

Oral presentation

OA01-06 LB. HIV-1 plasma RNA and risk of HIV-1 transmission

JR Lingappa*¹, JP Hughes¹, D Donnel², JM Baeten¹, JI Mullins¹,
MS Campbell¹, GE Gray³, M Essex⁴, C Farquhar¹, H Rees³, A Wald¹, L Corey¹
and C Celum¹

Address: ¹University of Washington, Seattle, Washington, USA, ²Fred Hutchinson Cancer Research Centre, Seattle, USA, ³University of the Witwatersrand, Johannesburg, South Africa and ⁴Harvard University, Boston, USA

* Corresponding author

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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.