Evaluation of pro-Brain-Derived Neurotrophic Factor in an Animal Model of Maple Syrup Urine Disease

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Introduction: Maple Syrup Urine Disease (MSUD) is a neurometabolic disorder that leads to the accumulation of branched chain amino-acids (BCAA) leucine, isoleucine and valine and their α-keto branched chain. Considering that neurotoxic mechanisms in MSUD are poorly known. Objectives: In this study aimed to evaluate the effects of BCAA administration on the levels pro-brain-derived neurotrophic factor (pro-BDNF) in rat brain. Methods: Wistar rats (10 and 30 days) received three injections of a pool of BCAA (15.8 μL/g body weight) containing leucine (190 mmol/L), isoleucine (59 mmol/L) and valine (69 mmol/L) or saline (control group), at intervals of one hour between injections, subcutaneously. One hour after the last administration the rats were killed by decapitation, the brain was removed and cerebral cortex, hippocampus and striatum were isolated; pro-BDNF levels were performed by Western blotting. Results: We observed that the acute administration of the BCAA pool increased the levels of pro-BDNF in the striatum and hippocampus in 10-day-old rats, whereas in 30-day-old rats, the increase occurred only in the striatum. Conclusion: Considering that the pro-BDNF promotes apoptosis in sensory and sympathetic neurons and facilitates hippocampal long-term depression, we speculate that our findings may be related to brain dysfunction observed in MSUD patients.

Keywords: Maple syrup urine disease; branched chain amino-acids; pro-BDNF
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