Impacts of Sucralose on Hedonic Feeding Behaviors in C. elegans for Implications in Human Obesity and Eating Disorders

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Globally, over 2.1 billion people, close to 30% of the world population, are overweight or obese. The consumption of calorically-dense, palatable foods for pleasure, a phenomenon known as hedonic feeding, is a major contributor to the development of obesity and associated diseases. In addition, there is an increasing prevalence of certain eating disorders that are directly linked to hedonic feeding behaviors. Consumption of sucrose, known commonly as table sugar, is associated with several detrimental health effects. Recent studies suggest that it can induce hedonic feeding behaviors, leading to weight gain and its related risks. Sucralose, the most popular artificial sweetener, holds potential for lowering sugar and calorie consumption given its ability to provide a sweet taste without adding calories. While there are currently few known direct health impacts of this artificial sweetener in comparison to sucrose, there is a potential for differences in their ability to induce hedonic feeding behaviors. After a multitude of clinical studies, there is no consensus on whether or not different types of sweeteners have different effects on eating behavior, particularly in terms of hedonic feeding preferences. The present study explored how sucralose and sucrose impact the hedonic feeding preferences employing C. elegans as a model organism. Results showed that wild-type C. elegans exposed to sucralose had significantly lower preferences for “junk-food” bacteria compared to those exposed to sucrose, while no significant differences were observed in cat-2 mutant C. elegans that do not produce dopamine. These results suggest that sucralose can dictate hedonic feeding behaviors via the dopaminergic system and may have preventative and therapeutic implications for human health.

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