Hypoxic-Ischemic Cerebral Cell Deaths & Locomotory-Cognitive Damage Mitigation Using Squid (Thysanoteuthis rhombus) Waste Integument Constituent: Simulated Non-Arrhythmia-Inducing Mortal Stroke Evolution Disruption

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Stroke is the leading cause of long-term disabilities, second leading cause of death, and among the fastest-growing diseases (WHO, 2014). Its steadily increasing incidence and poor treatment outcome are both attributed to lack of effective neuroprotectants that deter occurrence, recurrence, and severity of illness. A zebrafish larval model of stroke was utilized to measure the degree of neuroprotection exerted by extracts obtained from squid (Thysanoteuthis rhombus) integument against hypoxic-ischemic cerebral cell deaths. Evaporation under reduced pressure of the methanol-soaked integuments yielded crude extract, which was further separated by preparative thin layer chromatography where three isolates were obtained. Six-dpfzebrafish larvae were pre-exposed to amlodipine, one of the most effective neuroprotectants, distilled water, crude extract, isolates 1, 2, and 3, and embryo medium. Nitrogen perfusion on the hypoxia chamber simulated ischemic cerebral cell deaths of all larvae. Based on fluorescence microscopy and morphometric quantification of post-hypoxia cell deaths, isolate 2 outperformed all other treatments: fluorescence intensity of 8,214 was lower than the 62,292 of amlodipine. Isolate 2 also exhibited the best protection of locomotory capacity, and cognitive integrity retention as manifested by faster, coordinated, and farther swimming distances in response to touch. Strikingly, it did not induce arrhythmic effects, at normoxia, as evidenced by normal rhythm and heart rate versus amlodipine that had elicited atrioventricular block and bradycardia. This “painless” method of exploring anti-stroke potentials showed that isolate 2 efficiently inhibited cerebral cell deaths and neurobehavioral insults without posing substantial arrhythmic consequences.

Awards Won:
Third Award of $1,000