DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Disease Control and Prevention
Model Performance Evaluation Program
Human Immunodeficiency Virus Type 1 (HIV-1) Antibody Testing

Report of Results for the Performance Evaluation Survey Conducted

During January 2008

COORDINATING CENTER FOR HEALTH INFORMATION AND SERVICE
DIVISION OF LABORATORY SERVICES
ATLANTA, GEORGIA

Report of the January 2008 Human Immunodeficiency Virus Type 1 (HIV-1) Antibody Performance Evaluation Sample Testing Results Provided by Participant Laboratories in the Model Performance Evaluation Program, Centers for Disease Control and Prevention (CDC)

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Analysis of Testing Results Reported by Laboratories Participating in the Model Performance Evaluation Program for HIV-1 Antibody During January 2008

Introduction

Purpose

The purpose of this report is to present the analysis of results provided to the CDC by laboratories participating in the Model Performance Evaluation Program (MPEP) after they tested the human plasma samples shipped to them in January 2008.

Response

Of the 701 laboratories that received performance evaluation panels,

- 614 (87.6%) laboratories submitted results (overall response rate) and
- 450 (73.3%) of the 614 laboratories submitted results on-line.

Contents

This report contains the analysis of results for

- screening tests, including enzyme immunoassay (EIA) antibody tests, chemiluminescence immunoassay (CLIA), and antigen/antibody (Ag/Ab) combination tests
- Western blot (WB, a confirmatory test)
- indirect immunofluorescence assay (IFA, a confirmatory test), and
- "other" tests (test types other than EIA, WB or IFA, such as line or strip assays, etc.).

Executive Summary

Overall performance

Table 1 summarizes the results grouped by test type: EIA, WB, IFA, and "Other".

Table 1: Results Summary

			Positive Donors			Negative Donor			
Method	**Total # of Laboratories**	**Total # of results**	**Positive**	**I***	**False-negative (% false negative)**	**Negative**	**I**	**False-positive (% false positive)**	**Overall Performance (TP+TN/total # results)†**
EIA‡	601	3953	2619	nv§	34 (1.3)	1290	nv	10 (0.8)	98.9%
WB	218	1045	651	216 (24.9)	1 (0.1)	173	3 (1.7)	1 (0.6)	99.5%¶
IFA	26	132	70	16 (16.0)	14 (14.0)	31	0	1 (3.1)	76.5%¶
Other**	34	184	130	7 (5.1)	1 (0.7)	44	0	2 (4.3)	98.4%

* I, Indeterminate results.
† TP, true positives; TN, true negatives.
‡ All EIA assays, including CLIA and Ag/Ab tests.
§ nv, not valid. Indeterminate is not a valid interpretation for reporting final EIA results.
¶ When calculating overall performance, indeterminate interpretations are considered to be correct for HIV-1 antibody-positive donors, and incorrect for HIV-1 antibody-negative donors.
** "Other" test methods refer to test types other than EIA, WB or IFA, such as line or strip assays.

Laboratory demographics

Of the 614 laboratories reporting results for the January 2008 samples panel shipment:

- 447 (72.8%) were in the United States (U.S.) and U.S. territories laboratories and
- 167 (27.2%) were non-U.S. laboratories.

The laboratories identified themselves as:

- 214 (34.9%) hospitals,
- 173 (28.9%) health departments,
- 112 (18.2%) independent laboratories,
- 80 (13.0%) blood banks, and
- 35 (5.7%) other types, which include university-associated research centers, university clinics, Federal government facilities, STD clinics, counseling and testing sites, community-based organizations, etc.

Continued on next page

Executive Summary, Continued

Test summary

The test results reported by the laboratories (614) are as follows:

- 354 (57.7%) performed EIA only,
- 215 (35.0%) performed EIA and a supplemental test,
- 34 (5.5%) performed an "Other" test in addition to, or instead of EIA, WB, and IFA, and
- 11 (1.8%) performed only a supplemental test.

Laboratory practice questions

To obtain more information about laboratory practices, three questions were added to the EIA section of the result booklet and online data entry system.

Of the laboratories that responded:

- 581 laboratories provided answers to the question concerning supplemental/confirmatory testing,
- 10 laboratories reported using the Gen-Probe Aptima HIV-1 RNA Qualitative Assay, and
- 575 laboratories reported the algorithms that are normally used in their laboratories.

Their specific responses to those questions are shown on pages 17-18.

Survey Samples

The challenge samples used in this survey were the *same samples* sent in the July 2007 survey, see page 8 for a description of the challenge samples.

Challenge Samples

Survey samples

The survey samples were undiluted, defibrinated plasma obtained from individual donors who were either

HIV-1 infected (HIV-1 antibody positive):

These samples were heat-treated at 56º C for 60 minutes to inactivate blood-borne viruses including HIV-1, human T-lymphotropic virus types I and II (HTLV-I/II), and hepatitis B and C viruses.

HIV-1 uninfected (HIV-1 antibody-negative):

These samples were not heat-treated.

Note: The challenge samples in this survey do not contain HIV antigens and only contain HIV-1 antibodies.

Donor testing

Before shipment, each donor sample was tested with the following:

- one chemiluminescence immunoassay (CLIA)
- two HIV-1 EIA kits
- two HIV-1/HIV-2 EIA kits (including one HIV-1/HIV-2 Plus O)
- supplemental tests
  - two HIV-1 Western blot (WB) kits
  - one HIV-1 indirect immunofluorescence assay (IFA)

Donor status

Donor 2: (single sample) strong-positive HIV-1

Donor 5: HIV-1 negative (duplicate samples)

Donors 6: (duplicate samples) and **7** (single sample) are HIV-1 antibody positive donors demonstrating factors consistent with seroconversion, including:

- a positive p24 antigen test,
- positive test for HIV-1 ribonucleic acid (RNA),
- rising HIV-1 antibody titers in EIA tests, and
- WB reactivity changing from one donation to the next from nonreactive (no bands) to indeterminate or reactive.

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Challenge Samples, Continued

Laboratory worksheet This worksheet is provided for use in comparing individual laboratory results with target results.

Table 2: Human Immunodeficiency Virus Type 1 (HIV-1) Antibody (Ab) Testing for the January 2008 Shipment

Panel Letter	Vial Label	CDC Donor Number	CDC Test Results[1]	Donor HIV Status	Laboratory Interpretation[2]			
					EIA Initial	EIA Final	WB	IFA
A	**A1**	5	Negative	Uninfected				
	A2	2	Positive	Infected				
	A3	6	Positive	Infected				
	A4	6	Positive	Infected				
	A5	7	Positive	Infected				
	A6	5	Negative	Uninfected				
B	**B1**	6	Positive	Infected				
	B2	2	Positive	Infected				
	B3	5	Negative	Uninfected				
	B4	7	Positive	Infected				
	B5	6	Positive	Infected				
	B6	5	Negative	Uninfected				
C	**C1**	2	Positive	Infected				
	C2	6	Positive	Infected				
	C3	6	Positive	Infected				
	C4	7	Positive	Infected				
	C5	5	Negative	Uninfected				
	C6	5	Negative	Uninfected				
D	**D1**	6	Positive	Infected				
	D2	6	Positive	Infected				
	D3	2	Positive	Infected				
	D4	5	Negative	Uninfected				
	D5	7	Positive	Infected				
	D6	5	Negative	Uninfected				

1. The CDC results were obtained after composite testing with all commercially available HIV-1 and HIV-1/HIV-2 EIA, HIV-1 WB and IFA kits licensed by the Food and Drug Administration (FDA). All CDC results are consistent with the manufacturer's criteria for interpretation. WB interpretations are also consistent with Association of Public Health Laboratories/Centers for Disease Control and Prevention (APHL/CDC) interpretative criteria.

2. Laboratory Interpretation space is to be completed by participant laboratories to facilitate comparison of their result with CDC result.

Continued on next page

Challenge Samples, Continued

CDC WB results

Table 3: CDC Western blot (WB) testing results for the January 2008 shipment

Panel Letter	Vial Label	CDC Donor Number	CDC Western Blot Test Results Specific WB Band Detected[1]	HIV-1 WB Test Kit Manufacturer	CDC Interpretation[2]
A	A1, A6	5	No Bands	Both Manufacturers	Negative
	A2	2	17, 24, 31, 41, 51, 55 ,66, 120, 160 18, 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	A3, A4	6	24, 51, 55, 120, 160 24, 31, 40, 41, 51, 55, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	A5	7	24, 41, 51, 55, 66, 120, 160 18, 24, 31, 40, 41, 51, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
B	B1, B5	6	24, 51, 55, 120, 160 24, 31, 40, 41, 51, 55, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	B2	2	17, 24, 31, 41, 51, 55, 66, 120, 160 18, 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	B3, B6	5	No Bands	Both Manufacturers	Negative
	B4	7	24, 41, 51, 55, 66, 120, 160 18, 24, 31, 40, 41, 51, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
C	C1	2	17, 24, 31, 41, 51 ,55, 66, 120, 160 18, 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	C2, C3	6	24, 51, 55, 120, 160 24, 31, 40, 41, 51, 55, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	C4	7	24, 41, 51, 55, 66, 120, 160 18, 24, 31, 40, 41, 51, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	C5, C6	5	No Bands	Both Manufacturers	Negative
D	D1, D2	6	24, 51, 55, 120, 160 24, 31, 40, 41, 51, 55, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	D3	2	17, 24, 31, 41, 51, 55, 66, 120, 160 18, 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	D4, D6	5	No Bands	Both Manufacturers	Negative
	D5	7	24, 41, 51, 55, 66, 120, 160 18, 24, 31, 40, 41, 51, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive

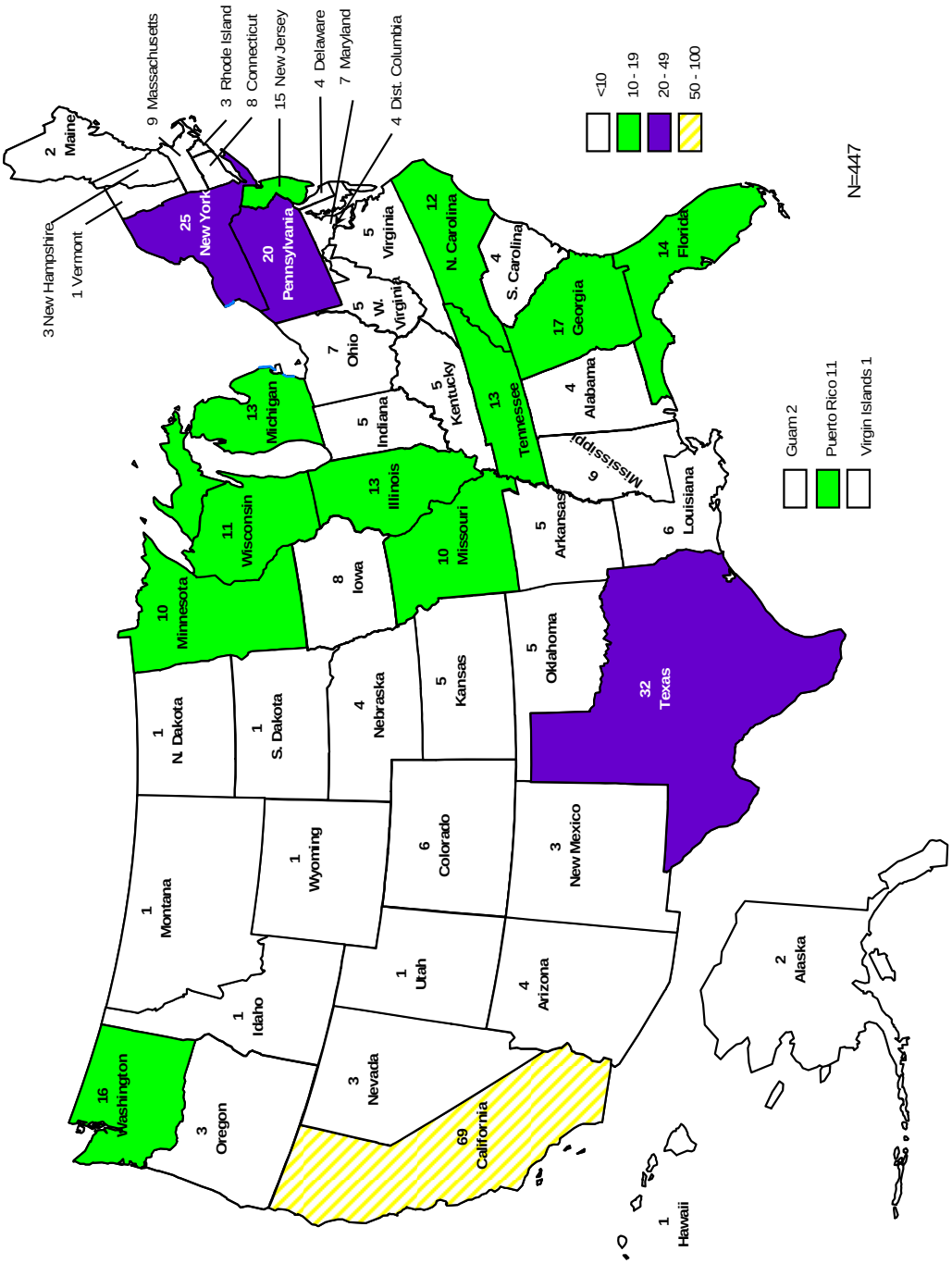
1. Western blot (WB) results are based on the band intensity of ≥1+ staining.
2. The CDC interpretation is consistent with APHL/CDC and the manufacturers' criteria for the interpretation of WB results.

Demographics

U. S. laboratories

Figure 1 shows the number and location of MPEP laboratories in the U.S. and U.S. territories submitting results for the January 2008 shipment.

Figure 1: Geographic distribution of MPEP participant laboratories in the United States and U.S. territories



All MPEP laboratories Including the United States and U. S. Territories, MPEP participants are located in 77 countries.

Table 4: Location of MPEP participants reporting HIV-1 antibody results

N=614

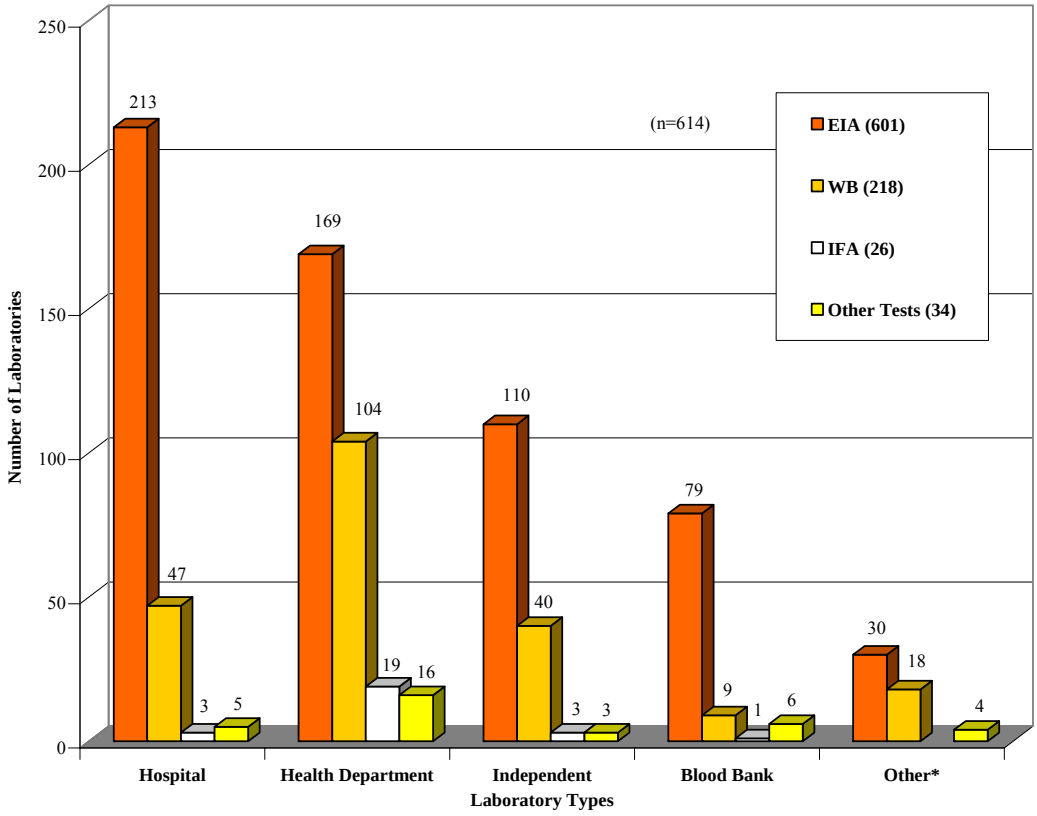
Country	Number of Laboratories	Country	Number of Laboratories	Country	Number of Laboratories
Albania	1	Hong Kong	2	Scotland	1
Algeria	1	Hungary	1	Senegal	1
Argentina	1	India	6	Slovakia	2
Australia	4	Ireland	1	Slovenia	2
Austria	1	Israel	4	South Africa	2
Bahamas	1	Italy	1	South Korea	2
Barbados	1	Jamaica	1	Spain	3
Belgium	2	Japan	1	Sri Lanka	4
Bolivia	1	Kazakhstan	6	St. Kitts/Nevis	1
Botswana	5	Kenya	2	Suriname	2
Brazil	2	Kyrgyzstan	3	Switzerland	1
Cameroon	1	Malaysia	2	Taiwan	1
Canada	17	Mali	2	Tanzania	8
Chile	1	Malta	1	Thailand	8
Colombia	2	Mexico	1	Trinidad	2
Cote d'Ivoire	3	Morocco	1	Turkey	1
Croatia	2	Nicaragua	1	Uganda	1
Curacao, Netherlands Antilles	1	Nigeria	2	United Kingdom	3
Denmark	3	Panama	1	United States	433
Dominican Republic	1	Paraguay	1	U.S. Territory	14
Ecuador	1	Peru	2	Uruguay	1
El Salvador	1	Philippines	2	Uzbekistan	10
Eritrea	1	Portugal	1	Venezuela	2
Germany	1	Republic of China	1	Vietnam	1
Ghana	2	Republic of Singapore	1	Zimbabwe	2
Guyana	1	Saudi Arabia	1		

Test methods by laboratory type

Figure 2 shows laboratory types and the test methods used. Some laboratories reported using more than one method. Therefore, the sum is greater than the total number of laboratories.

The "n" value in all figures refers to the number of laboratories reporting results, not the methods or test kits used.

Figure 2: Number of HIV-1 participants reporting EIA, WB, IFA, and "Other" results, by laboratory type



*"Other" laboratories include university-associated research centers, university clinics, Federal government facilities, STD clinics, etc.

EIA Methods and Results

Introduction

Of the 614 laboratories reporting results, 601 (97.9%) screened the challenge samples by enzyme immunoassay (EIA) or chemiluminescent assay (CLIA) testing. These laboratories used test kits that are designed to detect the presence of HIV-1 and/or HIV-2 antibodies (2nd and 3rd generation tests).

Participant laboratories located in the U.S. reported using 5 different EIA test kits and one chemiluminescent method for detection of antibodies in plasma and serum. These test kits are listed in Figure 3 below, and include:

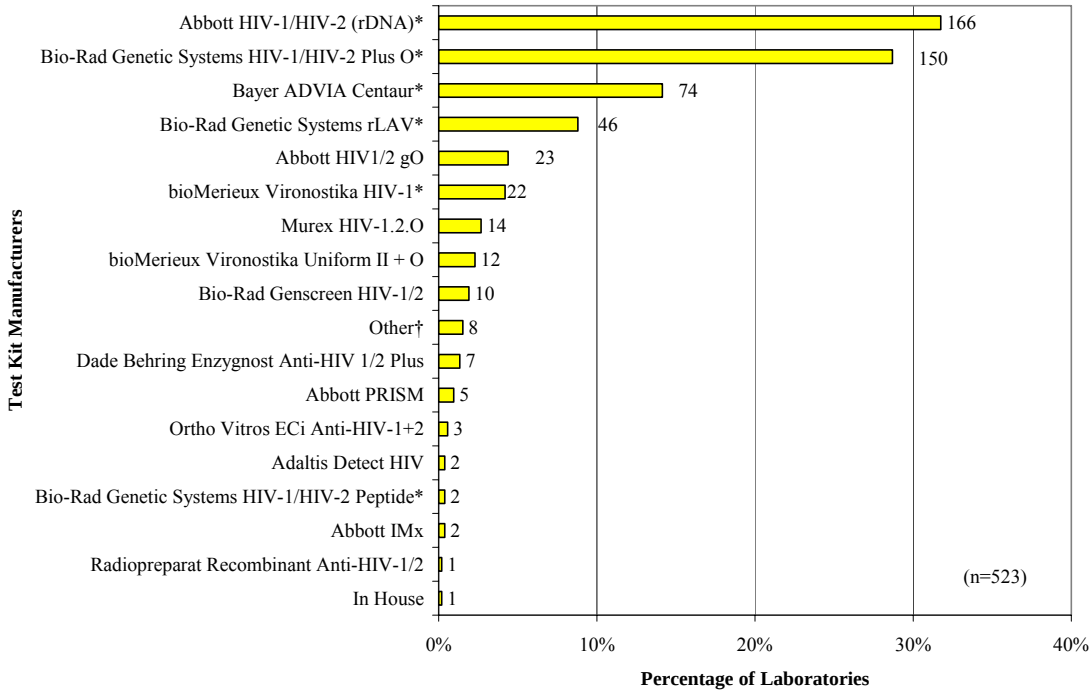
- 4 for HIV-1 and HIV-2
- 1 for HIV-1 only, and
- 1 chemiluminescent assay for HIV-1 and HIV-2.

MPEP participant laboratories outside the U.S. reported using 29 different EIA test kits for detection of antibodies to the HIV-1 and/or HIV-2 virus and HIV p24 antigen.

EIA antibody test kit manufacturers

Figure 3 shows the percentage and number of laboratories using a particular EIA or CLIA antibody-only test kit. The numbers at the end of the bars show the number of laboratories using each test kit.

Figure 3: Percentage and number of laboratories using EIA test kits, by manufacturer



*FDA approved EIA test kits.
†Other EIA test kits for which no manufacturers' code is provided in the result booklet.

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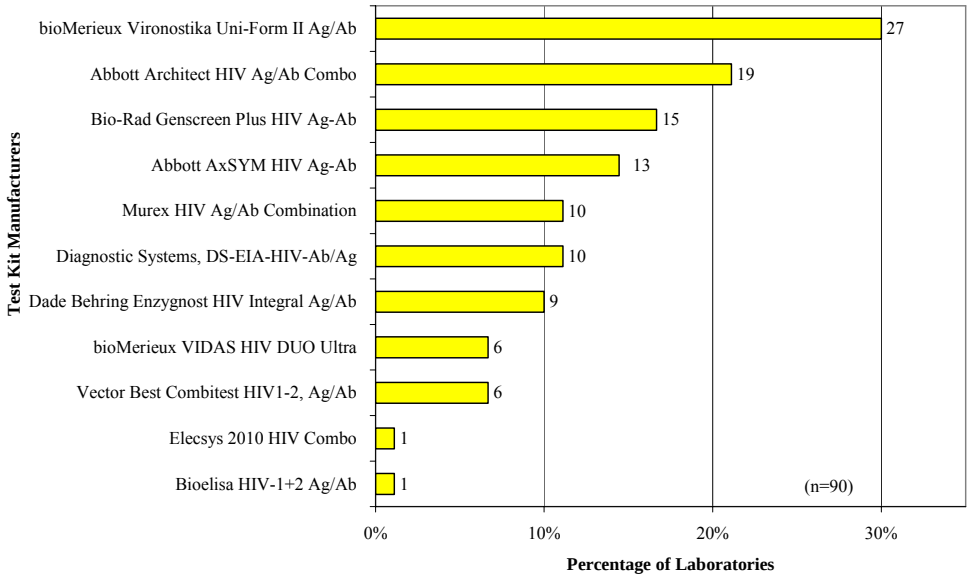
EIA Ag/Ab test kit manufacturers

Many laboratories outside the U.S. use test kits that detect the presence of antibodies to HIV and the presence of p24 antigen (HIV Ag/Ab test kits, 4th generation assays). These test kits are not yet FDA approved, therefore are not used by U. S. participants.

Of the 159 non-U.S. laboratories reporting EIA results, 90 (56.6%) used Ag/Ab test kits.

Figure 4 shows the percentage and number of laboratories that used antigen-antibody test kits for simultaneous detection of antigen and antibody.

Figure 4: Percentage and number of non-U.S. laboratories using Ag/Ab test kits, by manufacturer



Other EIA test kits

Ten non-U.S. laboratories reported using 5 EIA kits for which no manufacturers' codes are listed in the results booklet or online. These EIA test kit manufacturers are listed below. The number in parentheses is the number of laboratories that reported using these kits.

- AniLabsystems HIV EIA Microlisa, (1)
- Biokit Bioelisa HIV1+2 (rec), (1)
- Biotest Anti-HIV Tetra Elisa, (2)
- Roche Diagnostics Elecsys 2010, (1) and
- J. Mitra Microlisa HIV1/2, (5)

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EIA false-positive and false-negative results

Table 5: False-positive and false-negative EIA results, reported by participant laboratories, by kit manufacturer*

Manufacturer	Total # of Results	Negative Donor		Positive Donors	
		Negative	False-positive (% false positive)	Positive	False-negative (% false negative)
Abbott AxSym Ag-Ab	81	25	0	54	2 (3.6)
Abbott HIV-1/HIV-2 (rDNA)	989	329	0	659	1 (0.2)
Abbott HIV-1/2 gO	138	45	1 (2.2)	91	1 (1.1)
Bayer ADVIA Centaur	443	146	1 (0.7)	292	4 (1.4)
bioMérieux VIDAS HIV DUO Ultra	32	12	0	19	1 (5.0)
bioMérieux Vironostika HIV-1	128	40	0	76	12 (13.6)
bioMérieux Vironostika Uni-form II Ag/Ab	161	53	0	107	1 (0.9)
bioMérieux Vironostika Uni-form II + O	68	20	0	47	1 (2.1)
Bio-Rad Genetic Systems HIV-1/HIV-2 Plus O	896	292	4 (1.4)	600	0
Bio-Rad Genscreen Plus HIV Ag-Ab	88	26	2 (7.1)	58	2 (3.3)
Dade Behring Enzygnost Integral	54	18	0	35	1 (2.8)
Dade Behring Enzygnost Anti-HIV 1/2 Plus O	40	12	0	26	2 (7.1)
Diagnostic Systems EIA Anti-HIV Ag/Ab	60	18	2 (10.0)	40	0
J. Mitra and Co.	30	14	0	10	6 (37.5)

*__Note:__ Only false-positive and false-negative results are contained in this table. Those test kits for which false-positive and/or false-negative results were not reported are not included.

EIA results by donor

Incorrect results for donors for all reported EIA tests are as follows:

- Donor 2 (HIV-1 infected strong positive), 2 false-negatives
- Donor 5 (HIV-1 uninfected), 10 false-positives
- Donor 6 (HIV-1 infected seroconverter), 28 false-negatives, and
- Donor 7 (HIV-1 infected seroconverter), 4 false-negatives.

Comments

Donor 6 provided a greater challenge for participants than did Donor 7, both seroconverters. 82.4% (28/34) of false-negatives were reported for Donor 6 (duplicate samples in this shipment).

False-negative results are more problematic because while reactive or positive results are confirmed before reporting results, negative or false-negative results are not retested.

In this survey, the overall performance of laboratories reporting EIA and enhanced EIA results is 98.9% correct results.

Laboratory Practice Questions

Introduction

Three questions were asked in the January 2008 survey. The purpose of these questions was to:

- determine if the MPEP participant laboratories are performing supplemental or confirmatory tests, and if so which confirmatory tests,
- determine how Gen-Probe's Aptima HIV-1 RNA Qualitative Assay is being used, if at all, and
- determine what algorithm participants are presently using.

Note: The "N" value for each of the tables in the section represents the number of laboratories that responded to these questions.

Supplemental/ Confirmatory tests

1. What supplemental/confirmatory test(s) do you normally run for repeatedly reactive results obtained using the EIA test kit listed in the Repeat EIA section (or Initial EIA if no Repeat EIA is performed) on the opposite page? Check all that apply.

(N=581)

Number of Laboratories	Laboratory Responses
144	A. Supplemental/confirmatory test not run in our laboratory
283	B. Western blot (WB)
28	C. Immunofluorescence Assay (IFA)
2	D. Gen-Probe Aptima HIV-1 RNA Qualititive Assay
28	E. HIV-1 or HIV-1/2 Rapid Test
223	F. Send to reference laboratory
44	G. Other, (another EIA, line immunoassays, particle agglutination, HIV p24 antigen test, etc)

Of the 144 laboratories that reported that supplemental/confirmatory tests are not run their laboratories, 87 (60.4%) reported that supplemental or confirmatory tests are performed by another laboratory.

Use of Gen-Probe Aptima HIV-1 RNA test

2. If you indicated "Gen-Probe's Aptima HIV-1 RNA Qualitative Assay" in question 1, for what other purpose(s) do you use this assay? Check all that apply.

(N=9)

Number of Laboratories	Laboratory Responses
7	A. Only use as Supplemental/Confirmatory test for EIA repeat reactive samples
1	B. Use only as a method for screening blood or plasma donors
2	C. Use to aid in diagnosis of acute or primary HIV infection

In question number one, 2 laboratories indicated the use of Gen-Probe Aptima HIV-1 RNA. However, for question two, 9 laboratories reported the purpose for the use. One laboratory reported using Aptima for more than one purpose. Gen-Probe Aptima HIV-1 RNA is not in widespread use among the 614 MPEP participants.

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Testing Sequences - Algorithms

3. Please indicate your normal testing sequence for samples to be tested for HIV antibody by placing a number in the box corresponding to the step (1st, 2nd, 3rd, etc.) of the testing algorithm. If two assays occur simultaneously in the testing sequence (e.g., WB and IFA), give both assays the same number.

To facilitate comparison between the January 2008 and the July 2007 shipments, the reported algorithms are placed in the same order, as much as possible.

The table below shows the algorithm MPEP participants reported using in January 2008.

N= 575

Step 1	Step 2	Step 3	Step 4	Total Number (425) of U.S. Laboratories (%)	Total Number (150) of Non-U.S. Laboratories (%)	Total Number of Laboratories (%)
EIA-S	EIA-E	WB		243 (57.2)	30 (20.0)	273 (47.5)
EIA-S	EIA-E			95 (22.3)	37 (24.7)	132 (23.0)
EIA-S	EIA-E	IFA		18 (4.2)	1 (0.7)	19 (3.3)
EIA-S	WB			6 (1.4)	7 (4.7)	13 (2.3)
EIA-S	EIA-E	WB	RT	6 (1.4)	1 (0.7)	7 (1.2)
EIA-S				6 (1.4)	7 (4.7)	13 (2.3)
EIA-D	WB			4 (0.9)	2 (1.3)	6 (1.0)
EIA-S	EIA-E	WB	IFA	0	1 (0.7)	1(0.2)
EIA-S	EIA-D	WB		8 (1.9)	0	8 (1.4)
EIA-S	RT			1 (0.2)	3 (2.0)	4 (0.7)
EIA-S	EIA-E	RT		1 (0.2)	7 (4.7)	7 (1.2)
EIA-S	EIA-D	EIA-E	WB	1 (0.2)	4 (2.7)	4 (0.7)
Other Algorithms				36 (8.5)	50 (33.3)	86 (15.0)

EIA-S = EIA in singlicate
EIA-D = EIA in duplicate
EIA-E = Repeat EIA, if initial is reactive
WB = Western Blot
RT= HIV-1 or HIV-2 rapid test

Comments

While most U.S. laboratories reported performing testing according to CDC guidelines (see reference below), 101 of these laboratories reported performing EIA testing only. It is unclear from these results how many of the U.S. laboratories refer confirmatory testing to other laboratories.

The HIV testing algorithm recommended by CDC consists of initial screening with an EIA followed by confirmatory testing of repeatedly reactive EIAs with a more specific supplemental test (e.g., Western blot or IFA test).

For more information on HIV-1 testing algorithms log onto http://www.cdc.gov/mmwR/preview/mmwrhtml/rr5019a1.htm

Western Blot Methods and Results

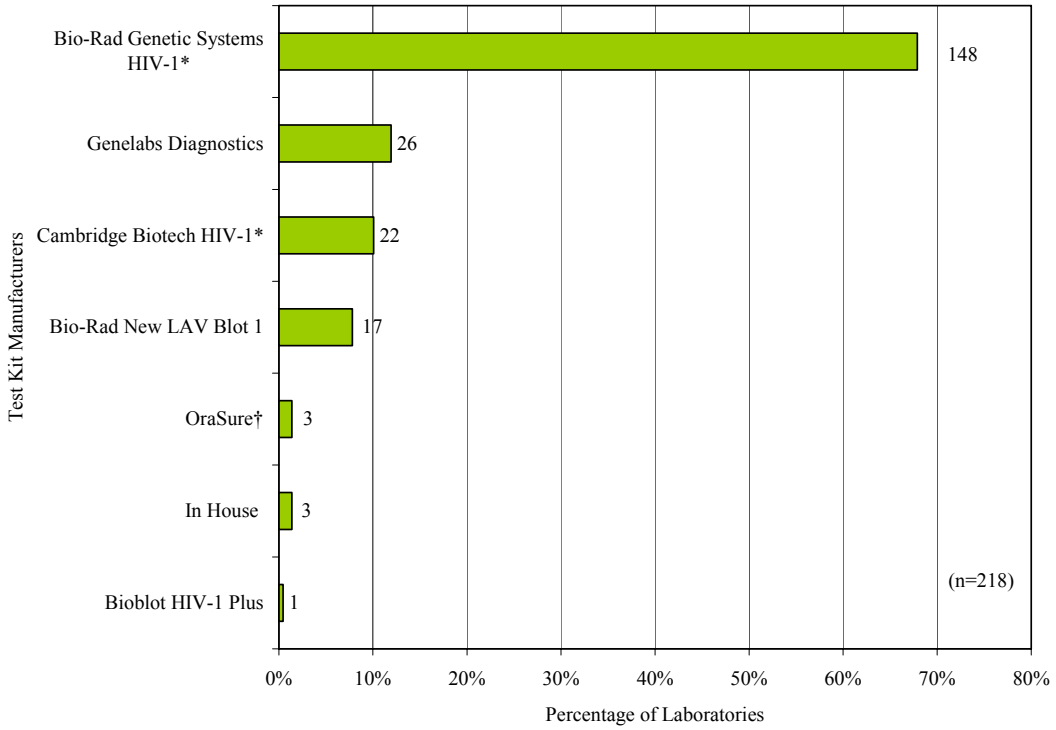
Introduction

Of the 614 laboratories reporting test results in this survey, 218 (35.5%) performed WB testing using five different commercially manufactured WB test kits and one in-house preparation. Three U.S. laboratories used the OraSure HIV-1 Western blot test kit to obtain results for these samples. However, OraSure HIV-1 Western blot is not FDA approved for testing serum or plasma.

WB test kits

The WB test kits used by MPEP participant laboratories are shown below. The numbers at the end of the bars show the number of laboratories using that test kit.

Figure 5: Percentage and number of laboratories using WB test kits, by manufacturer



* FDA approved WB test kits.
† OraSure HIV-1 Western Blot Kit is only FDA approved for oral fluid.

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Western Blot Methods and Results, Continued

WB interpretive criteria

Of the 218 laboratories reporting WB test results, 209 (95.9%) indicated which WB criteria they used to interpret tests results. Most laboratories used the Association of Public Health Laboratories/Centers for Disease Control and Prevention (APHL/CDC) WB interpretive criteria.

The number of laboratories using specific criteria are as follows:

- 185 (88.5 %) APHL/CDC
- 18 (8.6%) World Health Organization (WHO)
- 6 (2.9 %) stated "other" (Manufacturers' insert, Australian National Reference Laboratory, etc.)

WB interpretive guidelines

The WB interpretive guidelines recommended by the two FDA-licensed WB kit manufacturers are *identical* to the APHL/CDC HIV-1 WB interpretive criteria. According to these guidelines:

- A *Positive* test result is defined by the presence of any two of the following bands: p24, gp41, and gp120/160. (Distinguishing the gp120 band from the gp160 band is often very difficult. These two glycoproteins can be considered as one reactant for purposes of interpreting WB test results.) For instance, gp160 in combination with either p24 or gp41 is sufficient to interpret the Western blot as positive (See CDC/APHL interpretative criteria at http://www.cdc.gov/mmwr/preview/mmwrhtml/00001431.htm).
- An *Indeterminate* result is defined as bands present that do not meet the criteria for positive.
- A *Negative* result is defined as no bands present.

WB band patterns

The WB bands for the donor samples in this survey, as determined in pre-shipment testing with two FDA-licensed WB test kits, are shown in Table 2, page 10.

WB results by donor

The results by donor are:

- Donor 2 (HIV-1 infected strong positive): no false-negatives or indeterminates,
- Donor 5 (HIV-1 uninfected): 1 false-positive and 3 indeterminates,
- Donor 6 (HIV-1 infected seroconverter): 1 false-negative and 199 indeterminates, and
- Donor 7 (HIV-1 infected seroconverter): 0 false-negatives and 17 indeterminates.

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WB false-positive, indeterminate, and false-negative, results by test kits

Table 6: False-positive, indeterminate and false-negative interpretations for Western blot test, by manufacturer[§]

Manufacturer	Total # of Results	Negative Donor			Positive Donor		
		Negative	False-positive (%)	I[*(%)]	Positive	False-negative (%)	I (%)
Bio-Rad Genetic Systems HIV-1	696	108	1 (0.9)	1 (0.9)	442	0	144 (24.6)
Bio-Rad New LAV Blot 1	77	8	0	2 (20.0)	46	0	21 (31.3)
Cambridge Biotech HIV-1	102	16	0	0	63	1(1.2)	22 (25.6)
Genelabs Diagnostics HIV-1 Blot	138	34	0	0	80	0	24 (23.1)
In House	9	0	0	0	6	0	3 (33.3)
OraSure	18	6	0	0	12	0	2 (14.3)

*I, Indeterminates

§Note: Only false-positive, false-negative and indeterminate results are contained in this table. Those test kits for which false-positive and/or false-negative and/or indeterminate results were not reported are not included.

WB comments

In this shipment, there were 216 indeterminate results reported for the seroconversion samples,

- 199 (92.1 %) for Donor 6, and
- 17 (7.9 %) for Donor 7.

Several laboratories reported indeterminate interpretations even when the band patterns and band intensity appeared to fit the reported criteria for reactive results. (See WB interpretative guidelines on page 20).

There were 177 WB interpretations (including 3 indeterminates and 1 reactive) reported for Donor 5, the HIV-1 antibody-negative donor, although most laboratories do not normally perform WB testing of EIA non-reactive specimens as part of their routine algorithm for HIV antibody testing.

The overall performance for laboratories reporting WB results was 99.5% correct results.

IFA Methods and Results

Introduction

Of the 614 laboratories reporting results, 26 (4.2 %) performed IFA tests. Of these, 88.5% (23/26) used Sanochemia Fluorognost IFA, the only commercially available IFA test kit. Three laboratories used in-house methods.

IFA false-negative and indeterminate results

Table 7: False-negative and indeterminate IFA results reported by laboratories, by manufacturer

Methods/Manufacturer	Total # of Results	Negative Donors			Positive Donors		
		Negative	False-positive	I*	Positive	False-negative (%)	I (%)
Sanochemia Fluorognost	116	27	1 (3.6)	0	64	12 (13.6)	12 (13.6)
In-House	16	4	0	0	6	2 (16.7)	4 (33.3)

*I, indeterminates

IFA results by donor

Incorrect results for each donor are as follows:

- Donor 2, 1 indeterminate, 0 false-negatives
- Donor 5, 0 indeterminates, 1 false-positive
- Donor 6, 12 indeterminates, 14 false-negatives, and
- Donor 7, 3 indeterminates, 0 false-negatives.

Comments

IFA was performed by 4.2% of MPEP participant laboratories. The overall performance of laboratories that performed IFA was 76.5% correct results.

"Other" Test Methods and Results

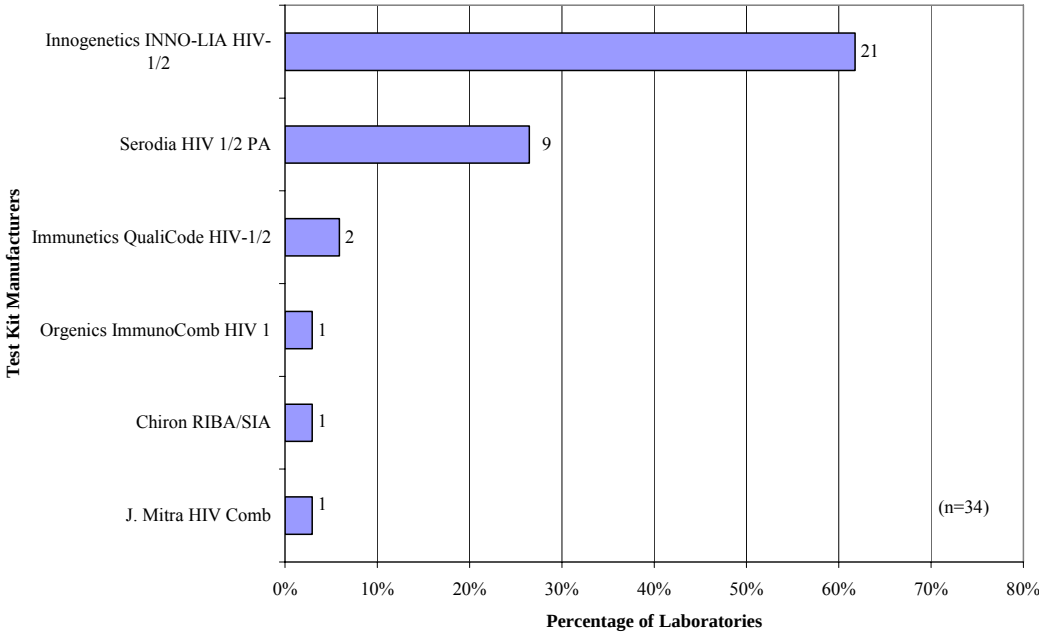
Introduction

Thirty-four (5.5%) of the 614 laboratories reported using "Other" tests. Tests in this category are based on line immunoblot assay technology or particle agglutination. Laboratories reported their results in the "Other" test type section of the result form since the form is not designed to capture all reporting formats for these types of results.

"Other" test kits, by manufacturer

Figure 6 shows the "Other" test kits used by laboratories participating in this survey. The numbers at the end of the bars show the number of laboratories using that test kit.

Figure 6: Percentage and number of "Other" HIV-1 antibody test kits reported by participants, by manufacturer



Other false-positive, indeterminate, and false-negative results

Table 8 below shows only false-positive, false-negative and indeterminate results. Those test kits for which false-positive and/or false-negative and/or indeterminate results were not reported are not included.

Table 8: False-positive, indeterminate, and false-negative results, reported by participant laboratories, by kit manufacturer

Manufacturer	Total # of Results	Negative Donor			Positive Donor		
		Negative	False-positive	I*	Positive	False-negative	I
Innogenetics INNOLIAHIV-1/2	110	27	1 (3.6)	0	80	0	2 (2.4)
Orgenics Immuno Comb	6	2	0	0	3	0	1 (25.0)
Immunetics Qualicode	12	2	0	0	8	0	2 (20.0)
J. Mitra HIV Comb	6	1	0	0	4	0	2 (33.3)
Serodia HIV-1/2 PA	34	9	1 (10.0)	0	23	1 (4.2)	0

*I, Indeterminates

Continued on next page

“Other” Test Methods and Results, Continued

Comments

In this shipment, there were 7 indeterminates, 2 false-positives, and 1 false-negative reported.

Laboratories using these “other” tests methods reported 98.4% correct results.

Appendix

Glossary of Terms

Chemiluminescence immunoassay, CLIA, is a screening test to detect antibodies to HIV using a chemiluminescent signal generating compound such as acridinium.

EIA: Enzyme immunoassay, sometimes referred to as ELISA (enzyme-linked immunosorbent assay), is a screening test to detect antibodies to HIV and other viruses and some bacteria.

False-negative: A negative test result for a sample that is actually positive.

False-positive: A positive test result for a sample that is actually negative.

HIV Antibody: Specific immunoglobulin produced the body's immune system in response to the HIV virus.

HIV Antigen: Specific immune-recognizable proteins, such as p24, which cause the production of antibodies.

HIV test: More correctly referred to as an HIV antibody test, this test detects antibodies to HIV, rather than detecting the virus itself.

IFA test: Indirect immunofluorescence assay, a confirmatory test for the detection of antibodies to Human Immunodeficiency Virus Type I (HIV-1) in human serum or plasma.

Indeterminate test results: A possible result for IFA, WB or "Other" test that might represent a recent HIV infection, but does not meet the criteria for positive.

Positive test: For HIV, a specimen that is reactive on a screening test such as an EIA test and confirmed positive on Western blot or other confirmatory test indicating that the donor is infected with HIV.

Seroconversion: Initial development of detectable antibodies specific to a particular antigen; the change of a serologic test result from negative to positive as a result of antibodies induced by the introduction of antigens or microorganisms into the host.

Western blot: For HIV, a laboratory test that detects antibodies specific for components of the HIV virus. It is chiefly used to confirm the presence of HIV antibodies in specimens found reactive using a screening test such as the EIA test.