

Researchers find 'switch' for brain's pleasure pathway

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Amid reports that a drug used to treat Parkinson's disease has caused some patients to become addicted to gambling and sex, University of Pittsburgh researchers have published a study that sheds light on what may have gone wrong.

In the current issue of Proceedings of the National Academy of Sciences, Pitt professor of neuroscience, psychiatry, and psychology Anthony Grace and Pitt neuroscience research associate Daniel Lodge suggest a new mechanism for how the brain's reward system works.

The main actor in the reward system is a chemical called dopamine. When you smell, touch, hear, see, or taste a pleasurable stimulus, the dopamine neurons in your brain start firing in bursts. So-called "burst firing" is how the brain signals reward and modulates goal-directed behavior. But just how the stimulus you perceive causes neurons to switch into or out of this mode has been a mystery.

Using anesthetized rats, Lodge and Grace found that one area in the brain stem, known as the laterodorsal tegmental nucleus, is critical to normal dopamine function.

"We've found, for the first time, the brain area that acts as the gate, telling neurons either to go into this communication mode or to stop communicating," says Grace. "All the other parts of the brain that talk to the dopamine neurons can only do it when this area puts them into the communication mode."



As a result, disruption in that area may play a major role in dopaminerelated brain function, both in normal behaviors and psychiatric disorders.

The brain area identified by the Pitt researchers is regulated by the "planning" part of the brain, the prefrontal cortex (PFC), thereby providing a powerful indirect means for the PFC to affect the activity of dopamine neurons. Such a link could explain how changes in the PFC, seen in disorders like schizophrenia and drug addiction, disrupt the signaling of dopamine neurons.

Source: University of Pittsburgh

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