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Genetic identification of a neural circuit that suppresses appetite

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Scientists at the University of Washington have used genetic engineering to identify a population of neurons that tell the brain to shut off appetite. Their study, "Genetic identification of a neural circuit that suppresses appetite," was published Oct. 13 in *Nature*.

To identify these neurons, or cells that process and transmit information in the brain, researchers first considered what makes an animal lose its appetite. There are a number of natural reasons, including infection, nausea, pain or simply having eaten too much already.

Nerves within the gut that are distressed or insulted send information to the brain through the vagus nerve. Appetite is suppressed when these messages activate specific neurons – ones that contain CGRP, (calcitonin gene-related peptide) in a region of the brain called the parabrachial nucleus.

In mouse trials, researchers used genetic techniques and viruses to introduce light-activatable proteins into CGRP neurons. Activation of these proteins excites the cells to transmit chemical signals to other regions of the brain. When they activated the CGRP neurons with a laser, the hungry mice immediately lost their appetite and walked away from their liquid diet (Ensure); when the laser was turned off, the mice resumed drinking the liquid diet.

"These results demonstrate that activation of the CGRP-expressing neurons regulates appetite. This is a nice example of how the brain

responds to unfavorable conditions in the body, such as nausea caused by food poisoning" said Richard Palmiter, UW professor of biochemistry and investigator of the Howard Hughes Medical Institute.

Using a similar approach, neurons in other brain regions have been identified that can stimulate the appetite of mice that are not hungry. Researchers hope to identify the complete neural circuit (wiring diagram) in the brain that regulates feeding behavior. By identifying these neural circuits, scientists may be able to design therapies that promote or decrease appetite.

Provided by University of Washington