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The role of myelin in sensory processing and interhemispheric information transfer

Along history, glial cells have been classified as the `glue` that gives shape to the brain, or as being space-filling cells. This view has completely changed, and nowadays, contrary to what was thought about them, has been shown that they may play a role in information processing. Specifically talking about oligodendroglia, the myelin sheath that these cell types produce is an essential constituent of neurons. It speeds up action potential propagation for adequate and efficient sensory and motor processing and it appears to have novel functions related to its close interaction with axons. Even though it has been studied how perception of sensory information is affected in demyelinating diseases, it is not completely understood how myelination can regulate the coordination of sensory stimuli, still representing a mayor question in this research field. For this reason, studying sensory systems that require a high temporal precision, as in the case of audition, may help understand how myelin deficiencies can affect sensory processing and information transfer.

In this study, I analysed diverse features of auditory processing in shiver mice, such as spectral and temporal aspects. I found that shiverer mice have diverse temporal abnormalities in sound processing such as prolonged latencies, inability to follow continuous clicks of stimulation at different rates, hyperexcitability and deficiencies in the detection of two sounds interrupted by a gap. Since part of the importance of this adequate temporal processing of information is related to proper conduction and synchronization, I was interested in finding a behavioural correlate of these sensory deficits. For this, I studied the information transfer along the corpus callosum, and more specifically laterality, as a measure of functionality of the major white matter tract of the brain in shiverer mice. Interestingly, I found that these mutant mice have changes in laterality, which may correlate to the degree of dysmyelination, and be part of the abnormal processing of information that these mice have.