Dieting youth show greater brain reward activity in response to food

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The story is a familiar one: most people are able to lose weight while dieting but once the diet is over, the weight comes back. Many of us can personally attest that caloric deprivation weight loss diets typically do not produce lasting weight loss. Oregon Research Institute (ORI) senior scientist Eric Stice, Ph.D., and colleagues provide results in a recent issue of *NeuroImage* that further our understanding of how and why most weight loss diets fail and provide a more comprehensive description of the impact of caloric restriction.

Results suggest that restricting food intake increases the reward value of food, particularly high-calorie, appetizing food (chocolate milkshakes), and that the more successful people are at caloric-restriction dieting, the greater difficulty they will face in maintaining the restriction. Additionally, abstaining from food intake for longer durations of time also increases the reward value of food, which may lead to poor food choices when the individual eventually does eat. Results imply that dieting characterized by meal skipping and fasting would be less successful than weight loss efforts characterized by intake of low energy dense healthy foods.

"These results are unique," said Stice "in that these data are the first to suggest that elective caloric restriction increases the degree to which brain regions implicated in reward valuation and attention are activated by exposure to palatable foods."

Participants were two groups of adolescents (Study 1 n=34; Study 2

n=51) who voluntarily restricted their caloric intake so as to approximate what occurs with real-world dieters. Using a brain imaging paradigm, Stice and his team examined the responsivity of adolescent's attention and reward regions of the brain to the individual's exposure to and imagined intake of palatable foods, unpalatable foods, and glasses of water shown in pictures. By including both pictures of palatable and unpalatable foods, the team was able to determine whether degree of "self-imposed" caloric deprivation correlated with hyper-responsivity of attention and reward regions for palatable versus unpalatable foods. In a second paradigm, the team measured teen's neural responses to consumption and anticipated consumption of a chocolate milkshake and a calorie-free tasteless solution. Stice examined whether the number of hours since last caloric intake (which varied from 3 to 22 hours) correlated with neural activation in response to receipt and anticipated receipt of a palatable food. They also tested whether youth who were in a negative energy balance for a 2-week period versus energy balance or a positive energy balance showed aberrant neural response to food stimuli.

"The implications of this imaging study are crystal clear; if people want to lose excess weight, it would be more effective to consume healthy, low-fat/low-sugar foods during regular meals, rather than go for long periods of time without any caloric intake" says Dr. Stice.

Funded by the National Institutes of Health (NIH), Stice has been studying eating disorders and obesity for 20 years. He has conducted this line of research at Stanford University and the University of Texas, and now continues at the Oregon Research Institute in Eugene, Oregon. This line of research has produced several prevention programs that effectively reduce risk for onset of eating disorders and obesity.

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