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Poster Presentation

De- and Remyelination Affect Cognitive and Locomotor Abilities in Mice

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Abstract

Multiple sclerosis (MS) is an autoimmune disease of the central nervous system (CNS) characterized by inflammatory and neurodegenerative processes. One of its pathophysiological hallmarks is demyelination, a consequence of oligodendroglial cell death leading supply shortfall and missing electrical insulation to axons. Demyelination induced consequences on neuronal network activity and subsequent behavior are still not fully understood. In order to characterize neuronal functionality following demyelination, we applied the cuprizone model. A diet including cuprizone leads to full CNS demyelination in five weeks and re-introduction of normal food promotes spontaneous remyelination. Therefore, we assessed a time course of the functional consequences of myelin gain and loss in mice in six experimental groups. They were tested for short and long term memory and locomotor abilities at different time points during and after cuprizone treatment. Performing the novel object recognition test by assessing the explorations of known or novel object, we evaluated short and long term memory abilities, which appeared impaired following the cuprizone administration in a time-dependent manner. Spontaneous remyelination promoted amelioration of the performance. Additionally, treated animals did not present obvious locomotor deficits but a sustained anxiety-like behavior which only partially improves upon remyelination. Demyelination of white matter fiber tracts and cortical areas associated to memory and cognition was evaluated with immunohistological staining using the proteolipid protein as a marker for adult oligodendrocytes. Indeed, cuprizone diet dramatically decreased the number of living cells while promoting astrogliosis axonal damage and activation of macrophages which physiologically remove the debris of damaged myelin. Taken together, our results show that CNS demyelination leads to impaired cognitive abilities in rodents; an effect that seems to be recover after remyelination.

Keywords: Central Nervous System, Multiple Sclerosis, Immunohistological

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