

Animal cyborg—behavioral control by activating 'toy craving' circuit

April 24 2018



Schematics showing possessive behavior induced by the MPA neural circuit.
Credit: The Korea Advanced Institute of Science and Technology (KAIST)

Children love to get toys from parents as presents. This craving for objects also underlies object hoarding disorders and shopping addiction. However, the biological causes of object pursuit have remained unknown. Part of the answer may lie with a neural circuit in the

hypothalamus associated with "object craving," according to neuroscientist Daesoo Kim from the Department of Biological Sciences at KAIST.

His research team found that some neurons in the hypothalamus are activated in [mice](#) while playing with toys. Thanks to optogenetics, they proved that these neurons in the hypothalamus actually govern obsessive behavior toward non-food objects in mice.

"When we stimulate a neuron in the [hypothalamus](#) of mice, they anxiously chased target objects. We found evidence that the [neural circuits](#) in the medial preoptic area (MPA) modulate '[object](#) craving,' the appetite for possessing objects," said Professor Kim.

Researchers also proved that the MPA circuit facilitates hunting behavior in response to crickets, natural prey for mice, showing the role of this circuit for catching prey. Further, the MPA nerves send excitatory signals to the periaqueductal gray (PAG), located around the cerebral aqueduct, to create such behavior. The team named this circuit the 'MPA-PAG' circuit.

The team showed for the first time that they could control mammalian behavior with this scheme of MPA-induced drive assisted steering (MIDAS), in which a mouse chases the [target objects](#) in the front of its head during stimulation of the MPA-PAG circuit. MIDAS allows mice to overcome obstacles to move in a desired path using optogenetics.

Professor Kim, who teamed up with Professor Phill Seung Lee in the Department of Mechanical Engineering, said, "This study provides evidence to treat brain disorders such as compulsive hoarding and kleptomania. It also contributes to the development of technology to control the behavior of animals and humans using strong innate motivation, and thus could impact neuroeconomics, defense, and disaster

relief."

He said the team would like to complete the neural circuit map governing behaviors of possession and hunting in the near future by exploring correlations with other neural behaviors controlling possessing and hunting activities. This research was published in *Nature Neuroscience* in March 2018.

More information: Sae-Geun Park et al, Publisher Correction: Medial preoptic circuit induces hunting-like actions to target objects and prey, *Nature Neuroscience* (2018). [DOI: 10.1038/s41593-018-0115-3](https://doi.org/10.1038/s41593-018-0115-3)

Provided by The Korea Advanced Institute of Science and Technology (KAIST)

Citation: Animal cyborg—behavioral control by activating 'toy craving' circuit (2018, April 24) retrieved 20 April 2024 from <https://medicalxpress.com/news/2018-04-animal-cyborgbehavioral-toy-craving-circuit.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--