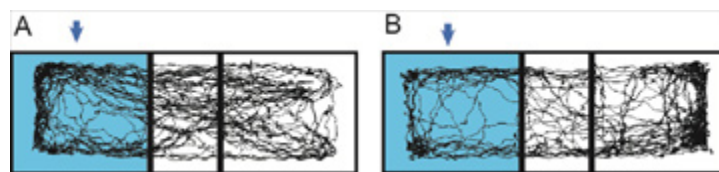


# Optogenetic control of brain circuits mediating reward and aversion

Researchers in Prof. Robert Malenka's laboratory have developed a light-activated animal system that could be used to identify compounds that treat certain psychiatric disorders. This optogenetic technology employs light-responsive opsins to precisely induce or modulate the brain circuits (ventral tegmental area dopamine and GABA neurons) involved in reward- or aversive-behaviors. This invention could be used to screen for therapeutic agents that treat conditions such as drug addiction, depression or schizophrenia.



*Optogenetic stimulation of a specific set of afferents to the ventral tegmental area can either elicit (A) conditioned place preference or (B) conditioned place aversion.*

## Applications

- **Drug screening** to identify compounds that may treat drug addiction or many other psychiatric disorders (e.g. schizophrenia, depression, bipolar disorder)
- **Optogenetic therapy** - targeted control of brain circuits to influence motivation and treat psychiatric disorders

## Advantages

- **Precise control** - by using light, optogenetic methods can control specific cells in the millisecond timescale

## Publications

- U.S. Published Patent Application 20140271479, "[OPTOGENETIC CONTROL OF INPUTS TO THE VENTRAL TEGMENTAL AREA](#)".
- Lammel S, Lim BK, Ran C, Huang KW, Betley MJ, Tye KM, Deisseroth K, Malenka RC. [Input-specific control of reward and aversion in the ventral tegmental area](#). *Nature*. 2012 Nov 8;491(7423):212-7.

## Patents

- Published Application: [20140271479](#)
- Published Application: [20170202912](#)
- Issued: [9,636,380 \(USA\)](#)

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