

## **A case control study to identify risk factors for feline injection site sarcomas in the United Kingdom**

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Feline injection site sarcomas (FISS) are a rare but frequently fatal neoplasm of cats. Previous studies in North America have suggested that vaccination, adjuvants within vaccines, and/or particular antigens are risk factors for tumour development. More recently it has been suggested that other injections and microchips may also be involved. These tumours are potentially lethal adverse event of vaccination/injection and have caused much controversy over the safety of feline vaccination. A case-control study was designed and implemented to identify risk factors for FISS development in the UK.

Practices (control practices) that submit samples for histopathology to one of our 4 collaborating diagnostic laboratories were invited to enrol in the study to recruit both cases and controls. For the purposes of this study the target population was the population of cats that attended these practices.

A case was defined as a cat with a tumour that had 7 or more (out of 10) histopathological features that had been identified by the development of a consensus of opinion amongst 5 expert pathologists. The location of the tumour and/ or previous vaccination history were not included in the case definition. A control was a cat that did not have a FISS. An exclusion criteria that stated every cat in the study had to be over 5 years of age (to ensure adequate vaccination/injection history was obtained) was applied.

Cases were identified prospectively from control practices and enrolled into the study. At the same time 4 different control practices were randomly chosen to select a control. A questionnaire was distributed to the owners of cases and controls to collect data regarding lifestyle, vaccination history etc. Univariate and multivariate analyses to identify risk factors for FISS development were carried out using .SPSS v16.0.

Response rates of 71% for cases and 65% for controls were achieved. Following a review of the histopathology 134/166 (82%) of tumours met the case definition and were used in the analysis with 604 controls. Cats of mixed breed had an increased odds of disease compared to pedigree cats. Hunting, fighting and being in a multi-cat household were associated with FISS development on univariate analysis. Increased odds of disease were also associated with vaccination and the use of spot-on topical insecticides

This is the first epidemiological study concerning FISS in the United Kingdom. This study investigated multiple risk factors and indicated that risk factors other than vaccination may increase the odds of tumour development. It also demonstrates that it is possible to effectively carry out a case-control study involving first opinion small animal practices.