

Sexual Risk Profile of Young Men in Vancouver, British Columbia, Who Have Sex with Men and Inject Drugs

Jacqueline M. O'Connell,¹ Thomas M. Lampinen,^{1,2} Amy E. Weber,^{1,2} Keith Chan,¹ Mary Lou Miller,¹ Martin T. Schechter,^{1,2} and Robert S. Hogg^{1,2,3}

Received Aug. 23, 2002; revised Sep. 5, 2003; accepted Sep. 10, 2003

We compared sexual risk behaviors of men who have sex with men and inject drugs (MSM/IDU) with those of other men who have sex with men (MSM). Of 910 MSM surveyed, 106 (12%) injected drugs in the previous year. MSM/IDU were younger than MSM and more likely to be HIV-seropositive, Aboriginal, economically disadvantaged, engaged in the trade of sex for money or drugs, and to report having female sexual partners. MSM/IDU reported more casual sexual partners and in multivariate analyses were twice as likely to report unprotected receptive anal intercourse with casual partners. These results, combined with those from previous analyses, suggest that the higher risk for HIV seroconversion among MSM/IDU in this cohort is attributable mainly to sexual rather than injection-related exposures. Controlled assessments are needed to identify optimal sexual risk reduction strategies for MSM/IDU.

KEY WORDS: Injection drug use; gay/bisexual men; HIV; sexual risk; sex trade.

INTRODUCTION

Men who have sex with men and are injection drug users (MSM/IDU) are at especially high risk for acquiring and transmitting HIV infection. Previous studies report up to eightfold elevations in HIV seroprevalence and seroincidence among MSM/IDU compared to other MSM (Crofts *et al.*, 1995; Hogg *et al.*, 2001; Weber *et al.*, 2001, 2003) and to other male IDU (Deren *et al.*, 1997; Kral *et al.*, 2001; Strathdee *et al.*, 2001). Importantly, the first AIDS cases among IDU in many cities are MSM/IDU who are thought to have acquired their infection sexually;

thus, MSM/IDU may introduce HIV to larger communities of IDU (Battjes *et al.*, 1989; Crofts and Hay, 1991; Landmann Szwarcwald *et al.*, 1998).

High levels of sexual risk behavior noted among MSM/IDU may not be adequately addressed by current HIV prevention programs (Centers for Disease Control and Prevention, 2000; Crofts *et al.*, 1995). HIV seroconversion among IDU is often thought to be associated primarily with injection-related factors (Nicolosi *et al.*, 1990; van Ameijden *et al.*, 1992). As a result, many HIV prevention efforts geared toward IDU focus on injecting behaviors, without addressing sexual risk (Rhodes *et al.*, 1999). Those programs that do aim to reduce sexual risk behavior among MSM and among IDU may have low coverage among MSM/IDU who do not identify closely with either of these communities (Bull *et al.*, 2002; Deren *et al.*, 1997). The design of effective HIV prevention programs for MSM/IDU requires a clearer understanding of their sexual behavior in relation to substance use, yet this knowledge is limited because few such men are engaged in research studies of either MSM (Koblin *et al.*, 2003; Stall *et al.*, 2001) or IDU

¹The Vanguard Project: BC Centre for Excellence in HIV/AIDS, Vancouver, Canada.

²Department of Health Care and Epidemiology, University of British Columbia, Vancouver, Canada.

³Correspondence should be directed to Dr. Robert Hogg, Program Director, Division of Epidemiology and Population Health, BC Centre for Excellence in HIV/AIDS, 608-1081 Burrard Street, Vancouver, BC V6Z 1Y6, Canada (e-mail: bobhog@hivnet.ubc.ca).

(Diaz *et al.*, 2001; Maslow *et al.*, 2002; Strathdee *et al.*, 2001).

We recently reported a sevenfold higher rate of HIV seroconversion among MSM/IDU compared to other young MSM enrolled in a prospective study in Vancouver (Weber *et al.*, 2003). Furthermore, HIV seroincidence among these MSM/IDU increased from 0.6 per 100 person-years in 1995–1999 to 3.9 per 100 person-years in 2000 (Hogg *et al.*, 2001). We therefore undertook this study to compare MSM/IDU with other MSM in this cohort with specific reference to sexual risk behaviors.

METHODS

Study Population

Between May 1995 and September 2000, HIV-seronegative MSM were recruited into an ongoing prospective study of HIV incidence and risk behaviors that has been previously described (Strathdee *et al.*, 1998, 2000). In brief, men were eligible to participate if they were between 15 and 30 years of age at baseline, lived in the Greater Vancouver region, had not previously tested HIV-positive, and self-identified as gay/bisexual or as ever having had sex with other men. Participants were recruited through outreach at gay community events and community health clinics, local physicians, and the gay and mainstream media. Eligible participants were referred to local HIV testing clinics, 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 antibody testing. Standard survey and testing techniques were used at each location to limit potential biases that might arise from differences between sites. Follow-up visits were conducted annually. Written informed consent was obtained from every participant according to a protocol approved by the University of British Columbia Research Ethics Board.

HIV Testing

Blood specimens found to be HIV-reactive by ELISA were confirmed by Western blot according to standard procedures at the provincial laboratory of the British Columbia Centre for Disease Control. Participants were encouraged to return to their physician, clinic, or the study's research nurse to

receive their HIV test results, and all participants were provided with pre- and posttest HIV counseling by trained personnel. Referrals were provided for universal medical care, HIV/AIDS care, available drug and alcohol treatment, and counseling, when appropriate.

Study Instruments

At enrolment, participants completed a self-administered structured questionnaire (Strathdee *et al.*, 1998; 2000), which typically took 1 h to complete. Information was collected on sociodemographic characteristics (age, race–ethnicity, education, employment status, income, housing) and substance use during the previous year, including injection drug use. Approximately 50 questions pertained to sexual behavior during the previous year, including trade of sex for either drugs or money, total numbers of male and female sexual partners, and frequencies of insertive and receptive anal intercourse with and without the use of condoms. Sexual behaviors were recorded separately for regular male partners, defined as partners with whom respondents had sex on a regular basis, at least once a month on average, and for casual male partners, defined as partners with whom they had sex less than once a month on average, including “one-nighters” and sex trade clients. Study personnel were available in person and by telephone to assist with completion of the questionnaire.

Statistical Analysis

Contingency table analysis compared MSM/IDU and MSM with respect to sociodemographic characteristics, substance use, and sexual behaviors. Unstable housing was defined *a priori* as living primarily in a single-room-occupancy hotel, boarding room, hostel, transition house, or jail or on the street. Categorical variables were compared for the two groups using Pearson's chi-square test. Contingency tables that contained one or more expected counts of less than five were analyzed by Fisher's exact test. Comparisons of continuous variables were carried out using Wilcoxon's rank-sum test. Unadjusted and adjusted odds ratios (OR, AOR) with 95% confidence intervals (CI) were computed using multivariate logistic regression models fit with SAS software version 8.2 (SAS Institute, Cary, NC).

RESULTS

Enrolment visit data collected from 910 participants were eligible for this analysis. Of these 910 MSM, 106 (12%) had injected drugs in the previous year and 804 (88%) had not. HIV serologic testing showed 9 of 106 MSM/IDU (8.5%) and 16 of 795 MSM (2.0%) were HIV-positive ($p = .001$). MSM/IDU were significantly younger, more likely to be Aboriginal, less educated, unemployed, living in unstable housing, and making less than \$10,000 per year (Table I). They were more likely than other MSM to report use of tobacco, marijuana, cocaine, crack, speed, acid, heroin, crystal methamphetamine, and ecstasy during the previous year but less likely to report consumption of alcohol (Table II). Among users of each substance, MSM/IDU used more frequently, with the exception of speed (data not shown).

Compared to noninjecting MSM, MSM/IDU were significantly more likely to report sex with women during the previous year (69% vs. 13%; $p = .001$) and less likely to report sex exclusively with men (24% vs. 82%; $p = .001$). In univariate analyses, MSM/IDU were less likely than other MSM to report having a *regular* male sex partner and less likely to have engaged in receptive anal intercourse with such partners (Table III). However, MSM/IDU had

Table I. Sociodemographic Characteristics of MSM/IDU and MSM^a

	MSM/IDU (N = 106) n (%)	MSM (N = 804) n (%)	p
Age (years)			
Median	24	25	.006
Interquartile range	21–27	22–28	
Ethnicity			
White	74 (73)	569 (72)	.001
Aboriginal	20 (20)	72 (9)	
Other	7 (7)	149 (19)	
Less than high school education			
Yes	50 (49)	85 (11)	<.001
No	53 (51)	707 (89)	
Unemployed			
Yes	82 (80)	223 (28)	<.001
No	21 (20)	575 (72)	
Unstable housing			
Yes	68 (64)	64 (8)	<.001
No	38 (36)	739 (92)	
Income less than \$10,000 per year			
Yes	35 (49)	202 (28)	<.001
No	36 (51)	507 (72)	

^aColumn totals may not equal total number of participants due to missing values.

Table II. Substance Use During the Previous Year by MSM/IDU and MSM^a

	MSM/IDU (N = 106) n (%)	MSM (N = 804) n (%)	p
Tobacco			
Yes	94 (89)	477 (59)	<.001
No	12 (11)	327 (41)	
Alcohol			
Yes	73 (69)	697 (87)	<.001
No	33 (31)	107 (13)	
Marijuana			
Yes	88 (84)	514 (65)	<.001
No	17 (16)	278 (35)	
Cocaine			
Yes	93 (89)	218 (28)	<.001
No	12 (11)	568 (72)	
Crack			
Yes	65 (65)	53 (7)	<.001
No	35 (35)	729 (93)	
Speed			
Yes	39 (39)	67 (9)	<.001
No	62 (61)	712 (91)	
Acid			
Yes	48 (47)	152 (19)	<.001
No	54 (53)	631 (81)	
Heroin			
Yes	78 (75)	24 (3)	<.001
No	26 (25)	758 (97)	
Crystal methamphetamine			
Yes	38 (38)	116 (15)	<.001
No	62 (62)	671 (85)	
Ecstasy			
Yes	30 (30)	168 (21)	.04
No	69 (70)	621 (79)	

^aColumn totals may not equal total number of participants due to missing values.

greater numbers of *casual* sexual partners and were more likely to have engaged in unprotected receptive and insertive anal intercourse with their casual partners (Table IV).

We observed a strong association between injection drug use and sex trade involvement during the previous year. Most MSM/IDU (76/106, or 72%) traded sex for money or drugs, compared to 111 (14%) of 793 noninjecting MSM ($p < .001$). In exploratory multivariate models adjusted for age and sex trade involvement, MSM/IDU were more likely than other MSM to report unprotected anal intercourse with casual partners, though these results did not reach statistical significance (unprotected receptive intercourse AOR 1.99, 0.96–4.15, $p = .07$; unprotected insertive intercourse AOR 1.73, CI 0.83–3.59, $p = .14$). We did not adjust for sex trade involvement in other multivariate models because sex trade involvement is a

Table III. Sexual Risk Behavior with Regular Partners of MSM/IDU and MSM^a

	MSM/IDU (<i>N</i> = 106) <i>n</i> (%)	MSM (<i>N</i> = 804) <i>n</i> (%)	<i>p</i>
Had a regular sex partner (previous year)			
Yes	60 (59)	590 (75)	<.001
No	42 (41)	198 (25)	
Number of regular sex partners (previous year)			
Median	2	2	<.001
Interquartile range	1–4	1–2	
Insertive anal intercourse ^b			
Yes	42 (70)	438 (74)	.477
No	18 (30)	152 (26)	
Receptive anal intercourse ^b			
Yes	35 (58)	444 (75)	.005
No	25 (42)	146 (25)	
Unprotected insertive anal intercourse ^c			
Yes	21 (50)	233 (53)	.692
No	21 (50)	205 (47)	
Unprotected receptive anal intercourse ^d			
Yes	24 (69)	239 (54)	.091
No	11 (31)	205 (46)	

^a Column totals may not equal total number of participants due to missing values.

^b Among participants with regular sex partners.

^c Among participants having insertive anal intercourse with regular partners.

^d Among participants having receptive anal intercourse with regular partners.

frequent consequence of injection drug use (Craib *et al.*, 2003; Crofts *et al.*, 1995; Diaz *et al.*, 1995).

Given the positive association of MSM/IDU status and use of illicit substances, we further examined the association of each substance with unprotected receptive and insertive anal intercourse with regular and casual partners. In univariate analyses, only unprotected receptive anal intercourse with casual partners was significantly associated with substance use, specifically cocaine (OR 1.66, CI = 1.06–2.60), crack (OR 2.39, CI 1.27–4.47), and acid (OR 2.11, CI 1.27–3.49). Starting with an initial multivariate regression model that included MSM/IDU status, age, and these three substances, we used a backward selection process to derive a final age-adjusted model in which status as an MSM/IDU (AOR 2.03, CI 1.03–4.00) and use of acid during the previous year (AOR 1.84, CI 1.08–3.12) remained the only independent predictors of unprotected receptive anal intercourse with casual partners. Tests for interaction were not significant.

DISCUSSION

In this study of community-recruited young MSM in Vancouver, those who injected drugs were twice as likely as other MSM to report unprotected

receptive anal intercourse with casual partners during the previous year. This result was unaffected by statistical adjustment for age and use of illicit substances. Among men who had receptive anal intercourse with casual partners, 52% of MSM/IDU reported an unprotected encounter compared to 30% of noninjecting MSM; the median number of casual partners during the previous year reported by MSM/IDU was twice that of other MSM.

A recently published study of risk factors for HIV seroconversion in our cohort showed unprotected receptive anal intercourse with casual partners to be strongly and independently associated with seroconversion in multivariate analyses (adjusted relative risk 4.9, CI 2.3–10.3); IDU status was not significant in the final regression model (Weber *et al.*, 2003). Taken together, results from this study and previous risk factor analysis strongly suggest that the elevated risk of HIV seroconversion observed among MSM/IDU in our cohort is attributable mainly to unprotected receptive anal intercourse. Importantly, the same conclusion was arrived at by investigators studying a cohort of male IDU in San Francisco (Kral *et al.*, 2001). On the basis of their results, Hagan (2003) showed that among MSM/IDU, the greatest reduction in HIV incidence is expected from elimination of sexual rather than injection-related exposures.

Table IV. Sexual Risk Behavior with Casual Partners of MSM/IDU and MSM^a

	MSM/IDU (<i>N</i> = 106) <i>n</i> (%)	MSM (<i>N</i> = 804) <i>n</i> (%)	<i>p</i>
Had a casual sex partner (previous year)			
Yes	89 (88)	644 (82)	.134
No	12 (12)	140 (18)	
Number of casual sex partners (previous year)			
Median	10	5	.028
Interquartile range	3–50	2–12	
Insertive anal intercourse ^b			
Yes	41 (46)	357 (55)	.096
No	48 (54)	287 (45)	
Receptive anal intercourse ^b			
Yes	42 (47)	319 (50)	.679
No	47 (53)	325 (50)	
Unprotected insertive anal intercourse ^c			
Yes	22 (54)	123 (34)	.016
No	19 (46)	234 (66)	
Unprotected receptive anal intercourse ^d			
Yes	22 (52)	97 (30)	.004
No	20 (48)	222 (70)	
Involved in sex trade (previous year)			
Yes	76 (72)	111 (14)	<.001
No	30 (28)	682 (86)	

^aColumn totals may not equal total number of participants due to missing values.

^bAmong participants with casual sex partners.

^cAmong participants having insertive anal intercourse with casual partners.

^dAmong participants having receptive anal intercourse with casual partners.

MSM/IDU in our study were more likely than other MSM to report having had sex with women and less likely to report having had sex only with men during the previous year. This suggests that the sexual identity of MSM/IDU may be other than gay; interventions to reduce their sexual risk may need to be tailored appropriately (Bull *et al.*, 2002; Deren *et al.*, 1997, 2001). Remarkably, like Kral *et al.* (2001), we were unable to find any published controlled assessments of sexual interventions for MSM/IDU.

A surprising observation in this present study is that 72% of MSM/IDU reported involvement in sex trade during the previous year. By comparison, 56% of female IDU in Vancouver report sex trade involvement during the previous 6 months (Craib *et al.*, 2003). The percentage of MSM/IDU reporting exchange of sex for money or drugs varies widely across studies: 64% of Latino men in Harlem (Diaz *et al.*, 2001), 24–33% of men in Sydney and Melbourne (Crofts *et al.*, 1995; Ross *et al.*, 1992), and 15% of men in Denver (Bull *et al.*, 2001). This variation could reflect regional differences in sex trade involvement among MSM/IDU or differences among studies in item definitions and time frames, modes of questioning, and convenience sampling. Nonetheless,

MSM/IDU in our sample were younger and more disadvantaged compared to other MSM, and sex trade involvement appears to be important to their survival. However, the increased risk of unprotected receptive anal intercourse with casual partners we observed among MSM/IDU was not due entirely to sex trade, as age- and sex-trade-adjusted odds ratios remained elevated (AOR 1.99, CI 0.96–4.15, *p* = .07).

To our knowledge, this is the first study to examine in multivariate analyses the relation between illicit substance use and sexual behavior among MSM/IDU (Bull *et al.*, 2002; Ross *et al.*, 1992). In univariate analyses, we found positive associations between unprotected receptive anal intercourse with casual partners and use during the previous year of cocaine, crack, and acid. In multivariate analyses adjusted for age and MSM/IDU status, acid remained significantly associated with this risk behavior and this association did not differ by IDU status. Of interest, a previous study found that MSM/IDU were more likely than other male IDU to use acid and ecstasy, but were otherwise not different in their use of illicit substances (Ross *et al.*, 1992).

In addition to multivariate analyses, other strengths of this study include its community-based

recruitment, large number of MSM/IDU, and distinction between receptive and insertive anal intercourse engaged in with regular and casual partners. Some limitations of this study should also be noted. Our cohort may not be representative of gay and bisexual men in Vancouver or elsewhere. In particular, we studied young, mostly HIV-seronegative MSM; other studies of substance use and sexual behavior among older and HIV-seropositive MSM/IDU are needed. Our results are cross sectional, based on self-reported data, and subject to social desirability effects; questionnaire items pertaining to drug use and sexual risk behaviors did not capture when these behaviors occurred with respect to one another. We were unable to assess the potential for bias due to nonparticipation, or whether and to what extent MSM/IDU recalled their sex behavior of the previous year differently than noninjecting MSM, or whether IDU misrepresented their sexual experience for the purpose of entering the study. Finally, the higher HIV seroprevalence among MSM/IDU in our study could simply reflect poorer knowledge of their current HIV serostatus or misrepresentation of their serostatus at enrolment. Nonetheless, the consistency of results among previous studies we have cited argues that the risk of HIV infection is indeed higher for MSM/IDU than for other MSM and other male IDU.

In summary, MSM/IDU were twice as likely as other MSM to report unprotected receptive anal intercourse with casual partners. These results, together with our recent risk factor analyses (Weber *et al.*, 2003), demonstrate the crucial role of sexual behavior in HIV seroconversion among MSM/IDU in this cohort. Additional studies are needed to understand the complex relation among substance use, sex trade involvement, sexual identity, and sexual risk behaviors among MSM/IDU. Ideally, these studies will employ targeted recruitment to ensure a balanced sample of MSM/IDU, other MSM, and other male IDU. Controlled assessments are urgently needed to identify optimal sexual risk reduction strategies for MSM/IDU.

ACKNOWLEDGMENTS

This study was supported by a grant from the National Health Research and Development Program (NHRDP), Health Canada. An investigator award granted by the Canadian Institutes for Health Research (CIHR) supports Dr. Hogg. Dr. Schechter is a CIHR scientist. Drs. Lampinen and Hogg are supported by the Michael Smith Foundation for

Health Research. We thank Peter Vann and Deborah Graham for assistance in preparing the manuscript.

REFERENCES

- Battjes, R. J., Pickens, R. W., and Amsel, Z. (1989). Introduction of HIV infection among intravenous drug abusers in low prevalence areas. *Journal of the Acquired Immune Deficiency Syndromes*, 2, 533–539.
- Bull, S. S., Piper, P., and Rietmeijer, C. (2002). Men who have sex with men and also inject drugs—Profiles of risk related to the synergy of sex and drug injection behaviors. *Journal of Homosexuality*, 42, 31–51.
- Centers for Disease Control and Prevention. (2000). HIV/AIDS among men who have sex with men and inject drugs—United States, 1985–1998. *Morbidity and Mortality Weekly Reports*, 49, 465–470.
- Craib, K. J., Spittal, P. M., Wood, E., Laliberte, N., Hogg, R. S., Li, K., Heath, K., Tyndall, M. W., O'Shaughnessy, M. V., and Schechter, M. T. (2003). Risk factors for elevated HIV incidence among Aboriginal injection drug users in Vancouver. *Canadian Medical Association Journal*, 168, 19–24.
- Crofts, N., and Hay, M. (1991). Entry of human immunodeficiency virus infection into a population of injecting drug users, Victoria, 1990. *Medical Journal of Australia*, 155, 378–382.
- Crofts, N., Marcus, L., Meade, J., Sattler, G., Wallace, J., and Sharp, R. (1995). Determinants of HIV risk among men who have homosexual sex and inject drugs. *AIDS Care*, 7, 647–655.
- Deren, S., Estrada, A., Stark, M., Williams, M., and Goldstein, M. (1997). A multisite study of sexual orientation and injection drug use as predictors of HIV serostatus in out-of-treatment male drug users. *Journal of the Acquired Immune Deficiency Syndromes and Human Retrovirology*, 15, 289–295.
- Deren, S., Stark, M., Rhodes, F., Siegal, H., Cottler, L., Wood, M., Kochems, L., Carlson, R., Falck, R., Rourke, K., Trotter, R., Weir, B., Goldstein, M. F., and Wright-De Aguiro, L. (2001). Drug-using men who have sex with men: Sexual behaviours and sexual identities. *Culture, Health and Sexuality*, 3, 329–338.
- Diaz, T., Vlahov, D., Greenberg, B., Cuevas, Y., and Garfein, R. (2001). Sexual orientation and HIV infection prevalence among young Latino injection drug users in Harlem. *Journal of Women's Health and Gender-Based Medicine*, 10, 371–380.
- Hagan, H. (2003). The relevance of attributable risk measures to HIV prevention planning. *AIDS*, 17, 911–913.
- Hogg, R., Weber, A., Chan, K., Martindale, S., Cook, D., Miller, M., and Craib, K. (2001). Increasing incidence of HIV infections among young gay and bisexual men in Vancouver. *AIDS*, 15, 1321–1322.
- Koblin, B. A., Chesney, M. A., Husnik, M. J., Bozeman, S., Celum, C. L., Buchbinder, S., Mayer, K., McKirnan, D., Judson, F. N., Huang, J., Coates, T. J., and the EXPLORE Study Team. (2003). High-risk sexual behaviors among men who have sex with men in 6 US cities: Baseline data from the EXPLORE study. *American Journal of Public Health*, 93, 926–932.
- Kral, A., Bluthenthal, R., Lorvick, J., Gee, L., Bacchetti, P., and Edlin, B. (2001). Sexual transmission of HIV-1 among injection drug users in San Francisco, USA: Risk factor analysis. *Lancet*, 357, 1397–1401.
- Landmann Szwarcwald, C., Bastos, F. I., and de Castilho, E. A. (1998). The dynamics of the AIDS epidemic in Brazil: A space-time analysis in the period 1987–1995. *Brazilian Journal of Infectious Diseases*, 2, 175–186.
- Maslow, C. B., Friedman, S. R., Perlis, T. E., Rockwell, R., and Des Jarlais, D. C. (2002). Changes in HIV seroprevalence and related behaviors among male injection drug users who do and do not have sex with men: New York City, 1990–1999. *American Journal of Public Health*, 92, 382–384.

- Nicolosi, A., Musicco, M., Saracco, A., Molinari, S., Ziliani, N., and Lazzarin, A. (1990). Incidence and risk factors of HIV infection: A prospective study of seronegative drug users from Milan and northern Italy, 1987–1989. *Epidemiology, 1*, 453–459.
- Rhodes, T., Stimson, G. V., Crofts, N., Ball, A., Dehne, K., and Khodakevich, L. (1999). Drug injecting, rapid HIV spread, and the ‘risk environment’: Implications for assessment and response. *AIDS, 13*(Supplement A), S259–S269.
- Ross, M. W., Wodak, A., Gold, J., and Miller, M. E. (1992). Differences across sexual orientation on HIV risk behaviours in injecting drug users. *AIDS Care, 4*, 139–148.
- Stall, R., Paul, J. P., Greenwood, G., Pollack, L. M., Bein, E., Crosby, G. M., Mills, T. C., Binson, D., Coates, T. J., and Catania, J. A. (2001). Alcohol use, drug use, and alcohol-related problems among men who have sex with men: The Urban Men’s Health Study. *Addiction, 96*, 1589–1601.
- Strathdee, S. A., Hogg, R. S., Martindale, S. L., Cornelisse, P. G. A., Craib, K. J. P., Montaner, J. S. G., O’Shaughnessy M. V., and Schechter M. T. (1998). Determinants of sexual risk-taking among young HIV-negative gay and bisexual men. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 19*, 61–66.
- Strathdee, S. A., Martindale, S. L., Cornelisse, P. G. A., Miller, M. L., Craib, K. J. P., and Schechter, M. T. (2000). HIV infection and risk behaviours among young gay and bisexual men in Vancouver. *Canadian Medical Association Journal, 162*, 21–25.
- Strathdee, S. A., Galai, N., Safaiean, M., Celentano, D. D., Vlahov, D., Johnson, L., and Nelson, K. E. (2001). Sex differences in risk factors for HIV seroconversion among injection drug users. A 10 year perspective. *Archives of Internal Medicine, 161*, 1281–1288.
- van Ameijden, E. J., van den Hoek, J. A., van Haastrecht, H. J., and Coutinho, R. A. (1992). The harm reduction approach and risk factors for human immunodeficiency virus (HIV) seroconversion in injecting drug users, Amsterdam. *American Journal of Epidemiology, 136*, 236–243.
- Weber, A. E., Chan, K., George, C., Hogg, R. S., Remis, R. S., Martindale, S., Otis, J., Miller, M. L., Vincelette, J., Craib, K. J., Masse, B., Schechter, M. T., LeClerc, R., Lavoie, R., Turmel, B., Parent, R., and Alary, M. (2001). Risk factors associated with HIV infection among young gay and bisexual men in Canada. *Journal of the Acquired Immune Deficiency Syndromes, 28*, 81–88.
- Weber, A. E., Craib, K. J., Chan, K., Martindale, S., Miller, M. L., Cook, D. A., Schechter, M. T., and Hogg, R. S. (2003). Determinants of HIV seroconversion in an era of increasing HIV infection among young gay and bisexual men. *AIDS, 17*, 774–777.