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Research Shows Some May Be Wired for Wider Waists

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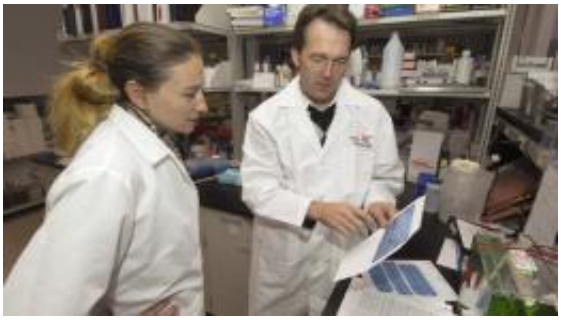

Matthias Tschop, MD

(PhysOrg.com) -- Development of obesity may be predetermined by how neurons in the brain are plugged together. New research from the University of Cincinnati (UC) shows that the amount of weight gained from eating fatty foods may be decided by the wiring of specific neurocircuitry in the hypothalamus.

The Cincinnati team, along with colleagues from Yale University and Monash University in Australia, has discovered differences in neural circuitry in the hypothalamic brain regions of otherwise identical rats, which predicted if these rats became obese from tasty high-fat foods. The differences in patterns were found around neurons known to regulate body weight and food intake.

The animal study, led by Matthias Tschop, MD, professor in UC's

endocrinology division, appears this week online ahead of print in Proceedings of the National Academy of Sciences *(PNAS)*.

Tschop and his team analyzed neurons of the so-called "melanocortin" system in rats that were either vulnerable or resistant to diet-induced obesity. When exposed to high-fat diets, vulnerable rats lost more synapses (the junctions where neurons send signals to cells) when compared to obesity resistant rats.

The observed pattern, called synaptic plasticity, also included differences in the number of stimulatory signals or inhibitory signals on key neurons known to regulate food intake and body weight. Differences in these patterns predicted if the animals would be resistant to the diet and stay lean, or be vulnerable to the diet and become obese.

"What we found most intriguing is that in response to high-fat diet, rats wired to be sensitive for obesity also showed signs of inflammatory reaction by non-neuronal brain cells, a response called reactive gliosis, which is typically seen following brain damage," says Tschop, a researcher at UC's Metabolic Diseases Institute.

This "inflammation," Tschop says, occurs alongside or after changes in neurons, and may not be easily reversible.

This new study adds evidence to the currently evolving hypothesis that inflammatory processes in key metabolism control centers of the brain, such as the hypothalamus, may play an important role in the cycle leading from overconsumption of fatty foods to obesity and ultimately to diabetes.

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