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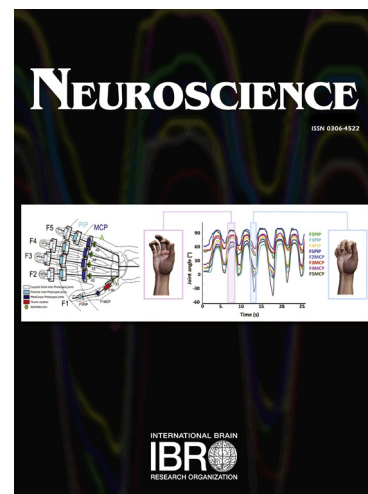
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Assessment of a Nutritional Supplement Containing Resveratrol, Prebiotic Fiber, and Omega-3 Fatty Acids for the Prevention and Treatment of Mild Traumatic Brain Injury in Rats

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ABSTRACT

Children and adolescents have the highest rates of traumatic brain injury (TBI), with mild TBI (mTBI) accounting for most of these injuries. Adolescents are particularly vulnerable and often suffer from post-injury symptomologies that may persist for months. We hypothesized that the combination of resveratrol (RES), prebiotic fiber (PBF), and omega-3 fatty acids (docosahexaenoic acid (DHA)) would be an effective therapeutic supplement for the mitigation of mTBI outcomes in the developing brain. Adolescent male and female Sprague Dawley rats were randomly assigned to the supplement (3S) or control condition, which was followed by a mTBI or sham insult. A behavioral test battery designed to examine symptomologies commonly associated with mTBI was administered. Following the test battery, tissue was collected from the prefrontal cortex (PFC) and primary auditory cortex for Golgi-Cox analysis of spine density, and for changes in expression of 6 genes (*Aqp4*, *Gfap*, *Igf1*, *Nfl*, *Sirt1*, and *Tau*). 3S treatment altered the behavioural performance of sham animals indicating that dietary manipulations modify premorbid characteristics. 3S treatment prevented injury-related deficits in the longer-term behaviour measures, medial prefrontal cortex (mPFC) spine density, and levels of *Aqp4*, *Gfap*, *Igf1*, *Nfl*, and *Sirt1* expression in the PFC. Although not fully protective, treatment with the supplement significantly improved post-mTBI function and warrants further investigation.

Keywords: Adolescence, Concussion, RT-qPCR, Golgi-Cox, Prefrontal Cortex, Primary Auditory Cortex

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