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

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As the prevalence of Type II Diabetes (T2D) has increased, the need to further examine underlying features of the disorder as well as potential modes of treatment has likewise risen. This investigation was based on inducing a major hallmark of 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 the induction of IR, key phenotypic characteristics such as developmental time, physical activity, fertility, weight, circulating Glucose concentration levels, and lifespan were measured and compared between the HSD Drosophila and those in the Control Group (CG), which consisted of a standard diet. The effects of Resveratrol and Pterostilbene were assayed amongst diabetic Drosophila in terms of all aforementioned phenotypes excluding fertility and developmental time. Notably, diabetic Drosophila raised on the HSD exhibited significant developmental delay, reduced physical activity, increased weight, higher circulating Glucose concentrations, and reduced lifespan relative to the Drosophila in the CG—no significant differences were recorded in the fertility assay. Both Resveratrol and Pterostilbene treatment restrained or overturned a key set of the negative physiological developments induced in the Drosophila. Upon treatment, initially diabetic flies were found to have increased levels of physical activity, reduced weight, longer lifespans, and relatively low circulating Glucose concentrations in comparison with those in the HSD groups. Altogether, these results strongly indicate that the DM can be utilized as a cost-effective model organism for not only the induction of T2D, but also potential modes of treatment.

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