



## Plenary Address:

### **“Could we eradicate HIV by widespread usage of antiretroviral therapy?”**

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Current anti-retroviral therapies (ART, formerly known as HAART) do not cure HIV-infected individuals, but dramatically reduce viral load and hence increase survival time. We examine long-term effects and address the question “Could we eradicate an HIV epidemic by widespread usage of ART?” To answer this question we derive an analytical formula for the basic reproductive rate ( $R_0^{\text{ART}}$ );  $R_0^{\text{ART}}$  is the average number of new HIV-infections that one HIV-infected individual would generate during his/her lifetime in a community that is receiving ART and where both drug-sensitive and drug-resistant strains are co-circulating. We use our expression for  $R_0^{\text{ART}}$  and data to calculate the probability of eradicating a high prevalence epidemic, the HIV epidemic in gay men in San Francisco, (where HIV prevalence is 30%). We determine that the probability of eradication by widespread usage of ART is 0.85 (if risky behavior is also reduced), 0.5 (if levels of risky behavior remain constant) and 0.13 (if risky behavior increases). We show that it could take more than 100 years to achieve eradication. We also identify which factors would be the most important in determining the probability of achieving eradication; we then quantify the explicit tradeoff-between medical interventions (in terms of usage rates of ART) and behavioral interventions (in terms of changes in levels of risky behavior). Finally, we discuss whether ART should be used as a tool for controlling HIV epidemics. This work is a joint collaboration with Dr. Sally Blower (UCLA) and Hayley Gershengorn (Harvard).