

## Methamphetamine, the Brain, HIV, and Mental Health

Kristina Jones, MD

Recreational methamphetamine use is expanding among members of gay communities in the United States. Understanding the drug's mechanism of action and the short- and long-term psychiatric consequences of abuse offers insights into how methamphetamine affects HIV transmission behaviors among both HIV-positive and HIV-negative people, how it affects treatment-related behaviors such as adherence in people with HIV, and how it complicates the course of HIV disease.

### Methamphetamine Drug Characteristics

Methamphetamine is classified as a stimulant (an amphetamine). Other drugs in this class include cocaine and MDMA (methylenedioxymethamphetamine; Ecstasy) and medications such as methylphenidate (Ritalin). Each of these drugs has unique effects on the brain and behavior. Methamphetamine can be thought of as a super-concentrated amphetamine in the same way that "crack" is a concentrated form of cocaine.

Medical practitioners discovered amphetamines in the 1940s and the drug was used by pilots during World War II to help them stay awake during long missions. The drug was initially prescribed for weight loss until it was recognized that it produces adverse personality changes, that weight was regained as soon as the drug was stopped, and that ongoing use could lead to heart attack and death.

Colloquially known as "crystal," "tina," "meth," or "speed," methamphetamine can be smoked, snorted, injected, or ingested. Some users report "booty bumping," inserting a solution of methamphetamine and water rectally with a syringe causing decreased sensation in the rectum—"freezing"—and

some absorption of the drug. Methamphetamine is apparently used for longer and more aggressive sexual encounters. Methamphetamine may be contaminated with other dangerous substances such as phencyclidine (PCP) and toxic ingredients that may alter the effects users expect to experience.

In the body, methamphetamine lasts about 12 hours. Users report "runs" or "binges," during which methamphetamine is used every few hours for several days at a time.

Subjective symptoms of intoxication include alertness, euphoria, and an increased sense of well-being. Many users report feeling more sexual desire, heightened self-confidence, and freedom from anxiety about HIV. As discussed below, however, methamphetamine can lead to a variety of serious psychiatric effects and physical dangers ranging from hallucinations and paranoia to heart attack and kidney failure.

Many of the worst effects of methamphetamine—physical, psychiatric, and HIV-related dangers—can arise from casual or recreational use. That is, these effects do not occur only in the context of ongoing abuse.

### Prevalence and Reasons for Use

According to the World Health Organization, amphetamine and methamphetamine are among the most widely abused illicit drugs in the world, second only to marijuana. More than 35 million individuals regularly abuse these drugs, while 15 million abuse cocaine.<sup>1</sup>

Recent studies have begun to define both the threat that the methamphetamine epidemic poses to public health and the reasons men who have sex with men use methamphetamine. For example, a New York study found a relationship between methamphetamine and transmission-related sexual behaviors.<sup>2</sup> A San Francisco study found that in circuit party settings, the drug was used to initiate, enhance, and prolong sexual encounters, and that intoxication produced lapses in judgment leading to unprotected anal receptive intercourse.<sup>3</sup>

# Editorial: Just Say Mental Health

Robert Marks, Editor

It would be hard not to know by now that there is an amphetamine epidemic in the United States. Among gay and bisexual men, particularly in urban centers, methamphetamine use is fueling HIV transmission in ways that raise the specter of a more desperate time.

In a country that has inconsistently demonized and glorified the use of substances ranging from tobacco and alcohol to marijuana and heroin, that has accepted a "just-say-no" approach, and that has rejected the abundant evidence and scientific consensus on the value of medical marijuana, I have become wary of reports of the dire threat any substance poses to society. There is no

doubt, however, about methamphetamine. It is one nasty drug.

The articles in this issue of FOCUS should convince you, too. Kristina Jones, a psychiatrist who works on the front lines of the New York methamphetamine and HIV epidemics, offers a careful and clear description of the overwhelming risks that accompany methamphetamine use, an analysis that goes way beyond the paternalistic patter of just-say-no'ism. Los Angeles researchers Michael Campos and Steven Shopataw discuss some evolving methamphetamine treatment options, but their hope is measured.

The treatment of addiction is never easy. We also know that men who have sex with men have

higher rates of substance use than the general population, higher rates of depression, and higher rates of a history of childhood sexual abuse. Methamphetamine is not the first substance to which gay and bisexual men—and heterosexual people too—have turned to self-medicate these ills. It won't be the last. But it may be the nastiest.

## A Hit of Self-Esteem

To quote a line from an earlier draft of Jones's article: methamphetamine delivers "a hit of self-esteem in powder form." If there were ever a time to support programs that cultivate healthier paths to self-esteem, that time would be now. We know that just preaching "no" does not work. Offering drug treatment and mental health care and offering community support for people in sexual minorities does.

A southern California study of HIV-positive gay men using methamphetamine found that in addition to reporting sexual enhancement, users said the drug "provided temporary escape from being HIV-positive," helped "manage negative self-perception and social rejection associated with being HIV-positive," offered "a method of coping with the specter of death,"<sup>4</sup> and made it easier to approach sexual partners and to have anonymous sex with multiple partners.

A Los Angeles study of gay and bisexual men seeking treatment for methamphetamine dependence found that 61 percent of subjects were HIV-infected. Those with HIV were more likely to have injected methamphetamine and engaged in unprotected anal receptive intercourse with significantly more sexual partners than uninfected subjects.

## Medical Complications and HIV Treatment

Medical complications of methamphetamine ingestion include tachycardia (rapid heart rate) hypertension, tachypnea (shortness of breath) hyperthermia (raised internal body temperature), and central nervous system excitation. Methamphetamine toxicity can also lead to rhabdomyolysis (the breakdown of muscle tissue leading to kidney failure).<sup>5</sup> Methamphetamine can also lead to cardiovascular events such as heart attack and stroke.

Clinicians also report fatal interactions between protease inhibitors and both methamphetamine and Ecstasy. Protease inhibitors and methamphetamine each rely on a liver enzyme called CYP3A4 for their metabolism. When these substances are taken together, the enzyme's "receptor sites" are engaged by the protease inhibitor and cannot metabolize the methamphetamine, so the methamphetamine reaches the brain unchanged. This can result in a three- to tenfold increase in methamphetamine levels in the bloodstream and in the brain. An Australian patient taking a combination of stavudine, saquinavir, and ritonavir died after injecting methamphetamine.<sup>6</sup> Two case reports also document fatalities following ingestion of ritonavir and Ecstasy.<sup>7</sup>

## Psychological and Psychiatric Effects of Use

Methamphetamine use has serious psychological and psychiatric side effects, which may be long-lasting, continuing even after use has ceased. The effects of one-time use can include personality changes, most commonly suspiciousness or jealousy, paranoia, auditory hallucinations, restlessness, tension, irritability, aggressiveness (both sexual and physical), and appetite suppression.

Continual use of methamphetamine, with little or no sleep over a period of two to five days, can lead to extreme irritation and

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**The psychiatric effects of methamphetamine are caused largely by the release of dopamine; the medical complications are due primarily to the release of norepinephrine.**

paranoia. In approximately 10 percent of cases, heavy, chronic abuse can lead to psychosis, characterized by paranoia, impaired perception of reality, and vivid visual, auditory, and tactile hallucinations. Such amphetamine-produced psychoses mimic schizophrenia. Prolonged use can result in tolerance for the drug and increased levels of use, creating dependence.

Withdrawal symptoms, which occur 24 hours after last use of methamphetamine, resemble major depressive disorder. Symptoms include depressed mood, anhedonia (the inability to experience pleasure), fatigue, and suicidal ideation.

Quality clinical research data on long-term psychiatric consequences of methamphetamine use is sparse. People who use methamphetamine often also use other drugs such as alcohol, marijuana, cocaine, Ecstasy, gamma hydroxybutyrate (GHB), and ketamine. Each of these substances affects

the brain and behavior differently. Overall findings suggest that while acute psychosis tends to resolve, depressive symptoms tend to persist. California researchers studied 170 methamphetamine users two to five years after outpatient treatment. They found that of the 23 percent of the sample reporting paranoia at baseline, only 7 percent reported paranoia at follow-up, while 62 percent reported depressive symptoms at both baseline and follow-up. Twenty-eight percent of respondents reported violent behavior in the year prior to baseline.

### **The Role of Dopamine**

The psychiatric and behavioral effects of methamphetamine are mediated primarily through the release of two neurotransmitters: large amounts of dopamine, one of the brain's key neurotransmitters, and smaller amounts of norepinephrine. Methamphetamine addiction can be understood as a two-part phenomenon: during intoxication, there is too much dopamine, and during withdrawal there is too little. It can take months or years to recover to normal dopamine levels, and sometimes normal levels are never attained.

Dopamine acts in regions of the brain that affect the experience of pleasure, such

as subjective sensations of euphoria, well-being, sexual desire, and confidence. It also influences the body's sleep clock. Further, dopamine is involved in reward behavior; the mechanism that causes people to repeat behaviors that are pleasurable. Most neurochemical models of addiction focus on this role of dopamine as a behavioral reinforcer, and addiction to most drugs, including heroin and tobacco, relies on dopamine to reinforce the substance's pleasurable effects.

The large amounts of dopamine that are released during methamphetamine use may explain some of the behaviors intoxication causes. Dopamine flooding the brain's amygdala accounts for some of the aggressive behavior reported by methamphetamine abusers. Excess dopamine is also probably responsible for the psychotic symptoms seen in some users, and treatment of methamphetamine-related symptoms such as agitation, paranoia, and auditory hallucinations includes conventional antipsychotic drugs, which block dopamine. Some theories implicate excess dopamine as the cause of schizophrenia. After months or years of methamphetamine abuse, the brain's supply of dopamine is probably depleted, resulting in depression, emotional flattening, and anhedonia.

Researchers believe that methamphetamine can cause brain damage, because the drug pushes out huge amounts of dopamine from nerve cells. This flooding can be toxic to nerve cells and to the whole group of cells where dopamine is clustered and stored in the brain. Animal studies show that methamphetamine damages dopamine and the serotonin nerve structures. Human studies have provided hard evidence from scans of the brain that methamphetamine use leads to a reduction of dopamine transporter levels, a marker for dopamine function in the brain, showing that dopamine is absent or missing from the proteins that move dopamine around the brain.

### **Dopamine and HIV Dementia**

Dopamine also plays a role in the brain's ability to process information, that is, moving information from one brain cell to the next. The precise chemical mechanism of HIV dementia and HIV-related cognitive impairment is poorly understood. Research suggests, however, that impairment is caused by a metabolic alteration in brain chemistry that involves both brain cell loss and neuronal dysfunction, probably involving dopamine neurons. Some studies have found that HIV viral proteins are toxic to the dopamine neuron.

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The danger for HIV-positive methamphetamine users is that methamphetamine may amplify the neuron-damaging effect of HIV. Some researchers have inferred from this that the combination of HIV infection and methamphetamine abuse can increase the chances of cognitive impairment.<sup>9</sup>

## The Role of Norepinephrine and Serotonin

Many of the medical complications of methamphetamine are due to the other component of the drug, norepinephrine, which is chemically related to adrenaline. Norepinephrine is primarily responsible for methamphetamine's physical effects of increased heart rate and blood pressure, hence, its cardiovascular complications. The norepinephrine component may explain why methamphetamine abusers get high blood pressure, heart attacks, and strokes. Large amounts of norepinephrine may also account for the anxiety that users experience and for some of the weight loss.

In contrast, Ecstasy exerts its effects primarily through release of another neurotransmitter, serotonin. Serotonin is implicated in the regulation of mood, sleep, appetite, and libido, and is the key ingredient in most antidepressants. Unlike excess dopamine, excess serotonin does not usually result in psychosis, violence, or sexual behaviors that can lead to HIV transmission. In high doses, however, the excess serotonin released during Ecstasy use can cause hallucinations, paranoia, seizures, rhabdomyolysis (muscle breakdown leading to kidney failure), and death.

## Psychiatric Treatment

The acute psychotic symptoms associated with methamphetamine can be treated with standard neuroleptic (antipsychotic) medication and sometimes with hospitalization. Drug rehabilitation for methamphetamine addiction aims at inpatient detoxification, treatment for depression with antidepressants,

and harm reduction counseling for people who choose to continue use.

Since there is no evidence to guide medication use for methamphetamine recovery, methamphetamine treatment is modeled after cocaine treatment. However, randomized controlled trials of the dopamine “agonists”—substances such as bromocriptine and pergolide that promote dopamine's effects and which are used for cocaine recovery—have shown no efficacy in methamphetamine recovery.

Many drug abusers conclude that they need stimulants to recover. But a study of cocaine users in recovery found that methylphenidate, a stimulant and an indirect dopamine agonist, did not decrease cocaine use (although it did decrease dropout from drug treatment).<sup>10</sup> While drug users, including methamphetamine users, may present for psychiatric care demanding Ritalin or other stimulants, there is no data to support this approach. Finally, while psychiatrists may use the antidepressant bupropion (Wellbutrin; Zyban) to treat depressive symptoms in methamphetamine users, this drug does not work during acute stimulant withdrawal.

## Conclusion

Methamphetamine use, epidemic in many gay and bisexual communities, has serious adverse physical, psychiatric, and psychological effects, and the drug may interact with HIV medications to produce increased toxicity or death. Neurological complications resulting from dopamine depletion can lead to irreversible neuropsychiatric symptoms and may compound HIV-related cognitive impairment. Psychiatric consequences include acute psychosis and paranoia during intoxication, and long-lasting depression even after addiction has ended. At a time of continued, if measured, success in HIV treatment, burgeoning methamphetamine use threatens hope as well as health.

# Clearinghouse: Crystal Meth and HIV

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# Evidence-Based Treatments for Methamphetamine Abuse

Michael Campos, PhD and Steven Shoptaw, PhD

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Methamphetamine use was once primarily observed in the western United States and Hawaii, however, its use and production are on the rise across the United States. Data from the Drug Abuse Warning Network show increases in amphetamine/methamphetamine-related emergency room admissions across the nation from 1995 to 2002.<sup>1</sup> This article briefly reviews the efforts of the drug treatment community to develop evidence-based methamphetamine treatment.

The National Institute on Drug Abuse has funded evaluations of potential medications for methamphetamine withdrawal, craving, and associated cognitive deficits. Recent work has focused on evaluating the efficacy of drugs that enhance serotonin (sertraline); enhance serotonin, dopamine, and norepinephrine (bupropion); inhibit serotonin (ondansetron); enhance the neurotransmitter GABA (baclofen and gabapentin); and enhance cognition (aripiprazole, which partially enhances dopamine; rivastigmine, which inhibits acetylcholinesterase). Modafinil, which has shown promise as a cocaine pharmacotherapy, is another medication that has attracted interest as a methamphetamine treatment.

None of these medications, however, has yet proven its efficacy. By contrast, behavioral therapies have proven effective in helping methamphetamine abusers to recover and also reduce HIV-related sexual behaviors. The most effective interventions fall into two categories: cognitive-behavioral therapy and contingency management.

## Cognitive-Behavioral Therapy

Cognitive behavioral substance abuse

therapy is a short-term, focused approach that can be administered individually or in groups designed to initiate abstinence and avoid relapse. There are three broad phases of cognitive behavioral treatment.<sup>2</sup> The first phase is designed to gain initial control of drug use. Specific techniques include teaching participants to identify high-risk situations and methods to deal with thoughts about use. The second phase addresses more psychosocial substance-related problems including social isolation and unemployment. The third phase teaches internal coping skills, for example, managing triggers to relapse such as craving, and interpersonal coping skills, for example, drug refusal skills training.

The Matrix Model, a cognitive-behaviorally based outpatient treatment originally developed to treat cocaine dependence, incorporates many of these elements. Matrix treatment aims to stop drug use, teach issues critical to addiction and relapse, provide education for family members affected by addiction and recovery, help clients become familiar with self-help programs including 12-step programs, and provide weekly monitoring of urine and breath samples for drug and alcohol use.<sup>3</sup>

An eight-site, randomized outpatient trial, compared the Matrix Model to “treatment as usual,” which consisted of individual counseling sessions, groups, and 12-step participation. Researchers found that Matrix participation led to increased retention in treatment, increased program completion, and longer periods of sustained abstinence compared to treatment as usual. Matrix also resulted in comparable, but not statistically different levels of drug-free urine while in treatment. By six month follow-up evaluations, all participants benefited equally from treatment as measured by greatly reducing methamphetamine use from baseline levels.

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See also references cited in articles in this issue.

## Contingency Management

Contingency management treats methamphetamine abuse by systematically delivering immediate reinforcement in response to a client's success in remaining drug free, as documented by biological samples such as urine. Contingency management can be used as a primary treatment or an adjunct to treatment for cocaine, opiate, and nicotine addictions and has been shown to be effective in the treatment of methamphetamine addiction.<sup>4-6</sup>

Contingency management understands drug abuse as an "operant" behavior, that is, behavior that is maintained by powerful reinforcers. It theorizes that alternative, non-drug reinforcers should decrease drug use if these reinforcers are sufficiently powerful and if they are incompatible with drug use. In many studies, vouchers for pro-social goods or services are the alternate reinforcer. The vouchers become increasingly valuable with provision of consecutive urine or breath samples that document continued abstinence. Provision of a sample that shows recent drug use does not earn a voucher for a participant and sets the value of the next voucher back to the initial value. Voucher values vary among studies, but the maximum that can be earned has ranged from about \$200 to about \$1,300 over a four-month period.

A recent trial, undertaken by researchers at the University of California, Los Angeles reported on outcomes of 162 methamphetamine-dependent gay and bisexual men who were randomly assigned to one of four 16-week behavioral drug abuse treatments: Matrix Model (40 participants), contingency management (42 participants), combined Matrix and contingency management (40 participants), and a version of the Matrix Model culturally tailored to gay issues (40 participants).<sup>6</sup> Researchers observed outcomes including methamphetamine use, as measured by urine testing, and self-reported sexual risk behaviors. Sixty percent of study participants were HIV-positive.

The study found statistically significant differences in retention and in the longest period of consecutive urine samples negative for methamphetamine metabolites in the contingency management and the Matrix plus contingency management conditions versus either of the other conditions that used the Matrix Model alone. The gay-tailored version of the Matrix Model also significantly reduced unprotected receptive anal intercourse during treatment when compared to the basic Matrix Model.<sup>7</sup> At one-year follow-up, however, reductions

from baseline in drug use and sexual risk behaviors were maintained similarly across all four groups.

## Conclusion

The combination of contingency management and cognitive-behavioral treatment constitutes a particularly powerful in-treatment and post-treatment approach. Contingency management appears to be an effective method for initiating abstinence, and the structure of reimbursements for drug-free urine samples is designed to reward sustained abstinence. This is important because individuals with periods of sustained abstinence while in drug treatment may benefit more from treatment than participants who have shorter in-treatment abstinence periods.

Cognitive-behavioral treatment offers training to develop coping skills related to maintaining abstinence after treatment. It gives clients the opportunity to process and learn from relapse, plan for high-risk substance-related and HIV-related situations, and learn new interpersonal skills.

The establishment of abstinence is vital not only because it improves treatment outcomes, but also because it allows for the natural recovery of normal cognitive function in methamphetamine users.

While methamphetamine addiction may lead to long-term problems that extend into abstinence, many of these cognitive and psychological problems may resolve within a year if abstinence is maintained.

The rise in methamphetamine use throughout the United States underscores the need for enhanced public education, increased law enforcement efforts to disrupt methamphetamine manufacture and trafficking, the development of evidenced-based treatment resources, and continuing work to evaluate medications to address methamphetamine-related craving, withdrawal, and cognitive deficits.

## Comments and Submissions

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## Recent Reports

### Substance Use and Sexual Behavior

Colfax G, Coates TJ, Husnik MJ, et al. Longitudinal patterns of methamphetamine, popper (amyl nitrite), and cocaine use and high-risk sexual behavior among a cohort of San Francisco men who have sex with men. *Journal of Urban Health*. 2005; 82 (1, Suppl. 1): i62–i70. (San Francisco Department of Public Health; University of California, Los Angeles; and University of California, San Francisco.)

A large San Francisco study of HIV-negative men who have sex with men found that episodic use of methamphetamine, poppers, or sniffed cocaine—even intermittent use—was associated with unprotected anal intercourse with serodiscordant partners.

Between January 1999 and February 2001, researchers recruited HIV-negative men who had engaged in any anal sex—protected or unprotected—with one or more men in the prior year. Men were excluded from the sample if they had been in a monogamous relationship for two or more

years with an HIV-negative male partner. Of the 736 men, 69 percent were White, 7 percent were African American, and 16 percent were Latino. Forty-two percent of the men were between the ages of 26 and 35, and 31 percent were between the ages of 36 and 45. Researchers collected at baseline and at six-month follow-up intervals (for a total of four years) data on alcohol and drug use, sexual behaviors, and depression symptoms.

Latino men were significantly less likely than White men to use methamphetamine, poppers, or sniffed cocaine. Men who were 25

years or younger were more likely than men who were 45 years or older to increase their drug use from one visit to the next.

At a minimum of one follow-up session, 52 percent of participants reported engaging in unprotected anal sex with a partner who was HIV-positive or whose status was unknown. Compared to other participants, those who had serodiscordant unprotected sex had lower levels of formal education, and were more likely to be depressed, to report multiple sex partners, and to report use of methamphetamine, poppers, or sniffed cocaine.

After the data were controlled for current depression levels, participants were significantly more likely to report serodiscordant unprotected sex during the six-month periods characterized by higher levels of drug use. However, above a certain level of use, there was no statistical difference in behavior, suggesting that “no level of use of these drugs should be considered ‘safe.’”

### Methamphetamine Use among Gay Men

Halkitis PN, Green KA, and Mourgues P. Longitudinal investigation of methamphetamine use among gay and bisexual men in New York City: Findings from Project BUMPS. *Journal of Urban Health*. 2005; 82(1 Suppl. 1): i18–i25. (New York University.)

HIV-positive men differ from HIV-negative men in both the contexts of, and reasons for, methamphetamine use, according to a longitudinal study of gay and bisexual club-drug users.

Researchers analyzed data from the Boys Using Multiple Party Substances (BUMPS) study, a longitudinal investigation of 450 club-drug-using gay and bisexual men recruited in New York City between February 2001 and October 2002. Participants had to self-identify as gay or bisexual and report that they had used club drugs—any combination of GHB, ketamine, MDMA, methamphetamine, and powdered cocaine—six times in the prior year.

The sample included 293 methamphetamine users and 157 non-users. The average age of methamphetamine users was 33. The sample was 51 percent White, 20 percent Latino, 15 percent African American, and 5 percent Asian-Pacific Islander.

African American men were less likely than White men, Latino men, and Asian-Pacific Islander men to report methamphetamine use. At both baseline and 12-month follow-up, significantly more HIV-positive than HIV-negative men had used methamphetamine at sex clubs and sex parties. HIV-positive men were also more likely than HIV-negative men to report using methamphetamine to deal with social pressures, to avoid conflict with others, and to avoid unpleasant emotions.

### Stimulant Use Among Gay Latino Men

Diaz RM, Heckert AL, and Sanchez J. Reasons for stimulant use among Latino gay men in San Francisco: A comparison between methamphetamine and cocaine users. *Journal of Urban Health*. 2005; 82 (1 Suppl. 1): i71–i78. (San Francisco State University.)

A San Francisco study of gay Latino men found that those who used methamphetamine were more likely than those who used cocaine to be HIV-positive, unemployed, and highly acculturated to U.S. society.

***Episodic use of methamphetamine, poppers, or sniffed cocaine was strongly associated with HIV transmission-related sexual behavior.***

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Researchers recruited a random sample of 300 men entering bars, sex clubs, and public sex environments, and participating in Internet chat rooms and phone sex services. Subjects had to have reported stimulant use in the prior six months. Acculturation was based on reports of frequency of use of the Spanish language among friends.

The average age was 30, and 90 percent of the sample were between the ages of 18 and 39. Participants were classified as methamphetamine users (52 percent), cocaine users (43 percent), or crack users (5 percent) based on the stimulant they reported most frequently using. Twenty-seven percent of methamphetamine users were HIV-positive, compared to 12 percent of cocaine users.

Methamphetamine users were more likely to report reasons for use related to sexual enhancement. Cocaine users were more likely to report reasons related to social connections. Among both groups, however, the most frequently reported reason for stimulant use was energy increase.

### Neuropsychological Impairment

Rippeth JD, Heaton RK, Carey CL, et al. Methamphetamine dependence increases risk of neuropsychological impairment in HIV infected persons. *Journal of the International Neuropsychological Society*. 2004; 10(1): 1–14. (University of California, San Diego; San Diego State University; and Veterans Affairs San Diego Healthcare System.)

A cross-sectional San Diego study found that the combination of HIV infection and methamphetamine dependence was associated with neuropsychological impairment.

Researchers split the sample of 200 participants into four groups: HIV-positive and methamphetamine dependent (22 percent); HIV-negative and methamphetamine dependent (24 percent); HIV-positive and methamphetamine nondependent (25 percent); and HIV-negative and methamphetamine nondependent (30 percent). The sample was 73 percent male, and the average age was 37. Sixty-eight percent of subjects were White, 12 percent were African American, and 17 percent were Latino.

Participants received a neuropsychological assessment, physical and neurological exams, a psychiatric and substance use interview, and a medical history. The neuropsychological evaluation assessed seven cognitive domains: speed of information processing; learning; recall; abstraction/executive functioning; verbal fluency; attention/working memory; and motor skills.

A "global deficit score" for each patient reflected an objective summary score of neuropsychological impairment. The three

groups that were HIV-positive, methamphetamine dependent, or both had significantly higher global deficit scores than the group of participants who were HIV-negative and methamphetamine nondependent.

Further, the HIV-positive and methamphetamine dependent group had significantly higher global deficit scores than the two groups with only one of the risk factors. When compared to the other three groups, the HIV-positive and methamphetamine dependent group had scores indicating greater problem severity in the learning, recall, and motor skills domains. Finally, the three groups with at least one risk factor had significantly higher depressive symptom scores than the HIV-negative and methamphetamine nondependent group.

### Amphetamine Use and Seroconversion

Buchacz K, McFarland W, Kellogg TA, et al. Amphetamine use is associated with increased HIV incidence among men who have sex with men (MSM) in San Francisco. *AIDS*. In press. (U.S. Centers for Disease Control and Prevention; San Francisco Department of Public Health; and University of California, San Francisco.)

HIV incidence among amphetamine users was significantly higher than among non-users, according to a study of almost 3,000 men who have sex with men testing at anonymous HIV test sites in San Francisco.

HIV incidence among users was 2.1 percent among non-users, 6.3 percent among amphetamine users, and 7.7 percent among people who had sex while using amphetamines. After controlling for other substance use, age, and ethnicity, the association weakened but the difference remained statistically significant.

### Next Issue

HIV prevention test counseling is a hybrid of many approaches that has evolved over 20 years. In the August issue of *FOCUS*, **Jaklyn Brookman, MFT**, a consultant to government and non-profit agencies and long-time HIV test counselor trainer, confronts some of the current challenges in counseling technique as she explores the art of risk reduction counseling.

Also in August, **David Huebner, PhD, MPH**, an Assistant Professor of Medicine at the UCSF Center for AIDS Prevention Studies, reviews the recent data on the effect of treatment optimism on motivations to engage in HIV risk reduction.