Steroid responsive meningitis arteritis (SRM or SRMA) is a systemic immune disorder characterised by inflammation of the meninges and the associated arteries that typically responds to corticosteroids. SRM is also known by other names such as Beagle pain syndrome, necrotizing vasculitis, juvenile polyarteritis syndrome, cortico-responsive meningitis, aseptic suppurative meningitis and sterile purulent meningitis, which sometimes generates confusion among owners and veterinary surgeons alike. The name steroid responsive meningitis arteritis is well established in the veterinary literature and best describes the clinical and pathological features of the disease.

SRM is over represented in Beagles, Boxers, Bernese Mountain dogs, Weimaraner, and Nova Scotia duck tolling retriever, which suggests the possibility of a genetic predisposition. Other young medium to large breed dogs may also be affected.

Age of onset typically is between six and 18 months with a range from four months to seven years old. The condition can either be acute or chronic and the clinical signs are characterised by episodes of profound spinal pain, depression, stiff gait and fever. These episodes result from a combined inflammation of the meninges and the meningeal arteries. Occasionally SRM occurs with immune-mediated polyarthritis, especially in Bernese Mountain dogs, Boxers and Akitas which causes pain and swelling of the joints.

There is not a definitive test for identification of SRM. Clinical diagnosis is based on the clinical presentation, history, and physical and neurological examination, in conjunction with specific blood tests, cerebrospinal fluid analysis and advanced imaging. These tests are required to rule out other diseases that may present with similar clinical signs especially as in some of the diseases corticosteroids may be contraindicated and detrimental to the patient.

Treatment with immunosuppressive dose of corticosteroids in cases of SRM usually results in rapid improvement, although there are refractory or chronic cases that require a second immunosuppressive drug. The treatment is long term and once the clinical signs are controlled, the dose of medication is decreased over months (usually a minimum of four months). The immunosuppressive treatment requires close monitoring by a veterinary surgeon, who decides, based on different examinations and diagnostic tests, when the medication can be decreased and finally discontinued. The prognosis for recovery is good but the potential for relapse exists.

First study

In 2010 the Canine Genetics team at the AHT, funded by generous donations from several Beagle Clubs from around the country and from many individuals, conducted a study into SRM in Beagles. A whole genome association scan was carried out on DNA samples from 47 Beagles (26 affected cases and 21 control cases). This type of scan allows us to compare the genomes of dogs affected with SRM to the genomes of healthy dogs (control cases) and to pinpoint any regions where a clear difference can be seen. Such regions are likely to be associated with the disease and may contain mutations in genes that are involved with SRM.

Although the genotyping was carried out successfully, the study failed to identify any regions of the genome which were clearly and significantly associated with the disease. The genotyping data we generated was of high quality, so the likely explanation of our failure to identify a region of the genome associated with SRM is because the disease is
more complex than was originally thought. This is either because SRM is caused by more than one gene, or the interaction between genes and the environment. In either of these cases the solution is to collect and genotype more samples, and any new data can be added to what we already have, thus increasing the chances of success.

This is a disappointing result in some ways, but as a result of this investigation we now can say fairly confidently that SRM in the Beagle is not inherited as a simple autosomal recessive disease with a high degree of penetrance, and that more samples need to be analysed to identify a genomic region associated with the disease.

Since then we have been collecting additional samples for a larger study, and in 2013 we achieved our target of collecting enough samples for a study with 48 cases and 48 controls. We also successfully applied for a grant from the Petplan Charitable Trust to carry out some of this work, and during 2014 we will be undertaking this new study.

**Definition of cases and controls**

To study any disease we require DNA samples from dogs that are affected with the disease ("cases") and also dogs of the same breed that are unaffected ("controls").

An affected case of SRM is defined as a dog that has been examined by a veterinary surgeon and based on clinical examination and diagnostic tests is suspected to have the disease.

A control case of SRM is defined as a dog over five years of age that has never had any of the clinical signs compatible with SRM.

Preferably, we would also require copies of examinations and diagnostic tests done by the veterinary surgeon in charge of the case.