

## Association of Methamphetamine Use During Sex With Risky Sexual Behaviors and HIV Infection Among Non-Injection Drug Users

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**Morbidity, mortality, and drug treatment data suggest that methamphetamine use is on the rise. Based on research findings of the sexual behaviors of methamphetamine-using injection drug users, we chose to examine the relationship between methamphetamine use during sex and risky sexual behaviors and human immunodeficiency virus (HIV) seropositivity among clients of publicly funded HIV testing sites in California who reported never injecting drugs. We found that among gay, bisexual, and heterosexual men and heterosexual women, users of methamphetamines reported more sexual partners than non-methamphetamine users. Among heterosexuals, a greater percentage of methamphetamine users than nonusers participated in anal intercourse. Methamphetamine use was independently related to decreased condom use during vaginal and anal intercourse, prostitution, and sex with known injection drug users. In addition, methamphetamine users were more likely to have had a sexually transmitted disease. When controlling for race or ethnicity; age; exposure to possibly infected blood or blood products; and the use of cocaine, alcohol, or marijuana during sex, methamphetamine-using bisexual men were more likely to test positive for HIV than those reporting no history of methamphetamine use. Our data suggest that noninjection methamphetamine use is related to increased, unprotected sexual activity and the risk of contracting sexually transmitted diseases, including HIV.**

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Methamphetamine use has become increasingly popular in recent years. Nationally, methamphetamine-related emergency room morbidity rose 350% from 1991 to 1994. During this time, the number of deaths from methamphetamine abuse nearly tripled.<sup>1</sup> In California, which is considered the hub for methamphetamine activity in the United States,<sup>1</sup> the number of methamphetamine-related hospital emergency admissions increased 366% from 1984 to 1993.<sup>2</sup> The number of admissions for methamphetamine abuse into California's public alcohol and drug treatment programs increased 186% from 1991-1992 to 1994-1995; the percentage of all admissions that were for methamphetamine treatment increased from 45% to 50% during this four-year period.<sup>3</sup>

The rise in methamphetamine use can be attributed to many factors. Producing methamphetamines is relatively easy and often is done in clandestine laboratories with inexpensive equipment.<sup>4</sup> Since the late 1980s, the major

producers and distributors of methamphetamines, once the trade of motorcycle gangs, have been organized drug-trafficking groups based in Mexico.<sup>1</sup> As a result, methamphetamines are competitively priced and widely available on the illegal drug market<sup>5</sup> under such street names as "batu," "chalk," "crank," "cris," "crystal," "glass," "go-fast," "ice," "meth," "shabu," "speed," and "zip." The use of methamphetamines can include swallowing or injecting, but increasing purity on the streets has encouraged more users to snort or smoke the drug.<sup>1</sup> Smoking methamphetamine parallels the effects of injecting it because the drug's rapid absorption from the lungs produces an immediate euphoria.<sup>5</sup> Methamphetamines have a euphoric effect similar to but a half-life exceeding that of cocaine by fourfold to eightfold.<sup>4</sup>

Like pharmaceutically produced amphetamines, used primarily to treat attention deficit disorder with hyperactivity, narcolepsy, and exogenous obesity,<sup>6</sup> illicitly synthesized methamphetamines have central nervous sys-

**ABBREVIATIONS USED IN TEXT**

AIDS = acquired immunodeficiency syndrome  
 HIV = human immunodeficiency syndrome  
 IDU = injection-drug user  
 STD = sexually transmitted disease

tem-stimulating effects. As stimulants, they create a neurochemical amplification of the pleasure experienced in most activities.<sup>7</sup> Methamphetamines can intensify emotions, increase energy, elevate self-esteem, and heighten sexuality, while reducing inhibitions and impairing judgment.<sup>7</sup>

Research on the behaviors of injection drug users (IDUs) indicates that (meth)amphetamine use is related to increased sexual activity without regard for the consequences associated with unprotected sexual intercourse. For example, among male prison inmates in Stockholm, Sweden, amphetamine-using IDUs reported more female sex partners than opiate-using IDUs.<sup>8</sup> Klee interviewed female IDUs from England and found greater interest in sex and frequency of intercourse among those who used amphetamines than among those who injected opiates.<sup>9</sup> In a survey of street-recruited, mostly heterosexual IDUs, male methamphetamine users reported more sex partners, and a greater percentage had traded money or drugs for sex, than men never using methamphetamines.<sup>10</sup> In addition, male and female methamphetamine-using IDUs participated in more acts of vaginal intercourse, and methamphetamine use was found to be an independent predictor of decreased condom use among both male IDUs and male sex partners of female IDUs.

Of the 64,006 persons seeking treatment for methamphetamine abuse in California from 1991-1992 to 1994-1995, more than half (54.6%) reported snorting the drug; only 20.9% injected methamphetamines.<sup>3</sup> Thus, we chose to investigate whether methamphetamines are related to risky sexual behaviors among non-IDUs. We compare the sexual behaviors of methamphetamine-using and nonusing clients of publicly funded human immunodeficiency virus (HIV)-antibody testing in California who reported never injecting drugs. In addition, this study examines HIV seropositivity, and testing-clients' self-reported history of infection with other sexually transmitted diseases (STDs) as outcomes of methamphetamine use during sex.

## Subjects and Methods

The California Department of Health Services, Office of AIDS [acquired immunodeficiency syndrome], funds HIV counseling and testing at about 850 sites throughout the state. Since July 1, 1994, the Office of AIDS has required counselors to record extensive risk-behavior information during the pretest, risk-assessment session using a standard report form. These client-provided data include the sex of lifetime sexual partners; the number of partners during the past 12 months; the use of speci-

fied noninjection drugs during sex; the frequency of using condoms or latex barrier protection during vaginal, anal-receptive, and anal-insertive intercourse; sex with a prostitute; receiving money or drugs in exchange for sex; sexual relations with a partner who has injected drugs; having had a diagnosis of an STD; personal history of injecting drugs; and possible infection through a blood or blood product transfusion, occupational blood exposure, or other possible blood-to-blood contact (such as tattooing). Clients' demographic information (sex, race or ethnicity, and age), self-reported date of previous negative or positive HIV test results (when applicable), and laboratory results of most recent tests are also forwarded to the Office of AIDS.

Between July 1, 1994, and December 31, 1995, Office of AIDS-funded test sites collected counseling and testing data from 370,220 clients. During this 18-month period, a person may have been tested more than once. To prevent analyzing paired data, we removed 47,370 records (12.8% of all records) for clients previously testing negative or positive for HIV antibodies during the study period. Data were then eliminated for 27,465 records (8.5%) from clients reporting a history of injection drug use. Using the sex of clients and their lifetime sexual partners, we created the following four sexual risk categories: gay men, bisexual men, heterosexual men, and heterosexual women. (These titles were selected for simplicity sake, although the behavioral terms "men who have had sex with men only," "men who have had sex with men and women," "men who have had sex with women only," and "women who have had sex with men" more accurately describe the 4 risk groups.) This procedure omitted 36,818 records for clients with missing gender data, clients who never had sexual relations, or female clients having had sex with women only. Thus, the following analyses were based on data from 258,567 sexually active men and women.

We used  $\chi^2$  tests to compare the sexual risk, race or ethnicity, and age categories between methamphetamine users and nonusers and to examine the prevalence of vaginal, anal-receptive, and anal-insertive intercourse by methamphetamine use. Using *t* tests, we compared the number of sexual partners by methamphetamine use. The frequency of condom use ("always" versus "sometimes" or "never") for vaginal, anal-receptive, and anal-insertive intercourse; having traded money or drugs for sex; having had sex with IDUs; and having had an STD were analyzed in multiple logistic regression models that included methamphetamine use, race or ethnicity, and age. To examine methamphetamine use in relation to the risks of using other drugs, we also present these models with cocaine (including "crack"), alcohol, and marijuana use during sex as predictor variables. Models for the risk of sexual HIV infection also controlled for possible exposure to HIV through blood or blood products. The large sample size resulted in extremely high statistical power. Thus, we chose the *P* value of less than .0001 as the criterion for determining statistical significance and calculated confidence intervals at the 99%

TABLE 1.—Characteristics of Sample and by Reported Methamphetamine Use During Sex

Characteristic	Sample, % (n = 258,567)	Methamphetamine User, % *
Sexual risk categories		
Gay men	6.2	2.4
Bisexual men	6.3	4.6
Heterosexual men	38.2	4.4
Heterosexual women	49.2	3.3
Race or ethnicity		
White	56.1	4.6
Latino or Latina	24.6	3.0
Black or African American	10.4	1.8
Asian or Pacific Islander	4.6	1.6
American Indian or Alaskan	0.7	10.0
Age, yr		
≤19	12.6	6.2
20–29	42.7	3.7
30–39	26.1	4.0
40–49	12.6	2.4
50–59	4.1	1.0
≥60	1.6	0.4

\*Comparisons are of demographic characteristics for methamphetamine use during sex by  $\chi^2$  test; all differences are significant ( $P < .0001$ ).

level. Statistical analyses were performed with the SAS software version 6.10.<sup>11</sup>

## Results

### Sample Characteristics

The study population included slightly fewer women (49.2%) than men (50.8%). As shown in Table 1, gay men represented 6.2% of the subjects, 6.3% were bisexual men, and 38.2% were heterosexual men. Subjects were more likely to be white (56.1%), followed by Latino or Latina (24.6%), and black or African American (10.4%). More than half of the subjects were younger than 30 years. A total of 2,830 persons, or 1.1% of the subjects, tested positive for HIV antibodies.

### Sample Characteristics by Methamphetamine Use

Methamphetamine use during sex was reported by 3.8% of subjects. The second column of Table 1 shows that bisexual and heterosexual men were more likely to have used methamphetamines, followed by heterosexual women. By race or ethnicity, a greater percentage of American Indian or Alaskan and white subjects reported methamphetamine use. Methamphetamines were used more by younger than older subjects.

### Sexual Behaviors and History of Sexually Transmitted Disease

Table 2 shows that methamphetamine use was related to the number of sexual partners. Across the four sex-

ual risk categories, users of methamphetamines reported significantly more sexual partners during the past year than nonusers.

Significant differences were found for a history of anal-receptive and -insertive intercourse by methamphetamine use. Most (81%) gay men using methamphetamines reported anal-receptive intercourse, compared with 70% for non-methamphetamine users ( $P < .0001$ ). Among heterosexual men, users of methamphetamines were more likely to have participated in anal sex with women than nonusers (27.1% versus 14.4%;  $P < .0001$ ). Similarly, a greater percentage (31.2% versus 15.9%) of female methamphetamine users compared with nonusers engaged in anal receptive intercourse ( $P < .0001$ ).

The data presented in Table 3 indicate that methamphetamine use was inversely associated with condom use, regardless of sexual risk category or type of intercourse (vaginal, anal-receptive, or anal-insertive). Across the sexual risk categories, methamphetamine users were at least twice as likely to have had sex with a prostitute and to have received money or drugs for sex. In addition, methamphetamine users were four times more likely to have had sex with an IDU. Finally, methamphetamine users were slightly more likely to have had an STD.

Given the similarity in findings across the sexual risk categories from Table 3, we decided to collapse the data when investigating the influence of methamphetamine use on sexual behaviors in relation to the use of other noninjection drugs. Table 4 shows the results of the multivariate models with cocaine, alcohol, and marijuana use during sex included as predictor variables. Methamphetamine use remained a correlate of sexual risk-taking behaviors and STD diagnosis when controlling for the effects of the use of cocaine, alcohol, and marijuana. In fact, methamphetamine use was the most significant predictor of condom use and having had sex with a partner who injected drugs.

### HIV Seroprevalence

Among gay and bisexual men, methamphetamine use was significantly associated with the risk of sexual HIV

TABLE 2.—Mean Number of Sexual Partners in Past 12 Months by Methamphetamine Use During Sex

Sexual Partner	Mean Number of Partners		t Value
	Methamphetamine Use	Methamphetamine User, No	
Gay men	13.6	6.9	5.9*
Bisexual men	9.8	6.0	5.4*
Heterosexual men	4.5	2.9	10.6*
Heterosexual women	4.5	2.4	10.9*
Total	5.3	3.1	16.3*

\* $P < .0001$ .

TABLE 3.—Multivariate Analyses of Sexual Behaviors and History of Sexually Transmitted Disease by Methamphetamine Use During Sex (odds ratio [99% CI])\*†

Sexual Behavior	Gay Men	Bisexual Men	Heterosexual Men	Heterosexual Women
Always used condoms during vaginal intercourse . . . . .	—	0.6 (0.4, 0.8)	0.4 (0.4, 0.5)	0.5 (0.5, 0.6)
Always used condoms during anal-receptive intercourse . . . . .	0.5 (0.3, 0.6)	0.7 (0.5, 0.9)	—	0.5 (0.4, 0.7)
Always used condoms during anal-insertive intercourse . . . . .	0.5 (0.4, 0.7)	0.6 (0.4, 0.7)	0.5 (0.4, 0.7)	—
Had sex with a prostitute . . . . .	3.3 (2.1, 5.0)	2.4 (1.9, 2.9)	2.0 (1.8, 2.2)	3.8 (2.8, 5.0)
Received money or drugs for sex . . . . .	4.3 (3.3, 5.7)	3.4 (2.3, 4.9)	2.5 (1.8, 3.5)	6.7 (5.6, 8.1)
Had sex partner who injected drugs . . . . .	5.0 (3.6, 6.9)	4.2 (3.4, 5.2)	4.4 (4.0, 4.9)	4.7 (4.3, 5.1)
Had sexually transmitted disease . . . . .	1.6 (1.0, 2.6)	1.7 (1.3, 2.4)	1.4 (1.2, 1.6)	1.7 (1.5, 1.9)

\*Models include race or ethnicity and age.

†Odds ratios compare methamphetamine use versus no methamphetamine use during sex.

infection (model 1, Table 5). The seroprevalence of HIV was significantly higher for bisexual men who had used methamphetamines, compared with non-methamphetamine users, in model 2, which included the use of other substances during sex.

## Discussion

We found methamphetamine use during sex related to risky sexual behaviors regardless of sex, age, race or ethnicity, or sexual orientation among persons who never injected drugs. Gay, bisexual, and heterosexual men and heterosexual women who used methamphetamines reported a greater number of sex partners than non-methamphetamine users. These findings are not accounted for solely by indiscriminate dating, for methamphetamine users were more often involved in transactions of money or drugs for sex. Users were also more likely to have had sex with a partner who injected drugs. In addition, a greater percentage of heterosexual male and female subjects who used methamphetamines participated in anal intercourse. Persons reporting a history of methamphetamine use, however, used condoms less often during vaginal, anal-receptive, and anal-insertive intercourse.

Our findings of sexual risk-taking behaviors by the use of methamphetamines in models that included the use of cocaine (and "crack"), alcohol, and marijuana suggest that the relationship between methamphetamine use and an increased risk of sexual HIV infection is independent of the use of other drugs. There are at least four explanations for this association. First, methamphetamine users exchange sex for money or drugs to support a drug habit. Second, it is possible that methamphetamine use is one of a number of behaviors, including sexual risk taking, sought out by persons who are risk takers by nature. Third, persons may use methamphetamines specifically to reduce social inhibitions and heighten sexual pleasure and performance (see L. E. Klosinski, "Crystal Crisis," *Positive Living*, October 1996, pp 1, 12, and 14). Fourth, the reported increase in energy, sexual arousal and performance, and atypical sexual behaviors linked to methamphetamine use<sup>7,8,12</sup> could translate into seeking sexual gratification from numerous partners. Moreover, the euphoric effects of methamphetamines may also cloud a user's judgment about the possible repercussions of unsafe sexual intercourse.

The consequences of such behavior include contracting an STD, including HIV. Across all four sexual risk

TABLE 4.—Multivariate Analyses of Sexual Behaviors and History of Sexually Transmitted Disease by Methamphetamine and Other Drug Use During Sex (odds ratio [99% CI])\*

Sexual History	Drug Use During Sex			
	Methamphetamines	Cocaine	Alcohol	Marijuana
Always used condoms during vaginal intercourse . . . . .	0.5 (0.5, 0.6)	0.8 (0.7, 1.0)	1.0 (0.9, 1.0)	0.9 (0.9, 0.9)
Always used condoms during anal-receptive intercourse . . . . .	0.6 (0.5, 0.7)	0.6 (0.5, 0.8)	1.0 (1.0, 1.1)	1.0 (0.9, 1.0)
Always used condoms during anal-insertive intercourse . . . . .	0.6 (0.5, 0.7)	0.7 (0.5, 0.9)	1.0 (0.9, 1.1)	0.8 (0.8, 0.9)
Had sex with a prostitute . . . . .	1.3 (1.2, 1.5)	2.4 (2.1, 2.6)	1.8 (1.7, 1.8)	1.3 (1.3, 1.4)
Received money or drugs for sex . . . . .	2.4 (2.1, 2.7)	4.1 (3.6, 4.6)	1.1 (0.99, 1.2)	1.8 (1.7, 2.0)
Had sex partner who injected drugs . . . . .	2.9 (2.7, 3.1)	1.8 (1.7, 2.0)	1.2 (1.1, 1.2)	1.4 (1.4, 1.5)
Had sexually transmitted disease . . . . .	1.2 (1.1, 1.4)	1.2 (1.1, 1.4)	1.2 (1.1, 1.2)	1.2 (1.1, 1.2)

\*Models include race or ethnicity and age.

TABLE 5.—Multivariate Analyses of Sexual HIV Infection by Methamphetamine Use During Sex

Sexual Partner	HIV Seroprevalence		Model 1*	Model 2†
	Methamphetamine Use, %	No Methamphetamine Use, %		
Gay men	11.9	6.4	1.9 (1.3, 2.9)	1.5 (0.9, 2.3)
Bisexual men	6.9	5.0	1.6 (1.1, 2.3)	1.5 (1.0, 2.2)
Heterosexual men	0.5	0.5	1.4 (0.8, 2.5)	1.6 (0.9, 2.8)
Heterosexual women	0.2	0.3	1.0 (0.4, 2.2)	0.7 (0.3, 1.6)
Total	1.3	1.0	1.5 (1.2, 1.9)	1.3 (1.0, 1.7)

\*Controlled for race or ethnicity, age, and possible infection through blood exposure (such as piercing, occupational, or transfusion).

categories, methamphetamine users were more likely to report being diagnosed as having an STD. Among bisexual men, our data suggest that the increased sexual risk taking associated with methamphetamine use may have been responsible for sexual HIV infections. Our findings for heterosexual subjects—especially regarding condom use among men, prostitution among women, and sex with IDUs among both men and women—indicate that methamphetamine use may contribute to the incidence of HIV infection in the non-injection drug-using heterosexual population.

By omitting data for IDUs, we were able to show that methamphetamine use is related to sexual HIV infections and that the sexual practices reported for methamphetamine-using IDUs<sup>8-10</sup> are applicable to non-IDUs, both heterosexual and homosexual. Thus, the mode of administration (injection versus noninjection; that is, snorting, smoking, or swallowing) appears to be extraneous to sexual risk-taking behaviors and effects. With the realization that methamphetamine use has been related to unsafe injection practices,<sup>10</sup> the importance of including methamphetamine prevalence in epidemiologic profiles and prevention strategies becomes apparent.

Although one of the strengths of this study is the consistency of results across the four sexual risk categories, our method suffers from weaknesses. The study population consisted of sexually active persons who chose to be tested for HIV during the 18-month study period. Thus, the findings, including rates of methamphetamine use and related influences on sexual behaviors and condom use, may not be representative of a larger population. Our self-reported data are also subject to inaccuracies. Clients being tested for HIV are asked to provide extensive risk-related information under what can be anxiety-provoking conditions. The fear of possible HIV infection and the focus on learning one's HIV status as soon as possible may interfere with the ability or willingness to provide a clear history of personal risk before the blood specimen is drawn. In addition, acknowledging methamphetamine use is admitting to an illegal activity, and its relevance to an HIV-risk assessment may not be appreciated by a client. Consequently, the prevalence of methamphetamine use in our study population may be understated. On

the other hand, clients may be more honest with HIV counselors than with interviewers in more formal research situations because they may seek to build a cooperative relationship with the counselor and obtain answers to worrisome questions and the benefits of personalized HIV-prevention recommendations.

Health educators should address promoted or experienced positive responses (such as elevated sexual experience and performance) to methamphetamines when designing HIV-prevention messages. Future research should assess the motivations for using methamphetamines. Researchers should also focus more directly on the history, patterns, and levels of use in relation to subsequent injection and sexual behaviors. For example, what percentage of casual, low-dose users who seek nonsexual outcomes (appetite suppression or elevated job performance) from methamphetamines progress to high-dose binges or more rapid modes of administration (such as injection), and at what point are sexual behaviors affected?

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