



Center for Behavioral Health Studies

CUE-INDUCED CRAVING LINKED TO DECISION-MAKING

Cravings Linked to Brain Regions

Environmental cues are the sights, sounds, or physical surroundings that a person associates with drug use. They can often trigger a nearly irresistible urge to use drugs even when people may not have used drugs for months or even years.

Scientists from the National Institute on Drug Abuse (NIDA) seeking an explanation for this phenomenon, have found that reminders of drug use induce powerful physiological responses in brain regions associated with learning, emotion, and decision-making.

These changes in the cognitive regions of the brain may contribute significantly to the cue-induced craving which plays an important role in relapse prevention for patients with addictions problems.

Relapse Experiments

To detect these changes, studies first established an association between morphine and a specific test environment using animals. Next, they evaluated levels in various brain regions of a protein called Fos. **This protein is expressed by genes involved in the regulation of levels of nerve cell activity.**

Researchers then injected the test animals with morphine or a saline solution once each day for 10 consecutive days while the animals were in a cage differ-

ent from the one in which they were normally housed. A second group of animals received daily injections of morphine while in their home cages.

Compared with the rats injected with saline solution, all animals injected with morphine, either in the test cage or in their home cages, exhibited increased levels of nerve cell activity.

It is well known that repeated administration of opiate drugs can result in drug conditioning effects, including increased activity locomotion.

Following 3-7 days with no exposure to either the test cage or morphine, the first group of animals were returned to the test cages but not injected with the drug or saline.

Rats who were previously exposed to morphine in the test cages showed levels of increased activity similar to when they had first received the drug. **This behavior indicates a conditioned association between the environment and morphine.**

When the brains of the first animals conditioned to both the drug and the test environment were examined, the researchers found increased levels of Fos-positive nerve cells. These cells are located in the prefrontal cortex, which is involved in goal-directed behavior. **The brains of the animals exposed to morphine in their home cages showed no increased Fos expression.**



Summary Finding

These experiments support the premise that the drug-environment relationship has a direct effect on specific regions and circuitry in the brain and human behavior.

Learning more about the molecular basis of cue-induced craving may soon lead to the development of new pharmacotherapies that target sites in the brain.

The consequences of cue-induced craving is virtually uncontrollable compulsive drug seeking use and abuse.

This drug-seeking behavior interferes with, if not destroys, an individual's functioning in the family and in society.

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