# HIV Testing in the US PrEP Demonstration Project: rEIA vs. Antigen/Antibody vs. RNA

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## Introduction

- Ensuring individuals are HIVuninfected prior to pre-exposure prophylaxis (PrEP) initiation and continuation is critical to minimize the risk of developing drug resistance
- The optimal HIV testing algorithm for PrEP is not yet known
- US CDC recommends, at minimum, documenting a negative blood EIA within the week before starting or restarting PrEP, and every three months during PrEP continuation; persons with suspected acute HIV infection should receive additional HIV testing

# **Objectives**

 To compare the performance of rapid blood enzyme immunoassay (rEIA), lab-based p24 antigen/antibody (4<sup>th</sup> generation), and RNA tests in detecting HIV infection at PrEP screening, initiation, and follow-up

## Methods

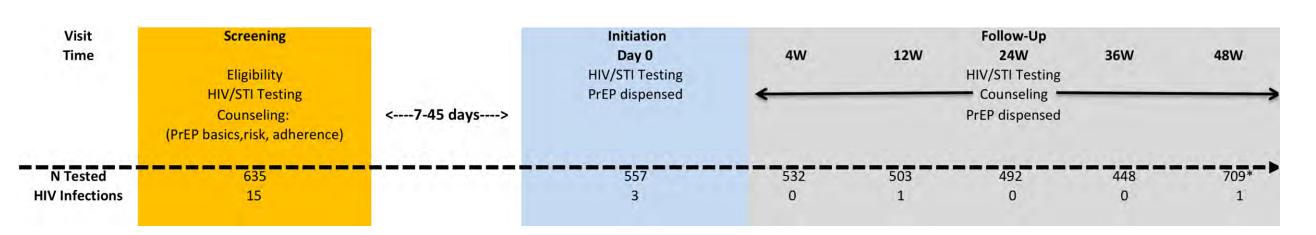
- From September 2012 to January 2014, 635 HIVuninfected men who have sex with men (MSM) and transgender women (TGW) attending STI clinics in San Francisco and Miami and a community health center in Washington, DC were screened for The Demo Project
- The 557 enrolled participants were offered up to 48 weeks of open-label emtricitabine/tenofovir
- All participants were HIV tested at screening, PrEP Initiation, and follow-up (weeks 4, 12, 24, 36, 48) with rEIA and 4<sup>th</sup> generation tests. Pooled RNA was performed at all visits in San Francisco, with quantitative or qualitative RNA only at enrollment in DC and Miami, respectively. Any positive test was confirmed using local testing algorithms

## Results

- 18 of 20 HIV infections were detected during Screening and PrEP Initiation (Figure 1): 15 (75%) at Screening and 3 (15%) at Initiation. Prevalence of HIV infection at screening was 15/635 or 2.4%
- Rapid EIA detected 14/15 infections at screening; Ag/Ab testing detected 13/13 infections at screening (**Table 1**)
- At PrEP initiation, 3 participants had HIV infection: all were rEIA (-), 4<sup>th</sup> generation (-) and RNA (+), with viral loads of 120, 3343, and 51 copies/mL (all pre-treatment); all RNA tests were detectable on repeat testing
- 2 participants started ART as soon as the first (+) RNA was known
- All participants found to be infected at initiation had been HIV-negative at screening within the prior 7-45 days

## Results

#### Figure 1: Visit Schedule and HIV Testing Results in PrEP DEMO



\*participants were offered optional testing at 48+4 weeks

#### Table 1. HIV Infections at Screening, Enrollment, and during Follow-up

	Pt	First visit at which HIV infection diagnosed	Rapid EIA	4 <sup>th</sup> Gen Ag/Ab	RNA	Final Status
SF	1	SCR	reactive	reactive	pool positive	infected
	2	SCR	reactive	reactive	pool positive	infected
	3	initiation	nonreactive	nonreactive	pool positive <sup>1</sup>	infected
	4	initiation	nonreactive	nonreactive	pool positive <sup>2</sup>	infected
	5	W12	reactive	reactive	8,671,733 c/mL	infected
	6	SCR	reactive	reactive	n/a	infected
	7	SCR	reactive	reactive	n/a	infected
	8	SCR	reactive	reactive	n/a	infected
	9	SCR	reactive	reactive	n/a	infected
=	10	SCR	nonreactive	reactive	n/a	infected
MIAMI	11	SCR	reactive	reactive	n/a	infected
Ξ	12	SCR	reactive	reactive	n/a	infected
	13	SCR	reactive	reactive	n/a	infected
	14	SCR	reactive	reactive	n/a	infected
	15	SCR	reactive	n/a	n/a	infected
	16	SCR	reactive	reactive	n/a	infected
	17	SCR	reactive	reactive	n/a	infected
	18	initiation	nonreactive	nonreactive	reactive <sup>3</sup>	infected
	19	SCR	reactive	44	n/a	infected
20	20	W48	reactive	reactive	79,540 c/mL	infected

3: qualitative RNA; quantitative RNA at confirmation was 51 c/mL

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1: RNA=120 c/mL

### evidence of infection; both had low or undetectable drug levels at seroconversion and no evidence of resistance on standard and

Results

 Of 2680 rapid EIAs during follow-up, there were 6 false positives in 2 participants

ultrasensitive genotyping assays

Of 2 infections during follow-up, both were

rEIA (+)/4<sup>th</sup> generation (+) at the visit with first

- Of 2673 4<sup>th</sup> generation Ag/Ab tests during follow-up, there were 3 false positives in 2 participants
- There were no false positive RNA tests at screening, enrollment or follow-up.

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- Limitations
- These results do not account for presence of symptoms of acute HIV infection
- Performance of EIA and Ag/Ab tests may differ in a cohort with lower adherence during PrEP follow-up

## Conclusions

- Rapid EIA and Lab-based 4<sup>th</sup> generation testing detected most, but not all HIV infection before PrEP initiation: 3/18 (16%) of infections at screening or initiation were detected by RNA only
- Acute HIV infection should be ruled out with an RNA test before starting PrEP, if available, particularly in clients with recent exposure, and despite recent negative testing
- Low viral loads should not be assumed to be false positives, especially during PrEP initiation
- In this cohort, with high PrEP adherence, rapid EIA and lab based 4<sup>th</sup> generation tests were adequate to detect HIV infection during PrEP follow-up.

Table 2. Performance of Rapid EIA and 4th Generation Ag/Ab tests during PrEP Follow-up

Test	# True Positives	#False Positives	# True Negatives	# False Negatives	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Rapid EIA	2	6	2672	0	100%	99.78%	25%	100%
Ag/Ab	2	3	2668	0	100%	99.89%	40%	100%