P008

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Comparison of HIV Incidence as Determined by Different Recency Assays in Ugandan Women

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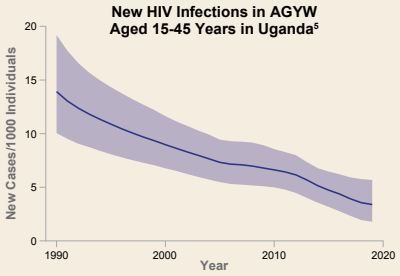
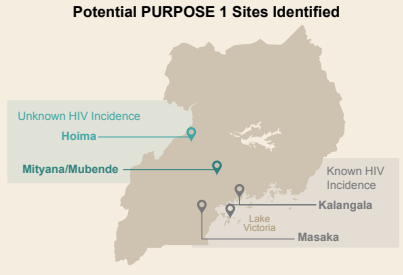
Introduction

- Accurate estimates of background HIV incidence (bHIV) are critical to site selection and evaluation of efficacy in next-generation pre-exposure prophylaxis (PrEP) studies with counterfactual designs[1]
- HIV-1 recent infection testing algorithms (RITAs) use recency assays to estimate population-level HIV incidence and are currently being employed in PrEP trials to estimate bHIV[2,3]
  - Multiple assays have been suggested to determine recent infections for RITA development, including antibody (Ab) avidity assays and HIV 1/2 antigen (Ag)/Ab HIV infection assays[4]
- The PURPOSE 1 study (ClinicalTrials.gov NCT04994509) is using the novel counterfactual bHIV design and requires a high bHIV (> 3.5/100 person-years [PY])
  - This trial is evaluating the efficacy and safety of lenacapavir and emtricitabine/tenofovir alafenamide for PrEP in adolescent girls and young women (AGYW) in South Africa and Uganda
  - The primary endpoint will compare HIV incidence in each active study arm (lenacapavir and emtricitabine/tenofovir alafenamide) to bHIV in the screened population
- The SIENA study was conducted to determine the bHIV among AGYW in and around central and midwestern Uganda in regions with sociodemographic factors associated with higher HIV incidence (eg, marital/relationship status, education level, financial independence, and available occupations)

HIV Incidence and Potential PURPOSE 1 Sites in Uganda





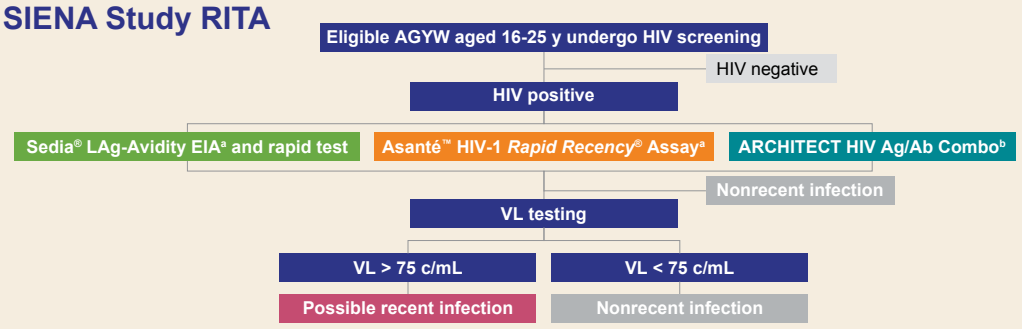
- In Uganda, HIV incidence has decreased at the national level; however, micro-epidemics still occur in key populations and high-risk communities
- 4 potential sites were identified, including 2 (Mityana/Mubende and Hoima regions) that have sociodemographic characteristics suggesting increasing HIV incidence, but with no recent data on bHIV
- Mityana/Mubende was confirmed as a PURPOSE 1 site due to a bHIV of 23.2/100 PY (95% confidence interval [CI] 13.1, 41.2)[6]

Objective

- To compare recency assay platforms by assessing their suitability, performance, and reliability for estimating bHIV in future PrEP studies

Methods

SIENA Study RITA



[a]Sedia Biosciences Corporation, Beaverton, Oregon, US; [b]LabCorp, Indianapolis, Indiana, US. EIA = enzyme immunoassay; LAg = limiting Ag; VL = viral load.

- Eligibility criteria: female sex, age 16-25 years, unknown HIV status, and no HIV testing in past 3 months
- A cross-section of AGYW were recruited from HIV testing sites and known areas of commercial sex activity, eg, bars, nightclubs, lodges, gold mines, factories, farmlands, islands, and fishing communities
- HIV diagnosis and confirmation via Alere Determine™ HIV-1/2 (Abbott, Abbott Park, Illinois, US), and OraQuick ADVANCE® Rapid HIV-1/2 Antibody Test (OraSure Technologies, Bethlehem, Pennsylvania, US)

Table 1. Recency Assay Characteristics[7]

	Platform	Method	Cutoff	Cutoff Time, y	MDRI, d	FRR, %	VL Cutoff, c/mL
LAg-EIA	Sedia LAg-Avidity EIA	Ab avidity, EIA	1.5 ODn	1	166.8	6.5	75
Asanté	Asanté HIV-1 *Rapid Recency* Assay	Ab avidity, lateral flow immunoassay, interpreted with electronic reader	2.5 LT/R	1	129.3	5.1	75
ARCHITECT	ARCHITECT HIV Ag/Ab Combo	Ag/Ab chemiluminescent immunoassay	175 S/Co	1	152.9	6.7	75

FRR = false recency rate; LT/R = long-term/recent band intensity; MDRI = mean duration of recent infection; ODn = normalized optical density; S/Co = signal/cutoff ratio.

- Positive samples analyzed for recent infection using the LAg-EIA, Asanté, and ARCHITECT recency assays
- VL determined by COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Test, v2.0 (Roche Diagnostics, Indianapolis)
- bHIV and 95% CI calculated using previously determined MDRI and FRR specific for the study population, based on Gao et al[8]
- Participants diagnosed with HIV were referred to appropriate sites for treatment

Results

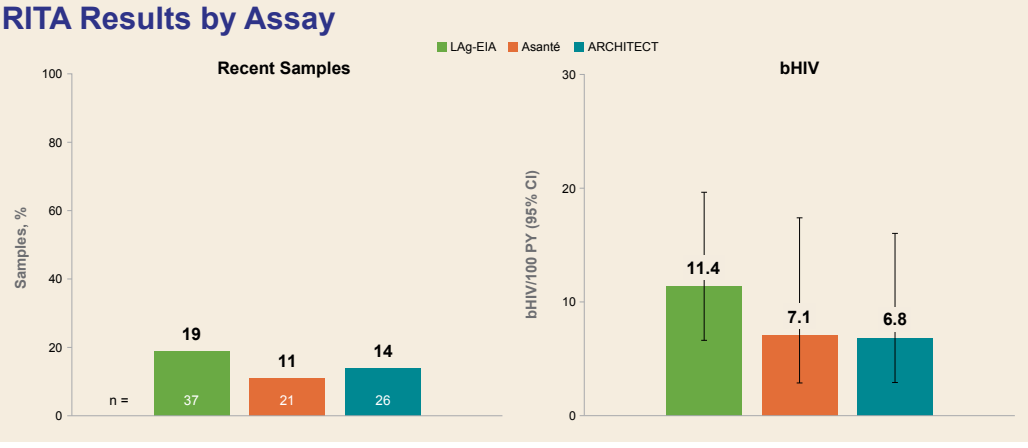
Participant Characteristics

		Total: N=742
Median age, y (range)		21 (16-26)
Secondary education or higher, n (%)		359 (48)
Living with partner/cohabiting, n (%)		109 (15)
Median time living in community, y (Q1, Q3)		1.2 (0.5, 5.5)
Median age at 1st sex encounter, y (Q1, Q3)		16 (14, 17)
Median mo since last HIV test (Q1, Q3)		8 (5, 15)
Sex partners in past 3 mo, n (%)[a]	0	0
	1	73 (10)
	≥ 2	630 (90)
Median number of vaginal sex encounters in past 3 mo (Q1, Q3)		100 (24, 100)
Condom use in past 3 mo, n (%)	Never	241 (32)
	Rarely	250 (34)
	Sometimes	195 (26)
	Often	47 (6)
New sex partner in past 3 mo, n (%)		518 (70)
Concerned about having HIV, n (%)	Somehow worried	321 (56)
	Very worried	222 (39)
Partner provided financial/material support, n (%)[b]		473 (91)
Primary occupation, n %	Commercial sex worker, bar/lodge/hotel attendant	479 (65)
	Other	263 (35)

[a]39 participants in Mityana/Mubende group reported number of sex partners not known; Mityana/Mubende %s calculated from n = 332; total %s calculated from n = 703; [b]105 participants in Hoima and 120 in Mityana/Mubende groups reported not applicable or missing data; Hoima %s calculated from n = 266; Mityana/Mubende %s calculated from n = 251; total %s calculated from n = 517. Q, quartile.

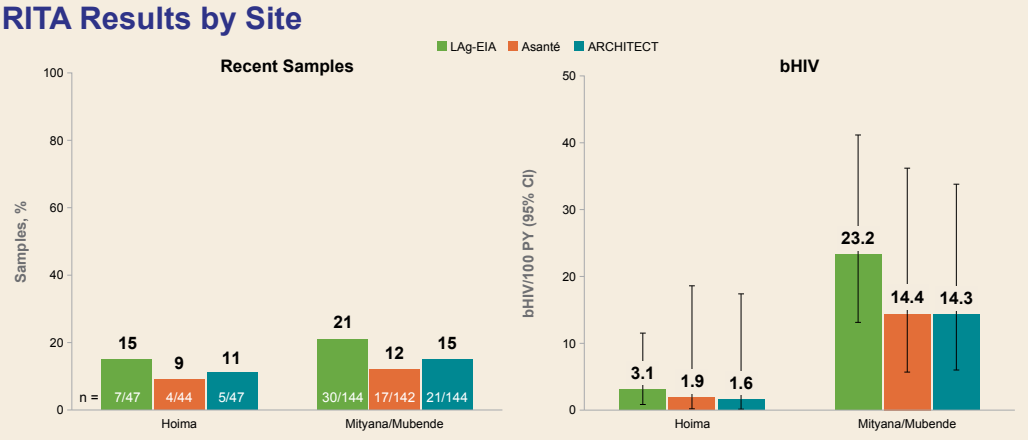
- Of 742 AGYW screened, 191 were diagnosed with HIV, of whom 44 (23%) had VL < 75 c/mL
- 53% of participants had HIV subtype A, 23% subtype D, and 18% subtype A/D

RITA Results by Assay



- The 3 assays identified 21-37 recent samples

RITA Results by Site



Correlations Between Assays

Concordance between assays Discordance between assays

		Asanté		
Infections[a]		Recent	Nonrecent	Total
LAg-EIA	Recent	20	12	32
	Nonrecent	1	153	154
	Total	21	165	186

		ARCHITECT		
Infections		Recent	Nonrecent	Total
LAg-EIA	Recent	22	13	37
	Nonrecent	4	152	110
	Total	26	121	147

		ARCHITECT		
Infections[b]		Recent	Nonrecent	Total
Asanté	Recent	13	8	21
	Nonrecent	9	156	165
	Total	22	164	186

[a]5 infections called recent by LAg-EIA were considered HIV negative by Asanté and results were excluded by assay protocol; [b]4 infections called recent and 1 called nonrecent by ARCHITECT were considered HIV negative by Asanté and results were excluded by assay protocol.

- Assay results were significantly correlated
  - LAg-EIA and Asanté: φ = 0.7376; LAg-EIA and ARCHITECT: φ = 0.6802; Asanté and ARCHITECT: φ = 0.5532

Conclusions

- In the SIENA study, the LAg-EIA, Asanté, and ARCHITECT recency assays identified high levels of recent infections, resulting in high estimates of bHIV in Uganda consistent with results seen evaluating other Ugandan HIV micro-epidemics
- These analyses support using these recency assays in the RITA to estimate bHIV in current and future PrEP studies
- The results demonstrate extremely high prevalence and incidence of HIV in AGYW in central and midwestern Uganda, highlighting the need for expanded HIV prevention options in these areas

References: **1.** Parkin N, et al. IAS 2021, poster 2322; **2.** Duong YT, et al. *AIDS Res Hum Retroviruses.* 2019;35:896-905; **3.** Kassanjee R, et al. *Epidemiology.* 2012;23:721-8; **4.** Kassanjee R, et al. AIDS 2016;30:2361-71; **5.** Institute for Health Metrics and Evaluation. GBD 2019. 2022. http://vizhub.healthdata.org/gbd-compare; **6.** Kiweewa FM, et al. AIDS 2022, poster EPC114; **7.** Grebe E, et al. EACS 2021, poster PE6/19; **8.** Gao F, et al. *Stat Commun Infect Dis.* 2021;13:2020000. **Acknowledgments:** We extend our thanks to the participants, their families, and all participating investigators. This study was funded by Gilead Sciences, Inc. Editing and production assistance were provided by Clint Earnheart of BioScience Communications, New York, New York, US, funded by Gilead.

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