USE OF MULTI-ASSAY ALGORITHMS TO IDENTIFY RECENT HIV INFECTIONS: HPTN 071/POPART

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Introduction

Background:

- Identifying individuals with recent HIV infection can provide important information about the state of the HIV/AIDS epidemic.
- Multi-assay algorithms (MAAs) developed for estimating population-level HIV incidence have also been used to identify individuals with recent infection.
- There are limited data about the performance of these methods for individual-level recency assessments.

Study Objective:

- To compare the performance of four MAAs for classifying persons infected <1 year as recently infected.

Samples Used for Analysis:

- Samples were obtained from a community-randomized trial that evaluated the impact of universal testing and treatment on HIV incidence in Zambia and South Africa (HPTN 071 [PopART]).
- Plasma samples were obtained from 220 seroconverters (infected <1 year) and 4,396 non-seroconverters (infected >1 year).
- 63/220 (28.3%) of the seroconverters and 3226/4396 (73.4%) of the non-seroconverters had VLs ≤400 c/mL.

Laboratory Methods:

- LAg-Avidity assay
- JHU modified BioRad-Avidity assay
- Assanté HIV-1 Rapid Recency assay
- Four MAAs evaluated

MAA	Laboratory results used to identify recent infections	Mean window period (days)
LAg MAA	LAg OD-n <1.5 + VL >1,000 copies/mL	130
MAA-C	LAg OD-n <2.8 + BioRad AI <95% + VL >400 copies/mL	248
Rapid MAA	Rapid LAg "recent" + VL >1,000 copies/mL	180
Alternate MAA	BioRad AI <40% + LAg OD-n <2.8	119

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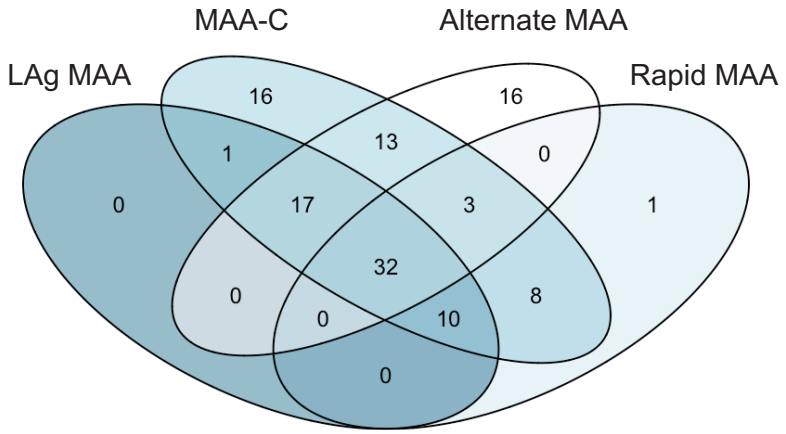
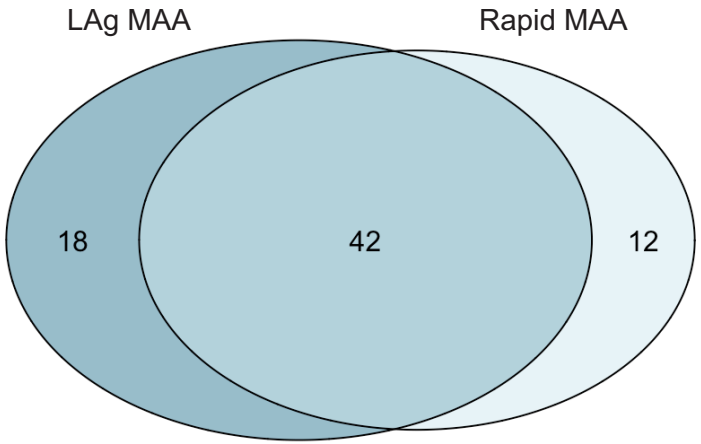
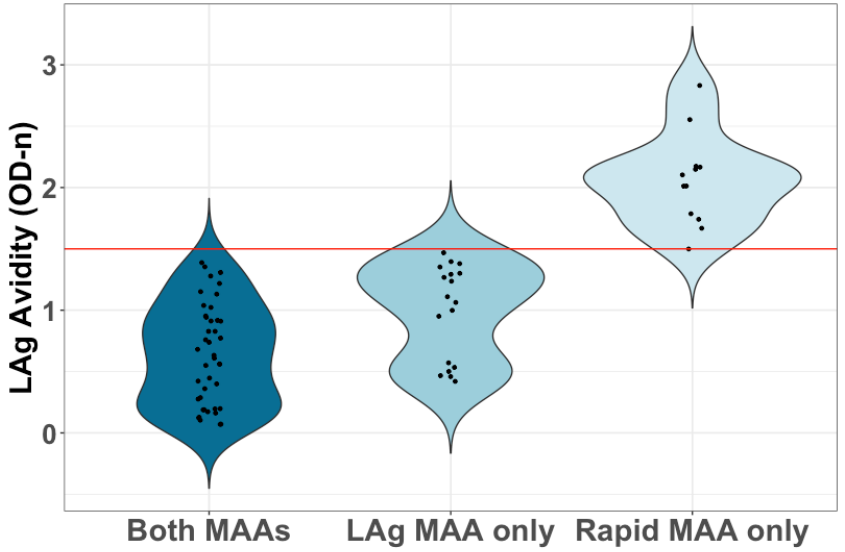
Results

- The four MAAs classified different numbers of seroconverters and non-seroconverters as recently infected.
- All four MAAs classified <50% of the seroconverters as recently infected.
- The number of seroconverters classified as recent by each MAA was not proportional to the mean window period.

	LAg MAA	MAA-C	Rapid MAA	Alternate MAA
Seroconverters (n=220)				
True recent	60	100	54	81
False non-recent	160	120	166	139
Non-seroconverters (n=4,396)				
True non-recent	4385	4362	4379	4336
False recent	11	34	17	69
Sensitivity	27.3%	45.5%	24.5%	36.8%
Specificity	99.7%	99.2%	99.6%	98.4%
Positive predictive value	84.5%	74.6%	76.1%	54.0%
Negative predictive value	96.5%	97.3%	96.3%	96.9%
False recent rate	0.2%	0.5%	0.4%	1.3%







- The four MAAs classified different overlapping groups of individuals as recently infected.
- Only 32 (15%) of the 220 seroconverters were classified as recently infected by all four MAAs.
- The LAg MAA and Rapid MAA both use LAg-based assays with the same target antigen and include a viral load with the same cutoff; these MAAs identified different subsets of seroconverters as recently infected.
- Seroconverters who were classified as recent by only one of the LAg-based MAAs did **not** have LAg values close to the 1.5 OD-n assay cutoff.

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Conclusions

- Substantial differences were observed in the performance of four MAAs for identifying individuals infected <1 year as recently infected.
- Sensitivity was low for all four MAAs.
- Each MAA classified different groups of individuals as recent vs. non-recent, even when the MAAs differed only in the type of LAg assay used (lab-based assay vs. rapid assay).
- These performance limitations should be considered if these methods are used for individual-level recency assessments.

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