number of related endogenous retroviruses embedded in the cat's genome. Endogenous retroviruses are viruses that have integrated into the DNA of a cat early on in evolutionary history. Since then, these viruses have acquired changes that make them incapable of producing infectious virus. However, the investigators have determined that these parts of the genome still interact with the infectious FeLV. Their hypothesis is that these endogenous retroviruses that once stemmed from FeLV infection have been hijacked by the host and now may actually help to protect cat cells from FeLV infection. They have also demonstrated that cat blood cells are inherently more resistant to FeLV infection in culture. By reviewing data stored in a repository, they have found further evidence that the endogenous retrovirus RNA produced in the cell may inhibit infection with the virus that causes disease in cats.

Retroviruses like FeLV consist of protein-encoding genes flanked by two non-coding regions, LTRs. These regions have multiple functions, including regions that promote transcription of regions directly adjacent and far away from the LTRs. In other retroviral systems, the LTRs have actually been shown to help guide and alter host-gene expression. The investigators then set out to examine where endogenous retrovirus LTRs are harbored in the domestic cat genome as this may relate to how they interact with infectious FeLV.

They have analyzed samples from 20 cats from three different 3 populations. They have also used next generation sequencing techniques to characterize the location of endogenous FeLV LTRs, and have begun to describe the host proteins that are positionally associated with the endogenous retroviruses. They are currently finishing their analysis to determine how FeLV-LTR in the normal cat genome might be impacting cell factors that relate to protection against FeLV infection.

(Dr. Chiu received a New Feline Investigator Grant Award for this project.)

Manuscripts in Preparation for publication:

Chiu ES and VandeWoude S. Comparisons of feline leukemia virus (FeLV) Susceptibility of puma (Puma concolor) and domestic cat (Felis catus) cells in relation to endogenous FeLV elements.

Chiu ES, Gagne RB, Lee JS, and VandeWoude S. Characterization of Endogenous Feline Leukemia Virus (enFeLV) Long Terminal Repeat (LTR) Integration Site Diversity. *In preparation*

Presentations:

Chiu ES & VandeWoude S. Domestic cats are genetically resistant to feline leukemia virus: Evidence from *in vitro* and *in vivo* infections. Ecology and Evolution of Infectious Diseases: 10-13 June 2019. Princeton, NJ (POSTER PRESENTATION; **Runner up – Within Host Interactions**)

Chiu ES. Role of Endogenous Retrovirus in Control of Feline Leukemia Virus Infection and Implications for Cross Species Transmission. Doctor of Philosophy Dissertation Defense: 3 May, 2019. Fort Collins, CO

Chiu ES & VandeWoude S. Endogenous feline leukemia virus (FeLV) may provide protection against exogenous FeLV infection. *International Workshop on Retroviral Pathogenesis*: 8-12 October 2018. Awaji, Japan (ORAL AND POSTER PRESENTATION)

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