

Study underscores the gut-brain connection and shows hunger hormone impacts memory

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A hormone that influences when and how frequently animals eat also appears to affect memory, USC scientists have found.

Animals and humans have the hormone [ghrelin](#) in their stomachs. Ghrelin tells animals as well as humans when they are hungry and helps regulate their metabolism, but scientists have never been certain how exactly it works.

To learn more about how ghrelin influences hunger, metabolism and [memory](#), researchers at the USC Dornsife College of Letters, Arts and Sciences collaborated with international scientists on a study of rats. They disrupted the ability of the ghrelin hormone to communicate to the [vagus nerve](#), a [nerve](#) that signals from the gut to the brain, and then monitored the impact on their feeding and cognitive behaviors.

The rats were not anxious but they began eating more frequently, said the study's lead and corresponding author Scott Kanoski, an associate professor of biological sciences at USC Dornsife.

The lack of ghrelin signaling to the vagus nerve "not only disrupted their blood glucose regulation, but they also gained more weight," he said.

"But it didn't seem to be affecting how much food they ate," he added. Instead, "they increased their frequency of eating so that they consumed more meals and they compensated for that by reducing the size of their meals.

"We think that the increased eating frequency is related to their memory impairment. Memory from when you last ate will influence how soon you eat again. It led the rats in our study to eat sooner."

How the hunger hormone ghrelin impacts memory

Although the [rats](#) were able to remember where they had gotten food, they appeared to have forgotten that they had just eaten. Their stomachs were also slower to empty.

"The [animals](#) were impaired in a certain type of memory, called [episodic memory](#)," said study co-author Elizabeth Davis, a former researcher in Kanoski's lab at USC Dornsife. "This is the type of memory that helps you remember your first day of school, or what you ate for breakfast yesterday.

Davis said scientists are trying to learn more about ghrelin signaling through the vagus nerve because it may help researchers develop better therapies for metabolic-related diseases such as obesity and diabetes or other metabolic diseases, as well as epilepsy and Alzheimer's disease.

However, "a great deal of further research will be needed to uncover how manipulation of ghrelin signaling through the vagus nerve may be valuable in [human medicine](#)," said Davis, who recently left USC for a private pharmaceutical company after completing her postdoctoral degree in biological sciences.

The study was published in the journal *Current Biology* on Sept. 17.

More information: Elizabeth A. Davis et al. Ghrelin Signaling Affects Feeding Behavior, Metabolism, and Memory through the Vagus Nerve, *Current Biology* (2020). DOI: [10.1016/j.cub.2020.08.069](https://doi.org/10.1016/j.cub.2020.08.069)

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