Dietary Protein:Carbohydrate Ratio Impacts Development and Locomotion of Drosophila melanogaster

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The American diet, rich in carbohydrates, has been implicated in the rise of metabolic syndrome. Metabolic syndrome includes various conditions that increase a person’s risk for cardiovascular disease and stroke. The model organism, Drosophila melanogaster, was used t0 determine the effect of carbohydrates on development and locomotion. The high carbohydrate diets retarded larval growth and development as reflected by increased pupation and eclosion half-times and a decrease in mass at matched time points. Despite the delayed development, larvae reared on the high carbohydrate diets eventually eclosed following a rapid increase in mass during the 24-48 hours immediately preceding eclosion. Locomotion studies indicated both 1:0 and 1:6 diets impaired larval movement. Adults reared on the 1:2 diet showed a faster reaction to negative geotaxis. Small size and lack of movement result from the flies’ inability to process the excess sugars. The flies’ response correlates with symptoms found in both type I and type II diabetes. In conclusion, these data suggest that dietary carbohydrates' metabolism is linked to the development and movement of D. melanogaster larvae and adults. Understanding this link could provide mechanistic insight into the relationship between carbohydrate metabolism and metabolic syndrome.

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