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Our brains on food: From anorexia to obesity and everything in between

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The brains of people with anorexia and obesity are wired differently, according to new research. Neuroscientists for the first time have found that how our brains respond to food differs across a spectrum of eating behaviors – from extreme overeating to food deprivation. This study is one of several new approaches to help better understand and ultimately treat eating disorders and obesity.

Eating disorders have the highest mortality rate of any mental illness. And more than two-thirds of the U.S. population are overweight or obese – a health factor associated with cardiovascular issues, diabetes, and cancer. "This body of work not only increases our understanding of the relationship between food and brain function but can also inform weight loss programs," says Laura Martin of Hoglund Brain Imaging Center at the University of Kansas Medical Center, one of several researchers whose work being presented today at a meeting of cognitive neuroscientists in Chicago.

"One of the most intriguing aspects of these studies of the brain on food," Martin says, is that they show "consistent activations of reward areas of the brain that are also implicated in studies of addiction." However, how those reward areas respond to food differs between people depending on their eating behaviors, according to the new brain imaging study by Laura Holsen of Harvard Medical School and Brigham and Women's Hospital and colleagues.

Holsen's team conducted fMRI brain scans of individuals with one of

three eating conditions – anorexia nervosa, simple obesity, and Prader-Willi syndrome (extreme obesity) – as well as healthy control subjects. When hungry, those with anorexia, who severely restrict their food intake, showed substantially decreased responses to various pictures of food in regions of their brains associated with reward and pleasure. For those who chronically overeat, there were significantly increased responses in those same brain regions.

"Our findings provide evidence of an overall continuum relating food intake behavior and weight outcomes to food reward circuitry activity," Holsen says. Her work also has implications, she says, for everyday eating decisions in healthy individuals. "Even in individuals who do not have eating disorders, there are areas of the brain that assist in evaluating the reward value of different foods, which in turn plays a role in the decisions we make about which foods to eat."

Kyle Simmons of the Laureate Institute studies the neural mechanisms that govern such everyday eating decisions. His work with fMRI scans has found that as soon as people see food, their brains automatically gather information about how they think it will taste and how that will make them feel. The brain scans showed an apparent overlap in the region on the insula that responds to seeing food pictures and the region of the insula that processes taste, the "primary gustatory cortex."

Simmons is currently expanding this work to better understand the differences in taste preferences between lean, healthy individuals and obese ones. "We simply don't know yet if differences exist between lean and obese participants," he says. "And knowing which brain regions underlie inferences about food taste and reward is critical if we are going to develop efficacious interventions for obesity and certain eating disorders, both of which are associated with enormous personal and public health costs."

More information: The symposium "The Brain on Food: Investigations of motivation, dopamine and eating behaviors" takes place on April 3, 2012, at the 19th annual meeting of the Cognitive Neuroscience Society (CNS). More than 1400 scientists are attending the meeting in Chicago, IL, from March 31 to April 3, 2012.

Provided by Cognitive Neuroscience Society

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