



American College of Neuropsychopharmacology

Formatted: Don't adjust space between Latin and Asian text

EMBARGOED FOR RELEASE
December 10, 2008 at 6:00 a.m. Eastern

CONTACT: Sharon Reis, 202 745 5103
sreis@gymr.com

DOES SUGAR HAVE ADDICTIVE PROPERTIES?

Studies in animal models suggest dependence motivates sugar seeking

NASHVILLE, TN (December 10, 2008) – New evidence from animal models suggests that sugar can act on the brain in ways similar to drugs of abuse. Eating large amounts of sugar when hungry, also known as sugar-bingeing, can cause behavioral and neurochemical changes in the brain that resemble those produced when someone takes substances of abuse including morphine, cocaine and nicotine. The findings were presented today at the annual meeting of the American College of Neuropsychopharmacology (ACNP).

“Our findings with lab rats show that intermittent access to sugar can lead to changes in the brain and behavior similar to those caused by drugs of abuse,” said Bart Hoebel, PhD, Professor of Psychology, Princeton University. “In certain models, sugar-bingeing causes long-lasting effects on the brain and increases the inclination to take other drugs of abuse, including alcohol.”

Addiction research traditionally focuses on classic drugs of abuse. For example, there is extensive research documenting the changes in the brain that occur when rats voluntarily take morphine, heroin, cocaine, nicotine or alcohol. According to The American Psychiatric Association’s *Diagnostic and Statistical Manual-IV-TR (DSM)* which is a tool used by psychiatrists in diagnosing dependency, the key stages leading to addiction include bingeing, withdrawal and craving, with consequences severe enough to disrupt people’s lives.

Bingeing occurs when an individual takes large amounts of the substance in short periods of time, usually after a period of voluntary abstinence or forced deprivation. If the drug is no longer available or if its effects are chemically blocked, withdrawal can occur, which is expressed as physiological and psychological effects that are opposite to those that the drug itself produces. Craving is an uncontrollable, compulsive desire to find and consume the drug, coupled with difficulty stopping, as a result of dependence and abstinence.

Hoebel and his team sought to extend existing research on drugs of abuse by conducting tests with sugar to see if they would meet the same criteria as are typically used for addictive drugs. Researchers found that when hungry rats drink a sugary solution, this releases the chemical dopamine in a brain area called the nucleus accumbens. This chemical signal is thought to trigger motivation and, over time, addiction. When ordinary food is no longer novel, or the animal is not hungry, eating no longer releases as much dopamine. However, when large amounts of sugar are ingested on an empty stomach using a "binge-inducing schedule," the brain continues to release strong surges of dopamine. A 12-hour per day schedule of access to the sweet drink and food was chosen to induce binge intake of sugar. This also provides an animal model of sugar-bingeing in people.

Addictive drugs are also taken in binges, and cause repeated, intermittent increases in dopamine in the nucleus accumbens. In this regard, sugar-bingeing is like drug bingeing, although the effect produced by natural rewards is smaller and more localized in the brain. Therefore, Hoebel's group went to the next stage and explored neural mechanisms that cause withdrawal signs. "We blocked the opioid receptors in the brains of rats on the sugar-binge schedule, making them unable to sense the release of the brain's own opioids. We found that this caused a state of anxiety coupled with a drop in their level of dopamine, which are signs of withdrawal," said Hoebel.

These researchers also conducted tests for cross-sensitization, which occurs when pretreatment with one drug of abuse leads to greater sensitivity to another drug of abuse. The researchers deprived the bingeing rats of their sugar for a time, forcing abstinence, and found that these rats would work harder to get sugar, were hyperactive in response to amphetamine, and would drink more alcohol than normal. This indicated, they believe, that sugar-bingeing has a "gateway effect," causing the animals to substitute alcohol as an alternative substance of abuse when the sugar is no longer available.

Hoebel emphasized that while these findings are exciting, more research is needed to understand the implications for people. He noted that the most obvious connection of these findings to humans would be in the field of eating disorders. "It seems possible that the brain changes and behavioral signs seen in rats may occur in some individuals with binge-eating disorder or bulimia. Our work provides links between the traditionally-defined substance-use disorders, such as drug addiction, and the development of abnormal desires for natural substances. This knowledge might help to devise new ways of diagnosing and treating these conditions in humans."

ACNP, founded in 1961, is a professional organization of more than 700 leading scientists, including four Nobel Laureates. 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.

###