High-fat diets may spur overeating, mouse study suggests

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Chips are stacked against would-be healthy eaters, expert says.

(HealthDay)—Many people who have tried to give up fatty foods in favor of healthier choices have found themselves obsessing over cookies or chips. Choosing a salad over a cheeseburger can feel like a Herculean act of will.

Now scientists believe they've found an important clue about why this happens.

Working in mice, researchers say they've discovered how the gut talks to the reward centers of the brain, and how high-fat diets can jam this communication, potentially leading to overeating and obesity.

The study, which was published online Aug. 15 in the journal *Science*, also found that high-fat diets actually led mice to turn up their noses at their normal, low-fat chow.

"The implications to humans are huge," said Paul Kenny, a professor of pharmacology at the Scripps Research Institute in Jupiter, Fla.

"You're trying to lose weight. You have a bad diet and you're trying to adjust it, [but] your body and brain in concert are saying, 'No, I don't want that type of food,'" said Kenny, who was not involved in the research. "The chips are stacked against you—literally, potato chips. And that's why you're very likely to fail."

Eating food—especially food high in fat—triggers the release of the feel-good brain chemical dopamine.

Previous studies have found that as people and mice become obese, the brain's dopamine system stops working properly. Eating becomes less rewarding.

As food becomes less stimulating, one theory holds that people need to eat more and more to feel satisfied—creating a vicious cycle of weight gain and overeating.

But researchers have never really understood why or how this happens, or, crucially, how to stop it.

For the new study, researchers studied two groups of mice. The first group was fed a normal, low-fat diet. The second group was put on a high-fat diet. Researchers fed the mice through catheters that ran directly into their stomachs to eliminate any influence from the taste or chewing of the foods.

As expected, the mice consuming a high-fat diet made less dopamine in their brains. But surprisingly, they also made less of a lipid (fat) signal called oleoylethanolamine (OEA) in their intestines.

OEA plays an important role in digestion, said the expert who first identified the signal.

"It prevents the excessive eating of fat," said Daniele Piomelli, a professor of anatomy and neurobiology at the University of California, Irvine.

When the researchers gave the mice on the high-fat diet an infusion of OEA, they also made more dopamine in their brains, suggesting that the signal also plays an important role in the reward value of food.

"The fact that this compound is connected with the reward centers of the brain is beautiful and makes sense because all survival mechanisms depend on reward," said Piomelli, who was not involved in the current study.

When humans hunted and gathered their food, it would have made sense for fat to be highly rewarding to the brain.

"Fat is in such short supply in nature. Not in our refrigerators, but in nature it is," Piomelli said. "It is very important for the body to be able to eat the small amounts it finds in the wild and to be able to absorb it completely. That's what this compound does."

Now that dietary fat is hard to escape, this ancient feedback loop may be working against humans.

"We do know that people who have problems making the lipid signal OEA tend to become more morbidly obese," Piomelli said.

But the study also shows there may be hope on the horizon for frustrated dieters.

Mice on a high-fat diet given infusions of OEA lost weight and started to show more interest in low-fat food, suggesting that the compound makes the brain more sensitive to smaller amounts of calories in the gut, said researcher Ivan de Araujo, an associate professor of psychiatry at Yale University.

Experts say, however, that results from animal studies often don't turn out the same in humans.

Whether medications that boost OEA might one day help cottage cheese become as rewarding to the human brain as cheesecake remains to be seen.

"We don't know whether this can successfully be translated into humans," he said.

More information: To learn more about healthy eating, head to the U.S. National Heart, Lung, and Blood Institute.

Paper: "A Gut Lipid Messenger Links Excess Dietary Fat to Dopamine Deficiency," by L.A. Tellez et al *Science*, 2013.

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