Docket #: S10-329

Animal Model of Substance Abuse Behavior

Researchers in Prof. Karl Deisseroth's laboratory have used optogenetic tools to develop an animal model for cocaine-modulated behavior modification by precisely targeting defined neural circuit elements. The inventors have used this approach to generate rodents that can be made to instantaneously transition into and out of a symptomatic state by precisely blocking the giant cholinergic interneurons of the nucleus accumbens (NAc).

Behavioral changes in these mice include drug responsiveness, reward memory, reinforcement, and anhedonia. Because the effects of silencing these neurons disrupts drug-related learning without affecting place preference, it is possible that control of the microcircuit could be used to selectively disrupt the addictive properties of drugs without affecting appetite or aversive responses in general. The mice and the targets identified with them could be used for research and therapeutic development.

Related Optogenetics Inventions
The Deisseroth Laboratory has developed a wide variety of optogenetics tools, including opsin genes, medical devices, animal models, and screens. Additional information on these technologies can be found by clicking on the “more technologies from Karl Deisseroth” link below.

Applications

- **Research tool** - platform for studying hedonic behavior in conditions such substance abuse and depression (to identify phenotypes, endophenotypes and treatment targets)
- **Screening** - to identify new targets and treatments for disorders related to hedonic behavior

- **Therapeutic** - intervention to control reward-learning behavior to disrupt the addictive properties of drugs of abuse

Advantages

- **Precise control** of behavior
- **Less laborious, less expensive, and less variable** than current models

Patents

- Published Application: 20130317569
- Published Application: 20170157269
- Issued: 9,992,981 (USA)

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