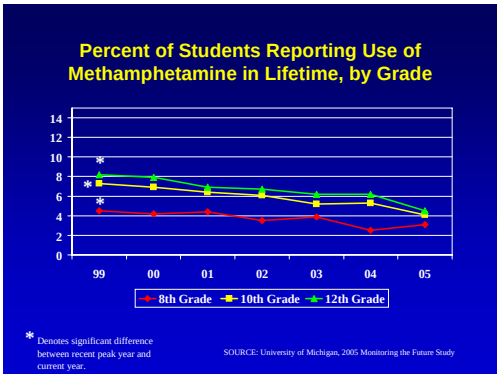
Methamphetamine Addiction:
Cause for Concern – Hope for the Future

Research Update from the
National Institute on Drug Abuse

Methamphetamine abuse is a significant problem in the United States

- Approximately 12 million people 12 years and older have abused methamphetamine in their lifetime and approximately 600,000 were current users in 2004 (NSDUH).
- Abuse appears to be increasing in certain areas of the country, especially rural communities.
- According to NIDA's 2005 Monitoring the Future Survey, there have been significant decreases between 2004 and 2005 in methamphetamine abuse among 10th and 12th graders (Figure 1).
- Methamphetamine abuse is dangerous due to its high addiction liability and significant health and social consequences.

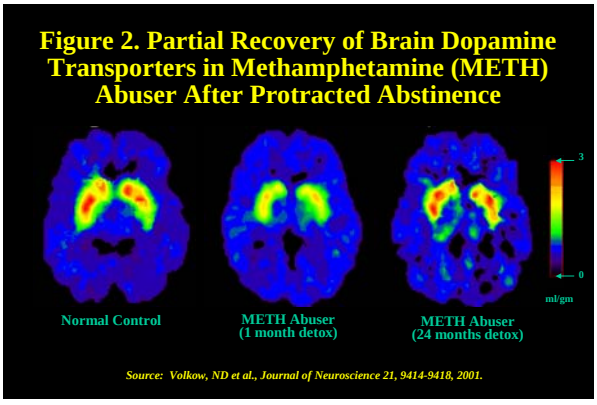


Methamphetamine acts by increasing the release of dopamine in the brain, which leads to euphoria. However, this extra sense of pleasure is followed by a "crash" that often leads to increased use of the drug and eventually to difficulty in feeling any pleasure. Long-term methamphetamine abuse also results 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 dopamine- and serotonin-containing regions of the brain. 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 with extended abstinence, there is some recovery from methamphetamine-induced changes in dopamine function (Figure 2).



A recent neuroimaging study of methamphetamine abusers showed partial recovery of brain function in some regions following protracted abstinence, associated with improved performance on motor and verbal memory tests. However, function in other regions did not display recovery even after two years of abstinence, indicating that some of these changes can be very long lasting.

Methamphetamine and HIV

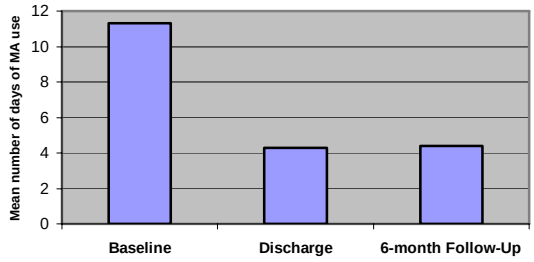
In addition to its damaging effects on the brain, methamphetamine is inextricably linked with HIV, hepatitis C, and other sexually transmitted diseases. Its abuse increases the risk of contracting HIV not only due to the use of contaminated injection equipment, but also due to increased risky sexual behaviors as well as 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 methamphetamine-abusing, HIV-positive patients, 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).

Figure 3. Efficacy of the Matrix Model



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

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

NIDA is also developing medications for methamphetamine addiction. In 2000, NIDA established the Methamphetamine Clinical Trials Group (MCTG) to conduct clinical (human) trials of medications for methamphetamine addiction in geographic areas in which its abuse is particularly high, including San Diego, Kansas City, Des Moines, Costa Mesa, San Antonio, Los Angeles, and Honolulu. For example, modafinil, which is used to treat narcolepsy, has shown promise in cocaine treatment and may have positive effects on executive function and impulsivity, will be tested in the MCTG. Another potential treatment is the anti-epileptic medication, gamma-vinyl GABA (GVG). Studies have demonstrated that half of the GVG-treated methamphetamine addicts remained drug free for approximately six weeks despite living in their normal home environment with ready access to drugs.

To treat methamphetamine overdose, NIDA is also developing monoclonal antibodies to methamphetamine that will sequester the drug in the bloodstream thereby preventing its deleterious effects.

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

Geoffrey Laredo
Senior Advisor to the Director
Office of Science Policy and Communications
National Institute on Drug Abuse
Phone 301-594-6852/Fax 301-443-6277
glaredo@nida.nih.gov