

Eating a high-fat diet may rapidly injure brain cells that control body weight

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Obesity among people who eat a high-fat diet may involve injury to neurons, or nerve cells, in a key part of the brain that controls body weight, according to the authors of a new animal study. The results will be presented Tuesday at The Endocrine Society's 93rd Annual Meeting in Boston.

"The possibility that [brain injury](#) may be a consequence of the [overconsumption](#) of a typical American diet offers a new explanation for why sustained weight loss is so difficult for most [obese individuals](#) to achieve," said presenting author Joshua Thaler, MD, PhD, a faculty member with the Diabetes and Obesity Center of Excellence at the University of Washington in Seattle.

Thaler and his colleagues studied the brains of rodents for the short-term and long-term effects of eating a high-fat diet. After giving groups of six to 10 rats and mice a high-fat diet for periods from one day to eight months, the researchers performed detailed biochemical, imaging and cell sorting analyses on the animals' brains.

Within the first three days of consuming a diet that had a similar [fat content](#) to the typical American diet, rats consumed nearly double their usual daily amount of calories, Thaler reported. Rats and mice fed the high-fat diet gained weight throughout the study. These rodents developed inflammation in the hypothalamus, the part of the brain containing neurons that control body weight. At the same time, a group of support cells called glia and scavenger cells called microglia accumulated in the [hypothalamus](#) and appeared to become activated. Although this collective response to [brain inflammation](#)-called gliosis-subsided days later, it recurred after four weeks.

"Gliosis is thought to be the brain equivalent of wound healing and is typically seen in conditions of neuronal injury, such as stroke and multiple sclerosis," Thaler said. "We speculate that the

early gliosis that we saw may be a protective response that fails over time."

In their experiments, Thaler said they also detected damage to, and eventual loss of, critical weight-regulating neurons. These neurons, called pro-opiomelanocortin (POMC) neurons, were reduced in number by month 8 of the high-fat diet in mice, according to Thaler. These results were not present in same-age rodents fed standard chow.

It is not yet clear whether this presumed neuronal injury is permanent, but it may contribute to weight gain, he stated.

This research, which was funded by the National Institute of Diabetes and Digestive and Kidney Diseases, provides a new potential target for obesity treatment, Thaler concluded.

"If new medicines can be designed that limit neuron injury during overeating, they may be effective in combating the obesity epidemic," he said.

Provided by The Endocrine Society

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