

Your Brain and Comfort Foods

Neuroimages Capture Effects

MATTHEW TRYON (D3341-1)

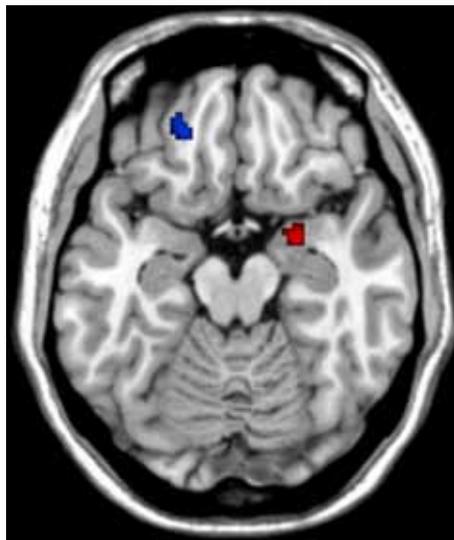
You probably know someone who's a stress eater—a person who loads up on high-calorie goodies like vanilla ice cream or chocolate cake as a source of comfort when life gets tough. In some instances, stress-induced eating can lead to overweight and obesity, which can, in turn, increase risk of heart attack, stroke, and chronic disease such as type 2 diabetes.

That's why Agricultural Research Service nutritionist Kevin Laugero and colleagues are taking a close look at pathways inside the brain that link stress to unhealthy eating habits, or, technically speaking, the neurophysiology of stress-eating.

The research is part of ongoing studies at the ARS Western Human Nutrition Research Center in Davis, California, to develop new, effective ways to combat America's obesity epidemic.

In studies begun in 2012, Laugero and coinvestigators have employed a leading-edge technology, fMRI (functional magnetic resonance imaging), to document brain activity associated with stress-eating. The research is designed to answer basic questions of interest to medical and nutrition researchers alike, such as: Why do some people respond to stress by overeating foods high in sugar and fat, while others don't? At what age does stress-eating become a habit? What situations are the most likely to trigger it?

For one of Laugero's most recent studies, 30 healthy female volunteers, aged 20 to 53, were asked to fill out the Wheaton Chronic Stress Survey to evaluate the amount of chronic stress caused by their work, finances, or relationships. Then, brain scans were taken while each volunteer viewed, in



When viewing pictures of high-calorie foods, study volunteers who reported high chronic stress showed enhanced activity in the amygdala region (red) of the brain, which is associated with emotions, and diminished activity in the prefrontal cortex (blue), which regulates self-control.

random order, an assortment of 200 photos of high-calorie foods, such as apple pie, lemon cake, or candy bars; 200 images of healthier foods, including a garden salad, fresh asparagus, or black bean soup; and 100 images of everyday objects such as coins, a cell phone, or a baseball.

The scientists found that some patterns of brain activity in the “high-chronic-stress” volunteers differed markedly from those of low-chronic-stress participants. For example, activity in the prefrontal cortex, a region of the brain that regulates self-control and strategic decisionmaking, was essentially “turned off” when high-stress volunteers viewed calorie-rich foods. At

the same time, the scans showed an increase in activity in the amygdala (pronounced *uh-MIG-duh-luh*), a brain region associated with emotions.

These responses were in contrast to patterns detected in brain scans of the low-stress volunteers who were shown the same food photos.

Obesity researchers have, for more than a decade, used sophisticated neuroimaging technology to detect and map the way our brains respond to food. But these findings from Laugero's research are new. They not only add to our knowledge of the neurophysiology of stress-eating, but also may help pave the way to new, science-based strategies that can help tomorrow's stress-eaters lose the habit—and unwanted pounds, as well.

Laugero and coresearchers Matthew Tryon at the ARS nutrition center, Rashel DeCant of the University of California-Davis Department of Nutrition, and Cameron Carter of the university's Departments of Psychiatry and Psychology documented the study in a peer-reviewed scientific article published in 2013 in the journal *Physiology & Behavior*. ARS and the UC-Davis Imaging Research Center, in Sacramento, funded the study.—By **Marcia Wood**, ARS.

This research is part of Human Nutrition, an ARSnational program (#107) described at www.nps.ars.usda.gov.

*Kevin Laugero is in the USDA-ARS Obesity and Metabolism Research Unit, Western Human Nutrition Research Center, 430 W. Health Sciences Dr., Davis, CA 95616; (530) 752-4173, kevin.laugero@ars.usda.gov.**