The GENetic associations with dilated cardiomyopathy in DEERhounds (GENDEER) Study

Dr Emily Dutton from Cheshire Cardiology, Professor Jo Dukes-McEwan from the University of Liverpool and Professor Ottmar Distl from University of Veterinary Medicine Hannover, Institute for Animal Breeding and Genetics, have been awarded PetSavers funding to investigate any genetic associations with dilated cardiomyopathy (DCM) in deerhounds.

The aim of this project is to assess whether there is a genetic basis to the heart disease dilated cardiomyopathy (DCM) in Deerhounds. Identifying a genetic defect, or defects, which may be the cause of DCM would aid in the discovery of a DNA blood test (or panel of tests) for DCM in Deerhounds. This may then become available to vets, pet owners and breeders alike and help prevent as well as diagnose the disease early.

Deerhounds are reported to have a high prevalence of the heart disease DCM. There is grow­ing evidence that, as in humans, DCM in dogs has a strong genetic basis. It has been hypothesised that each breed may have its own particular genetic mutation, or mutations, leading to DCM. The main aim of this research project would be to identify genetic locations (“loci”) associated with DCM in Deerhounds. A genetic test, or tests, would aid diagnosis of DCM in Deerhounds. As DCM is an adult-onset disease, testing breeding dogs and bitches before breeding for a genetic mutation that could lead to DCM would help prevent disease. Genetic tests for DCM would also aid diagnosis and help vets in general practice. Diagnosing DCM early in the disease process is important as there is evidence that treatment in the earlier stages of DCM extends survival in dogs (The PROTECT Study).

Primary DCM is suspected to be caused by genetic abnormalities but there is currently no information regarding this in the Deerhound. Analysing blood collected from DCM-affected and DCM-free hounds would help identify the underlying genetic cause(s) of DCM in Deerhounds. The hypothesis is that primary DCM is caused by genetic mutations in the Deerhound. These are multiple genetic defects (multigenic), rather than being due to one simple genetic abnormality (monogenic). The aims and objectives of the study include assessing whether there is a genetic basis to primary DCM in Deerhounds. To identify genetic defects which may be the cause of the familial disease, DCM, in Deerhounds and which may help in the discovery of DNA tests for DCM in Deerhounds. Genome-wide association studies (GWAS) will be performed on blood samples collected from 45 DCM-affected Deerhounds and 45 DCM-free, healthy control Deerhounds.

Measurement of biomarkers (NT-proBNP) in addition to Holter analyses have been shown to help vets diagnose early (preclinical) DCM in Doberman pinschers. Genetic tests would provide additional, important information to aid diagnosis. The study population includes over 90 Deerhounds, some of which which have already been assessed by the lead investigator, Emily Dutton (RCVS Specialist in Veterinary Cardiology), as part of an ongoing prospective, longitudinal study assessing breed reference echo intervals and ventricular arrhythmias in unaffected (i.e. DCM-free) and affected (i.e. DCM-affected) Deerhounds. DCM-free Deerhounds are clinically healthy hounds over 4 years of age with no echocardiographic evidence of DCM (dilated heart with impaired contractility), no evidence of an underactive thyroid (T4/TSH concentrations within normal range) and < 50 abnormal ventricular beats on a 24 hour ECG (Holter) recording. Echocardiography (cardiac ultrasound) is to be performed on all recruited hounds. The clinically healthy deerhounds are scanned either by the lead investigator at annual breed shows as part of an already established ongoing project or by any cardiologist with appropriate qualifications. Deerhounds from abroad can also be included in this project as long as they have seen a veterinary cardiologist. The study population selection criteria for the DCM-affected Deerhounds are those of any age selected either due to there being a suspicion of heart disease (e.g. presence of a heart murmur or gallop rhythm picked up at routine vaccination appointment) or breeding animals whereby the owner requested an echo (ultrasound) or blood test (NT-proBNP) to help exclude heart disease prior to breeding. Finally, any owners concerned their pets may have been affected with heart disease can request the NT-proBNP test and are included in the study (please note that the owner will be expected to pay for the blood sample and echocardiogram due to limited funds). All owners of the hounds are to provide records of five generation pedigree. Signed owner consent for participation of their hound in the study is required and has been obtained for all cases recruited so far. Screening of hounds with NT-proBNP occurs either at breed shows or when the hounds present to their vets in general practice, e.g. for vaccination appointments, neutering or for senior health checks. Blood samples are taken if there is a suspicion of DCM, if a pet owner is concerned about their Deerhound’s cardiac health or when a hound is to be used for breeding and DCM needs to be excluded. Full Doppler echocardiography (cardiac ultrasound) with concurrent ECG monitoring is performed by the veterinary cardiologist to assess heart size and confirm the presence or absence of DCM with the hound in the standing position. Ethical approval has already been obtained from The Animal Health Trust (41-2017E).

More information can be found at <http://www.deerhoundgenetics.com/>. For any questions regarding the GENDEER Study, or if you have a Deerhound which may be suitable, please email emily@cheshirecardiology.com.