Concentration-Dependent Effects of Dietary Niacin and NAD+ in Longevity, Memory, and Motor Function of Drosophila melanogaster

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Niacin is an essential nutrient for life. It serves as a precursor to nicotinamide adenine dinucleotide (NAD+), a critical coenzyme for ATP production, DNA repair and gene expression. In humans, niacin deficiency is detrimental, and can result in death. However, the effect of niacin taken at doses exceeding the daily recommended amount remains unclear. In the Drosophila Parkinson model, flies exhibit severe cognitive and motor dysfunction. Studies showed that, in these mutant flies, niacin and NAD+ supplements improve motor and neurological functions. As aging flies exhibit motor and neurological dysfunction similar to those of Parkinson mutants, I investigated whether dietary niacin and NAD+ supplements could enhance metabolic and cognitive functions in aging flies. Consistent with previous reports, I observed that flies live 8-9 weeks, accompanied by gradual, age-related declines in cognitive and motor abilities. My findings reveal that high concentration (50 mg/100 g) of niacin or NAD+ adversely affects the normal aging process of flies. Flies given high doses live less and exhibit signs of motor and cognitive dysfunction at younger age than untreated groups. I show that these detrimental effects occur in a dose-dependent manner. Intriguingly, supplementation with a milder dose of niacin (10 mg/100 g) had the opposite effect. In files older than 5-6 weeks, mild doses of niacin improved longevity, motor function and short term memory. Experiments are underway to study the mechanism by which varying concentrations of niacin affect the health of flies. Taken together, these results suggest that moderate niacin supplements may offer partial mitigation of senescence in flies.

Awards Won:
American Psychological Association: Complimentary student affiliate memberships
American Psychological Association: Third Award of $500