Winn Feline Foundation Progress Report

Winn Grant Number (W-, MT-)	W13-029
Project Title	Phenotypic characterization of feline cardiomyopathy in Norwegian Forest cats using echocardiography, plasma biomarkers and histopathology
Institution	Royal Veterinary College
Investigator(s)	Prof. Virginia Luis Fuentes, Prof. Ken Smith, Dr Jessie Rose Payne , Kieran Borgeat, Julia Sargent, Lois Wilkie
Project Start Date	May 2013
Report Number	Final report
Current Date	15 Feb 2016

Study Objectives

(1) **to define the phenotypic characteristics of cardiomyopathy in Norwegian forest cats (NFCs)** using echocardiography and pathology

Progress: 100% completed

(2) to evaluate the sensitivity and specificity of plasma biomarkers to identify cardiomyopathy in NFC

Progress: 100% completed

(3) to collect and store blood samples (DNA) for future genome-wide association studies to search for potential causative mutations for cardiomyopathy in NFC.

Progress: 100% completed

Non-Confidential, Lay Language Progress Summary

This Winn Feline Foundation grant has allowed us to employ multiple diagnostic approaches to help define the characteristics of heart muscle disease (cardiomyopathy) in Norwegian Forest cats (NFCs). We have shown that cardiomyopathy is inherited in NFCs, and we have identified some common features, such as absence of a heart murmur. From microscopic examination of NFCs that have died from their heart disease, we have identified abnormalities that suggest NFC cardiomyopathy includes some features of hypertrophic cardiomyopathy (HCM). In HCM, the walls of the main pumping chamber of the heart (the left ventricle) become thickened. Affected NFCs also have features of the less commonly seen restrictive cardiomyopathy (RCM), where the walls of the left ventricle appear normal with ultrasound, but the muscle is stiff and infiltrated with scar tissue when examined under the microscope.

The characteristics of NFC cardiomyopathy make it particularly challenging to diagnose before disease is advanced- veterinarians are unlikely to hear anything abnormal when listening to an affected cat's heart, and even echocardiographic screening with ultrasound can be challenging in the early stages as subtle thickening of the walls of the heart is easy to miss. Our experience has been that most cats presented for echocardiographic screening are normal or mildly affected, whereas severely affected cats often deteriorate so rapidly that they can only be investigated by autopsy. For this reason, we wanted to evaluate blood tests (the 'biomarkers' NT-proBNP and Troponin-I) as an alternative way to detect NFCs at risk. Unfortunately biomarkers did not reliably identify mildly affected cats, but we were not able to examine any severely affected cats before death so we were unable to test the performance of biomarkers for identifying severe cases.

Samples from examined cats were stored for DNA analysis. In order to identify any underlying genetic mutation, it is essential to have DNA samples from cats clearly classified as affected or unaffected. This study has allowed us to collect such samples, and will enable us to proceed to the next stage. Our hope is that ultimately, a blood test or cheek swab test will be available to identify affected NFC.

We are extremely grateful for all the support we have received from NFC breeders and owners so far. We hope that with your continued help, we can find the underlying cause of this distressing disease and thus help breeders identify affected cats prior to making breeding decisions.