PURDUE UNIVERSITY
Animal Disease Diagnostic Laboratory

Purdue Canine Genetics Lab

Neuroaxonal Dystrophy (NAD)

Disease: Neuroaxonal Dystrophy

Breed: Miniature American Shepherds, Miniature Australian Shepherds, and Toy Australian Shepherds

About the condition:

An inherited neurological disease termed Neuroaxonal Dystrophy (NAD) has been reported in Miniature American Shepherd, Miniature Australian Shepherd, and Toy Australian Shepherd dogs in the United States and Europe. Cases have been confirmed by post-mortem examination by board certified veterinary neuropathologists.

The age-of-onset is typically in young adult dogs (2-4 years of age), which is unfortunate, because dogs may have been bred before they are known to be affected. Clinical signs begin very mildly, including a wide rear stance and intermittent abnormal gait, beginning in the pelvic limbs. They may have difficulty climbing stairs or jumping onto heights that shouldn't normally be a problem. The signs will progress and worsen slowly, but insidiously, over time. Pelvic limbs may drag, resulting in wounds to the top of the foot. Eventually the dog will demonstrate an abnormal gait all the time, and the thoracic limbs will also become affected. The thoracic limbs typically exhibit a "high stepping" gait. Other clinical signs can include: head tremors, mental dullness, vision issues, urinary and fecal incontinence (periodic progressing to permanent), laryngeal paralysis, and others. The speed and severity of progression of these signs ultimately dictate the dog's quality of life, and may necessitate humane euthanasia if the dog cannot walk on its own.

Necropsy of the neurological system reveals pathological changes throughout the brain (including the cerebrum and cerebellum) and spinal cord.

Research carried out at Purdue University, in parallel with researchers at the University of Pennsylvania and the University of Bern (in Switzerland), indicates that this disease is inherited in an autosomal recessive manner. We have identified a mutation within a disease-associated gene, and all affected dogs have two copies of this mutation. We are now offering a genetic test which allows owners to determine their dog's status for this mutation (clear, carrier, or affected) in order to diagnose affected dogs and to guide future breeding decisions. Carriers do not need to be removed from the breeding population; however, they should only be bred to clear mates to avoid producing affected offspring.