Musculoskeletal Effects of Tirasemtiv and Urtica dioica on Dstac Gene Knockdown in Drosophila melanogaster: Applications Towards STAC3 Disorder (Native American Myopathy)

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STAC3, known as Native American Myopathy, was first identified within the Lumbee tribe of North Carolina and is known to be an inherited mutation that causes congenital myopathy and musculoskeletal anomalies resulting in poor muscle development and strength. Stac proteins produced by the stac gene activate an excitation-contraction coupling pathway responsible for the regulation of calcium ions within muscle cells and the contraction of muscles. Mutations in the stac gene prevent muscle contractions through the inefficient release of calcium ions within this pathway. This study focused on the ability of a modern drug, Tirasemtiv, and a traditional indigenous herb, Urtica dioica, to remediate the symptoms of a STAC3 ortholog modeled in Drosophila melanogaster through calcium transients in the excitation-contraction coupling pathway. The motility and locomotion of adult and larval Drosophila melanogaster with stac knockdown were assessed prior to and post-treatments with Urtica dioica, Tirasemtiv, or a combination of the treatments. The results suggest that individual Urtica dioica and combined Urtica dioica and Tirasemtiv treatment show the greatest restoration of motility in adult Drosophila melanogaster. Urtica dioica also has the greatest restoration of distance traveled and contractions in larvae, however, the results suggest that the combination treatment is most effective at restoring muscular efficiency (distance traveled per contraction). These findings present Urtica dioica and Tirasemtiv as novel candidates for further research toward a remedy for the symptoms of STAC3 Disorder. The use of Western medicine and indigenous medicinal practices in this study works to bridge the gap between modern and indigenous healthcare knowledge.

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