

## NEUROAXONAL LEUKODYSTROPHY IN THREE CHIHUAHUAS

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Neuroaxonal dystrophy (NAD) is a neurodegenerative disorder characterized by severe degeneration of neuronal cells and their processes. The predominant neuropathological feature is the presence of a large number of spheroids in the CNS.

The aim of this study is to describe the neuropathological findings in 3 cases of NAD in Chihuahua puppies. Two 2-month-old male Chihuahuas from the same litter and a presumably not related 2-month-old female Chihuahua were presented with neurological signs including severe depression, tetraparesis, ataxia, absence of menace response and bilateral strabismus.

Post-mortem examination revealed lesions restricted to the CNS in all cases. Grossly there was moderate to severe dilation of lateral ventricles accompanied by atrophy of the cerebral cortex and flattening of the cerebral convolution, as well as cavitation of the subcortical white matter, thinning of the corpus callosum and rupture of the septum pellucidum. Coronal samples of fixed brains were routinely processed for histology and sections were stained with H&E, Luxol Fast Blue, CNPase, neurofilaments and GFAP. Histopathological examination revealed marked and widespread axonal swelling with formation of round to irregularly shaped spheroids, accompanied by gliosis and severe myelin loss. The lesions primarily affected the white matter in the cerebrum and cerebellum, and both white and gray matter in the medulla oblongata, pons and spinal cord. Spheroids were numerous and large in the white matter of the cerebrum, cerebellar medulla, and several nuclei of the brain stem including lateral cuneatus, spinal tract of trigeminal nerve, olivary, solitary tract, lateral lemniscus, cochlear, trapezoid body, and lateral and medial geniculate. The presence of spheroids was moderate in the pontine nuclei, transverse and longitudinal pontine fibers, caudal colliculi and periaqueductal grey matter. A moderate number of spheroids was found in the cerebellar nuclei and in the nucleus of vagus. Spheroid of smaller caliber were found in the cerebral and cerebellar cortices. Scattered spheroids were evident in the reticular substance of the medulla oblongata and pons. Segmental loss of Purkinje cells was observed in all cases, accompanied by cytoplasmic vacuolation in one case.

The lesions observed in our cases were consistent with a form of NAD. In canine NAD, dystrophic axons are mainly found in the grey matter of the sensory brainstem nuclei, accompanied by cerebellar atrophy. In Chihuahuas and Papillons spheroids are also described in the white matter and in the cerebral and cerebellar cortices. Our cases differed from previous reports showing severe cerebral atrophy and high involvement of cerebral and cerebellar white matter with spheroids accumulation, while cerebellar atrophy was limited to mild loss of Purkinje cells. Findings in our dogs resembled Hereditary Diffuse Leukoencephalopathy with Spheroids described in adult humans.

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