OA01-06 LB. HIV-1 Plasma RNA and Risk of HIV-1 Transmission

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Background

Non-sterilizing HIV-1 vaccines may provide public health benefits if they significantly reduce plasma HIV-1 RNA, thus potentially reducing infectiousness. Quantification of reduction in plasma HIV-1 RNA needed to decrease HIV-1 transmission is useful for design of efficacy trials of candidate HIV-1 vaccines. We modeled the relationship between plasma HIV-1 RNA and HIV-1 transmission using data from a prospective study of African heterosexual HIV-1 serodiscordant couples.

Methods

3408 HIV-1-infected participants with CD4 counts ≥250 cells/mm3 enrolled in the Partners in Prevention HSV/HIV Transmission Study and their partners were followed for ≤24 months. HIV-1 transmission events were assessed for viral genetic linkage within the enrolled partnership by determining HIV-1 env and gag sequences from partners. The relationship between plasma HIV-1 RNA over time and risk of genetically linked HIV-1 transmission was evaluated with a Cox model with a natural cubic spline.

Results

84 post-enrollment linked HIV-1 transmissions were observed. HIV-1 incidence increased rapidly and non-linearly with higher plasma HIV-1: from 0.53 transmissions per 100 person-years for plasma HIV-1 RNA <10,000 copies/mL to 6.2 for HIV-1 RNA >1,000,000 copies/mL ($p<0.0001$). Baseline HIV-1 RNA in men was, on average, 0.4 log10 higher than in women; no significant difference in risk of transmission for a given HIV-1 level was observed between men and women ($p = 0.17$). Given the distribution of plasma HIV-1 RNA in this population of stable cohabiting couples, our modeling predicts that a 0.74 log10 reduction in average plasma HIV-1 RNA in the population would be required for a 50% reduction in HIV-1 transmission risk.

Conclusion

This analysis provides a detailed description of the relationship between plasma HIV-1 RNA and risk of heterosexual HIV-1 transmission. These findings suggest targets for reduction in HIV-1 RNA for use in evaluating non-sterilizing HIV-1 vaccine candidates in HIV-1 infected persons to reduce risk of heterosexual HIV-1 transmission.