Quantitative Analysis of the Role of Mitochondria in Drosophila melanogaster Lifespan

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The purpose of the research project is to discover if the quantity of mitochondria in Drosophila melanogaster affects its lifespan. Furthermore, if there is a correlation between mitochondrial quantity and lifespan, the project investigates whether the quantity of mitochondria correlates with a decrease or increase in lifespan.Scientists have seen structural mitochondrial changes effect lifespan but until this project, the effect of the quantity of mitochondria on lifespan had not been examined. The experiment utilized a cohort of flies with mitochondria that were tagged with green fluorescent protein (GFP). Because the mitochondria of each fly were tagged with green fluorescence, the brightness of each fly represented the quantity of mitochondria in each fly. Flies were video assayed at twelve days, shortly after maturation and early enough in the lifespan that little to no mitochondrial malfunction was likely to have occurred. Each fly in the cohort was viewed by cameras equipped with software that quantified the fluorescent brightness. After brightness was quantified, the flies were maintained and tracked until they died to measure lifespan. A regression analysis was then conducted comparing quantity of mitochondria (represented by amount of fluorescence) to lifespan. After analyzing the data from the regression analysis comparing GFP to lifespan, a statistically significant correlation was found between the quantity of mitochondria (observed by the cameras as the amount of green fluorescent protein) and lifespan. It was determined that more mitochondria relative to the other flies in the cohort correlates with a longer lifespan. The knowledge that mitochondrial quantity affects lifespan ultimately sheds more light on the question, “What causes aging?

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