Messenger between gut and brain linked to eating behavior

Yale UniversityYale University

Yale researchers report they may have found a key molecular messenger that links the stomach-to-brain reward circuits and signals the brain it has sufficient calories.

Mice placed on a high-fat diet have a deficiency of dopamine, a key neurotransmitter involved in activating reward centers of the brain. This suggests that mice — and humans — may overeat in an attempt to restore dopamine release to normal levels.

The Yale researchers show in research published in the Aug. 16 issue of the journal Science that an infusion of the gastrointestinal lipid messenger oleoylethanolamine not only triggers activity of the dopamine system in the brain, but also helped restore levels of the neurotransmitter in mice fed a high-fat diet.

“In the obese — as well as in drug addicts — there seems to be a deficiency in their ability to sense the rewarding properties of certain stimuli, which may lead them to seek more food or more drugs,” said Ivan E. de Araujo, associate fellow in The John B. Pierce Laboratory and senior author of the study. “A deficiency in this chemical messenger produced in the gut may be what makes them unable to sense the presence of calories in the gastrointestinal tract, leading to low dopamine release after ingesting meals containing relatively less calories.”

The scientists indeed found that after infusion with oleoylethanolamine mice fed a high-fat diet showed an increased interest in consuming low-fat meals.

“It could be that bariatric surgery works because it affects levels of this gut messenger, thereby modulating the brain reward circuitry,” he said.

His lab and those of colleagues at the J.B. Pierce Laboratory will now explore how the system works in humans and whether the findings can lead to a new way to treat obesity, de Araujo said.

The work was funded by the National Institutes of Health.

Lead author of the paper is Luis A. Tellez. Other Yale authors include Sara Medina, Wenfei Han, Jozelia G. Ferreira, Paula Licona-Limón, Xueying Ren, TuKiet T. Lam, and Gary J. Schwartz.

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