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**Epidemiological Aspects
of
Feline Hyperthyroidism in New Zealand**

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Abstract

A questionnaire-based case-control study of 375 cats was conducted in New Zealand over a 14-month period from 1996 to 1998 and then used to identify possible risk factors for feline hyperthyroidism.

The owners of 125 hyperthyroid cats, 125 age- and sex-matched and 125 random control cats were asked 64 questions, about their cats' exposure to potential risk factors including: cat and owner demographics, each cat's medical history, the indoor and outdoor environment, the cat's diet and feeding practices.

For the clinical cases a questionnaire of 10 questions completed by the attending veterinarian provided the demographic data, the cat's medical history and clinical signs before, and at the time of diagnosis of hyperthyroidism.

A range of statistical techniques was employed to analyse the data, including univariate odds ratio and chi-squared calculations, stepwise forward unconditional (case-random controls) and conditional (case-matched controls) logistic regression, frequency analyses and Cox regression (proportional hazards model) for case-random status. Kaplan-Meier survival analysis was used for hyperthyroid cats to evaluate the effects of a number of different treatments, including medical, surgical and radioactive iodine treatment, on survival time (months) of the cats after the diagnosis and up to the final date of the study.

Variables that were positively associated with feline hyperthyroidism from the case-random control comparison included age, breed, sex, age at desexing, history of any oral cavity diseases, sleeping predominantly on the floor, regular use of anti-flea products (in particular applied to the cats'

bed/bedding) and eating more than ½ of the daily diet as a commercial canned food.

Older cats were more likely to develop hyperthyroidism. Siamese cats were found to have a lower risk for developing hyperthyroidism. Females were three times as likely to develop the condition as males. With cat's age at desexing, the category "don't know", which indicated either that the cat had had a previous owner or was of unknown origin, was associated with increased risk for developing hyperthyroidism. Although oral cavity diseases were controlled for age, the occurrence of dental disorders was associated with a five-and-a-half-fold higher risk of developing hyperthyroidism. A 6.6-fold increase in risk of developing hyperthyroidism was calculated for cats sleeping predominantly on the floor. Cats eating half or more of their daily food as a canned commercial cat food were shown to have twice the risk of developing hyperthyroidism as those cats whose diets excluded canned food.

In order to focus on factors which might influence occurrence of the disease in cats at similar constitutional risk of feline hyperthyroidism a second investigation was conducted in which each case was compared with a control animal matched on sex and age (± 1.5 years) for the case.

In this comparison, cats with episodes of diarrhoea were seven times more likely to have hyperthyroidism. The use of fly sprays in the cat's indoor territory was also associated with an increased risk of developing this disorder. Cats eating a variety of flavours of commercial canned cat food had 3.8-fold increased risk of developing hyperthyroidism compared with cats whose diets consisted of a single flavour of canned food. The interaction between drinking water from puddles and the regular use of animal/plant origin fertilisers (sheep manure, compost, commercial blood

and bone fertiliser) in the cat's outdoor territory was associated with a 5.3-fold higher risk of developing disease.

Other variables that appeared to have some protective effects included "more than one cat in the household" (from the case-matched model) and the previously mentioned protective effect of breed, for Siamese cats only, from the case-random control comparison.

The questionnaire completed by veterinarians provided information on history and clinical findings in affected cats. The frequencies for the clinical signs weight loss, polyphagia, hyperactivity, tachycardia and palpable thyroid gland(s) were 92%, 68%, 34%, 62% and 56% respectively. Skin changes, episodes of vomiting and decreased activity had the following frequencies: 49%, 26% and 11% respectively.

The increased number of feline hyperthyroidism diagnoses in the warmer six months of the year, from October until March, indicates seasonality of recognition of disease, but may not represent true date of onset.

The relevance of the identified risk factors to the aetiology of feline hyperthyroidism is discussed, bearing in mind that some of the potential risk variables mentioned earlier could be the result of the disease itself. The analysis of this study suggested that further investigations should be undertaken into the molecular basis of the disease, into dietary factors and other potentially important risk factors such as insecticides, breed and sex susceptibility.

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Dedication

This thesis is dedicated to all the cats of the world, small and big, domestic and wild, in particular to the late Mimusia, Spust and Simon

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