The Synergistic Effect of Omega-3 Fatty Acids (DHA and EPA) and Zinc Picolinate on Traumatic Brain Injury in Galleria mellonella

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Every 15 seconds, a person suffers a traumatic brain injury (TBI), a leading cause of mortality and lifelong disability worldwide. Despite its prevalence, effective therapeutic treatments tailored to enhance TBI recovery remain elusive, with current strategies confined to preventative measures and post-TBI rehabilitation. This experiment introduced a novel model for TBI using Galleria mellonella and tested the hypothesis that the synergistic effect of omega-3 fatty acids (docosahexaenoic acid [DHA] and eicosapentaenoic acid [EPA]) combined with zinc picolinate would increase the efficiency of recovery from TBI. For the experimental setup, TBI was induced in Galleria mellonella using a high impact trauma (HIT) device. They were then divided into four groups in separate petri dishes: an untreated control and three groups treated post-TBI with varying doses of omega-3 fatty acids (0-0.4 mL), zinc picolinate (0-0.4 g), and their synergy. Results showed that 0.1 mL of omega-3 fatty acids combined with 0.1 g of zinc picolinate significantly enhanced Galleria mellonella survival rates, achieving 29% to 100% survival. One-way ANOVA confirmed the efficacy of the synergistic treatment, revealing significant improvements with a p-value < 0.05. This dosage achieved a score of 0 on the modified neurological severity score (mNSS) test, indicating behavioral restoration of cognitive function. Microscopic examination of brain tissue stained with cresyl violet revealed restoratory activity in cortex volume. These findings revealed that the optimal dose of 0.1 mL of omega-3 fatty acids and 0.1 g of zinc picolinate increased recovery from TBI in Galleria mellonella, offering promising insights for developing accessible, nutrition-based therapies to improve outcomes for TBI patients.

Awards Won:
Third Award of $1,000