Palmitoylethanolamide Reduces Neuropsychiatric Behaviors by Restoring Cortical Electrophysiological Activity in a Mouse Model of Mild Traumatic Brain Injury

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Traumatic brain injury (TBI) represents a major public health problem, which is associated with neurological dysfunction (Saatman et al., 2008). In severe or moderate cases of TBI, in addition to its high mortality rate, subjects may encounter diverse behavioral dysfunctions. Previous reports suggest that an association between TBI and chronic pain syndromes tends to be more common in patients with mild forms of brain injury (Ofek and Defrin, 2007; Nampiaparampil, 2008). Despite causing minimal brain damage, mild TBI (mTBI) often leads to persistent psychologically debilitating symptoms, which can include anxiety, various forms of memory and learning deficits, and depression. At present, no effective treatment options are available for these symptoms, and little is known about the complex cellular activity affecting neuronal activity that occurs in response to TBI during its late phase. Here, we used a mouse model to investigate the effect of Palmitoylethanolamide (PEA) on both the sensorial and neuropsychiatric dysfunctions associated with mTBI through behavioral, electrophysiological, and biomolecular approaches. Fourteen-day mTBI mice developed anxious, aggressive, and reckless behavior, whilst depressive-like behavior and impaired social interactions were observed from the 60th day onward. Altered behavior was associated with changes in interleukin 1 beta (IL-1β) expression levels and neuronal firing activity in the medial prefrontal cortex (Giordano et al., 2012). Compared with vehicle, PEA restored the behavioral phenotype and partially normalized the biochemical and functional changes occurring at the supraspinal level. In conclusion, our findings reveal some of the supraspinal modifications responsible for the behavioral alterations associated with mTBI and suggest PEA as a pharmacological tool to ameliorate neurological dysfunction induced by the trauma.

References:

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