Animal ***Health*** Trust
Oncology Research Group

Research study to identify Genetic Risk Factors for Mast Cell Tumours in Boxers

With the invaluable support of The British Boxer Club, in the autumn of 2009 the Oncology Research Group at the AHT was successful with an application to the Kennel Club Charitable Trust for funding for a study to identify inherited genetic alterations responsible for Boxers, as a breed, having an increased susceptibility to developing mast cell tumours. The study has subsequently benefited from a generous donation from Home Counties Boxer Welfare. It is hoped that the research will enable the development of a DNA test that can be used to identify individual Boxers that are more likely to develop mast cell tumours.

Since the study began in January 2010 (and in collaboration with scientists in Sweden, the Netherlands and the United States), we have analysed ('genotyped') DNA samples from 139 Boxers with mast cell tumours, and 117 Boxers aged at least 7 years old that have never had a mast cell tumour. We have been searching for genetic markers (called 'SNPs'), amongst the 170,000 SNPs that we look at in each DNA sample, that are present much more frequently (than would be expected by chance) in the DNA of Boxers with mast cell tumours. Such SNPs would indicate the locations on particular chromosomes that contain genetic alterations that cause an increased risk of developing mast cell tumours. Although we have found SNPs on two chromosomes that may be located close to such genetic alterations, the results are inconclusive. Consequently we need to analyse additional DNA samples from both Boxers with mast cell tumours and unaffected dogs, and continually re-analyse the data until we obtain conclusive results. In addition to continuing to collect samples from Boxers which have, or have had, a mast cell tumour, we particularly wish to collect samples from 'veteran Boxers' (dogs aged at least 10 years old) that have never had any type of cancer. This is proving to be a major obstacle to progress with the study, and we really need the help of Boxer owners and breeders to collect these samples.

In addition to continuing with the conventional 'genetic mapping' strategy to search for genetic risk factors for mast cell tumours in Boxers, we are also considering attempting an entirely new approach. The new approach is to 'decode' the 2.4 billion 'letters', which comprise the DNA in each dog, from both a number of Boxers with mast cell tumours and a number of elderly, unaffected Boxers, and attempt to identify consistent differences between the DNA from Boxers with mast cell tumours and the DNA from unaffected Boxers. Such differences may represent inherited genetic alterations that cause an increased susceptibility to developing mast cell tumours. Unfortunately, this approach is not straightforward, as it is difficult to prove which genetic alterations may contribute to an increased risk of developing cancer. In addition, the 'decoding strategy' (properly referred to as 'whole genome DNA sequencing') currently costs around £5,000 per dog, and so there is a considerable challenge to find sufficient funds to make this approach achievable.

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