



American College of Neuropsychopharmacology

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CONTACT: Sharon Reis, 202 745 5103

sreis@gymr.com

Tamara Moore, (202) 745-5114

tmoore@gymr.com

EATING DISORDERS LINKED WITH DISRUPTED REWARDS PROCESSES IN BRAIN Overeating Mirrors Drug Addiction Behaviors

MIAMI, FL (December 7, 2010) – New research on eating disorders, including obesity and anorexia nervosa, demonstrates the influence the brain has on appetite and weight control. Obesity and anorexia, oftentimes considered metabolic in nature, appear to also reflect brain functions involving reward and inhibition. This research will be presented today by a panel of prominent scientists at the annual meeting of the American College of Neuropsychopharmacology. Nora D. Volkow, MD, director of the National Institute on Drug Abuse, will be the discussant for the panel.

Past studies have shown that individual differences may predispose a person to under-eat or over-eat. These behaviors are influenced by the pleasure derived from eating and drinking, sensory properties of food and a person's prior experiences, current internal state, expectations, beliefs and genes.

The studies being presented during today's panel examined several of these factors and the brain activity associated with them. They reveal a complex, integrated system in which signals from the body interact with brain circuitry to control eating behavior. Desensitization to these signals may lead to pathological eating. As in other addictions, the dopamine reward system is critically involved. The similarities hold implications for potential treatment and prevention of obesity, Volkow noted.

"The brain is a complicated, integrated system whose responses are linked to changes in the body as well as predisposing factors associated with a person's experiences with food," said Volkow. "When the brain senses the need for food, the reward system is activated. But the more a person overeats, the more insensitive to food rewards they may become, potentially causing a need to increase stimuli, which in this case is more food intake."

Examining the brain's response to certain foods, Dana M. Small, PhD, of the John B. Pierce Laboratory and Yale University, found an inverse relationship between a person's BMI (body mass index) and the brain's response to a milkshake. Obese individuals experienced much less activation of reward centers as they ate the food. The study determined that the response

of the caudate, an area of the brain associated with learning and memory, to a milkshake was a better predictor of future weight gain than many traditional measures.

Cary R. Savage, PhD, of the University of Kansas Medical Center conducted a study of food motivation using functional magnetic resonance imaging (fMRI). He and his colleagues found that individuals who were obese differed from healthy weight participants in the way that the brain responded to anticipated food or monetary rewards and punishments. Obese individuals showing greater brain sensitivity to anticipated reward and less sensitivity to anticipated negative consequences than healthy weight individuals.

Other research being presented in this panel includes:

- To better understand the brain functions of individuals with anorexia nervosa and bulimia nervosa, Walter H. Kaye, MD, and colleagues at the University of California San Diego used fMRI to examine the brain's response to the tastes of sucrose and an artificial sweetener and the brain's response to pictures of palatable foods compared to color-matched neutral objects. Their findings suggest that individuals who under-eat or over-eat have an altered sensitivity when consuming sucrose.
- Julie L. Fudge, MD, of the University of Rochester Medical Center followed the "taste pathway" in humans to better understand how information received by various areas of the brain involved in eating behaviors. Her findings suggest a way that emotional associations with food can converge with taste and instinctive sensations to influence eating behavior.

Disturbances in appetite and weight regulation affect a significant proportion of the U.S. population, and obesity is considered a national epidemic. One in every three adults and one of six children are obese, a condition that arises from chronic imbalances between energy intake and expenditure.

"The studies in this panel represent a growing body of research linking the brain and the wiring in the brain to overeating and obesity," Volkow said. "We really need to do much more work to better understand integration with processes which regulate food intake and reward processing in the brain. This research opens the doors to a much greater understanding of obesity."

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ACNP, founded in 1961, is a professional society of nearly 1,000 leading scientists in the field of brain and behavior disorders. ACNP members include Nobel Laureates as well as the recipients of many other distinguished awards. The mission of ACNP is to further research and education in neuropsychopharmacology and related fields in the following ways: promoting the interaction of a broad range of scientific disciplines of brain and behavior in order to advance the understanding of prevention and treatment of disease of the nervous system including psychiatric, neurological, behavioral and addictive disorders; encouraging scientists to enter research careers in fields related to these disorders and their treatment; and ensuring the dissemination of relevant scientific advances.