NEUROSCIENCE

Scientists use light to control monkey brains

George Dvorsky

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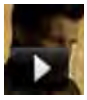
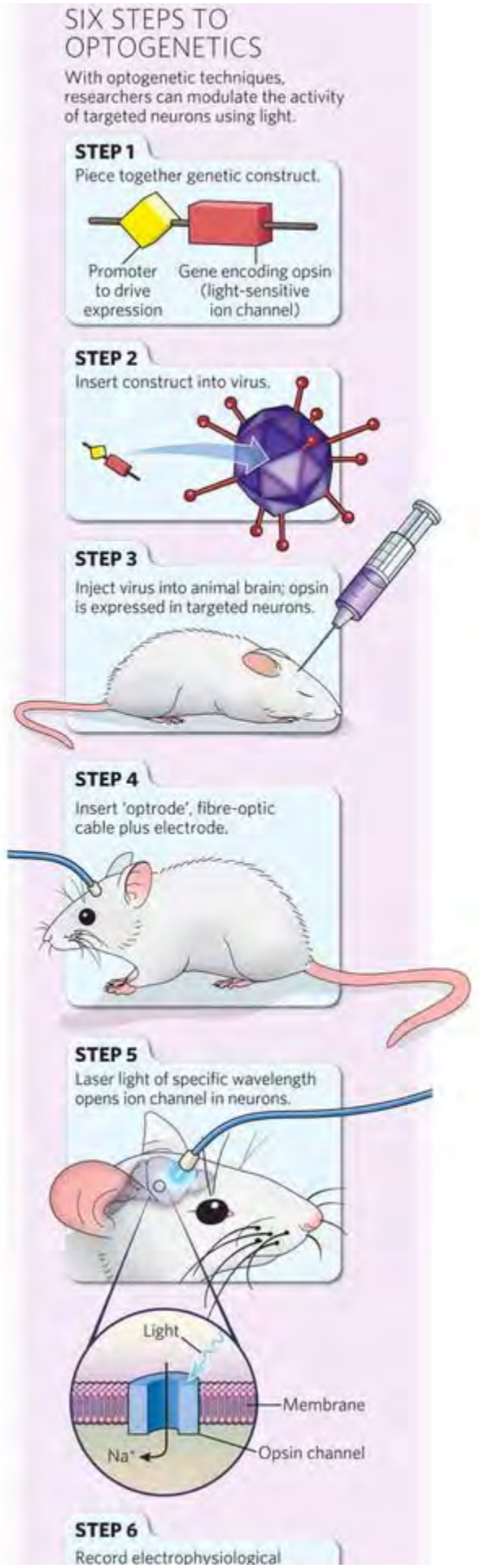
Optogenetics, a brand new field of research in which living, cortical neurons and other cells can be manipulated or controlled with optical technology (namely fiber optic cables), has been heralded as the next big thing for treating such things as heart conditions, paralysis, and even diabetes.

Up until now, however, they've only been able to test this technique on rodents — but a recent breakthrough in which scientists were able to control monkeys' brains with light has shown that the concept also applies to humans — an important piece of insight that could lead to dramatic new treatments for cognitive disorders.

The concept behind optogenetics is





remarkable. The first step in the process is to deliver a gene into brain cells, and this is done by injecting an animal with a special virus. Once delivered, the gene produces a series of light-responsive proteins. These proteins are then either activated or disabled by fiber optic cables that are inserted into the brain.

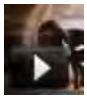
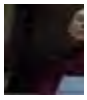
Scientists, including optogenetics pioneer Ed Boyden, have used the technique to control the behaviors of mice, but they weren't sure if it could work on primates — hence the recent initiative by Boyden, Annelles Gerits, Wim Vanduffel, and others to test the procedure on rhesus monkeys.

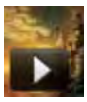
Writing in *Technology Review*, Susan Young describes the experiment:

The behavior studied in today's published report is quite subtle: two monkeys were trained to purposefully move their eyes to a target on a screen when given a cue. But when the relevant optogenetically ready modified neurons were stimulated by light from optical fibers inserted into their brains, the neuronal circuit responsible was sped up, and the monkeys were able to complete this task faster.

"It's a simple task, but it is a cognitive task," says study senior author Wim Vanduffel, who splits his time between Harvard Medical School and the University of Leuven. "It's a stepping stone," he says, one that opens up new research into understanding brain function.

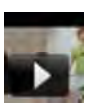
"[Optogenetics] may also become useful in the far future for therapeutic purposes, because if you can activate or deactivate very specific cell types, you can actually target particularly circuitries that are







important in different diseases with much more precision than is possible at this moment with drugs or [electrical] stimulation," says Vanduffel. "But there is still a very long way to go before it gets there."

The scientists claim, that by virtue of their experiment, they were able to induce both behavioral and functional changes in monkeys. The breakthrough will help scientists to better understand advanced cognition and the various ways the tool could be used in a clinical setting.

You can read the entire study at *Current Biology*.

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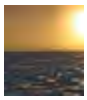
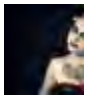
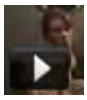
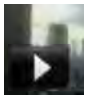


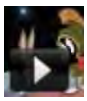

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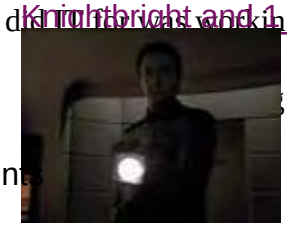

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