



Sexual Behavior and HIV-1 Risk for HIV-1-uninfected Partners in African HIV-1 Serodiscordant Partnerships

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Background

Half of HIV-1 infected adults in sub-Saharan Africa have an uninfected partner. National serosurveys and mathematical modeling suggest that up to two-thirds of new HIV-1 infections in Africa occur within stable sexual partnerships. Little is known about sexual behaviors and risk of HIV-1 acquisition for HIV-1 uninfected partners in serodiscordant partnerships.

Study Sites



Kampala, Uganda

Kigali, Rwanda

Eldoret, Kisumu, Nairobi, Thika, Kenya

Moshi, Tanzania

Kitwe, Ndola, & Lusaka, Zambia

Gabarone, Botswana

Cape Town, Johannesburg (Soweto & Orange Farm), South Africa

Objective

- To prospectively describe sexual behaviors of HIV seronegative partners in known HIV serodiscordant partnerships, including condom use with the primary HIV infected versus outside partners,
- To explore gender differences in sexual behavior, and risk of HIV acquisition within or outside the primary partnership with the HIV infected partner

Methods

Between November 2004 and April 2007, heterosexual HIV serodiscordant couples from 7 African countries across East and Southern Africa were enrolled into the Partners in Prevention HSV/HIV Transmission Study.

We conducted a prospective study of 3380 HIV-1 serodiscordant partnerships (2283 with HIV-1 uninfected male partners, 1097 with HIV-1 uninfected female partners) answer the above objectives. At quarterly visits for up to 24 months, HIV-1 uninfected partners were asked about sexual behavior during the prior month.

Behavioral assessment: HIV negative partners of discordant couples completed an interviewer-administered sexual behavior questionnaire at enrollment and at each quarterly visit thereafter.

Data collected included the number of sex acts with the primary study partner and with outside partners during the past month, and the number of acts with each partner type protected by condoms.

Laboratory methods: HIV serologic testing was by rapid HIV antibody tests, with positive results confirmed by ELISA and Western blot.

For HIV uninfected partners who consequently seroconverted to HIV, analysis of HIV *env* and *gag* gene sequences from both members of the couple was used to determine whether transmission was genetically linked within the partnership, or was unlinked and thus likely acquired from an outside partner

Results: During follow-up, the proportion of HIV-1 uninfected partners reporting sex with their HIV-1 infected partner in the prior month declined significantly (from 93.5% at enrollment to 73.2% at 24 months, $p < 0.0001$) while the proportion reporting sex with an outside partner increased significantly (from 3.1% to 13.9%, $p < 0.0001$). Sex with the known HIV-1 infected partner and an outside partner in the same month was uncommon (3-5%) and stable throughout follow-up. HIV-1 uninfected men were significantly more likely than HIV-1 uninfected women to report partners other than their known HIV-1 infected partner ($p < 0.0001$). Sex unprotected with condoms was reported significantly more frequently with outside partners than with primary HIV-1 infected partners (RR 4.6; 95%CI 4.2-5.2). The proportion who acquired HIV-1 during study follow-up was similar for those who ever versus never reported an outside partner (3.1 vs. 4.0%, $p = 0.6$). However, based on DNA sequencing, 18 of 21 (86%) of those who acquired HIV-1 and who reported outside partners were found by viral sequencing to have an HIV-1 isolate that was virologically distinct from that of their primary partner, compared to 23 of 106 (22%) for those who reported no outside partners during follow-up ($p < 0.001$).

Proportion of HIV uninfected partners reporting sexual partnership outside their known HIV serodiscordant partnership, during 24 months of follow-up

Months since enrollment	ALL	Reporting outside partner (%)	WOMEN	Reporting outside partner (%)	MEN	Reporting outside partner (%)
0 (enrollment)	3380	104 (3.1%)	1097	5 (0.5%)	2283	99 (4.3%)
3	3230	164 (5.1%)	1061	9 (0.9%)	2169	155 (7.2%)
6	3121	207 (6.6%)	1029	18 (1.8%)	2092	189 (9.0%)
9	3022	254 (8.4%)	1006	27 (2.7%)	2016	227 (11.3%)
12	2835	272 (9.6%)	950	31 (3.3%)	1885	241 (12.8%)
15	2417	280 (11.6%)	809	30 (3.7%)	1608	250 (15.6%)
18	2092	260 (12.4%)	704	30 (4.3%)	1388	230 (16.6%)
21	1607	212 (13.2%)	532	18 (3.4%)	1075	194 (18.1%)
24	1250	174 (13.9%)	427	17 (4.0%)	823	157 (19.1%)

Sexual behavior of HIV uninfected partners in HIV serodiscordant partnerships over time, with both primary HIV infected and outside partners*

Visit month	No sex reported (%)		Sex with HIV+ primary partner only		Sex with outside partner only		Sex with both HIV+ partner and outside partner (concurrent)	
	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN	WOMEN	MEN
0	7.9	5.6	91.6	90.1	0.0	0.3	0.5	4.1
3	10.9	7.8	88.2	85.0	0.2	1.7	0.7	5.5
6	13.4	10.7	84.8	80.1	1.0	3.8	0.8	5.2
9	13.8	13.2	83.5	75.6	2.0	5.7	0.7	5.6
12	15.0	14.6	81.9	72.6	2.7	6.6	0.4	6.2
15	16.2	15.3	80.1	69.2	3.5	9.0	0.3	6.5
18	19.7	14.4	76.2	69.1	3.6	10.3	0.6	6.3
21	23.1	17.5	73.5	64.6	2.8	11.0	0.6	6.9
24	22.5	14.7	73.5	66.3	3.5	12.3	0.5	6.7

Conclusions

Among HIV-1 serodiscordant couples followed for 24 months, sexual frequency declined within the primary partnership as outside partnerships increased. Those with outside partners were no more likely to acquire HIV-1.

In addition to antiretroviral treatment for the HIV-1 infected partner to reduce infectiousness, prevention strategies for HIV-1 serodiscordant couples need to include strategies to reduce acquisition from outside partners, such as oral or topical pre-exposure prophylaxis.

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