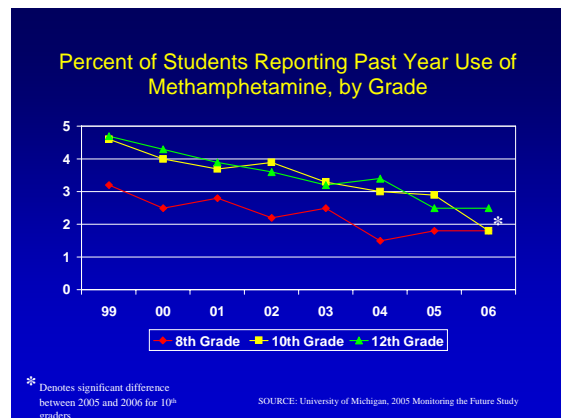


Methamphetamine Addiction: Cause for Concern – Hope for the Future – March 2007

A Research Update from the National Institute on Drug Abuse

Methamphetamine abuse is a significant problem in the United States

- Approximately 10 million people 12 years and older have abused methamphetamine in their lifetimes; in 2005, approximately 500,000 were current users (NSDUH).
- Abuse has been especially noteworthy in certain areas of the country with indicators suggesting particular problems in Hawaii, the West Coast states, rural areas of the West and, more recently, the Midwest.
- According to NIDA's 2006 Monitoring the Future Survey, there has been a significant decline of past year methamphetamine abuse by 10th graders; however, during the same time period the abuse rate among 8th and 12th graders did not change (Figure 1).
- Methamphetamine's potent addiction liability and destructive health and social consequences make its abuse particularly dangerous.

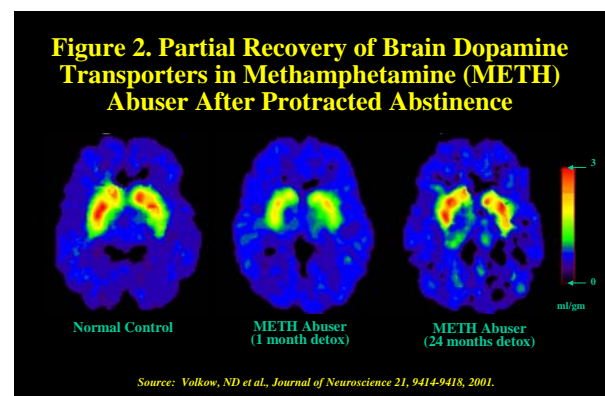


Methamphetamine acts by increasing the release of dopamine in the brain, which leads to feelings of euphoria. However, this influx of pleasure is followed by a “crash” that often leads to increased use of the drug and eventually to difficulty feeling any pleasure at all, especially from natural rewards. Long-term methamphetamine abuse also results in many damaging physical and psychiatric effects, such as:

- Addiction;
- Violent Behavior;
- Anxiety;
- Confusion;
- Insomnia;
- Psychotic features (e.g. paranoia, hallucinations, delusions); and
- Cardiovascular problems (e.g. rapid heart rate, irregular heartbeat, increased blood pressure, stroke).

What Does Methamphetamine Do to the Brain?

Methamphetamine's adverse effects on the brain are clear. In animals, methamphetamine damages nerve terminals in brain regions containing dopamine and serotonin, two chemicals essential for normal functioning of the central nervous system. Similarly, in humans, methamphetamine alters the brain in ways that impair decision-making, memory, and motor behaviors, and causes structural and functional deficits in brain areas associated with depression and anxiety. Dopamine cell death, however, has not been documented in methamphetamine abusers, which could explain why extended abstinence allows for some recovery from methamphetamine-induced deficits in dopamine function (Figure 2). But even though a recent neuroimaging study of methamphetamine abusers showed partial recovery of brain



function in some regions following protracted abstinence, function in other regions did not display recovery even after two years of abstinence—suggesting that long-lasting and even permanent brain changes may result from methamphetamine abuse.

Methamphetamine and HIV

In addition to its harmful effects on the brain, methamphetamine is inextricably linked with HIV, hepatitis C, and other sexually transmitted diseases. Its abuse increases the risk of contracting HIV not only through the use of contaminated injection equipment, but also through increased risky sexual behaviors and through physiological changes that may favor HIV transmission.

Methamphetamine abuse may also affect HIV disease progression. For example, clinical studies suggest that current methamphetamine abusers on highly active antiretroviral therapy may be at greater risk of developing AIDS than non-users, possibly due to poor medication adherence or interactions between methamphetamine and HIV medications. Similarly, preliminary studies suggest that interactions between methamphetamine and HIV itself may lead to more severe consequences for HIV-positive patients who abuse methamphetamine, including greater brain damage and cognitive impairment. More research is needed to better understand these interactions.

Treatments for Methamphetamine Addiction

Methamphetamine addiction can be successfully treated. The Matrix Model, a proven effective treatment for methamphetamine addiction, consists of a 16-week intervention that includes intensive group and individual therapy to promote the behavioral changes needed to remain off drugs, prevent relapse, and establish a new lifestyle unrelated to drugs. When applied to methamphetamine abusers, the Matrix Model has been shown to significantly reduce drug use (Figure 3).

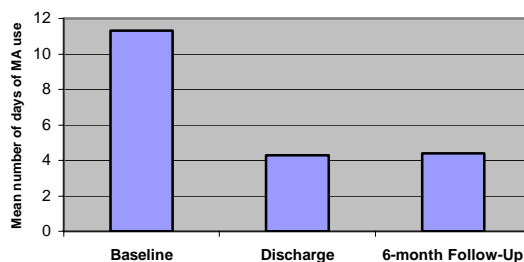
Motivational Incentives for Enhancing Drug Abuse Recovery (MIEDAR), an incentive-based method for cocaine and methamphetamine abstinence, is another treatment program that has recently demonstrated efficacy in methamphetamine abusers through NIDA's National Drug Abuse Clinical Trials Network.

NIDA is supporting the development of medications for all aspects of methamphetamine abuse and addiction. For example, a recent clinical trial revealed that the antidepressant bupropion, marketed as Wellbutrin, ® is effective in reducing methamphetamine abuse in low/moderate users. Because addiction changes the parts of the brain that affect our ability to think, to control impulses, and to understand consequences, with methamphetamine in particular exceeding other drugs in its disruption of cognition, and because drug-impaired cognitive functioning can predict treatment dropout and lead to continued abuse and relapse, people undergoing methamphetamine treatment also need medications to help them recover this functioning to give behavioral therapies the best chance to work. A "rising star" in this arena is modafinil, a medication used to treat narcolepsy, which appears to improve cognitive functioning, and may also complement behavioral counseling for methamphetamine abuse. To treat methamphetamine overdose, NIDA is also developing antibodies to methamphetamine that will bind the drug in the bloodstream and prevent its deleterious effects.

For further information please visit NIDA on the web at www.drugabuse.gov or contact:

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Figure 3. Efficacy of the Matrix Model



Source: Rawson et al. (2004) *Addiction* 99:708-17.