Sexual Network Dynamics of Black Men Who Have Sex with Men in HPTN 061: Longitudinal Analysis

I. Background and Rationale

Men who have sex with men (MSM) constituted the largest proportion of new HIV infections in the United States. Black MSM have been affected by HIV at dramatically disproportionate rates, comprising about a quarter of new HIV infections in the US. The disproportionate rate of HIV infection in Black MSM is not explained by differences in individual behavioral risk, such as unprotected anal intercourse, number of sexual partners, and substance use. One hypothesis is that the characteristics of sexual networks of Black MSM place them at increased risk of HIV compared to non-Black MSM. A person's risk of HIV infection is not only dependent on one's risk behaviors, but also on the risk behaviors and HIV prevalence of other partners in one's sexual network. Sexual networks are rarely static, and cross-sectional snapshots of networks and their characteristics may only partially explain the HIV disparity by race/ethnicity among MSM. Therefore, in addition to a baseline characterization of sexual networks of Black MSM, it is important to examine how changes in sexual networks of Black MSM over time influence HIV infection and sexual risk behaviors.

II. Objectives:

This investigation will describe the sexual network characteristics over a 12-month period of Black MSM enrolled in the HPTN 061 study in 6 cities, comparing 6-month and 12-month data from the social and sexual network inventory to the baseline inventory. The study will also assess the association of network changes with change in sexual risk behaviors (i.e., unprotected receptive anal intercourse, unprotected insertive anal intercourse, and unprotected serodiscordant sex) and new HIV infection.

Hypothesis: *Sexual network instability will be associated with increased sexual risk behaviors and new HIV infection after controlling for individual risk factors, with increased sexual network density, increased sexual network size, decreased overlapping of sexual and social networks, increased assortative mixing by race/ethnicity, and increased HIV prevalence within sexual networks among Black MSM.*

IV. Methods:

Network Variables at Months 0, 6, and 12 months:

Participant/network level:
Race composition of sex partners
Age difference between participant and partner
Sexual network size
Overlap between social and sexual networks
Sexual network density
Any unprotected serodiscordant sex between participant and partner

Partner level:
Gender of partner
Type of partner
HIV status of partner
Frequency of condom use
HIV positive participant disclosure of HIV status to partner

Change in the network variables will be assessed by the difference in mean values or proportions of the variables from the previous visit. We will also use a measurement of network stability from prior studies, defined as the proportion of all the nominated persons who appear in a network at two timepoints and calculated as B / (A + C – B), where A denotes the persons at time 1, C represents persons at time 2, and B represents the intersection of A and C. Pearson's rank correlation will be used to compare the stability index with sexual network size.

Outcome Variables:

Because this is a longitudinal analysis, we want to look at any change in frequency of sexual risk behaviors over time and new HIV infection rates. The sexual risk behavior outcome variables will be derived from the ACASI questionnaire completed at each follow-up visit: (1) change in the frequency of unprotected receptive anal intercourse (change in the number of receptive anal acts without condoms in the last 6 months and change in the proportion of receptive anal sex acts without condoms in the last 6 months), (2) change in the frequency of unprotected insertive anal intercourse (change in the number of insertive anal acts without condoms in the last 6 months and change in the proportion of insertive anal sex acts without condoms in the last 6 months), and (3) change in the frequency of unprotected serodiscordant sex in the last 6 months and change in the proportion of serodiscordant sex acts without condoms in the last 6 months. New HIV infection will be defined as new HIV seroconversion confirmed by ELISA and Western Blot at a follow-up visit with a negative ELISA and Western Blot at the previous visit.

Analytic Plan:

Collinearity of the network variables will be checked. To compare change in the network variables and outcome variables from the prior visit, we will calculate standardized difference, based on the t-test (or z-test), defined as the difference between two means (or proportions) divided by the standard error of the within person difference between two means (or proportions); a p-value ≤ 0.05 will be considered significant. Bivariate associations between the change in the network variables and the outcome variables will be tested using logistic regression with GEE. Variables with p-values < 0.05 based on the generalized Wald X^2 in the bivariate analyses will be entered into the multivariate GEE regression models; backward elimination will assess for variables that are independently associated with the sexual risk behavior outcomes with p-values ≤ 0.05. The regression models will include individual sociodemographic and sexual risk characteristics, derived from the ACASI questionnaire of each participant at the follow-up visit. The models will be stratified by HIV status and will adjust for any confounding variables. Pairwise interactions between main independent effects and time will be assessed, and will be included in the final model if p-value ≤ 0.05. For this longitudinal analysis, GEE will be used to account for the dependency of observations between repeated measurements taken over time on the same individual.

V. Intended product:

An abstract submission to the Conference of Retroviruses and Opportunistic Infections (CROI) 2013

A manuscript in a peer-reviewed scientific journal

VI. Recommendation of writing team members:

Hong Van Tieu (lead)
Others on the baseline sexual network manuscript writing team: Sam Griffith, Pamina Gorbach, Ting Liu, Lei Wang, Carl Latkin, Susan Buchbinder, Kenneth Mayer, Beryl Koblin, etc.
Others TBD

VII. Incorporation of community perspective

Results of the analysis and manuscript will be reviewed at local community advisory board meetings of study sites, and input will be incorporated into the final product.