

Brain circuitry that drives drug-seeking compulsion identified

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In experiments with rats, researchers have identified the change in brain circuitry that drives development of a compulsion to seek drugs, even when that compulsion is self-destructive. The researchers demonstrated the function of the circuitry by selectively switching off drug-seeking in the animals. They said their findings show the key role of the brain region, known as the striatum, which is a region activated by reward.

Barry Everitt and David Belin published their findings in the February 7, 2008, issue of the journal *Neuron*, published by Cell Press.

The researchers drew on previous studies indicating that when drug-seeking transforms from a goal-directed behavior to a compulsion, control over that behavior shifts from the ventral to dorsal region of the striatum.

In their experiments, the researchers first trained rats to press a lever to obtain cocaine, which also activated a signal light. The researchers manipulated the schedule of cocaine-receiving and lever-pressing so that it would induce compulsive lever-pressing in the rats to obtain cocaine.

The researchers found that when they used surgery and drugs to sever the functional connection between the two striatal regions, the result was decreased drug-seeking behavior in rats, compared with rats in which the disconnection was not made.

In a second set of experiments, the researchers showed that the “disconnected” rats did not show reduced ability to acquire such training

responses. Both normal and disconnected rats could learn to pull a chain to receive a sugar-water reward so long as the activity was continuously reinforced.

The researchers concluded that “The results of the present study demonstrate that intrastriatal connectivity is a key aspect of the functional organization of the striatum and also a critically important component of the complex neural mechanisms involved in the development of drug addiction.”

Source: Cell Press

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