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Angiotensin 1-7 Rescues Cognitive Decline and Neuronal Loss Following Traumatic Brain Injury in Mice

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Abstract

Purpose of study: Traumatic brain injury (TBI) is a leading cause of death and disability in the U.S., accounting for approximately 30% of all injury deaths and 3 million TBI-related emergency visits yearly. There is limited research in the area of mitigating the post-inflammatory effects of non-fatal traumatic brain injury. Angiotensin 1-7, an endogenous peptide that acts on the MAS receptor, has recently shown to be anti-inflammatory, anti-oxidative, and vasodilatory unlike its relative, angiotensin II. We asked the question of whether Ang 1-7 modulates neuroinflammation and improves cognitive function in mice following traumatic brain injury.

Methods: A controlled cortical impactor with a retractable piston was used to model a mild traumatic brain injury (mTBI). Mice either received Ang 1-7 (1 mg/kg, n=12) or normal saline (0.9%, n=12) 2 hours post-TBI and 30 minutes prior to novel objection recognition (NOR) testing on days 1, 3, 7, 14 post-TBI with tissue harvesting for hematoxylin and eosin (H&E) staining.

Results: Between-group studies showed that Ang 1-7 treated mice showed significantly higher NOR ratios compared to that of the control group. Additionally, statistically significant higher neuronal count in the ipsilateral hippocampal and cortical tissues days 1, 3, 7, and 14 post-TBI was observed in the Ang 1-7 group.

Conclusion: Together, these results demonstrate that Ang 1-7 significantly improves cognitive function and rescues further cell loss against secondary intrinsic injury following extrinsic mTBI and suggest that it may be a novel therapy to the effects of mild traumatic brain injury.