Use of an Automated Assay to Identify HIV Infections in a Population Survey in Africa

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BACKGROUND

HPTN 071 (PopART) is a community-randomized HIV prevention trial in Zambia and South Africa (SA) that includes a cohort of >30,000 adults.

In this ongoing clinical trial, initial HIV testing is performed in-country using the 4th-generation Abbott ARCHITECT HIV Ag/Ab Combo Test (CE marked, referred to as Abbott Combo, one run per sample). Specialized procedures for sample and data management are used in-country to optimize sample processing and reduce testing and clerical errors. HIV infection is confirmed in the United States (U.S.) at the HPTN Laboratory Center (LC) for all samples with a reactive in-country test result. Quality Assurance testing is performed for 10% of samples with a non-reactive in-country test result.

We evaluated performance of the Abbott Combo test as an HIV screening test in this large, African cohort.

METHODS

All samples that were initially reactive with the Abbott Combo test in-country (Abbott POS) were tested at the HPTN LC with a second 4th-generation test (the FDA-cleared GS HIV Combo Ag/Ab test, Bio-Rad Combo). Ten percent of the samples that were initially non-reactive with the Abbott Combo test in-country (Abbott NEG) were tested at the HPTN LC using the FDA-cleared Abbott Combo test (Figure 1).

Samples with discordant results (in-country and HPTN LC results did not agree) were tested with the Multispot HIV-1/HIV-2 test (Bio-Rad), the Geenius HIV-1/HIV-2 Supplemental test (Bio-Rad), and an HIV-1 RNA test (RealTi*me HIV*, Abbott m2000, using a cutoff of 400 copies/mL).

RESULTS

10,391 samples were tested in the U.S. (5,563 from Zambia, 4,828 from SA; 7,696 Abbott POS; 2,695 Abbott NEG); 56 samples had discordant test results. For the Abbott POS samples: 52/7,695 (0.68%) were non-reactive with the Bio-Rad Combo test (25 from Zambia, 27 from SA). Further testing revealed that four were HIV-positive (the original Abbott test result was correct), 48 were HIV-negative (the original Abbott test result was false positive (Table 1). For the Abbott NEG samples: 4/2,695 (0.15%) were reactive when retested with the FDA-cleared version of the same assay. One had a signal/cutoff (S/C) ratio of 1.25 and was non-reactive on a second repeat test. The other two had S/C ratios of 4.77 and 10.38; both were reactive with the Bio-Rad Combo test, but had undetectable HIV RNA and non-reactive Multispot and Geenius tests. All four were classified as HIV-negative (Table 2). Overall, 48/7,695 Abbott POS samples had an initial false positive test result and 0/2,695 Abbott NEG samples had a false negative result (sensitivity=100%; specificity=98.3%).

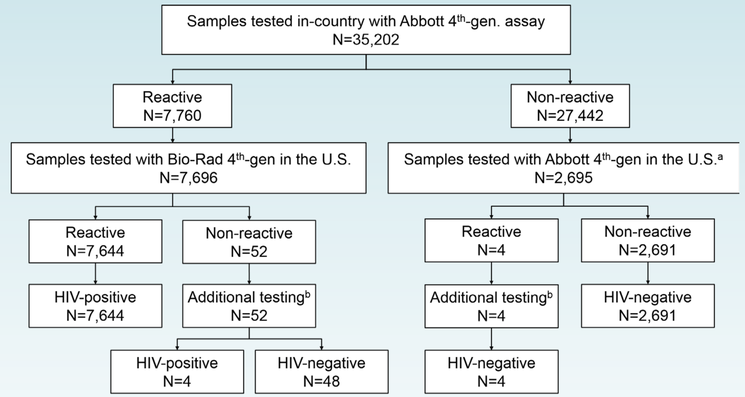
TABLE 1. Evaluation of samples that had a reactive Abbott Combo in-country test, a non-reactive Bio-Rad Combo test at the HPTN LC, and at least one other reactive/positive test result*

ID#	4th-generation assays						Discriminatory assays		HIV RNA	HIV status
	Abbott (site)	S/CO	Bio-Rad	S/CO	Abbott	S/CO	MultiSpot	Geenius	Abbott (c/ml)	
1	R	496.5	NR	0.24	NR	0.12	R (undif.)	Neg	<400	Pos
2	R	1.31	NR	0.25	NR	0.18	R (HIV-1)	Neg	<400	Pos
3	R	874.7	NR	0.27	NR	0.10	NR	Indet. (HIV-2)	<400	Neg
4	R	5.13	NR	0.70	R	7.70	Indet. (HIV-1)	Pos (HIV-1)	<400	Neg
5	R	398.6	NR	0.37	R	497.5	R (HIV-1)	Pos (HIV-1)	<400	Pos
6	R	1.26	NR	0.74	R	1.48	NR	Neg	75,360	Pos
7	R	1.15	NR	0.31	R	2.48	NR	Indet. (HIV-1)	<400	Neg
8	R	1.99	NR	0.88	R	1.49	NR	Indet. (HIV-2)	<400	Neg
9	R	1.72	NR	0.23	R	1.79	NR	Indet. (HIV-2)	<400	Neg

TABLE 2. Evaluation of samples that had a non-reactive Abbott Combo in-country test with a reactive Abbott Combo test at the HPTN LC*

ID#	4th-generation assays						Discriminatory assays		HIV RNA	HIV status
	Abbott (site)	S/CO	Bio-Rad	S/CO	Abbott	S/CO	MultiSpot	Geenius	Aptima	
1	NR	0.24	NR	0.89	R	1.25	n/a	n/a	n/a	Neg
2	NR	0.12	R	7.85	R	4.77	NR	Neg	NR	Neg
3	NR	0.11	R	13.57	R	10.38	NR	Neg	NR	Neg
4	NR	0.26	R	1.64	R	2.45	NR	Neg	NR	Neg

Figure 1. HPTN 071 HIV testing algorithm



Footnotes:
[a] 10% of the samples that had a non-reactive Abbott 4th-gen in-country test result were retested in the U.S.
[b] Additional testing was performed using a discriminatory assay and a HIV RNA assay.

CONCLUSIONS

The Abbott Combo test performed well when screening for HIV infection in a large, population-level survey in Africa. Special data and sample management procedures likely contributed to the high quality of initial HIV screening test results in this study. Quality assurance testing was helpful for confirming HIV infection status, especially for samples with an initial reactive Abbott Combo test result.

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