Development of Diet-Induced Insulin Resistance in Drosophila melanogaster and a Characterization and Comparison of the Anti-Diabetic Effects of Resveratrol and Pterostilbene, Part II

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This investigation was based on inducing a major hallmark of Type II Diabetes (T2D), insulin resistance (IR), in Drosophila melanogaster (DM) through high Sucrose diets (HSD) and characterizing the therapeutic effects of the polyphenols Resveratrol and Pterostilbene. To verify IR induction, Drosophila pupation rates were recorded for signs of developmental delay. Furthermore, physical activity tests that measured 3rd instar larvae crawling rates were performed. Resveratrol and Pterostilbene, dissolved in Ethanol, were administered as treatment—a standard diet was used for control. Upon the verification of IR, assays incorporating the polyphenolic treatment groups were executed. Such assays included a weight assay, a Hydrogen peroxide-based oxidative stress resistance assay, a spectrophotometer-based Glucose concentration assay, and a Real-Time PCR based genetic analysis assay. Statistically significant results from the entire study include developmental delay and decreased physical activity in HSD larvae, and high weight and Glucose concentration levels in HSD adult DM; Resveratrol and Pterostilbene treatment notably overturned the latter two physiological developments. Certain statistically significant results, with respect to T2D induction and treatment, were observed through both the Real-Time PCR and oxidative stress resistance assays, although most of the remaining results were promising, albeit non-significant. Altogether, the results from this study indicate that the DM can potentially be utilized as a cost-effective model organism for not only T2D induction, but also potential modes of pharmacologic treatment.

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