# Patterns of Sexual Behavior and Condom Use in a Cohort of Homosexual Men

MARTIN T. SCHECHTER, MD, PHD, KEVIN J. P. CRAIB, MMATH, BRIAN WILLOUGHBY, MD, CCFP, BRUCE DOUGLAS, MD, FRCPC, W. ALASTAIR MCLEOD, MD, FRCPC, MICHAEL MAYNARD, MD, PETER CONSTANCE, MD, AND MICHAEL O'SHAUGHNESSY, PHD

**Abstract:** To measure the magnitude of risk reduction within a cohort of homosexual men, questionnaire responses in April 1984–March 1985 were compared to those in October 1986–September 1987. A total of 361 subjects were eligible (231 seronegative, 130 seropositive). The annual number of sex partners declined significantly from a median of 8.0 to 5.0 with no difference between the serologic groups. The number of subjects reporting no receptive anal intercourse increased as did condom use during anal receptive intercourse. More seronegatives than seropositives subjects reported *no* condom use during receptive anal intercourse with *regular* partners (45.7 per cent versus 23.4 per cent), and with *casual* partners (14.9 per cent versus 1.5% percent). Among subjects with the most casual sexual contact at the second visit, 33.3 per cent of seronegatives and 29.2 per cent of seropositives did not report usual condom use during receptive anal intercourse with casual partners. Although we have documented marked risk reductions, safe sex practices are still not universal, and a few individuals continue to put themselves at extremely high risk. (*Am J Public Health* 1988; 78:1535–1538.)

## *Introduction*

In the absence of an effective vaccine against *human immunodeficiency virus* (HIV), primary prevention efforts must center on modifying behaviors associated with its transmission. Thus, community groups and public health agencies have concentrated their efforts to varying degrees on promoting both reductions in the number of sex partners and in the frequency of anal intercourse, as well as increases in the use of condoms and in the practice of other safe sexual activities. The degree to which such changes have occurred has only recently been assessed and the effect of knowledge of HIV serologic status on risk reduction remains unclear. We report here on changes in sexual practices and condom use in our ongoing cohort study of homosexual men.

## *Methods*

The methods and aims of the Vancouver Lymphadenopathy-AIDS Study (VLAS) have been described in detail previously.[1,2] Briefly, the VLAS is an ongoing prospective study of over 700 homosexual men who were recruited from six general practices in central Vancouver, British Columbia during the period November 1982 to February 1984. Subjects have been returning for follow-up visits approximately every six months since enrollment. The visit frequency has been reduced to once per year in the last cycle. During each visit, subjects complete a detailed self-administered questionnaire. In addition, each study subject undergoes a complete physical examination and blood samples are drawn for immunologic and HIV antibody testing. Antibody testing is carried out at the National Reference Laboratory at the Laboratory Center for Disease Control in Ottawa utilizing ELISA (enzyme linked immunosorbent assay) with equivocal results further assessed by Western Blot. Some participants may have additional blood samples drawn for HIV antibody testing between study visits at the discretion of their physicians. All participants are counseled by their physicians to adopt safer sex guidelines including reduction in the number of sex partners and avoidance of unprotected intercourse.

Subjects were eligible for this analysis if they completed their third visit during the period April 1984–March 1985 (EV) and their seventh visit during October 1986–September 1987 (LV). The third visit was chosen for the baseline because serologic results were not available until this time and the seventh visit was the most recently completed at the time of analysis.

As of October 1987, 58 cases of AIDS (acquired immune deficiency syndrome) had been diagnosed in our study according to Centers for Disease Control (CDC) criteria. Seropositive subjects for the present analysis were defined as those eligible subjects who were seropositive at EV and who had remained AIDS-free as of October 1987. It should be noted, however, that 14 per cent of the seropositive group at EV had an AIDS-related condition as defined by a helper cell (CD4) count below 400 and/or two or more of the following symptoms: fever, weight loss, fatigue, diarrhea, arthralgia, thrush, cough unrelated to smoking, or dyspnea. Seronegative subjects were defined as those who were seronegative at EV. It was recognized that the seronegative group would contain individuals who seroconverted between visits and were therefore seropositive at the time of LV.

Patterns of sexual behavior were measured using questionnaire items pertaining to the number of different sexual partners in the previous 12 months, the frequency of various sexual practices during this period, and condom use during these practices. At LV, a distinction was made between regular (at least one sexual encounter per month) and casual partners.

Statistical analyses of the data were carried out using non-parametric methods because inspection revealed the distribution of number of sexual partners to be non-normal. All reported p-values are two-sided. For all paired comparisons, subjects with incomplete or missing information regarding the variable of interest were excluded from the analysis.

## *Results*

A total of 361 subjects completed their third and seventh

Address reprint requests to Martin T. Schechter, MD, PhD, Vancouver Lymphadenopathy-AIDS Study Group, St. Paul's Hospital, 1081 Burrard Street, Vancouver, British Columbia, Canada V6Z 1Y6. He and all the co-authors (except Dr. O'Shaughnessy) are with the AIDS Study Group and also affiliated with the University of British Columbia; Dr. O'Shaughnessy is with the Viral Laboratory, Federal Center for AIDS, Department of National Health and Welfare, Ottawa, Canada. This paper, submitted to the Journal February 22, 1988, was revised and accepted for publication May 18, 1988.

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visits within the defined time periods. Those not eligible included 97 whose third and/or seventh visits fell outside the defined periods, 45 who had not yet completed their seventh visit, 58 who had developed AIDS by October 1987, 79 who had moved away, 89 who had withdrawn from the study, and one who died of unrelated causes. Of the 361 eligible subjects, 231 (64.0 per cent) were seronegative at EV, and 130 (36 per cent) were seropositive; 27 (11.7 per cent) of the 231 seronegative subjects seroconverted during the period between visits. The median interval duration between the EV and LV for all 361 subjects was 28 months (range = 20–42), 29 months for the seronegative group, and 27 months for the seropositive group. The median ages at EV were identical (34 years) for the two groups.

As seen in Table 1, there was a decline in the reported number of annual sexual partners between the two visits from a median of 8.0 to 5.0. Of the 361 subjects, 246 (68.1 per cent) reported a reduction in the number of sexual partners, 19 (5.2 per cent) reported no change, and 96 (26.6 per cent) reported an increase. Declines were noted in both the seronegative and seropositive groups. It is noteworthy that the decline in numbers of partners was similar whether or not an AIDS-related condition as defined above was present at EV.

To control for the higher number of sexual partners at baseline in the seropositives, we restricted the analysis to subjects who reported more than the median number (8) of sexual partners at EV (Table 2). Essentially equal declines were noted in both groups.

As seen in Table 3, there was a decline in the frequency of receptive anal intercourse between EV and LV. At EV, 28.1 per cent of seronegatives and 16.9 per cent of seropositives reported none of this practice in the prior year. At LV, these proportions had risen to 45.3 per cent and 35.6 per cent, respectively with regular sexual partners and 74.5 per cent and 36.9 per cent, respectively with casual partners. However, 6.6 per cent of seronegatives and 31.1 per cent of seropositives reported receptive anal intercourse in at least 30 per cent of casual sexual encounters. Seronegatives were much more likely to not practice receptive anal intercourse with casual than with regular partners at LV but no such differences were seen with seropositives.

Table 4 demonstrates a marked increase between the visits in the use of condoms during receptive anal intercourse. At EV, only 3.6 per cent of seronegatives and 3.7 per cent of seropositives reported condom use in more than 30 per cent of receptive anal acts. At LV, these proportions had risen to 34.4 per cent and 63.9 per cent, respectively with regular partners and 72.3 per cent and 81.5 per cent, respectively with casual partners. It is noteworthy that a higher proportion of seronegative subjects than seropositive subjects reported never using condoms during receptive anal intercourse with casual partners (14.9 per cent vs 1.5 per cent; p = 0.007).

As seen in Table 5, among those in the upper 50 per cent of casual contact, 33.3 per cent of seronegatives and 28.2 per cent of seropositives reported they used condoms in less than 60 per cent of receptive anal exposures to casual partners.

**TABLE 1—Reported Numbers of Sexual Partners in Past Year at EV and LV by Serologic Group**

| Group | EV | LV | LV-EV* | P-Value** |
|---|---|---|---|---|
| Seronegative (n = 231) | | | | |
| Median | 6.0 | 5.0 | −2.0 | <.0001 |
| Range | [0,140] | [0,208] | [−99, +68] | |
| Mean | 16.1 | 12.2 | −3.9 | |
| SD | 23.2 | 20.6 | 17.6 | |
| Seropositive (n = 130) | | | | |
| Median | 12.0 | 7.0 | −3.0 | <.0001 |
| Range | [2,200] | [0,100] | [−151, +88] | |
| Mean | 21.0 | 14.0 | −7.0 | |
| SD | 26.1 | 17.9 | 27.0 | |
| All subjects (n = 361) | | | | |
| Mean | 8.0 | 5.0 | −2.0 | <.0001 |
| Range | [0,200] | [0,208] | [−151, +88] | |
| Mean | 17.9 | 12.8 | −5.1 | |
| SD | 24.3 | 19.7 | 21.5 | |

*Paired difference LV-EV
**P-value based on Wilcoxon signed rank test.

**TABLE 2—Reported Numbers of Sexual Partners in Past Year at EV and LV by Serologic Group (restricted to those reporting more than eight sexual partners at EV)**

| Group | EV | LV | LV-EV* | P-Value** |
|---|---|---|---|---|
| Seronegative (n = 94) | | | | |
| Median | 24.0 | 15.0 | −9.0 | <.0001 |
| Range | [10,140] | [1,208] | [−99, +68] | |
| Mean | 33.5 | 22.0 | −11.5 | |
| SD | 28.4 | 28.0 | 24.0 | |
| Seropositive (n = 78) | | | | |
| Median | 24.0 | 12.0 | −10.0 | <.0001 |
| Range | [10,200] | [1,100] | [−151, +70] | |
| Mean | 32.0 | 18.1 | −13.9 | |
| SD | 28.8 | 18.5 | 30.7 | |
| All subjects (n = 172) | | | | |
| Median | 24.0 | 12.0 | −9.0 | <.0001 |
| Range | [10,200] | [1,208] | [−151, +70] | |
| Mean | 32.8 | 20.3 | −12.5 | |
| SD | 28.5 | 24.2 | 27.1 | |

*Paired difference of LV-EV
**P-value based on Wilcoxon signed rank test.

*Discussion*

There are several caveats which should be recognized at the outset concerning these data. Our original intent in recruiting participants through general practitioners was to avoid potential bias associated with recruitment through sexually transmitted disease clinics or secondary referral centers. Nevertheless, it must be recognized that gay men who choose to attend medical practices that provide care to

**TABLE 3—Frequency of Receptive Anal Intercourse by Serologic Status at EV and LV**

| Sexual Behavior | Frequency* | Seronegative n (%) | Seropositive n (%) |
|---|---|---|---|
| Receptive anal intercourse at EV | Never | 64 (28.1) | 22 (16.9) |
| | Infrequent | 104 (45.6) | 51 (39.2) |
| | Often | 34 (14.9) | 28 (21.5) |
| | Usually | 26 (11.4) | 29 (22.3) |
| Receptive anal intercourse with regular partners at LV** | Never | 58 (45.3) | 26 (35.6) |
| | Infrequent | 47 (36.7) | 28 (38.4) |
| | Often | 9 (7.0) | 7 (9.6) |
| | Usually | 14 (10.9) | 12 (16.4) |
| Receptive anal intercourse with casual partners at LV† | Never | 137 (74.5) | 38 (36.9) |
| | Infrequent | 35 (19.0) | 33 (32.0) |
| | Often | 6 (3.3) | 17 (16.5) |
| | Usually | 6 (3.3) | 15 (14.6) |

*Infrequent = 1–30% of sexual encounters; Often = 31–60% of sexual encounters; Usually = >60% of sexual encounters
**Restricted to those reporting at least one regular partner
†Restricted to those reporting at least one casual partner

**TABLE 4—Frequency of Condom Use During Receptive Anal Intercourse at EV and LV by Serologic Group Among Those Reporting Receptive Anal Intercourse**

| Sexual Behavior | Frequency of Condom Use* | Seronegative** n (%) | Seropositive** n (%) |
|---|---|---|---|
| Receptive anal intercourse at EV | Never | 130 (79.3) | 78 (72.2) |
| | Infrequent | 28 (17.1) | 26 (24.1) |
| | Often | 3 (1.8) | 3 (2.8) |
| | Usually | 3 (1.8) | 1 (0.9) |
| Receptive anal intercourse with regular partners at LV** | Never | 32 (45.7) | 11 (23.4) |
| | Infrequent | 14 (20.0) | 6 (12.8) |
| | Often | 2 (2.9) | 6 (12.8) |
| | Usually | 22 (31.4) | 24 (51.1) |
| Receptive anal intercourse with casual partners at LV† | Never | 7 (14.9) | 1 (1.5) |
| | Infrequent | 6 (12.8) | 11 (16.9) |
| | Often | 4 (8.5) | 8 (12.3) |
| | Usually | 30 (63.8) | 45 (69.2) |

*Infrequent = 1–30% of episodes of receptive anal intercourse; Often = 31–60% of episodes of receptive anal intercourse; Usually = >60% of episodes of receptive anal intercourse.

**Restricted to those reporting at least some receptive anal intercourse with a regular partner.

†Restricted to those reporting at least some receptive anal intercourse with a casual partner.

large numbers of gay men may not accurately reflect the homosexual community at large. Furthermore, the mere participation in a prospective study involving repeated questionnaires, physical examinations, serologic testing, and counseling by committed practitioners can be expected to have additional effects on behavior that may not have occurred outside the context of the study. This represents a form of surveillance bias in which the very act of observation influences the behavior being observed. In addition, questions naturally arise concerning the reliability and validity of information obtained by questionnaire regarding sexual activity. However, some reports suggest that both the interviewer-administered and self-administered questionnaire can provide reasonably reliable data concerning sexual behavior in gay men when the period of recall is relatively short.[3,4] The data analyzed in this study always pertained to sexual behavior in at most the year prior to questionnaire completion. There remains the question of the definition of the seronegative group. We defined the latter to include those individuals who were HIV antibody negative at the time of EV which resulted in the inclusion of 27 individuals who had seroconverted between EV and LV. However, as it was our intent to study the relation of serologic status and *subsequent* behavior change, we felt that this definition was the most appropriate. Any definition requiring persistent seronegativity throughout the duration of observation would impose constraints on behavioral variables during this period and artifactually influence the behavior change under study.

**TABLE 5—Frequency of Condom Use During Receptive Anal Intercourse with Casual Partners at LV by Serologic Group Among Those Reporting Receptive Anal Intercourse and More Than Five Casual Partners**

| Sexual Behavior | Frequency of Condom Use* | Seronegative** n (%) | Seropositive** n (%) |
|---|---|---|---|
| Receptive anal intercourse with casual partners at LV | Never | 3 (10.0) | 0 (0.0) |
| | Infrequent | 4 (13.3) | 8 (16.7) |
| | Often | 3 (10.0) | 6 (12.5) |
| | Usually | 20 (66.7) | 34 (70.8) |

*Infrequent = 1–30% of episodes of receptive anal intercourse; Often = 31–60% of episodes of receptive anal intercourse; Usually = >60% of episodes of receptive anal intercourse.

The present data document marked changes in sexual behavior in this cohort over a 28-month period, suggesting at least some success for ongoing educational initiatives. Our results are consistent with behavioral change which has been reported in several other studies of homosexual men[5–13] and which may now be having beneficial effects on HIV transmission. Winkelstein, *et al,* demonstrated progressive declines in seroconversion rates in a seronegative cohort which they attributed, at least in part, to behavior change.[5] We have recently found similar declines in seroconversion among initially seronegative men in our cohort, with five successive annual seroconversion rates from November 1982 through October 1987 of 3.9, 9.8, 7.3, 4.2, and 0.9 per cent respectively.*

Our finding that the decline in number of sexual partners was comparable in the seronegative and seropositive groups is consistent with the observation of Fox, *et al,*[12] that disclosure of serologic status did not markedly influence subsequent numbers of partners in a cohort of homosexual men. The fact observed here and elsewhere[12,13] that the marked overall behavior change exceeded any differences between serologic groups suggests that the effects of societal influences, such as community education and media coverage, may have outweighed any marginal additional effect of knowledge of serologic status. We did observe some differences, however, between the serologic groups. Although seronegatives practiced receptive anal intercourse with casual partners less often than did seropositives, it was disconcerting to note that when they did engage in this practice, seronegatives utilized condoms less often than did seropositives. Although it may be that seronegatives were more selective in the choice of their casual partners, the possibility remains as suggested by others[12,13] that some seronegatives may infer from their negative status some form of protection and this may act as a disincentive to behavior change.

Our data highlight an important fact concerning sexual behavior in this population often overlooked in studies of temporal change. It is that it is potentially misleading to measure overall change in certain variables such as numbers of partners or condom use without reference to the type of partner or the sexual activity in question. Sexual encounters can vary in their risk of HIV transmission from the ongoing sexual encounters of two mutually monogamous seronegative partners at one end of the spectrum, to receptive anal intercourse with casual or anonymous partners of unknown serology at the other. Seronegatives appeared to adjust the type of sexual practice to the partner in that they were much more likely to never practice receptive anal intercourse with casual partners than with regular partners. Furthermore, at the recent visit, seronegatives were more likely to use condoms during receptive anal intercourse with casual partners than with regular partners. Failure to distinguish between types of partners would have obscured these differences and would have attenuated the change observed with casual partners where safer practices are most critical. Nevertheless, it was disappointing to observe that even at the recent visit, as many as 15 per cent of seronegatives never use condoms during receptive anal intercourse with casual part-

* Schechter MT, Willoughby B, Craib KJP, *et al.* Unpublished data, 1988.

ners and only 64 per cent of this group report the usual use of condoms during this practice. While it is a small proportion of seronegatives who report continuing receptive anal intercourse with casual partners, these individuals continue to place themselves at extremely high risk of HIV infection and probably account for why new infections, although slowing, are still continuing to appear. Also, seropositives with symptoms or low helper cell counts, who may be the most infectious to others,[14] did not lower their numbers of partners to any greater degree than well seropositives. The barriers to behavior change[15,16] at work in these subgroups and in other areas where behavior change has been less marked[17,18] need to be studied so that individuals at continuing high risk can be effectively targeted.

### ACKNOWLEDGMENTS

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### REFERENCES

1. Schechter MT, Boyko WJ, Douglas B, *et al:* The Vancouver Lymphadenopathy-AIDS Study: 6. HIV seroconversion in a cohort of homosexual men. Can Med Assoc J 1986; 135:1355–1360.
2. Schechter MT, Boyko WJ, Jeffries E, *et al:* The Vancouver Lymphadenopathy-AIDS Study: 4. Effects of exposure factors, cofactors and HTLV-III seropositivity on number of helper T cells. Can Med Assoc J 1985; 133:286–292.
3. Saltzman SP, Stoddard AM, McCusker J, Moon MW, Mayer KH, *et al:* Reliability of self-reported behavior risk factors for HIV infection in homosexual men. Public Health Rep 1987; 102:692–697.
4. Coates RA, Soskolne CL, Calzavara L, *et al:* The reliability of sexual histories in AIDS-related research: Evaluation of an interview-administered questionnaire. Can J Public Health 1986; 77:343–348.
5. Winkelstein W, Samuel M, Padian NS, *et al:* The San Francisco Men's Health Study: III. Reduction in human immunodeficiency virus transmission among homosexual/bisexual men, 1982–86. Am J Public Health 1987; 77:685–689.
6. McKusick L, Horstman W, Coates TJ: AIDS and sexual behavior reported by gay men in San Francisco. Am J Public Health 1985; 75:493–496.
7. Martin JL: The impact of AIDS on gay male sexual behavior patterns in New York City. Am J Public Health 1987; 77:578–581.
8. Self-reported changes in sexual behaviors among homosexual and bisexual men from the San Francisco City Clinic cohort. MMWR 1987; 36:187–189.
9. Carne CA, Weller IV, Johnson AM, *et al:* Prevalence of antibodies to human immunodeficiency virus, gonorrhoea rates, and changed sexual behavior in homosexual men in London. Lancet 1987; 1(8534):656–658.
10. Van Griensven GJP, Tielman RAP, Goudsmit J, *et al:* Effect of HIVab serodiagnosis on sexual behavior in homosexual men in The Netherlands. Washington, DC: International Conference on AIDS, June 1, 1987.
11. Farthing CF, Jesson W, Taylor HL, Lawrence AG, Gazzard BG: The HIV antibody test: Influence on sexual behavior of homosexual men. Washington, DC: International Conference on AIDS, June 1, 1987.
12. Fox R, Odaka NJ, Brookmeyer R, Polk BF: Effect of HIV antibody disclosure on subsequent sexual activity in homosexual men. AIDS 1987; 1:241–246.
13. McCusker J, Stoddard AM, Mayer KH, Zapka J, Morrison C, Saltzman SP: Effects of HIV antibody test knowledge on subsequent sexual behaviors in a cohort of homosexually active men. Am J Public Health 1988; 78:462–467.
14. Goedert JJ, Eyster ME, Biggar RJ: Heterosexual transmission of human immunodeficiency virus (HIV): Association with severe T4-cell depletion in male hemophiliacs. Washington, DC: International Conference on AIDS, June 3, 1987.
15. Emmons C, Joseph JG, Kessler RC, Wortman CB, Montgomery SB, Ostrow DG: Psychosocial predictors of reported behavior change in homosexual men at risk for AIDS. Health Educ Q 1986; 13:331–345.
16. Valdiserri RO, Lyter D, Callahan C, Kingsley L, Rinaldo C: Condom use in a cohort of gay and bisexual Men. Washington, DC: International Conference on AIDS, June 5, 1987.
17. Jones CC, Waskin H, Gerety B, Skipper BJ, Hull HF, Mertza GJ: Persistence of high-risk sexual activity among homosexual men in an area of low incidence of the acquired immunodeficiency syndrome. Sex Transm Dis 1987; 14(2):79–82.
18. Calabrese LH, Harris B, Easley KA, Proffitt MR: Persistence of high risk sexual activity among homosexual men in an area of low incidence of acquired immunodeficiency syndrome. AIDS Res 1986; 2(4):357–361.

## US Government Issues Report on Status of Organ Transplantation

The US Government issued its first annual report on the scientific and clinical status of organ transplantation in late summer. The essence of the report, based on the 1986 data, is that "significant advances are being made in the field of organ transplantation," and there has been a dramatic rise in the number of people receiving transplants as well as the number of people on waiting lists. According to the report:

- One-year patient survival is 96 per cent for recipients of kidneys from living donors, and 91 per cent for recipients of cadaveric kidneys;
- One-year graft survival rates are about 88 per cent for recipients of kidneys from living donors, and 71 per cent for recipients of cadaveric kidneys;
- The probability of survival for at least one year after heart transplantation is about 85 per cent when triple drug therapy is used to suppress the immune system. Triple drug therapy usually involves cyclosporine, azathioprine and corticosterioids.
- The number of people benefitting from organ transplants—kidney, heart, liver, heart-lung, or pancreas transplants—was about 11,500 in 1986. More than 10,500 remained on waiting lists at the end of the year.

Copies of the new *Report on the Scientific and Clinical Status of Organ Transplantation* may be obtained from: Division of Organ Transplantation, Rm 9-31, Health Resources and Services Administration, US Public Health Service, DHHS, 5600 Fishers Lane, Rockville, MD 20857. Tel: (301) 443-7577.