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No superinfection among seroconcordant couples after well-defined exposure

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Background: Sequential infection with variants of HIV-1, or superinfection, has been described in case reports involving persons who are recently infected and those who have been intermittently treated with antiretroviral therapy. The frequency of superinfection after exposure to a genetically distinguishable virus is not known.

Methods: The Positive Partners study is a prospective cohort of seroconcordant HIV-1 infected couples in San Francisco who practice unprotected anal or vaginal intercourse with each other. Couples were enrolled if they reported that their infections predated their relationship and if viral genetic analysis indicated no evidence of transmission linkage at baseline. Population sequences at the *tat*, *pro*, and *pol* loci were derived from PBMC DNA and plasma viral RNA. **Results:** Forty-eight individuals in 24 couples evaluated at baseline were found to have virus populations that were readily distinguishable by phylogenetic analysis. All couples had subtype B infections and none were recent or acute infections. Viral sequence analysis at a follow-up timepoint was completed for 19 couples, indicating no evidence of systemic superinfection. There were 38.1 person years of sexual exposure to genetically distinguishable variants of HIV-1 involving 1,580 reported intercourse episodes. Considering all 72 individuals completing the prospective study, there was no evidence of superinfection after 65 person years of observation and 4,021 intercourse acts. An additional 137 person years of exposure had occurred in couples that enrolled in the study without evidence of prior superinfection. **Conclusions:** Seroconcordant couples are uniquely valuable for superinfection research because exposure can be well characterized. The lack of superinfection after exposure among seroconcordant couples may be due, in part, to viral suppression during treatment and partial viral suppression during drug resistant viremia. Anti-viral immune responses or viral interference may block superinfection among those with well-established infections.

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