



WINN FELINE FOUNDATION

For the Health and Well-being of All Cats

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EVALUATING NONINVASIVE MEASURES OF CHRONIC STRESS IN CATS

PROJECT STUDY: Quantification and evaluation of long-term cortisol in the hair and nails of cats: novel, noninvasive measures of chronic stress in cats

Principal Investigators: Drs. Elena Contreras and Michael Lappin; Colorado State University

Interim report summary, MT17-017; New Feline Investigator Grant Award (2017)

This project evaluating feline hair and nail cortisol concentrations is approximately halfway complete. The expenditure of funds for this project is within expectations. The enzyme immunoassay (EIA) has been successfully validated for the quantification of cat hair and nail cortisol, and the technique is now being used on our samples. The cortisol concentrations have been determined in 36 samples thus far; this includes 25 hair and 11 nail samples. There are another 45 samples including 25 hair and 20 nail samples from 15 cats that are awaiting laboratory processing and analysis. A cat behavior, medical, and stress level questionnaire has also been constructed and administered to the owners of the cats that provided samples.

Preliminary results suggest that cat hair cortisol amounts vary widely depending on body location from which the hair was clipped, type of hair (undercoat vs regular, guard hair), and portion of hair sampled (root vs tip). Nail cortisol amounts appear to be more consistent if comparing front vs rear nails or a combination of both; however, nail cortisol concentrations were overall much lower than hair cortisol concentrations. Although hair cortisol amounts varied within each cat, preliminary results suggest that the average hair cortisol concentration in a cat is related to the cat's average nail cortisol concentration.

Both hair and nail cortisol concentrations were markedly increased in those cats that were evaluated as being chronically stressed and that had an ungroomed, unkempt appearance. Hair and nail cortisol concentrations were very low in those cats that were evaluated as being happy, unstressed cats that had groomed, soft fur. Chronic illness did not appear to increase cortisol level if concurrent stress was not associated with the cat's adaptation to the illness and quality of life.

After the investigators receive results from the 45 samples currently being processed, they will evaluate whether the methodology to quantify nail cortisol should be modified so that a larger amount of cortisol can be extracted from the nails. This might entail assistance from another laboratory. They will also further evaluate the differences in cortisol between hair types and correlation with nail cortisol amounts. Results from those 45 samples will also guide selection of cats from which to obtain hair and nail clippings for the last half of the study. The relationship between hair and nail cortisol levels and questionnaire responses will also be assessed; they will evaluate the contribution of owner-reported stress level of the cat, grooming behaviors, chronic illnesses, household factors, and other variables to differences in cortisol levels between cats.

The principal investigators are excited about their results to date. The unexpected yet important findings regarding variation in hair cortisol in each cat, are those which have not been sufficiently evaluated in the literature but should be understood if veterinarians and organizations intend to use hair cortisol as a measure of chronic stress in cats. Furthermore, their findings regarding nail cortisol quantification are promising and might provide an accurate and non-invasive means of determining chronic stress in cats. This method of assessment would be particularly beneficial when treating or managing a cat with suspected behavioral issues, and it would be a novel and important method of evaluating chronic stress in cats in long-term facilities such as research facilities, catteries, or shelters.

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