

# HIV infection and risk behaviours among young gay and bisexual men in Vancouver

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## Abstract

**Background:** Young gay and bisexual men may perceive that the consequences of HIV infection have dramatically improved with the availability of highly active antiretroviral therapy. We therefore sought to identify trends in HIV infection rates and associated risk behaviours among young gay and bisexual men in Vancouver.

**Methods:** Prospective cohort study involving gay and bisexual men aged 18–30 years who had not previously tested HIV positive. Subjects were recruited through physicians, clinics and community outreach in Vancouver. Annually participants were tested for HIV antibodies and asked to complete a self-administered questionnaire pertaining to sociodemographic characteristics, sexual behaviours and substance use. Prevalence of HIV infection and risk behaviours were determined for eligible participants who completed a baseline questionnaire and HIV testing as of May 1998. The primary outcome was the proportion of men who reported having protected sex during the year before enrolment and who reported any episode of unprotected sex by the time of the first follow-up visit.

**Results:** A total of 681 men completed a baseline questionnaire and HIV testing as of May 1998. The median duration between baseline and the first follow-up visit was 14 months. The median age was 25 years. Most of the subjects were white and of high socioeconomic status. The majority (549 [80.6%]) reported having sex only with men; 81 (11.9%) reported bisexual activity. Of the 503 men who had one or more regular male partners, 245 (48.7%) reported at least one episode of unprotected anal sex in the year before enrolment; the corresponding number among the 537 who had one or more casual male partners was 140 (26.1%). The prevalence and incidence of HIV seropositivity were 1.8% (95% confidence interval [CI] 0.8%–2.8%) and 1.7 per 100 person-years [95% CI 0.7–2.7], respectively. Fifty-two (26.5%) of the 196 and 55 (29.7%) of the 185 men with regular partners who reported having practised protected insertive and receptive anal sex in the year before the baseline visit reported engaging in these activities without a condom at the follow-up visit; the corresponding numbers among the 232 and 242 men with casual partners who had practised protected insertive and receptive anal sex before the baseline visit were 43 (15.5%) and 26 (9.4%) respectively at follow-up.

**Interpretation:** The incidence of HIV infection is unacceptably high among this cohort of young gay and bisexual men. Preliminary results suggest a disturbing trend toward increasing levels of unprotected anal intercourse.

Homosexual and bisexual activity continues to be the most frequently reported risk factor among AIDS cases in Canada and the United States.<sup>1,2</sup> This trend is likely to continue for several years, given that the median incubation period for HIV infection exceeds 10 years and that most gay and bisexual men with HIV infection acquired it in the early to mid 1980s.<sup>3</sup> In Toronto, Montreal and Vancouver AIDS has been the leading cause of early death among men

## Research

## Recherche

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since 1989.<sup>4</sup> Among young gay and bisexual men in Vancouver, the HIV/AIDS epidemic has reduced life expectancy by up to 20 years.<sup>5</sup>

Since 1982, when the first cases of AIDS appeared in Canada, 2 early prospective studies involving homosexual men documented significant decreases in HIV incidence and high-risk sexual behaviours over time.<sup>6,7</sup> Annual HIV incidence rates among homosexual men participating in the Vancouver Lymphadenopathy-AIDS Study decreased steadily, from a peak of 11.5% per year in 1984 to less than 1% per year in 1995 and thereafter.<sup>8</sup> In the Toronto Sexual Contact Study significant reductions in high-risk behaviours were consistent with declining HIV incidence rates.<sup>6</sup> However, since cohort members at highest risk tended to become HIV-positive earlier during follow-up rather than later, results from such studies are unlikely to be generalizable to the broader gay and bisexual male population.<sup>3</sup> Furthermore, it cannot be assumed that these earlier observations reflect current trends in HIV incidence and risk behaviours, especially among the younger generation of gay and bisexual men. For example, recent data from San Francisco clearly shows increases in unsafe sexual behaviour among gay and bisexual men coinciding with the availability of more effective antiretroviral treatment.<sup>9</sup>

We undertook the present study to identify trends in HIV infection rates and associated risk behaviours among young gay and bisexual men in Vancouver. Our analysis reports on research findings for the two-thirds of the cohort of men who completed a baseline and at least one follow-up visit. This community-based study is one of the first to provide insights into the current risk behaviours and HIV infection rates in this population in a Canadian setting.

## Methods

Beginning in May 1995 gay and bisexual men were recruited into an ongoing prospective study of HIV incidence and risk behaviours, the methods of which have been described previously.<sup>10</sup> The study protocol was approved by the Ethics Committee for Human Experimentation, Providence Health Care/University of British Columbia. In brief, men were eligible to participate if they were aged 18 to 30 years, lived in the Greater Vancouver region, had not previously tested HIV positive, and identified themselves as gay or bisexual or had sex with other men. Potential participants were recruited through community outreach at gay community events, health clinics and local physicians, and through the gay and mainstream media. After providing written informed consent, participants were referred to a local HIV-testing clinic, the study's research nurse or their physician's office, where they completed a confidential self-administered questionnaire and provided a blood sample for HIV testing at baseline and annually thereafter.

At enrolment, subjects were asked to provide contact information (e.g., telephone numbers for themselves and another person, mailing address) to facilitate follow-up. Using these means, participants were reminded of their annual follow-up visit, beginning 1 month before the anniversary date. Participants who did not return within 2 months after their anniversary date were sent a letter to encourage their ongoing participation. Innovative strategies

(e.g., birthday cards, study newsletters, study Web site, outreach at bars and gay community events) were used to regain contact with subjects who had no fixed address or who became lost to follow-up. As an additional incentive, subjects were invited to return to the study nurse for free hepatitis A and B vaccination and interim HIV testing (every 6 months). At any time during the study, participants were referred to appropriate community services at their request (e.g., counselling, HIV/AIDS organizations, drug or alcohol treatment programs, health care services).

All participants were provided with pre- and post-test HIV counselling by a nurse or physician at every visit. Test results found positive through enzyme-linked immunosorbent assay (ELISA) were confirmed using the Western Blot technique according to standard procedures at the provincial laboratory of the British Columbia Centre for Disease Control, British Columbia Ministry of Health. Participants were asked to return to their physician, clinic or the study's research nurse to receive their test results. In addition, HIV test results were forwarded to the study nurse or the project coordinator; those from physicians or clinics were obtained with permission. Reactive and indeterminate test results were followed-up and confirmed with the British Columbia Ministry of Health.

The baseline and follow-up questionnaires were designed to collect information on sociodemographic characteristics, sexual behaviours with men and women, substance use and psychosocial variables (e.g., depression, social support).<sup>10</sup> The baseline questionnaire referred to the 12 months before enrolment, whereas the follow-up questionnaire pertained to the period between baseline and follow-up. Questions on sexual activity were prefaced by a definition of sex as "oral, anal or vaginal intercourse." Questions on sexual behaviours were classified as either consensual (defined as "sex you engaged in willingly"), nonconsensual ("sex you were forced or coerced into, including rape, sexual assault or childhood sexual abuse") or paid sex ("exchange of sex for money, goods or drugs").

Data were collected on total numbers of male and female sexual partners in the previous year and lifetime, age at which respondents first engaged in sexual activity, and frequencies of specific consensual sexual practices over the last year (e.g., insertive v. receptive anal intercourse, with and without ejaculation). Sexual behaviours were recorded for subjects with one or more regular male partners (men with whom respondents had sex more than once a month on average) and for those with one or more casual male partners (men with whom they had sex with less than once a month on average). Respondents were also asked to indicate the frequency of condom use during these encounters, reasons for inconsistent condom use and whether or not they had had unprotected insertive or receptive anal intercourse with a male partner they knew at the time was HIV positive.

Respondents indicated their frequency of use of each of the following substances within the last year: alcohol, cigarettes, marijuana or hashish, lysergic acid diethylamide (LSD), ecstasy, cocaine or crack, heroin, amyl and butyl nitrite inhalants (i.e., "poppers"), amphetamines or "other." Participants were also asked whether they had injected drugs within the last year and whether they had used a needle someone else had already used.

Prevalence of HIV infection and risk behaviours were determined for all eligible participants who completed a baseline questionnaire and an HIV test as of May 1998. Among men who had returned for at least one annual follow-up visit, HIV incidence was calculated using person-time methods.<sup>11</sup> Ninety-five percent confidence intervals were calculated based on the Poisson distribution. For the purpose of this analysis, participants who had not

returned for follow-up within 2 months of their anniversary date were conservatively considered lost to follow-up.

The primary outcome of interest was the proportion of men who reported having protected sex during the 12 months before enrolment and who reported any episode of unprotected sex by the time of the first follow-up visit. HIV-positive men and men who became HIV positive between baseline and follow-up were excluded from this analysis, because they may have consciously changed their behaviours before completion of the follow-up questionnaire.

## Results

A total of 681 men met the study's eligibility criteria and completed a baseline questionnaire and HIV test as of May 1998. These participants were recruited through direct community outreach (51.5%), clinics (31.1%), physicians (12.2%) and undetermined (5.2%). Subjects completed their baseline visit through HIV-testing clinics (38.8%), the study's research nurse (36.0%), their physician (25.0%) or unknown (0.2%).

The sociodemographic characteristics of the subjects are reported in Table 1. The majority of participants were white, had completed high school, were employed and lived in stable housing. With respect to sexual behaviours (Table 2) most of the participants reported currently having sex only with men (80.6%), but a sizeable proportion (11.9%) reported having sex with both men and women. The median number of lifetime male partners far exceeded that of female partners. Drug use (including alcohol [more than 10 drinks per week] but excluding tobacco) was reported by 504 (74.0%) of the participants. The most commonly reported recreational drugs were amyl and butyl nitrates, cocaine or crack, and ecstasy (Table 2). Nearly two-thirds of the participants smoked cigarettes.

High levels of unprotected anal sex were noted among

**Table 1: Sociodemographic characteristics of 681 young gay and bisexual men in Vancouver at enrolment**

Characteristic	No. (and %) of subjects*
Median age (and IQR)	25.8 (23.1–28.6)
Completed high school or greater	567 (85.0)
Employed	475 (69.8)
Living in stable housing†	596 (90.7)
Income > \$10 000 per year	434 (70.5)
Receiving income assistance	132 (19.4)
Ethnic background	
White	491 (72.1)
Asian	65 (9.5)
Aboriginal	57 (8.4)
Hispanic	15 (2.2)
Other	53 (7.8)

Note: IQR = interquartile range.

\*Unless otherwise stated. Only those who stated a response were included in the denominator for each item.

†Defined as not living in a hotel, boarding house, group home or in the street at baseline visit.

subjects reporting regular and casual sexual partnerships at baseline. Of the 503 men who reported having one or more regular male sexual partners, almost half (245 [48.7%]) stated that they had had at least one episode of unprotected insertive or receptive anal intercourse in the previous year. The corresponding number among the 537 men who reported having one or more casual male partners was 140 (26.1%). Within each type of partnership, levels of unprotected intercourse were similar for receptive and insertive forms of anal sex.

In a further analysis we examined the proportion of men who reported having protected sex in the year before enrolment and who reported any episode of unprotected sex between baseline and the first follow-up visit. Proportions were calculated separately for men who had regular male sexual partners and those who had casual male partners. Of

**Table 2: Sociobehavioural characteristics of subjects at enrolment**

Characteristic	No. (and %) of subjects*
Median age at first sexual encounter with a male (and IQR), yr	18.0 (15.0–20.0)
Median age at first sexual encounter with a female (and IQR), yr	17.0 (15.0–19.0)
Living with male partner	145 (21.3)
<b>Current sexual activity</b>	
Homosexually active	549 (80.6)
Bisexually active	81 (11.9)
Celibate	37 (5.4)
Median lifetime no. of male sexual partners (and IQR)†	30.0 (10.0–59.5)
Median lifetime no. of female sexual partners (and IQR)†	2.5 (2.0–12.0)
Median no. of male sexual partners in previous year (and IQR)†	6.0 (3.0–12.5)
Median no. of regular male sexual partners in previous year (and IQR)†	2.0 (1.0–2.0)
Median no. of casual male sexual partners in previous year (and IQR)†	5.5 (3.0–13.5)
Had anal sex in the previous year with person known to be HIV positive	111 (17.7)
Had unprotected anal sex in the previous year with person known to be HIV positive	27 (4.5)
Ever experienced sexual abuse	225 (33.8)
Received payment for sex in previous year	92 (13.5)
Paid someone for sex in previous year	24 (3.5)
<b>Recreational drug use in previous year</b>	
Amyl or butyl nitrates	206 (31.0)
Cocaine or crack	200 (29.7)
Ecstasy	130 (19.4)
Amphetamines	71 (10.7)
Any injection drug	42 (6.2)
Heroin	38 (5.7)
Alcohol (> 10 drinks/wk)	102 (16.1)
Cigarettes	425 (62.8)

\*Unless otherwise stated.

†Restricted to participants who reported having had sexual intercourse with males or females.

the 285 men with regular partners 196 (68.8%) reported having had protected insertive and 185 (64.9%) protected receptive anal sex in the year before the baseline visit. At follow-up, 52 (26.5%) of the 196 subjects and 55 (29.7%) of the 185 subjects reported having had unprotected insertive anal sex respectively. Of the 278 men with casual partners 232 (83.5%) reported having had protected insertive and 242 (87.1%) protected receptive anal sex in the year before the baseline visit. Of these men, 43 (15.5%) and 26 (9.4%) reported having had unprotected insertive and receptive anal intercourse respectively by the time of their first follow-up visit.

At baseline, 12 participants were found to be HIV positive. Two participants had indeterminate test results (i.e., reactive ELISA result, indeterminate Western Blot result). Of these, one subsequently became seropositive during follow-up and the other subsequently had a negative test result. After excluding these 2 people from the analysis, we found that the prevalence of HIV infection at baseline was 1.8% (95% CI 0.8%–2.8%).

By May 1998, 335 (77.0%) of the 435 participants due to return for follow-up did return. The median duration between baseline and first follow-up visit was 14 months. Among a total of 638.63 person-years, 11 men became seropositive between baseline and follow-up, including 1 man whose baseline test result was indeterminate, for an overall HIV incidence rate of 1.7 per 100 person-years (95% CI 0.7–2.7). Before their first anniversary date, 2 of the men who became HIV positive died of non-AIDS-related causes (suicide in one case and unknown cause in the other).

Compared with subjects who remained HIV-negative, those who became seropositive were younger and more

likely to report high-risk behaviours (Table 3). The small number of seropositive men precluded a multivariate analysis of risk factors. However, among participants aged 25 or less, the incidence of HIV was 2.5 per 100 person-years (95% CI 0.5–4.5), and among those exchanging sex for money, goods or drugs, the incidence was as high as 9.5 per 100 person-years (95% CI 1.2–17.9).

Finally, in an attempt to examine potential biases due to differential follow-up, we compared characteristics of the men who returned with those who did not return within 2 months of their anniversary date. The latter tended to be younger (median age 25 v. 26,  $p = 0.003$ ) and non-white (35.8% v. 22.3%,  $p = 0.002$ ) and were more likely to be unemployed (40.4% v. 18.0%,  $p < 0.001$ ), to be bisexual (23.7% v. 5.5%,  $p < 0.001$ ) and to have exchanged sex for money, goods or drugs (36.5% v. 17.7%,  $p < 0.001$ ).

## Interpretation

Despite declines in HIV risk behaviours among gay men in the mid-1980s, there is growing concern about the risk of HIV infection among young gay and bisexual men in the second decade of the HIV/AIDS epidemic. However, data on current trends in this population, especially in Canada, are sparse. In the United States, an observed trend toward declining AIDS incidence among homosexual men has not been demonstrated among younger birth cohorts.<sup>12</sup> Estimates of HIV incidence among young gay men in San Francisco and New York City were 1% and 2%, respectively.<sup>13,14</sup> Similar rates have been observed in Amsterdam and Australia.<sup>15,16</sup> Compared with the very high HIV infection rates observed in the early 1980s,<sup>8</sup> these rates appear deceptively low. However, even an annual HIV incidence rate of 1% to 2% will translate to a prevalence of 25% within 20 years.<sup>17</sup>

In our cohort of young gay and bisexual men in Vancouver, we observed an HIV incidence rate of 1.7 per 100 person-years. Because of regional variations in rates of HIV infection and sexual behaviours among gay and bisexual men,<sup>18,19</sup> these rates are not necessarily generalizable to other populations of gay and bisexual men in Canada. However, our findings concur with results from other settings. In Ontario the province-wide HIV seroconversion rate among gay and bisexual men who underwent repeat HIV testing was 3.2 per 100 person-years (95% CI 2.3–4.1).<sup>19</sup> In Montreal preliminary data from an ongoing cohort study suggest an HIV incidence rate of 1.3 per 100 person-years.<sup>20</sup> Continued surveillance of these populations is needed to identify trends and to tailor effective prevention programs to meet local needs.

**Table 3: Univariate analysis of factors associated with HIV seroconversion among 331 subjects available at follow-up\***

Characteristic	HIV negative <i>n</i> = 321	HIV positive <i>n</i> = 10	<i>p</i> value†
Median age (and IQR), yr	27.5 (24.6–29.9)	25.8 (24.1–26.3)	0.03‡
White	267 (83.2)	10 (100.0)	0.38
Employed	292 (94.2)	6 (60.0)	0.003
Living in stable housing	292 (97.3)	6 (75.0)	0.02
Completed high school or greater	287 (90.5)	7 (70.0)	0.07
Income > \$10 000 per year	264 (86.6)	5 (55.6)	0.03
Injected drugs	5 (1.6)	3 (30.0)	< 0.001
Shared needles	1 (0.3)	1 (10.0)	0.06
Had anal sex with partner known to be HIV positive	58 (19.1)	3 (30.0)	0.42
Had unprotected anal sex with partner known to be HIV positive	11 (3.4)	3 (30.0)	0.006
Received payment for sex	23 (7.3)	4 (40.0)	0.006

\*Two participants who became seropositive during follow-up died before completing a follow-up questionnaire; in these cases behavioural data were obtained from their baseline questionnaire. One subject who became seropositive during follow-up was excluded from this analysis because he had been identified only through anonymous database matching.

†Unless otherwise stated, *p* values were calculated using Fisher's exact test.

‡Wilcoxon rank-sum test.

Given the high prevalence of risk behaviours at baseline in our study, the fact that our prospective data suggest a trend toward increasing levels of unprotected anal sex is worrisome. Previously we demonstrated that low education level, use of amyl and butyl nitrites, low level of social support and a history of sexual abuse were independent risk factors for unprotected anal sex with casual partners.<sup>10</sup> Other studies by our group and others have confirmed the important role of alcohol and drug use in sexual risk-taking among gay men.<sup>6,10,21,22</sup> Among other factors, complacency toward HIV infection may have arisen because of optimism surrounding recent advances in antiretroviral therapy.<sup>23</sup> Other researchers have proposed that sexual risk-taking may be due to feelings of fatalism and inevitability,<sup>24</sup> lack of direct experience of the AIDS epidemic among the younger generation of gay men<sup>24</sup> or a desire to escape the rigorous norms and standards required for a lifetime of safer sex.<sup>22</sup>

It could be argued that our descriptive data overestimates levels of actual risk, especially among gay men with regular partners who may be practising “negotiated safety”<sup>25</sup> (i.e., unprotected sex within the context of a relationship in which both partners have tested HIV negative). However, a surprising proportion of the participants reported having anal sex with a man they knew at the time was HIV positive; this was especially true among those who became HIV positive during follow-up, who more commonly reported unprotected sex with both regular and casual partners. At least in our cohort, these results suggest that HIV serodiscordance (a relationship in which one partner is HIV positive and the other HIV negative) is a reality in many sexual relationships of young gay and bisexual men.

Our findings may underestimate the true extent of trends in HIV incidence and risk behaviours, since the men who were eligible for follow-up but who did not return appeared to be at higher risk of HIV infection. Our study instrument also relied on self-reported data, which can compromise reliability and validity. Despite these limitations, our findings confirm that HIV incidence is unacceptably high among our cohort of young gay and bisexual men in Vancouver, especially among younger men and those who are paid for sex. Our findings underscore the urgent need for targeted interventions among young gay and bisexual men who remain at high risk for HIV infection.

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## References

1. Division of HIV/AIDS Surveillance, Bureau of HIV/AIDS, STD and TB, Laboratory Centre for Disease Control. *HIV/AIDS in Canada. Surveillance report to December 31, 1997*. Ottawa: The Division; Apr 1998.
2. *HIV/AIDS Surveillance Report*. Atlanta: US Centers for Disease Control and Prevention; 1997;9(2):10.
3. Strathdee SA, Schechter MT. The epidemiology of AIDS in Canada: 1995. *Pract Allergy Immunol* 1995;10(5):172-8.
4. Hogg RS, Heath KV, Strathdee SA, Montaner JSG, O'Shaughnessy MV, Schechter MT. HIV/AIDS mortality in Canada: evidence of gender, regional and local area differentials. *AIDS* 1996;10:889-94.
5. Hogg RS, Strathdee SA, Craib KJP, O'Shaughnessy MV, Montaner JSG, Schechter MT. Modelling the impact of HIV disease on mortality in gay and bisexual men. *Int J Epidemiol* 1997;26(3):657-61.
6. Calzavara LM, Coates RA, Raboud JM, Farewell VT, Read SE, Shepherd FA, et al. Ongoing high-risk sexual behaviors in relation to recreational drug use in sexual encounters. Analysis of 5 years of data from the Toronto Sexual Contact Study. *Ann Epidemiol* 1993;3(3):272-80.
7. Schechter MT, Craib KJP, Willoughby B, Douglas B, McLeod WA, Maynard M, et al. Patterns of sexual behavior and condom use in a cohort of homosexual men. *Am J Public Health* 1988;78(12):1535-8.
8. Craib KJP, Strathdee SA, Hogg RS, Cornelisse PGA, Willoughby BC, Sestak P, et al. BC Centre for Excellence in HIV/AIDS, Vancouver, BC. Incidence rates of HIV-1 infection, AIDS progression and mortality in the Vancouver Lymphadenopathy-AIDS Study: results at 14 years [abstract]. *Can J Infect Dis* 1998;9(Suppl A):31A.
9. Increases in unsafe sex and rectal gonorrhoea among men who have sex with men — San Francisco, California, 1994–1997. *MMWR* 1999;48(3):45-8.
10. Strathdee SA, Hogg RS, Martindale SL, Cornelisse PGA, Craib KJP, Montaner JSG, et al. Determinants of sexual risk-taking among young HIV-negative gay men. *J Acquir Immune Defic Syndr Hum Retroviro* 1998;19:61-6.
11. Breslow NE, Day NE. Statistical methods in cancer research. Volume II — The design and analysis of cohort studies. *IARC Sci Publ* 1987;(82):1-406.
12. Greenland S, Lieb L, Simon P, Ford W, Kerndt P. Evidence for recent growth of the HIV epidemic among African-American men and younger male cohorts in Los Angeles County. *J Acquir Immune Defic Syndr Hum Retroviro* 1996;11:401-9.
13. Osmond DH, Page K, Wiley J, Garrett K, Sheppard HW, Moss AR, et al. HIV infection in homosexual and bisexual men 18 to 29 years of age: the San Francisco Young Men's Health Study. *Am J Public Health* 1994;84:1933-7.
14. Dean L, Meyer I. HIV prevalence and sexual behavior in a cohort of New York City gay men (aged 18–24). *J Acquir Immune Defic Syndr* 1995;8:208-11.
15. Van Griensven GJ, van den Bergh HS, Jansen M, de Wit JB, Keet IP. HIV infection and risky sexual behavior in a new cohort of young homosexual men in Amsterdam, 1995–1996. *Ned Tijdschr Geneesk* 1997;141:2293-6.
16. Law MG, Rosenberg PS, McDonald A, Kaldor JM. Age-specific HIV incidence among homosexually active men in Australia. *Med J Aust* 1996;164:715-8.
17. Hoover DR, Munoz A, Carey V, Chmiel JS, Taylor JM, Margolick JB, et al. Estimating the 1978–1990 and future spread of human immunodeficiency virus type 1 in subgroups of homosexual men. *Am J Epidemiol* 1991;134:1190-205.
18. Myers T, Godin G, Lambert J, Calzavara L, Locker D. Sexual risk and HIV-testing behaviour by gay and bisexual men in Canada. *AIDS Care* 1996;8(3):297-309.
19. Major C, Remis R, Galli R, Wu K, Degazio T, Fearon M. Ontario Ministry of Health, HIV Laboratory, Toronto; University of Toronto. Towards real-time HIV Surveillance using HIV testing data [abstract]. *Can J Infect Dis* 1998;9(Suppl A):40A.
20. Dufour A, Parent R, Alary M, Otis J, Remis R, Mâsse B, et al. Characteristics of young and older men who have affective and sexual relations with men (MSM) in Montreal [abstract]. *Can J Infect Dis* 1998;9(Suppl A):30A.
21. Hogg RS, Craib KJP, Willoughby B, Sestak P, Montaner JSG, Schechter MT. Sociodemographic correlates for risk-taking behaviour among HIV seronegative homosexual men. *Can J Public Health* 1993;84(6):423-6.
22. Ostrow D, McKirnan D. Prevention of substance-related high-risk sexual behavior among gay men: critical review of the literature and proposed harm reduction approach. *J Gay Lesbian Med Assoc* 1997;1(2):97-110.
23. Dille JW, Woods WJ, McFarlane W. Are advances in treatment changing views about high-risk sex? *N Engl J Med* 1997;337(7):501-2.
24. Katz MH. AIDS epidemic in San Francisco among men who report sex with men: successes and challenges of HIV prevention. *J Acquir Immune Defic Syndr* 1997;14(Suppl 2):S38-46.
25. Kippax S, Noble J, Prestage G, Crawford JM, Campbell D, Baxter D, et al. Sexual negotiation in the AIDS era: negotiated safety revisited. *AIDS* 1997;11:191-7.

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