Potential Impact of Long-Acting Antiretrovirals on Local HIV Epidemics

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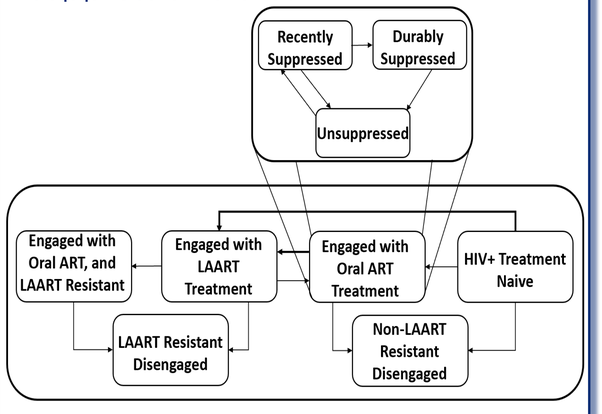
Background

- Long-acting antiretroviral (LAART) therapies may reduce medication non-adherence and promote retention in HIV care
- The potential impact of LAART on the US HIV epidemic remains unclear

Methods

- We extended a **compartmental model of HIV transmission**, grouping individuals based on treatment modality, care continuum and suppression status



- We simulated rollout of LAART for **3 separate indications**: (1) Switching "durably suppressed" (≥ 2 years) PWH onto LAART; (2) starting ART-experienced, unsuppressed PWH on LAART; and (3) starting ART-naïve PWH on LAART
- LAART may influence HIV care disengagement rates, gain and/or maintenance of viral suppression, and development of resistance

Results

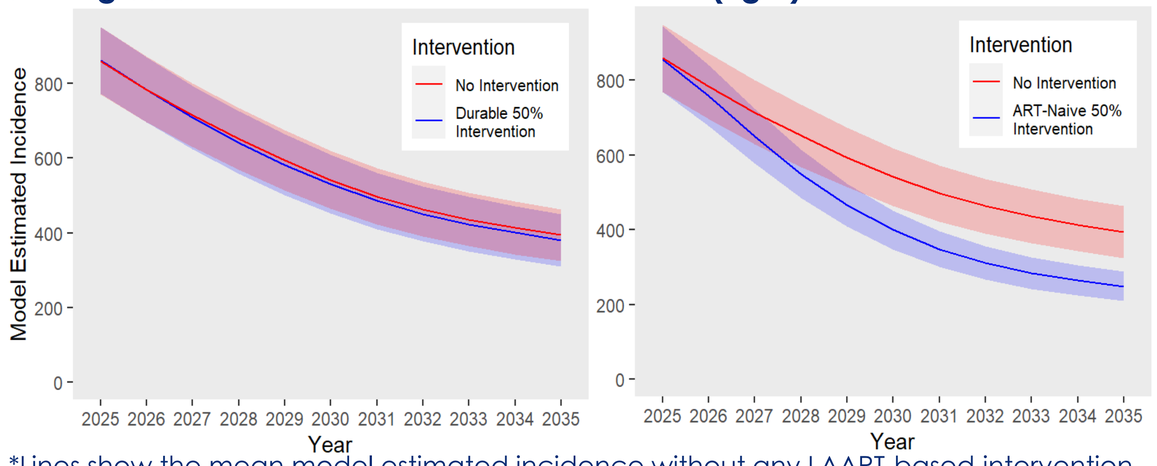
Among the 4 simulated cities, LAART based interventions yielded a modest reduction in HIV incidence, with the greatest effect being observed when starting *ART-naïve PWH on LAART*

Reduction* in HIV Incidence from 2025 to 2035 Under Different Indications For LAART

Modeled MSAs	*No LAART*	*% Durably Suppressed PWH on LAART*		*% ART-experienced, unsuppressed PWH on LAART*		*% ART-naive PWH on LAART*	
		25%	*50%*	*25%*	*50%*	*25%*	*50%*
Atlanta, GA	54% [47 - 59%]	55% [48 - 61%]	56% [49 - 62%]	55% [48 - 60%]	56% [48 - 61%]	65% [59 - 70%]	**71% [65 - 76%]**
Baltimore, MD	65% [61 - 69%]	66% [62 - 70%]	66% [62 - 71%]	66% [62 - 70%]	67% [62 - 70%]	67% [63 - 72%]	**69% [65 - 73%]**
Los Angeles, CA	34% [25 - 43%]	35% [27 - 45%]	37% [28 - 46%]	36% [29 - 44%]	38% [31 - 46%]	40% [31 - 50%]	**44% [35 - 54%]**
Miami, FL	43% [37 - 48%]	44% [38 - 49%]	44% [38 - 50%]	44% [38 - 49%]	44% [39 - 49%]	48% [43 - 52%]	**51% [46 - 56%]**

*We report the mean and 95% credible interval across simulations

Effect of Switching 50% of Durably Suppressed Individuals on LAART (left) and Starting 50% of ART-Naïve Individuals on LAART (right) in Atlanta



*Lines show the mean model estimated incidence without any LAART-based intervention (red), and with an intervention (blue). Shading indicated the 95% credible interval

Key Parameters

Parameter	*Prior Mean (95% CI)*
OR* Disengagement on LAART vs Oral ART	0.75 (0.5 – 1)
% Unsuppressed Individuals Gaining Suppression on LAART	98.77% (97.2% -99.7%)
% Durably Suppressed Individuals Gaining Resistance on LAART	1.13% (0.3% -2.6%)
% Individuals Switching from LAART to Oral ART	3.29% (1.3%-6.2%)
HR* Gaining Suppression with Resistance* vs Without	1.06 (0.64-1.65)
HR Losing Suppression with Resistance* vs Without	0.99 (0.60-1.55)
HR Losing Suppression with Resistance* vs Without	1.28 (1.0-1.6)

*OR = Odds Ratio, HR = Hazards Ratio, Resistance refers to resistance to LAART

Limitations

- The pricing, side effects and potential drug interactions of LAART may affect effectiveness
- Real-world effectiveness of LAART for viral suppression for some clinical indications is unknown

Conclusions

- LAART may **modestly reduce HIV incidence** in local epidemics
- LAART's effect is most pronounced when targeting ART-naïve individuals