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Pleasurable behaviors reduce stress via brain pathways, research shows

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Whether it's food or sex, pleasurable activity provides more than just pleasure, University of Cincinnati (UC) researchers say. It actually reduces stress by inhibiting anxiety responses in the brain.

The findings were published online Nov. 8, 2010, ahead of print in *PNAS*, the official journal of the National Academy of Sciences.

Experiments designed by Yvonne Ulrich-Lai, PhD, research assistant professor, James Herman, PhD, director of the Laboratory of Stress Neurobiology and professor of psychiatry and behavioral neuroscience at UC, and colleagues also indicated that the reduced-stress effects continued for at least seven days, suggesting a long-term benefit.

"These findings give us a clearer understanding of the motivation for consuming 'comfort food' during times of stress," says Ulrich-Lai. "But it's important to note that, based on our findings, even small amounts of pleasurable foods can reduce the effects of stress."

The researchers provided rats twice daily access to a sugar solution for two weeks, then tested the rats' physiological and behavioral responses to stress. Compared with controls, rats with access to sugar exhibited reduced heart rate and stress hormone levels while placed in ventilated restraint tubes and were more willing to explore an unfamiliar environment and socially interact with other rats.

Rats who were fed a solution artificially sweetened with saccharin

(instead of being fed sucrose) showed similar reductions in stress responses, the researchers say, as did rats who were given access to sexually responsive partners. But sucrose supplied directly to the stomach did not blunt the rats' stress response, the researchers say.

"This indicates that the pleasurable properties of tasty foods, not the caloric properties, were sufficient for stress reduction," says Ulrich-Lai.

Physiological responses to stress include activation of the hypothalamic-pituitary-adrenocortical (HPA) axis, regulated by the brain structure known as the basolateral amygdale (BLA). Rats exposed to pleasurable activities, such as tasty foods and sex, experienced weakened HPA axis responses to stress, the researchers found.

Lesions of the BLA prevented stress reduction by sucrose, suggesting that neural activity in the BLA is necessary for the effect.

"Our research identifies key neural circuits underlying the comfort food effect," notes Ulrich-Lai. "Further research is needed, but identification of these circuits could provide potential strategies for intervening to prevent or curtail increasing rates of obesity and other metabolic disorders."

Provided by University of Cincinnati Academic Health Center

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