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 July 2004

CENTERS FOR DISEASE™
CONTROL AND PREVENTION

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

Report of the July 2004 Human Immunodeficiency Virus Type I (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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Table of Contents

List of Tables

List of Figures

Analysis of Testing Results Reported by Laboratories Participating in the Model Performance Evaluation Program for HIV-1 Antibody in July 2004

Introduction

Purpose

The purpose of this report is to present the analysis of results provided to the CDC by laboratories participating in the MPEP after they tested the human plasma samples shipped to them in July 2004.

Response

Of the 815 laboratories that were sent performance panels,

- 740 (90.8%) submitted results and
- 358 (48.4%) of the 740 laboratories submitted results on-line.

Contents

This report contains the analysis of results for

- enzyme immunoassay (EIA) screening,
- Western blot (WB, a confirmatory test),
- indirect immunofluorescence assay (IFA, a confirmatory test),
- "other" tests, (test types other than EIA, WB or IFA, such as line or strip assays, microparticle capture, chemiluminescence, etc.), and
- summary of the quality control practices for EIA, WB, IFA, and other tests.

Continued on next page

Challenge Samples

Survey Samples

The survey samples are undiluted, defibrinated plasma obtained from individual donors who are 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.

Donor testing

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

- two HIV-1 EIA kits,
- two HIV-1/HIV-2 EIA kits, and
- supplemental tests;
  - two HIV-1 Western blot (WB) kits, and
  - one HIV-1 indirect immunofluorescence assay (IFA).

Donors status

Donors 1 (duplicate samples) and **3** are HIV-1 antibody positive donors demonstrating factors consistent with seroconversion, such as

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

Donor 2: strong-positive HIV-1

Donor 4: HIV-1 negative (duplicate samples).

Continued on next page

Laboratory Worksheet

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

Table 1: Human Immunodeficiency Virus Type 1 (HIV-1) Antibody Testing for the July 2004 Shipment

Panel Letter	Vial Label	CDC Donor Number	CDC Test Results[1]	Donor HIV Status	Laboratory Interpretation[2]			
					EIA			
					Initial	Final	WB	IFA
A	**A1**	2	Positive	Infected	_____	_____	_____	_____
	A2	3	Positive	Infected	_____	_____	_____	_____
	A3	4	Negative	Uninfected	_____	_____	_____	_____
	A4	1	Positive	Infected	_____	_____	_____	_____
	A5	4	Negative	Uninfected	_____	_____	_____	_____
	A6	1	Positive	Infected	_____	_____	_____	_____
B	**B1**	2	Positive	Infected	_____	_____	_____	_____
	B2	4	Negative	Uninfected	_____	_____	_____	_____
	B3	1	Positive	Infected	_____	_____	_____	_____
	B4	4	Negative	Uninfected	_____	_____	_____	_____
	B5	1	Positive	Infected	_____	_____	_____	_____
	B6	3	Positive	Infected	_____	_____	_____	_____
C	**C1**	4	Negative	Uninfected	_____	_____	_____	_____
	C2	1	Positive	Infected	_____	_____	_____	_____
	C3	3	Positive	Infected	_____	_____	_____	_____
	C4	1	Positive	Infected	_____	_____	_____	_____
	C5	2	Positive	Infected	_____	_____	_____	_____
	C6	4	Negative	Uninfected	_____	_____	_____	_____
D	**D1**	1	Positive	Infected	_____	_____	_____	_____
	D2	4	Negative	Uninfected	_____	_____	_____	_____
	D3	1	Positive	Infected	_____	_____	_____	_____
	D4	2	Positive	Infected	_____	_____	_____	_____
	D5	4	Negative	Uninfected	_____	_____	_____	_____
	D6	3	Positive	Infected	_____	_____	_____	_____

1. The CDC result was 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). The CDC WB interpretation is consistent with the manufacturer's criteria for interpretation of WB results.

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 2: CDC Western blot (WB) testing results for the July 2004 shipment

Panel Letter	Vial Label	CDC Donor Number	CDC Western Blot Test Results Specific WB Band Detected[1]	WB Test Kit Manufacturer	CDC Interpretation[2]
A	A1	2	17, 24, 31, 41, 51, 55, 66, 120, 160 18, 24, 31, 41, 51, 55, 65, 120, 160	Cambridge Biotech[3] Genetic Systems	Positive Positive
	A2	3	17, 24, 31, 41, 51, 55, 66, 120, 160 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	A3, A5	4	No Bands	Both Manufacturers	Negative
	A4, A6	1	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
B	B1	2	17, 24, 31, 41, 51, 55, 66, 120, 160 18, 24, 31, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	B2, B4	4	No Bands	Both Manufacturers	Negative
	B3, B5	1	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
	B6	3	17, 24, 31, 41, 51, 55, 66, 120, 160 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
C	C1,C6	4	No Bands	Both Manufacturers	Negative
	C2, C4	1	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
	C3	3	17, 24, 31, 41, 51, 55, 66, 120, 160 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	C5	2	17, 24, 31, 41, 51, 55, 66, 120, 160 18, 24, 31, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
D	D1, D3	1	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
	D2, D5	4	No Bands	Both Manufacturers	Negative
	D4	2	17, 24, 31, 41, 51, 55, 66, 120, 160 18, 24, 31, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive
	D6	3	17, 24, 31, 41, 51, 55, 66, 120, 160 24, 31, 40, 41, 51, 55, 65, 120, 160	Cambridge Biotech Genetic Systems	Positive Positive

1. The Western Blot (WB) results is based on the band intensity of = 1+ staining.
2. The CDC interpretation is consistent with the manufacturer's criteria for the interpretation of WB results.
3. Cambridge Biotech/Calypte Biomedical.

Overview Continued on next page

Results Summary

Overall results

Table 3 summarizes the results grouped by test type: EIA, WB, IFA, and Other.

Table 3: Results Summary

			Positive Donors			Negative Donor			
Method	**Total # of laboratories**	**Total # of results**	**Positive**	**I***	**False-negative**	**Negative**	**I**	**False-positive**	**Overall Performance (TP+TN/total # results)†**
EIA	677	4372	2899	nv‡	24	1388	nv	61	98.1%
WB	238	1081	941	4	1	120	11	4	98.5%§
IFA	35	189	135	5	0	49	0	0	100%§
Other¶	86	594	414	3	2	167	2	6	98.3%§

* I, Indeterminate results

† TP, true positives; TN, true negatives.

‡ nv, Indeteminate is a not 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, microparticle capture, chemiluminescence, etc.

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Key findings

The results from this survey compared to those from the previous survey are described below:

EIA:

Compared to the January 2004 shipment, there were increases in the percentages of false-positive and false-negative EIA results reported in this survey.

- The percentage of false-positive results increased from 0.13% to 1.57%, a more than 10-fold increase. In the current shipment, 63.9% (39/61) of the false-positive results were reported by laboratories using with the Bio-Rad Genetic System HIV-1/HIV-2 Peptide EIA.

- The percentage of false-negative results went from 0.37% to 0.62%. In the current shipment, 75.0% (18/24) of the false-negative results was reported by laboratories that used Abbott HIV-1/HIV-2 (rDNA), (9) and Genetic Systems HIV-2 EIA, (9) test kits.

WB:

The overall performance of the laboratories performing Western blot was 98.5% (1065/1081) in this shipment compared to 99.2% (1217/1227) in the January 2004 shipment.

IFA:

IFA performance was100% (189/189) in this shipment compared to 96.8% (180/186) in January 2004.

Other tests:

The overall performance of laboratories using tests other than EIA, WB, or IFA was 98.3% (584/594) compared to 99.5% (557/560) in the January 2004 shipment.

Quality Control:

When performing HIV antibody testing, most laboratories are using external quality controls. See Table 9 on page 25.

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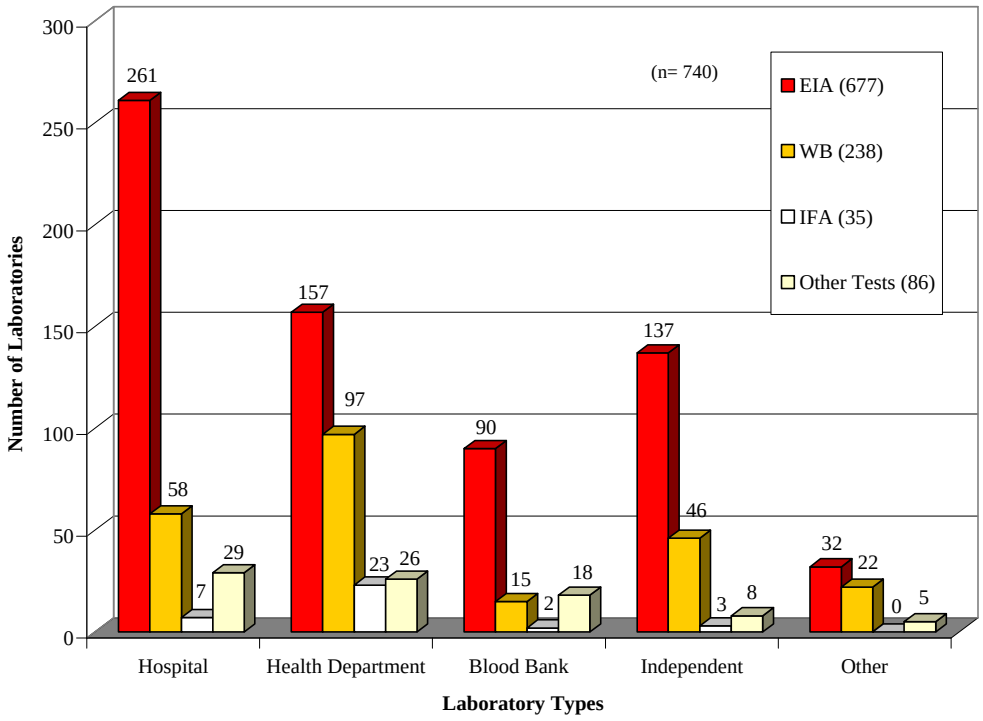
Laboratory Demographics and Methods

Test methods by laboratory type

Figure 1 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, not the number of methods or tests kits used.

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



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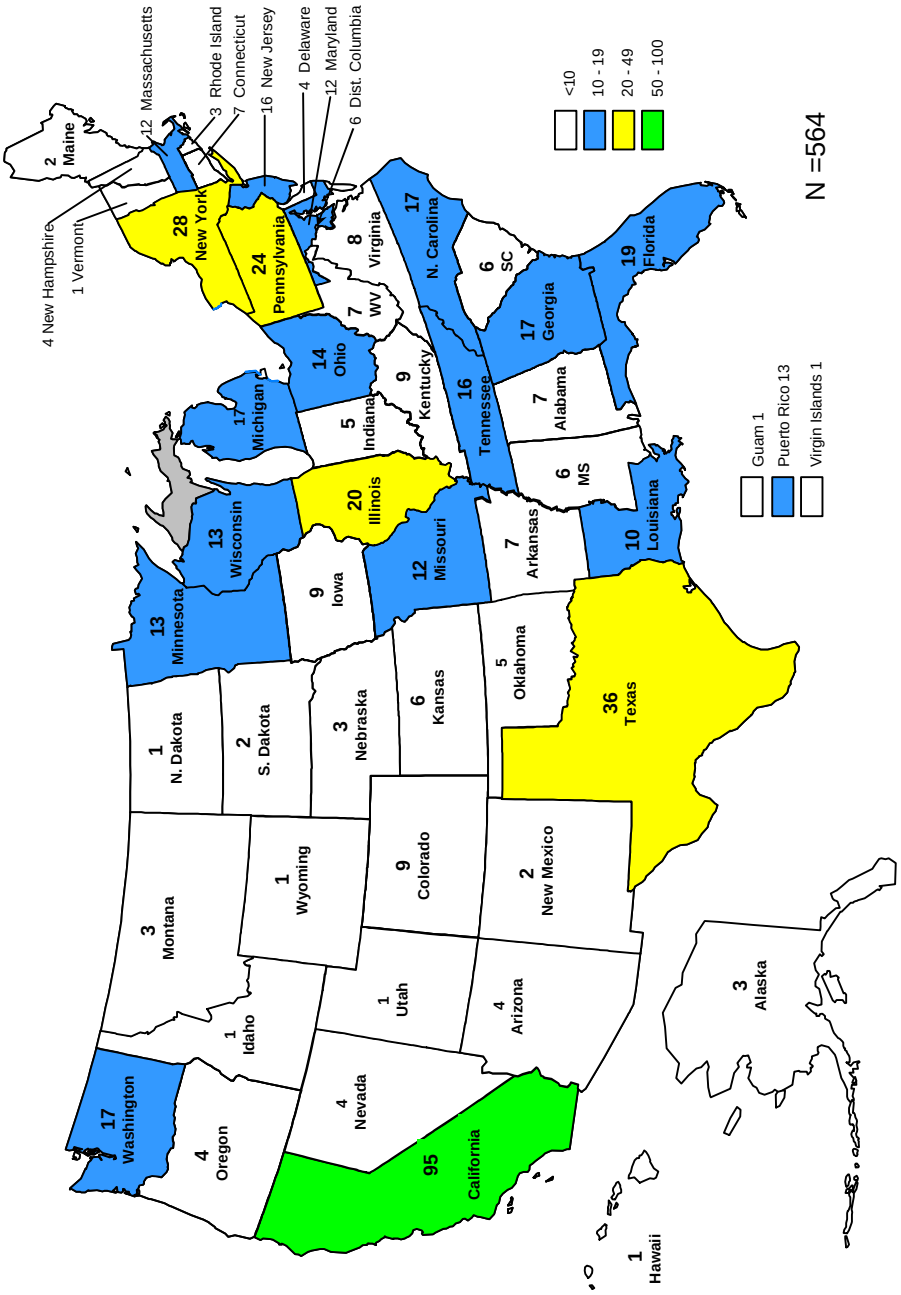
Laboratory Demographics and Methods, Continued

U.S. laboratories

Figure 2 shows the number and location of MPEP laboratories in the U.S. and U.S, Territories.

Figure 2: Geographic distribution of laboratories in the United States and U.S. Territories



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Laboratory Demographics and Methods, Continued

All MPEP laboratories

Including the United States, MPEP participants are located in 77 countries

Table 4: Location of laboratories by country reporting HIV-1 Ab results

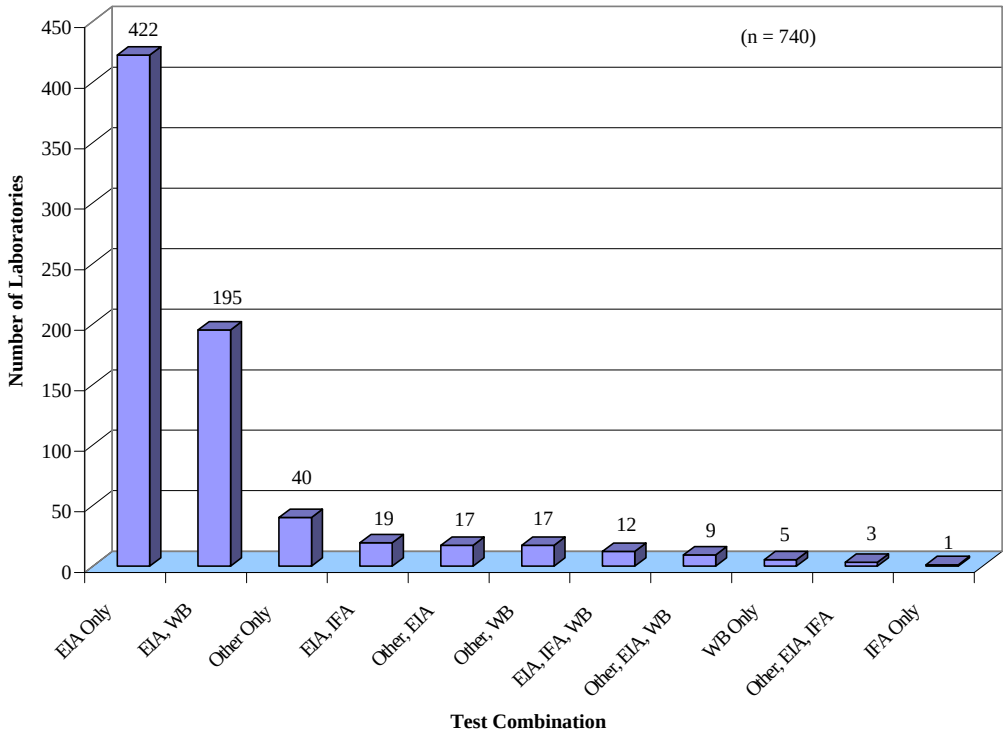
Country	Number of Laboratories	Country	Number of Laboratories	Country	Number of Laboratories
Algeria	1	Hong Kong	2	Scotland	1
Argentina	7	Hungary	1	Slovakia	1
Australia	6	India	4	Slovenia (Yugoslavia)	2
Austria	3	Ireland	1	South Africa	3
Bahamas	1	Israel	5	South Korea	1
Barbados	1	Italy	2	Spain	4
Belgium	2	Jamaica	1	Sri Lanka	5
Bolivia	1	Japan	1	St. Kitts/Nevis	1
Botswana	2	Kazakhstan	6	Switzerland	1
Brazil	4	Kenya	2	Taiwan	2
Cameroon	1	Kyrgyzstan	3	Tanzania	2
Canada	18	Malaysia	2	Thailand	8
Chile	1	Malta	1	Trinidad	2
Columbia	1	Mexico	1	Turkey	1
Costa Rica	2	Morocco	1	Turkmenistan	1
Cote d'Ivoire	3	Myanmar (Burma)	1	US Territory	15
Croatia	2	Nicaragua	1	Uganda, East Africa	1
Denmark	3	Nigeria	1	United Arab Emirates	3
Dominican Republic	1	Panama	1	United Kingdom	1
El Salvador	1	Paraguay	1	United States	549
England	2	Peru	2	Uruguay	1
Eritrea	1	Philippines	2	Uzbekistan	10
Germany	3	Portugal	1	Venezuela	3
Ghana	3	Republic of Singapore	1	Vietnam	1
Guyana	1	Romania	1	Zambia	1

Laboratory Demographics and Methods, Continued

Test methods

The test combinations used by the MPEP laboratories are shown in Figure 3.

Figure 3: The combination of HIV-1 antibody tests reported by participant laboratories



Of the 740 laboratories reporting results;

- 422 (57.0%) performed only EIA,
- 238 (32.2%) performed EIA and a supplemental test,
- 86 (11.6%) laboratories performed an AOther@ test in addition to, or instead of, EIA, WB and IFA, and
- 6 (0.8%) performed only a supplemental test.

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EIA Methods and Results

Introduction

MPEP laboratories reported using 37 different EIA test kits for detection of antibodies to the HIV-1 and/or HIV-2 virus. Laboratories outside the U.S. reported using 28 different EIA test kits.

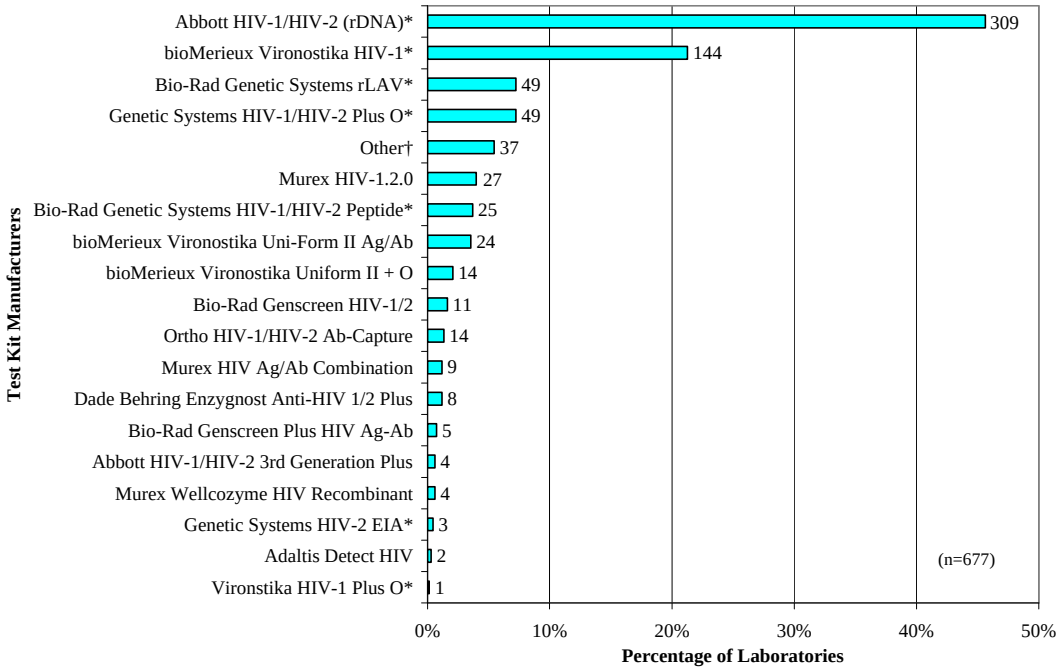
Laboratories located in the U.S. reported using nine EIA test kits. Of these, eight are FDA approved. EIA test used by U.S. laboratories include:

- 4 HIV-1/2,
- 2 HIV-1 only,
- 1 antigen/antibody,
- 1 HIV-2, and
- 1 HIV-1 test only for research purposes (not FDA approved).

EIA test kit manufacturer

Figure 4 shows the percentage of laboratories using a particular HIV-test kit. The numbers at the end of the bars show the number of laboratories using that test kit.

Figure 4: Percentage of laboratories using EIA test kits, by manufacturer



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

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Other EIA test kits

There are other EIA kits for which no manufacturers' codes were listed in the results booklet or online. Some of these EIA test kit manufacturers are listed below. The number in parenthesis is the number of laboratories that reported using these kits.

- Biotest Anti HIV Tetra ELISA (4),
- Human Gesellshaft for Biochemia and Diagnost HIV 1 and 2 (1),
- MBS Recombinant HIV-1, 2 (4),
- Nihol Peptoscreen-2 (6), and
- Span Diagnostics Enzaid HIV-1 and 2 (1).

EIA false-positive and false-negative results

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

Manufacturer	Number of laboratories	Total # of Results	False-positives	False-negatives
Abbott HIV-1/HIV-2 (rDNA)	309	1853	5 (0.26%)	9 (0.49%)
BioMérieux Vironostika HIV-1	144	860	5 (0.58%)	2 (0.23%)
Bio-Rad Genetic Systems rLAV	49	294	1 (0.34%)	0
Genetic Systems HIV-1/HIV-2 Plus O	49	294	2 (0.68%)	0
Murex HIV-1.2.O	27	162	4 (2.47%)	1 (0.62%)
Bio-Rad Genetic Systems HIV-1/HIV-2 (peptide)	25	150	39 (26.0%)	0
BioMérieux Vironostika Uni-Form II Ag/Ab	24	144	5 (3.47%)	1 (0.69%)
Murex HIV Ag/Ab combination	8	48	0	1 (2.08%)
Nihol Peptoscreen-2	6	72	0	1 (1.39%)
Genetic Systems HIV-2 EIA*	3	16	0	9 (56.25%)
Total	644	3893	61 (1.57%)	24 (0.62%)

*Genetic Systems HIV-2 EIA detects the presence of HIV-2 antibody. CDC testing only confirms the presence of HIV-1 antibody.

EIA results by donor

There were no incorrect EIA results reported for the strong positive challenge, Donor 2. Incorrect results for other donors are as follows;

- Donor 1 (HIV-1 infected seroconverter), 14 false negatives,
- Donor 3, (HIV-1 infected seroconverter) 10 false negatives, and
- Donor 4, (HIV-1 uninfected) 61 false positives.

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EIA comments

The number of false-positive and false-negative EIA results reported in this survey increased compared to the January 2004 shipment. There were

- 61 false-positives reported by 33 laboratories compared to 5 false-positives reported in the January 2004 shipment.
  - 20 (60.6%) of the 33 laboratories used Bio-Rad Genetic Systems HIV-1/HIV-2 Peptide EIA,
    - all panel codes were represented,
    - at least 9 different lot numbers of Bio-Rad Genetic Systems HIV-1/HIV-2 Peptide were used, and
    - the laboratories are located throughout the U.S. and one is located in Canada.
- 24 false-negatives were reported by 15 laboratories compared to 14 false-negatives reported in the January 2004 shipment:
  - 7 (46.7%) laboratories used Abbott HIV-1/HIV-2 (rDNA)
  - 3 (20.0%) used Bio-Rad Genetic Systems HIV-2 EIA, and,
  - all panel codes were represented.

Questions concerning changes in test kits

In this survey we asked two additional questions. The purpose of the questions were to determine

1. if the MPEP laboratories had changed and/added EIA tests in the past year, and
2. whether they plan to add and/or change EIA test kits with in the next year.

Changed or added EIA test kits

The responses to the question did you change/add EIA test kits with in the last year were as follows:

Of the 372 laboratories responding,

- 314 (84.4%) had not changed or added EIA test kits and
- 58 (15.6%) changed or added EIA tests. Of those,
  - 30 changed only,
  - 12 added only,
  - 10 answered “yes” they added, but did not answer further, and
  - 6 laboratories added and changed EIA test kits.

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Planning to change or add test kits

The response to the question are planning to change/add EIA test kits within the next year was as follows:

Of the 647 laboratories responding,

- 578 do not plan to add or change,
- 69 (10%) plan to add or change. Of those,
  - 64 plan to only change,
  - 2 plan to only add, and
  - 3 plan to change and add EIA test kits with the next year.

Comments on EIA questions

Several EIA test kit manufacturers either have replaced or plan to replace their current assays containing only Group M antigen with assays that contain both the traditional Group M and additional Group O antigens.

Forty-five (77.6%) of the 58 laboratories that changed and/or added EIA test kits in the past year, and 58 (84.1%) of the laboratories that plan to change and/or add EIA test kits within the next year responded that they have or will switch to kits with Group O antigen.

Western Blot Methods and Results

Introduction

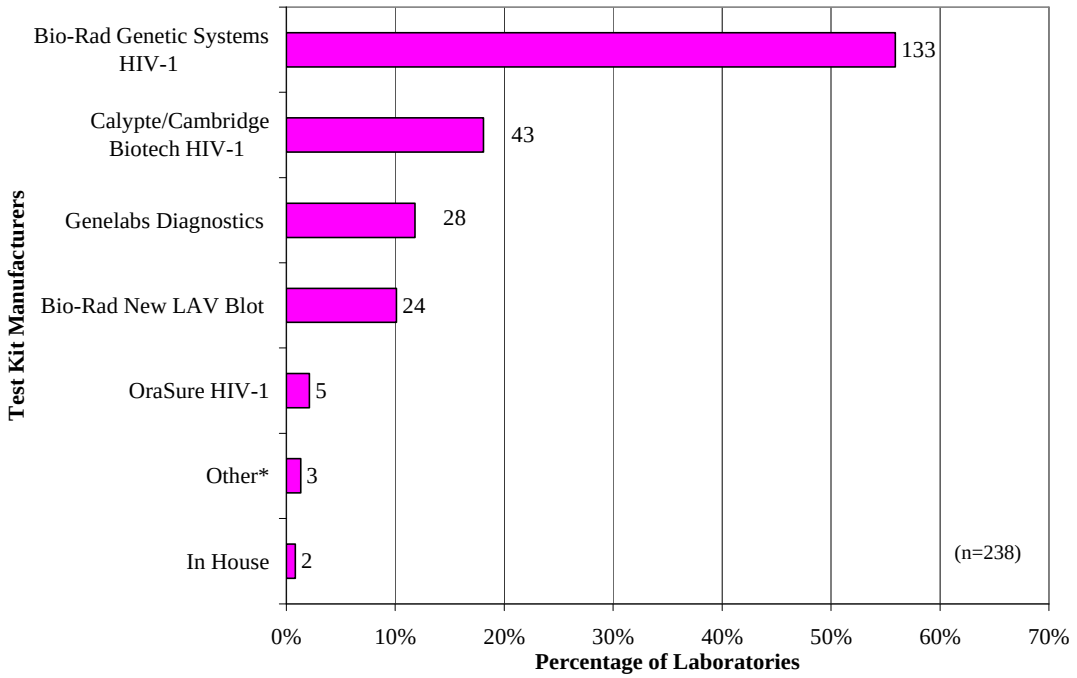
Of the 740 laboratories reporting test results in this survey, 238 (32.2%) performed WB testing using 6 different commercially manufactured WB test kits and one in-house preparation.

In the U.S., two FDA approved WB kits are available for testing serum or plasma.

WB test kits

The WB test kits used by MPEP laboratories are shown below.

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



*Other, WB tests for which no manufacturers' codes are included in the result booklet.

WB interpretative criteria

Of the 238 laboratories reporting WB test results, 232 (97.5%) 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:

- 206 (88.8%) APHL/CDC,
- 16 (6.9%) World Health Organization,
- 10 (4.3%) stated "other" (Manufacturers' insert, Australian National Reference Laboratory, etc.).

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WB interpretive guidelines

The WB interpretive guidelines published 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.)
- 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.

Note: All participating U.S. laboratories indicated they were using the APHL/CDC HIV-1 WB interpretive criteria.

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 7.

WB results by donor

The results by donor are

- Donor 1 (HIV-1 seroconverter): no false-negatives, no indeterminates,
- Donor 2 (HIV-1 infected, strong positive): 1 false-negative and 3 indeterminates,
- Donor 3 (HIV-1 seroconverter): no false-negatives,1 indeterminate, and
- Donor 4 (negative): 4 false-positives, 11 indeterminates.

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

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

Manufacturer	Total # of Results	Negative Donor			Positive Donors		
		Negative	False-positive	I*	Positive	False-negative	I
Bio-Rad Genetic Systems HIV-1	593	55	1	6	531	0	0
Bio-Rad New LAV Blot 1	114	18	1	3	90	1	1
Cambridge Biotech HIV-1	187	13	0	2	172	0	0
Genelabs Diagnostics	139	26	2	0	110	0	1
J. Mitra & Co. LTD	6	2	0	0	2	0	2
Total	1039	114	4	11	905	1	4

*I, Indeterminate

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WB comments

There were 135 WB interpretations reported for Donor 4, the HIV-1 antibody-negative donor, although most laboratories do not normally include WB testing of EIA non-reactive specimens in their routine algorithm for HIV antibody testing.

In this shipment

- For the HIV-1 negative sample (Donor 4)
  - 11 indeterminate were reported by 8 laboratories, 6 of which reported non-reactive EIA results, and
  - 4 false-positive WB results were reported by 3 laboratories.

- For the HIV-1 antibody strong-positive sample (Donor 2), there were
  - 3 indeterminates reported by 3 laboratories and
  - 1 false-negative was reported.

- For the seroconversion samples (Donors 1 and 3),
  - most laboratories had no difficulty in detecting antibodies to gag (p24), pol (p31), and env (gp41, gp120, gp160) antigens;
  - only one laboratory reported indeterminate for Donor 3.

Note: Some laboratories report indeterminate results when non-viral bands are observed on the nitrocellulose test strip.

IFA Methods and Results

Introduction

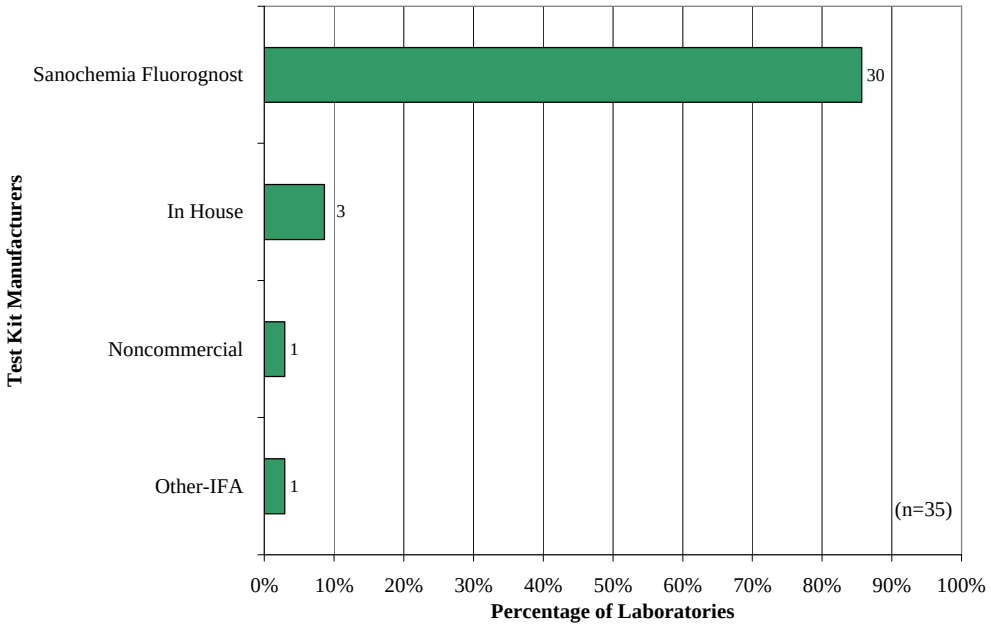
Of the 740 laboratories reporting results, 35 (4.7%) performed IFA tests. There was only one commercial IFA test kit manufacturer, Sanochemia Fluorognost IFA, reported by the participant laboratories. However,

- 3 laboratories used "in-house" kits,
- 1 laboratory reported "other", and
- 1 noncommercial IFA test kit was reported.

IFA test kits, by manufacturer

The IFA test kits reported are shown in Figure 6. The numbers at the end of the bars are the number of laboratories using that test kit.

Figure 6: Percentage of laboratories using IFA test kits, by manufacturer



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IFA results

Table 7: IFA results by test kit manufacturer

Methods/ Manufacturer	Total # of Results	Negative Donor			Positive Donors		
		Negative	False-positive	I†	Positive	False-negative	I
In-House	18	6	0	0	9	0	3
Sanochemia Fluorognost	161	41	0	0	118	0	2
Noncommercial	4	4	0	0	0	0	0
Other*	6	2	0	0	4	0	0
Total	189	53	0	0	131	0	5

†I, Indeterminate
*Other IFA test kits for which no manufacturers' codes are provided in the results booklet.

IFA results by donor

For the 189 IFA total interpretations reported, the interpretations by donor are as follows:

- Donor 1 (HIV-1 infected seroconverter)
  - 2 indeterminates
  - 0 false-negatives
- Donor 2 (HIV-1 strong positive)
  - 0 indeterminate
  - 0 false negatives
- Donor 3 (HIV-1 infected seroconverter)
  - 3 indeterminates
  - 0 false- negatives
- Donor 4 (HIV-1 uninfected)
  - 0 indeterminate
  - 0 false positive

Comments

There were no false-positive or false-negative results reported in this shipment an improvement over the last five shipments. The table below lists the overall performance in the last five shipments.

Shipment Date	# of Participants	Overall Performance
July 2002	35	93.3%
January 2003	38	95.8%
July 2003	37	93.7%
January 2004	34	96.8%
July 2004	35	100%

“Other” test Methods and Results

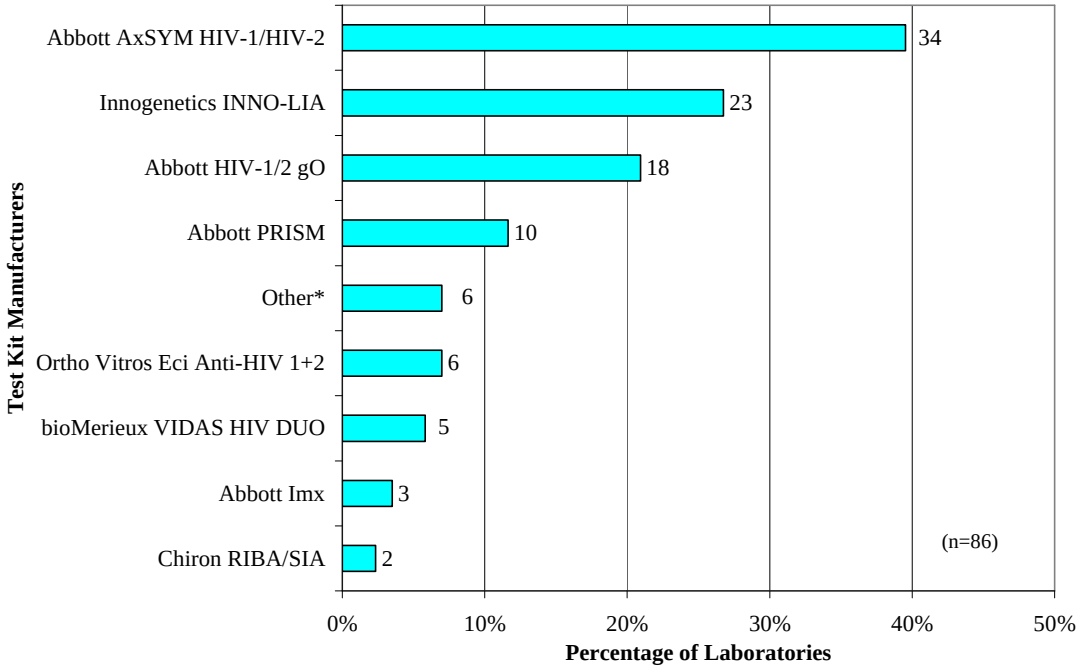
Introduction

Eighty-six (11.6%) of the 740 laboratories reported using “Other” tests. Some of the participating laboratories used more than one test kit.

Participating laboratories reported using 12 different commercially manufactured tests kits which MPEP groups into the “other” category. These tests are based on microparticle capture and chemiluminescence measurement and the results differ from the traditional microtiter-format EIA tests. Laboratories reported their results in the AOther@ test type section of the result form since it is not designed for these types of results.

“Other” tests kits, by manufacturer

Figure 7: Percentages of "Other" HIV-1 antibody test kits reported by participants, by manufacturer



*Other tests for which no manufacturers’ codes are included in the result booklet.

Other “other” test kits

Test kits for which no manufacturers’ code is included in the result booklet or the test kits were too new to be included are listed below. The number in parenthesis is the number of laboratories using that test kit.

- BioRad Sanofi Access HIV1/2 (1),
- Serodia Particle Agglutination (1),
- J. Mitra MicroElisa HIV (1), and
- Orgenics Immunocomb II HIV 1/2 (1).

Continued on next page

"Other" test Methods and Results, Continued

Results by donor

The results by donor are as follows;

- Donor 1 (HIV-1 seroconverter): 1 false-negative and 2 indeterminates,
- Donor 2 (HIV-1 strong positive): 1 false-negative,
- Donor 3 (HIV-1 seroconverter):1 indeterminate, no false-negatives, and
- Donor 4 (negative): 2 indeterminates and 6 false-positives.

"Other" results

Table 8: False-positive, false-negative and indeterminate determinations for "Other" test kits

Methods/Manufacturer	Total # of Results	Negative Donor			Positive Donors		
		Negative	False-positive	I*	Positive	False negative	I
Abbott AxSYM HIV-1/HIV-2	204	65	3	0	133	2	1
Innogenetics INNO-LIA	116	20	3	2	91	0	0
Abbott PRISM	60	20	0	0	38	0	2
Total	380	105	6	2	262	2	3

*I, Indeterminate

Comments

Among the 594 "other" interpretations reported,

- For Donor 4, negative donor, there were
  - – 6 false-positives reported by 4 laboratories and
  - – 2 indeterminates reported by another laboratory.

- For Donor 2, the HIV-1 strong positive donor,
  - – one laboratory reported a false-negative result and
  - – no indeterminates were reported.

- And for the seroconversion samples (Donors 1 and 3)
  - – one false-negative was reported by one laboratory and
  - – 3 indeterminates were reported by 2 laboratories.

The overall performance of the tests in the "other" category was 98.3% compared to 99.5% in the January 2004 shipment.

Quality Control Testing

Introduction

Internal controls are reactive and non-reactive samples included in manufacturers' kits which are used to

- validate the test run, and
- calculate test-run cut-off values.

These internal controls may not validate the analytic testing process, which may include testing problems such as

- faulty pipettors,
- inadequate incubation conditions, or
- sensitivity of the test kits.

External controls are reactive and non-reactive specimens purchased separately from the test kits. These are used to evaluate the accuracy of the test in detecting antibody to HIV and to check if the person conducting the test performs it correctly.

The Quality Control (QC) section of the result booklet is designed to determine laboratory practices concerning the use of external controls.

External quality control sources

Table 9 describes the external quality control (QC) practices reported by most of the MPEP laboratories.

Table 9: Summary of External Quality Control Material Sources, by Test Method

Test Type (Total # of Laboratories)*	Number of Laboratories (%) Reporting External QC	Source of External Quality Control Materials		
		In-House	Commercial	Both
EIA (677)	513 (75.8%)†	152 (29.6%)	335 (65.3%)	23 (4.5%)
WB (238)	91 (38.2%)	51 (56.0%)	36 (39.6%)	4 (4.4%)
IFA (35)	15 (42.9%)	10 (66.7%)	5 (33.3%)	0
Other (86)	48 (55.8%)	21 (43.8%)	25 (52.1%)	2 (4.2%)

* Not all laboratories completed the QC section of the result booklet.
† Three laboratories indicated they used external QC but did not identify the source of the material.

Comments

In the two most subjective HIV-1 antibody tests, IFA and WB, less than half of the laboratories reported using external QC materials. The overall the percentage of laboratories performing external controls has shown only a slight increase from that of previous shipments.

Laboratories are encouraged to use external controls whenever possible.

Glossary of Terms

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.

Evaluation: A process for determining how well health systems, either public or private, deliver or improve services and for demonstrating the results of resource investments.

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

IFA test: Immunofluorescent antibody test for HIV is the use of antibodies chemically linked to a fluorescent dye to identify the presence of antigens in a test sample.

Indeterminate test result: 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 supplemental test indicating that the specimen donor is infected with HIV.

Quality control: Operational techniques or tasks that are performed to find and correct problems that might occur.

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.