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(Dr. Grigson discusses her findings in more detail on our 'Sound Research' podcast, which can be accessed here: http://goo.gl/zdwP5)

BINGE EATING MAY LEAD TO ADDICTION-LIKE BEHAVIORS

HERSHEY, PA– A history of binge eating – eating large amounts of food in a short period of time – may make an individual more likely to show other addiction-like behaviors, including substance abuse, according to Penn State College of Medicine researchers. In the short term, this finding may shed light on factors that promote substance abuse, addiction, and relapse; and in the long term, may help clinicians treat individuals suffering from this devastating disease.

"Drug addiction persists as a major problem in the United States," said Patricia Sue Grigson, Ph.D., professor, Department of Neural and Behavioral Sciences. "Likewise, excessive food intake, like binge eating, has become problematic. Substance abuse and binge eating are both characterized by a loss of control over consumption. Given the common characteristics of these two types of disorders, it is not surprising that the co-occurrence of eating disorders and substance abuse disorders is high. It is unknown, however, whether loss of control in one disorder predisposes an individual to loss of control in another."

Grigson and her colleagues found a link between bingeing on fat and the development of cocaine-seeking and -taking behaviors in rats, suggesting that conditions promoting excessive behavior toward one substance can increase the probability of excessive behavior toward another. They report their results in Behavioral Neuroscience.

The researchers used rats to test whether a history of binge eating on fat would augment addiction-like behavior toward cocaine by giving four groups of rats four different diets: normal rat chow; continuous ad lib access to an optional source of dietary fat; one hour of access to

optional dietary fat daily; and one hour of access to dietary fat on Mondays, Wednesdays, and Fridays. All four groups also had unrestricted access to nutritionally complete chow and water. The researchers then assessed the cocaine-seeking and -taking behaviors.

"Fat bingeing behaviors developed in the rats with access to dietary fat on Mondays, Wednesdays, and Fridays – the group with the most restricted access to the optional fat," Grigson said.

This group tended to take more cocaine late in training, continued to try to get cocaine when signaled it was not available, and worked harder for cocaine as work requirements increased.

"While the underlying mechanisms are not known, one point is clear from behavioral data: A history of bingeing on fat changed the brain, physiology, or both in a manner that made these rats more likely to seek and take a drug when tested more than a month later," Grigson said. "We must identify these predisposing neurophysiological changes."

While the consumption of fat in and of itself did not increase the likelihood of subsequent addiction-like behavior for cocaine, the irregular binge-type manner in which the fat was eaten proved critical. Rats that had continuous access to fat consumed more fat than any other group, but were three times less likely to exhibit addiction-like behavior for cocaine than the group with access only on Mondays, Wednesdays and Fridays.

"Indeed, while about 20 percent of those rats and humans exposed to cocaine will develop addiction-like behavior for the drug under normal circumstances, in our study, the probability of addiction to cocaine increased to approximately 50 for subjects with a history of having binged on fat," Grigson said.

Future studies will look closer at how bingeing can lead to addiction-like behaviors, for example, whether bingeing on sugar or a mixture of sugar and fat also promotes cocaine or heroin addiction; and whether bingeing on a drug, in turn, increases the likelihood of bingeing on fat.

Other researchers are Matthew D. Puhl, Angie M. Cason, Department of Neural and Behavioral Sciences, Penn State College of Medicine; Rebecca L. Corwin and Francis H.E. Wojnicki, Department of Nutritional Sciences, Penn State.

This research is funded by the National Institute on Drug Abuse.

Penn State College of Medicine, located on the campus of Penn State Milton S. Hershey Medical Center in Hershey, Pa., boasts a portfolio of more than $105 million in funded research. Projects range from the development of artificial organs and advanced diagnostics to groundbreaking cancer treatments and understanding the fundamental causes of disease.