Scientists explore stress, weight loss and our brain

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It's not just our imagination: We really do eat differently when we're stressed.vNutritionists at UC Davis and the U.S. Department of Agriculture's Western Human Nutrition Research Center are shedding light on the important link between stress, our brain and body weight—discoveries that could help society fight obesity and improve our individual efforts to lose weight and keep it off.

"It is becoming clear that stress degrades our ability to make healthy food choices for long-term well-being," said Kevin Laugero, a research nutritionist with the Western Human Nutrition Research Center and an adjunct professor with the UC Davis Department of Nutrition.

"Knowledge of dietary guidelines is important, but we also have to help people, from a very early age, find ways to manage stress and develop their capacity to choose long-term gain over short-term reward," he said.

Laugero is a member of the obesity and metabolism research unit at the center, which was established in 1980 in San Francisco and relocated to a new facility at UC Davis in 2006. The center is equipped with a human calorimeter for measuring 24-hour energy expenditure, as well as a metabolic kitchen for live-in studies.

Dieting involves an ongoing series of decisions, essentially weighing short-term reward against long-term consequences (e.g., "I know I should choose the apple, but that apple pie sure smells good"). The researchers have studied decision-making issues such as: Does our ability

to recognize the long-term consequences of our decisions affect our weight management? Are there physiological factors, like stress, that affect how we make decisions?

Weight loss and decision-making

In one study, published in the April 2011 issue of the journal *Physiology and Behavior*, the researchers worked with 29 volunteers—women between the ages of 20 and 45—who were obese but otherwise healthy. They asked the women to eat specially prepared meals in the nutrition center for 15 weeks. For the first three weeks, the meals were designed to stabilize each woman's weight. For the next 12 weeks, their meals provided 500 fewer daily calories than needed to maintain their weight.

After the 15 weeks, some volunteers lost as much as 27 pounds. Some volunteers lost no weight at all.

"Although we can only speculate, we assume those who lost fewer pounds may have deviated from the prescribed diet, when they were at home, for example," Laugero said.

The researchers wanted to get a snapshot of the volunteers' pattern of decision-making to see whether it correlated with weight loss.

It did. They asked volunteers to take the Iowa Gambling Task, a computer-based test used to evaluate a person's "executive function," or ability to plan and make decisions based on future consequences of current actions. Scientists believe control of these executive functions is located in our prefrontal cortex and linked to brain regions critical for processing pleasurable and emotional stimuli, as well as to stress hormones such as cortisol.

The gambling test asks subjects to amass "credits" in a card game. Some

of the card decks offer more credits in the short run but also require a high payback. Others offer fewer credits right away but entail less payback.

"Most people can learn to distinguish the 'good' from the 'bad' decks and start drawing cards only from the decks that offer more long-term gain," said Megan Witbracht, a postdoctoral researcher in the UC Davis Department of Nutrition.

It takes longer, however, for some people to recognize the pattern, and others don't see it at all, she noted. Volunteers who lost the most weight also scored highest on the Iowa Gambling Task.

"That suggests that those who are better at making decisions based on long-term consequences are more successful at maintaining weight loss," Witbracht said.

Stress and weight loss

Does stress affect decision making and weight loss? To measure that, researchers analyzed the volunteers' levels of the stress hormone cortisol.

Indeed, volunteers with the highest cortisol levels had the lowest scores on the gambling task and lost the fewest pounds.

But guess what? During the 12-week, calorie-restricted diet, cortisol levels climbed to some degree in all the volunteers.

"Dieting can be a stressful situation," Witbracht said.

So what's a dieter to do?

"Awareness is a good place to start," Laugero said. "Weight management

is more than an energy-in, energy-out formula. And just because you understand dietary guidelines doesn't mean you will follow them, especially when you're under stress. For many, being aware of their emotions and controlling their response to stressful situations may significantly improve decisions about what and how much to eat."

The U.S. Centers for Disease Control and Prevention estimates that 35 percent of adults and 18 percent of children in America are overweight or obese, conditions associated with higher risk for Type 2 diabetes, cardiovascular disease and other chronic disorders. Understanding the connection between stress, our brain and body weight may help to reduce those numbers, Laugero said.

"You need to start early, helping children with their social and emotional development so they can make positive choices for long-term health," he said. "Stress changes your brain, affecting the regions that help you make smart decisions.

"Evidence suggests that stress-reduction techniques such as exercise and meditation might change it back," Laugero said. "Reducing the impact of stress and developing techniques for improving executive function during early childhood may go a long way in making more healthy choices over a lifetime."

Laugero is currently exploring the relationships among executive function, stress, and eating behavior in preschoolers. He suggests that techniques that help improve decision-making in early childhood may reduce the impact of stress and emotion on eating habits later in life.

Witbracht is conducting more studies with dieters and the Iowa Gambling Task, delving deeper into how people make decisions about what they eat.

Provided by UC Davis