Human Immunodeficiency Virus Infection in Heterosexual Intravenous Drug Users in San Francisco

RICHARD E. CHAISSON, MD, ANDREW R. MOSS, PHD, ROBIN ONISHI, MD, DENNIS OSMOND, MA, AND JAMES R. CARLSON, PHD

Abstract: To investigate the risk of infection with the human immunodeficiency virus (HIV) in San Francisco, the prevalence of antibodies to HIV was determined in 281 heterosexual intravenous drug users recruited from community-based settings. Ten per cent of subjects had ELISA and Western blot confirmed seropositivity for antibodies (95 per cent CI 6.8–14.2 per cent). Analysis of behavioral factors revealed an increased risk of seropositivity in addicts who reported regularly sharing needles when injecting, particularly those sharing with two or more persons (odds ratio = 5.43; 95 per cent CI 1.08–52.5). Blacks and Latinos also had a greater prevalence of seropositivity than Whites, and this finding persisted after adjustment for needle sharing (adjusted odds ratio = 2.8; 95 per cent CI .84–8.59). Seropositivity was not associated with age, sex, duration of drug use, or history of prostitution. These data indicate that a new epidemic of AIDS (acquired immunodeficiency syndrome) in intravenous drug users, similar to that which has occurred among homosexuals in San Francisco, is possible. The relatively low seroprevalence in 1985 provides health officials an important opportunity to intervene and attempt to prevent widespread infection of drug users with HIV. *(Am J Public Health* 1987; 77:169–172.)

Introduction

The acquired immunodeficiency syndrome (AIDS) has occurred in specific high-risk groups in the United States consistently since 1981. Homosexual or bisexual men and intravenous (IV) drug users constituted 72 and 17 per cent, respectively, of all AIDS cases reported to the Centers for Disease Control through January 13, 1986,[1] and represent the largest populations of infected individuals. A human retrovirus, HTLV-III/LAV or ARV (now referred to as Human Immunodeficiency Virus-HIV), has been established as the causative agent of AIDS and related conditions.[2–4] Serologic surveys of asymptomatic members of risk groups have revealed a high prevalence of infection with HIV, ranging from 40 to 70 per cent of homosexual men in San Francisco and from 50 to 60 per cent of IV drug users in New York and northern New Jersey.[5–9] In the metropolitan New York area, the prevalence of HIV infection is extremely high in both homosexual men and IV drug users, and an overlap in exposure to the virus in these two groups has been reported.[10]

San Francisco has a high incidence of AIDS but, unlike eastern cities, the AIDS epidemic in San Francisco has been confined almost exclusively to homosexual men. As of April 30, 1986, there had been 1,943 cases of AIDS in San Francisco, of which 97 per cent were homosexual or bisexual males and 1 per cent were heterosexual IV drug users.[11] San Francisco also has a large population of intravenous drug users (10–12,000; 1.5 per cent of the population), the majority of whom are heterosexual opiate users.[12] To investigate the prevalence of HIV infection in this population, we conducted a seroepidemiologic survey of heterosexual IV drug users in San Francisco. To avoid selection bias that may have overestimated the prevalence of infection, we recruited non-hospitalized IV drug users in community-based settings.

From the Departments of Medicine (Chaisson), and Epidemiology and International Health (Chaisson, Moss, Onishi, Osmond), University of California, San Francisco; The Medical Service, San Francisco General Hospital (Chaisson); and Department of Pathology, University of California, Davis (Carlson). Address reprint requests to Dr. Richard E. Chaisson, AIDS Epidemiology Group, Ward 84, San Francisco General Hospital, 995 Potrero, San Francisco, CA 94110. This paper, submitted to the Journal June 9, 1986, was revised and accepted for publication August 29, 1986.
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Methods

We studied heterosexual IV drug users enrolled in five major opiate addiction treatment programs, representing the majority of treatment facilities in San Francisco, and a sample of addicts who were not undergoing treatment, from December 1984, to October 1985. Subjects in treatment were receiving either acute heroin detoxification or chronic methadone maintenance. All subjects had reliable histories of opiate addiction. Eligibility for detoxification programs includes a documented history of needle use and a positive urine opiate test. To enroll in methadone maintenance, a two-year history of opiate addiction must be documented. Potential subjects were approached in the clinic and informed of the purpose of the study and asked to participate. Recruitment rates ranged from 54 to 79 per cent of clients approached, and varied from clinic to clinic. Refusing clients most often cited lack of time as the reason for not participating. Out-of-treatment subjects were recruited from community settings in high drug use areas of San Francisco using a chain-referral technique. All gave histories of chronic intravenous drug use and had stigmata of needle use. Informed consent was obtained from all subjects agreeing to be studied and an anonymous identification code was generated for each subject. The study was approved by the Human Subjects Committee of the University of California, San Francisco.

Each subject was interviewed with a standard questionnaire to obtain demographic, sexual, drug use, and behavioral information. The number of persons with whom needles were usually shared during drug injection was obtained for the last 209 subjects. Following interview, serum was collected from each subject and stored at −70°C prior to testing for HIV antibodies. Testing for antibodies to HIV was performed in duplicate by enzyme-linked immunosorbent assay (ELISA), as previously described.[13] Sera positive by ELISA (subject/control optical density ratio ≥ 2) were confirmed by Western blot. Sera with bands at the p24 and/or gp41 region were considered positive; only sera positives by both ELISA and Western blot were analyzed as positives.

Data analysis was performed using the chi-square or Fisher's exact test for univariate measures; the Mantel-Haenszel adjustment was employed to assess independence of risk factors found significant by univariate analysis. A

TABLE 1—Prevalence of HIV Antibodies in 281 Heterosexual IV Drug Users in San Francisco, 1984–85

Characteristics	No. Tested	No. Positive	% Positive
All subjects	281	28	10
Sex*			
Male	152	17	11
Female	128	11	9
Race			
White	143	8	6
Black	60	9	15
Latino/Other	78	11	14
Program Type			
Detoxification	115	12	10
Methadone Maintenance	119	15	13
Out-of-treatment	47	1	2
Age† (years)			
≤ 25	30	2	7
26–35	130	12	9
36–45	76	13	17
≥ 46	27	1	4
Duration of Heroin Use** (years)			
≤ 5	38	3	8
6–10	57	7	12
11–15	68	8	12
16–20	48	2	4
> 20	48	8	17
History of Prostitution (Females)			
Yes	40	4	10
No	88	7	8

*Sex missing for 1 subject.
†Age missing for 18 subjects.
**Unable to determine for 22 subjects.

logistic regression analysis of weighted needle sharing data was used to analyze risk associated with this practice.

Results

During the 10-month course of this study, 291 IV drug users were enrolled in the study and underwent interview and antibody testing. Ten men who gave a history of homosexual behavior were excluded from analysis; one of these men was seropositive. The subjects had a median age of 34 years and 54 per cent were male. Fifty-one per cent were White, 21 per cent were Black, and 28 per cent were of other racial-ethnic origin, primarily Latino. The median duration of intravenous drug use was 13 years.

Of the 281 heterosexual IV drug users studied, 28, or 10 per cent (95% confidence interval 6.8–14.2 per cent) were positive by ELISA and Western blot for antibodies to HIV (Table 1). The distribution of seropositives did not significantly differ by sex, age, or duration of drug use. There was no difference in prevalence of antibodies among subjects in treatment by type of treatment program (detoxification vs methadone maintenance); however, the small sample of subjects (N = 47) recruited from out of treatment included only one seropositive (2 per cent), thus differing from the in-treatment group. Other factors for which no significant differences could be detected include history of prostitution (4/40 subjects reporting a recent history of prostitution were seropositive), number of sexual partners, and travel to metropolitan New York in the previous five years. Two subjects reported having had sex with AIDS cases; one of these was seropositive. Small numbers of subjects reported regularly cleaning needles with alcohol or by boiling; no significant differences in seroprevalence were detected between those who did and did not clean needles regularly.

A clear difference in seroprevalence was detected by history of regularly sharing needles when injecting drugs (Table 2). Of a subset of 209 subjects for whom needle sharing data were available, seroprevalence was 3 per cent (2/65) for those who did not regularly share needles, vs 15 per cent (10/68) for those who regularly shared with two or more persons. The odds ratio for seropositivity as 5.43 (95 per cent confidence interval 1.1–52.5) for subjects sharing with two or more persons.

TABLE 2—Seropositivity for Antibodies to HIV by Number of Persons with Whom Needles Are Usually Shared for 209 IV Drug Users

No. Persons Needles Shared with	No. Tested	No. Positive (%)	Odds Ratio (95% CI)
0	65	2 (3)	1
1	76	7 (9)	3.2 (.58–32.4)
≥ 2	68	10 (15)	5.4 (1.08–52.5)

Of 143 Whites studied, eight (6 per cent) were seropositive compared to 20 of 138 (14 per cent) Blacks, Latinos and others (odds ratio = 2.9; 95 per cent confidence interval 1.15–7.77) (Table 3). Analysis of seroprevalence by race controlling for needle sharing showed persistence of the racial difference (adjusted odds ratio = 2.8; 95 per cent confidence interval .84–8.59) with the difference most pronounced in Blacks and Latinos who regularly shared needles with two or more persons. Moreover, Whites had a higher mean number of persons with whom needles were regularly shared.

Discussion

We found a 10 per cent prevalence of antibodies to the HIV among 281 heterosexual IV drug users in San Francisco during late 1984 and 1985. Because our sample was not random, subjects may not be representative of the entire IV drug using population in San Francisco. However, there is no indication that individuals at increased risk of HIV infection either preferentially volunteered for or avoided this study. These data, while in distinct contrast to the prevalence of infection among homosexuals in San Francisco,[5–7] suggest an emerging epidemic of AIDS among drug users in San Francisco. AIDS cases in IV drug users in San Francisco are now being reported at the rate of several per month;[14] this is closely comparble to the situation in homosexual men in 1982. It is likely that growth of the epidemic in IV drug users in San Francisco will parallel the epidemic in homosexual men, as has occurred nationally.[15]

Retrospective studies of sera from other populations of IV drug users suggest that once HIV is introduced into a community, it spreads rapidly to infect the majority of drug addicts. In New York City, the prevalence of HIV antibodies in IV drug users increased from 11 per cent in 1977 to 27 per cent in 1979 to 58 per cent in 1984.[8] In Edinburgh, similar changes have been documented among drug users, with seroprevalence rising to more than 50 per cent in a two-year

TABLE 3—Prevalence of HIV Antibodies by Race in 281 IV Drug Users

Race	No. Tested	No. Positive (%)	Odds Ratio (95% CI)
White	143	8 (6)	1
Black/Latino/Others	138	20 (14)	2.9 (1.15–7.77)

Adjusted Odds Ratio = 2.8 (95% confidence interval 0.84–8.59) controlled for needle sharing using Mantel-Haenszel adjustment for 209 subjects for whom data were available.

period.[16] In Italy and Spain, rapid increase in the proportion of seropositives from nil to one-half to three-fourths of all addicts tested have been documented in the space of several years.[17,18] The striking increases in seroprevalence seen in these subpopulations appear to reflect the introduction and rapid spread of HIV in at-risk populations as a whole.

Previous studies in IV drug users have demonstrated an increased risk of seropositivity in addicts who report regularly sharing needles.[16,19] Our data expand these findings by demonstrating increased risk of seropositivity with increasing number of persons with whom needles are regularly shared. We were unable to document a protective effect of needle cleaning prior to injection. However, although almost all subjects who shared needles reported rinsing with water, only 16 and 19 per cent of subjects, respectively, usually or always boiled or rinsed needles in alcohol.

HIV infection in San Francisco IV drug users is significantly more prevalent in Blacks and Latinos than in Whites (Table 3). This racial difference has also been reported in New York and New Jersey,[9*] though not in European surveys. There are no evident behavioral or demographic characteristics that readily explain the alarming prevalence of infection in this population. While needle sharing is no more prevalent among Blacks and Latinos than among Whites, the risk of infection is clearly greater for individuals who share needles with minority group members due to the higher prevalence of infection in this group.

Several factors may explain why HIV infection in San Francisco drug users lags behind homosexual men by four years. First, there appears to be little overlap between the homosexual and heterosexual drug using populations in San Francisco. In one cohort of homosexual men at risk for AIDS, 26 per cent had a history of IV drug use but only 2 per cent had ever used heroin.** Hence, heterosexual heroin users have little opportunity to share needles with homosexual men who may be seropositive. The majority of heterosexual IV drug users with AIDS or AIDS-related complex in one New York study, on the other hand, had shared needles with homosexual men.[10] In addition, the use of "shooting galleries", areas where addicts gather to purchase and inject drugs with used and shared needles and other paraphernalia, is common in New York City but less so in San Francisco. The social isolation of addicts and lack of "shooting galleries" in San Francisco may have provided a protective barrier to early introduction of HIV to drug users here. Now that the virus is established among IV drug users, the rate of increase in prevalence may parallel changes seen in other populations of addicts in the eastern US and Europe.

These data have several important implications. The potential of an epidemic of AIDS in IV drug users in San Francisco will necessitate changes in the city's medical care system for AIDS and in AIDS prevention programs, both of which are oriented to a predominantly White, middle-income homosexual population. The most effective strategy to prevent HIV infection in IV drug users is to eliminate IV drug injection altogether. For individuals who continue to inject drugs, a cessation of needle sharing and the use of sterile needles and syringes are essential. Overcoming a number of educational, legal, and financial barriers to the use of sterile needles by addicts unable to stop injecting may be the most effective means of halting the spread of the AIDS epidemic in IV drug users.

*DesJarlais DC and Friedman SR, personal communication.
**Moss AR, unpublished data.

The situation of IV drug users in San Francisco presents a unique challenge to public health officials, substance abuse professionals, and health care providers. With a small minority of IV drug users infected currently, aggressive intervention efforts can be instituted to prevent further transmission of the virus to uninfected individuals. With knowledge of the cause of AIDS and of the mechanisms of transmission of the HIV at hand, it is imperative that immediate action be taken. While it is not clear which strategies will be most effective, it is certain that failure to act will result in large scale infection of at-risk individuals and a new wave of deaths from a now preventable epidemic.

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