The Effect of Senescence on Drosophila Rhythmic Behavior and Possible Molecular Mechanism

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Weak rhythmic activity is a manifestation of aging process. In this experiment, wild type Drosophila is selected to study the rhythm changes and rhythm-related gene expression mechanisms during normal aging process. The effects of aging on the rhythm of drosophila and the underlying causes were studied. Taking every 10 days as an age group, rhythm box is used to monitor all ages' wild type Drosophila rhythm; characteristics of rhythm activity change during aging are analyzed statistically, which include the methods of activity histogram, sleep line chart and locomotor auto-gram analysis, free-running period calculating, and individual differences and mortality rate measurement. The study concludes that Drosophila senescence process gradually weakens the rhythm activity and increases rhythm disorders, which is manifested in the extension and disappearance of the rhythm behavioral cycle and in the intolerance of sleep deprivation. 40-day-age has been found to be the age boundary in which the rhythm changes significantly. The relative quantitative expression of clock transcription factor genes in different ages is detected by qPCR. According to the previous conclusion, the study measures the gene expression within 24 hours of Drosophilas aged 3/30/40 days. The result has revealed a gradual disordered expression of clk, which also appears peaks at 30 and 40 day age, and the inapparent expression differences of tim and per, indicating that clk is related to the intrinsic ability to regulate rhythmic behavior during aging, while the expression changing of tim and per do not influence the rhythm significantly.

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