# HIV-1 Rapid Testing MPEP June 2007 Report of Results

Report of the June 2007 Human Immunodeficiency Virus Type 1 (HIV-1) Rapid Testing (RT) Performance Evaluation Sample Results Provided by Participant Facilities in the Model Performance Evaluation Program (MPEP), Centers for Disease Control and Prevention (CDC).

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## Donor Report

**HIV Rapid Testing MPEP June 2007**

**Panel and Vial Designations, CDC Donor Numbers, CDC HIV Rapid Test Results and Donor HIV Status**

| Panel Letter | Vial Label | CDC Donor Number | CDC Test Result[1,3] | Donor HIV Status | Laboratory Interpretation[2] and/or Results | |
|---|---|---|---|---|---|---|
| | | | | | Test Result | Interpretation |
| A | A1 | 12 | Positive (S) | Infected | _____ | _____ |
| | A2 | 20 | Positive (W) | Infected | _____ | _____ |
| | A3 | 12* | Positive (S) | Infected | _____ | _____ |
| | A4 | 21 | Positive (W) | Infected | _____ | _____ |
| | A5 | 21* | Positive (W) | Infected | _____ | _____ |
| | A6 | 6 | Negative (N) | Uninfected | _____ | _____ |
| B | B1 | 20 | Positive (W) | Infected | _____ | _____ |
| | B2 | 12 | Positive (S) | Infected | _____ | _____ |
| | B3 | 21 | Positive (W) | Infected | _____ | _____ |
| | B4 | 12* | Positive (S) | Infected | _____ | _____ |
| | B5 | 6 | Negative (N) | Uninfected | _____ | _____ |
| | B6 | 21* | Positive (W) | Infected | _____ | _____ |
| C | C1 | 21 | Positive (W) | Infected | _____ | _____ |
| | C2 | 21* | Positive (W) | Infected | _____ | _____ |
| | C3 | 12 | Positive (S) | Infected | _____ | _____ |
| | C4 | 6 | Negative (N) | Uninfected | _____ | _____ |
| | C5 | 12* | Positive (S) | Infected | _____ | _____ |
| | C6 | 20 | Positive (W) | Infected | _____ | _____ |
| D | D1 | 21 | Positive (W) | Infected | _____ | _____ |
| | D2 | 21* | Positive (W) | Infected | _____ | _____ |
| | D3 | 6 | Negative (N) | Uninfected | _____ | _____ |
| | D4 | 12 | Positive (S) | Infected | _____ | _____ |
| | D5 | 20 | Positive (W) | Infected | _____ | _____ |
| | D6 | 12* | Positive (S) | Infected | _____ | _____ |

* Duplicate donors

[1] The CDC result was obtained after pre-shipment testing for the presence of HIV-1 antibody with all commercially available HIV Rapid Testing kits licensed by the Food and Drug Administration (FDA) and with selected FDA-licensed Enzyme Immunoassay (EIA) kits. The CDC result is consistent with the manufacturers' criteria for interpretation of results.

[2] Laboratory Interpretation space (to be completed by participant laboratory) provided to facilitate comparison of participant laboratory result with CDC result.

[3] Strong (S) and Weak (W) designations are based on qualitative observations of the colorimetric test results for reactive samples.

## Report of Results: Overview

**Purpose**

This report describes the results of the HIV Rapid Testing Model Performance Evaluation Program (HIV-RT MPEP) shipment survey shipped in June 2007. It represents a collection of results reported by a variety of testing sites using different HIV rapid test kits on six challenge samples.

The six survey samples were derived from four individual donors and included two duplicate samples. These samples represent donors matched to the previous survey (December 2006).

The major findings are summarized below.

**Response rate**

The survey shipment was sent to 660 testing sites within and outside of the United States. Responses were received from 580 (87.9%) of the testing sites. Of those responding:

- 511 (88.1%) were U.S. testing sites, and
- 69 (11.9%) were non-U.S. testing sites.

*Note*:
Twenty-one testing sites submitted multiple result forms, indicating the use of two to three different test kits, so that the total number of responses was 610.

**Overall performance**

Overall accuracy (percent of correct results) for all samples, by all sites with all kit types, was 93.8% (3,406/3,630). "Indeterminate" result interpretations were considered to be incorrect, and "Invalid" result interpretations were not included in the analyses. (Twenty-nine invalid results were reported by twenty-seven testing sites. These tended to be related to the use of flow-through testing devices, e.g. absorption difficulties.)

A summary of results for all challenges is shown in the following table:

**Table 2: Percentages of positive and negative results by donor type**

| | | Positive Donors | | | Negative Donors | | | |
|---|---|---|---|---|---|---|---|---|
| Total # of facilities | Total # of Results | Positive/ Reactive Results | Ind* | False Negative (% False Neg.) | Negative/ Non-Reactive Results | Ind | False Positives (% False Pos.) | Overall Performance (TP + TN/Total # of Results) |
| 580 | 3630 | 2827 | 20 ( 0.7%) | 196 (6.4%) | 579 | 3 (0.5%) | 5 (0.8%) | 93.8% |

* Ind= Indeterminate

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## Report of Results: Overview, Continued

**MPEP plasma samples, summary results**

- The MPEP plasma **positive challenges** included one strong-positive sample (Donor 12) and two weak-positive samples (Donors 20 and 21).
- The current survey was "matched" to the December 2006 survey; i.e. the samples in both surveys originated from the same donor materials.
- The 196 false-negative and 20 indeterminate results represent a rate of error similar to that of the December 2006 survey, which is a notably higher error rate than in previous surveys; of these 216 incorrect results reported for positive challenges:
    - 5 (2.3%) were reported for Donor 12,
    - 126(58.3%) were reported for Donor 20 and
    - 85 (39.4%) were reported for Donor 21.
  - Overall accuracy for MPEP plasma positive samples was 92.9% (2827/3043).
  - Accuracy varied with test kit used (40.0% - 100%).
  - The kit types used by reporting participants were as follows:

| Rapid HIV kit type | # sites | # false-negatives (n=196) | # indeterminates (n=20) |
|---|---|---|---|
| OraSure OraQuick ADVANCE | 353 | 95 | 10 |
| Trinity Biotech Unigold Recombigen | 83 | 65 | 3 |
| MedMira Reveal G2 or G3 | 72 | 21 | 2 |

- Five false positive and three indeterminate results were reported on the **negative challenge** (Donor 6).
  - Overall accuracy was 98.6% (579/587).
  - Three out of the five false positive results were associated with use of the OraSure OraQuick ADVANCE Rapid HIV 1/2 Ab Test.

**Changes in specimen type**

- **Oral fluid (oral mucosal transudate) as a specimen type:**
  - was indicated in 142 responses by sites using the OraSure OraQuick ADVANCE Rapid HIV-1/2 test kit,
  - showed an increase in usage from the 103 responses reported to MPEP in the December 2006 survey,
  - was used primarily in the U.S. (139/142, 97.9%) by sites identified as:
    - health department (21/139, 15.1%),
    - counseling and testing (33/139, 23.7%)
    - community based organization (CBO) (49/139, 35.3%)
    - family planning center (12/139, 8.6%)
    - sexually transmitted disease (STD) clinic (7/139, 5.0%) or
    - hospital (6/139, 4.3%).

**Confirmatory testing practices**

Seventeen U.S. testing sites indicated that only EIA (in-house or sent out) was done for confirmation of a preliminary positive (reactive) rapid test result.

CDC guidelines state that reactive rapid HIV tests should be confirmed with Western blot (WB) or indirect immunofluorescence assay (IFA), even if a subsequent EIA is nonreactive. ***It is the responsibility of each testing site to ensure that appropriate guidelines are being followed***, regardless of where the confirmatory tests are performed.

## Challenge Samples

**Sample description**

The plasma samples for this challenge shipment of the HIV-RT MPEP were shipped in June 2007.

The six samples for this shipment were from four donors:

- one strong HIV-1 antibody positive (in duplicate),
- two weak HIV-1 antibody positive (one in duplicate), and
- one HIV-1 antibody negative.

**Description of challenge samples**

All sample plasma were single bleeds drawn from individual donors. The resulting plasma for all samples was tested to determine HIV-1 antibody reactivity.

The samples for the June 2007 HIV Rapid Testing MPEP survey were processed as follows:

- All donor samples were clarified prior to dispensing and tested to ensure they were free of bacterial contamination.
- HIV-1 antibody-positive plasma samples were heat-treated at 56ºC for 60 minutes to inactivate infectious agents, whereas HIV-antibody-negative samples were not heat-treated.
- The serostatus of both positive and negative samples was confirmed by all FDA-approved rapid HIV antibody tests, as well as selected FDA-approved EIA and Western blot kits.
- Negative samples were negative for HIV-1 antigen using an FDA-approved monoclonal antibody-based p24 antigen test.
- Positive samples were selected using the following criteria:
    - reactive by the Genetic Systems rLAV enzyme immunoassay kit at a signal-to-cutoff ratio between 3 and 5 for the weak-positive seroconverter samples and greater than 5 for the strong-positive samples, and
    - positive by the APHL/CDC interpretive criteria for Western blot (WB) patterns.

The strong-positive sample and one of the weak positive samples were included in the shipment in duplicate.

## Demographics

**Overview**

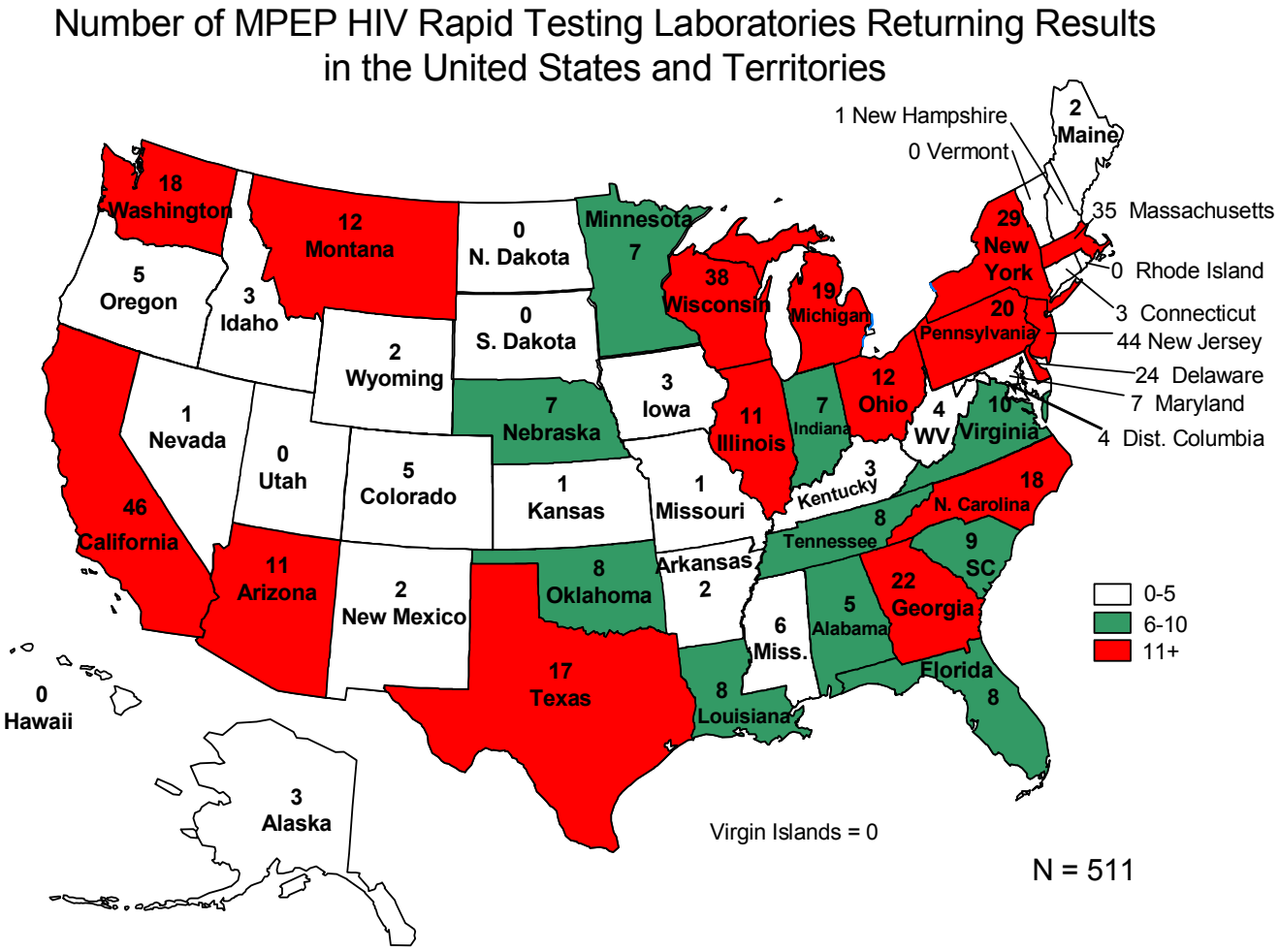
A total number of 580 different testing sites (foreign and domestic) submitted results. Of these:

- the 511 domestic testing sites are depicted in ***Figure 1***, and
- the 69 non-U.S. testing sites are listed in ***Table 3***.

The types of testing sites for responding participants are depicted in ***Figure 2***:

- The number of non-U.S. participants in the current survey (69) was similar to the previous survey (December 2006, n = 67).
- Non-U.S. participants included over 1/3 of the countries in the Global AIDS Program (GAP).
- The number of U.S. participants in the current survey (511) was greater by 10.8% from that of the previous survey (461).
- In the U.S., hospital testing sites predominated.

## Figure 1

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## Demographics, Continued

The following table shows the breakdown of participants outside the United States.

### Table 3

| Country | Number | Country | Number |
|---|---|---|---|
| Australia | 2 | Indonesia | 1 |
| Bahamas | 1 | Kenya | 1 |
| Bangladesh | 1 | Liberia | 1 |
| Belgium | 1 | Malawi | 1 |
| Botswana | 5 | Malaysia | 1 |
| Brazil | 1 | Mali | 1 |
| Burkina Faso | 1 | Nepal | 1 |
| Burundi | 1 | Niger | 1 |
| Cameroon | 2 | Nigeria | 1 |
| Canada | 2 | Panama | 1 |
| Columbia | 1 | Peru | 1 |
| Congo | 1 | Philippines | 3 |
| Cote d'Ivoire | 1 | Republic of Yemen | 1 |
| Dominican Republic | 1 | Senegal | 1 |
| Egypt | 1 | Slovakia | 1 |
| El Salvador | 1 | South Korea | 1 |
| Eritrea | 1 | Suriname | 1 |
| Ethiopia | 1 | Taiwan | 1 |
| Germany | 1 | Tanzania | 7 |
| Ghana | 1 | Thailand | 6 |
| Guyana | 1 | Zambia | 2 |
| Honduras | 2 | Zimbabwe | 1 |
| India | 3 | | |

N = 69

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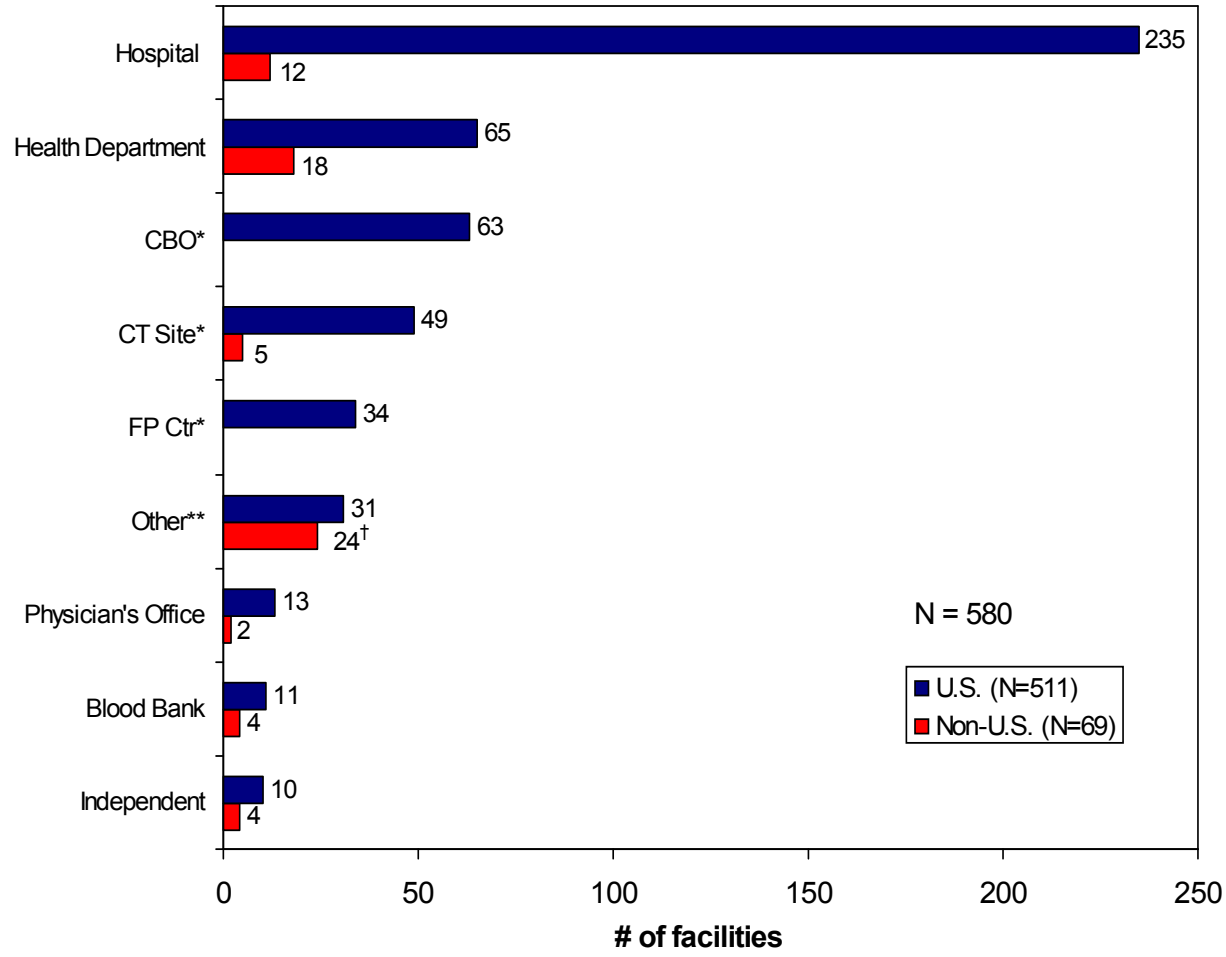
## Demographics, Continued

The types of testing sites for all participants in the current survey are shown in Figure 2, by U.S. and non-U.S. participants.

**Figure 2:**

**Types of testing sites, by U.S. & non-U.S.**




*Abbreviations:

CBO = community based organization
CT Site = counseling and testing site
FP Ctr = family planning center

** "Other" facility type includes:
health maintenance organization (HMO)
medical examiner
sexually transmitted disease (STD) clinic
correctional facility
drug treatment center
mobile unit

† 1/24 of the Non-U.S. "Other" type of testing sites were mobile units associated with U.S. embassies.

## Detailed Performance Results

***Table 4*** below gives the reactivity results by donor.

### Table 4

| | Reactivity | | | | | |
|---|---|---|---|---|---|---|
| **Donor Number** | **# of Participants** | **# of Results*** | **# Pos.** | **# Neg.** | **# Ind** | **% Correct** |
| **6 (Negative)** | 580 | 587 | 5 | 579 | 3 | 98.6% |
| **12 (Strong Pos)** | 580 | 1215 | 1210 | 4 | 1 | 99.6% |
| **20 (Weak Pos)** | 580 | 609 | 483 | 119 | 7 | 79.3% |
| **21 (Weak Pos)** | 580 | 1219 | 1134 | 73 | 12 | 93.0% |

* Some testing sites used more than one type of testing kit, therefore, the total number of results may exceed the total number of participants.

**MPEP plasma samples, detailed performance results**

**MPEP Negative Sample (Donor 6)**:

- Five false-positive results were reported; four by U.S. sites, and one by a non-U.S. site.
- Three indeterminate results were reported.

**MPEP Positive Samples:**

- There were 216 incorrect results on the MPEP HIV-positive samples. Of these:
  - One-hundred and ninety-six were false negative errors (181 by U.S. and 15 by non-U.S. sites), with
    - Fourerrors reported for strong-positive Donor 12,
    - One-hundred and nineteen errors reported for weak-positive Donor 20, and
    - Seventy-three errors reported for weak-positive Donor 21.
  - Twenty were indeterminate results.

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## Detailed Performance Results, Continued

***Table 5*** gives the accuracy for all samples by kit type

**Table 5: Results by test kit**

| Kit Type (manufacturer) | Reactive/Positive | | | | | | Non-Reactive/Negative | | | | | | Totals | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | # of Sites | # of Results | # Reactive | # Non-Reactive | # Indeter | % Correct | # of Sites | # of Results | # Reactive | # Non-Reactive | # Indeter | % Correct | Total # of Results | # Correct | % Correct |
| Oraquick ADVANCE Rapid HIV-1/2 Ab Test (OraSure) | 353 | 1771 | 1666 | 95 | 10 | 94.1% | 351 | 352 | 3 | 349 | 0 | 99.1% | 2123 | 2015 | 94.9% |
| Reveal G2 Rapid HIV-1 Antibody Test (MedMira) | 3 | 15 | 14 | 1 | 0 | 93.3% | 3 | 3 | 0 | 3 | 0 | 100.0% | 18 | 17 | 94.4% |
| Reveal G3 Rapid HIV-1 Antibody Test (MedMira) | 69 | 344 | 322 | 20 | 2 | 93.6% | 50 | 50 | 1 | 46 | 3 | 92.0% | 394 | 368 | 93.4% |
| Determine HIV-1/2 (Abbott) | 45 | 222 | 216 | 5 | 1 | 97.3% | 45 | 45 | 0 | 45 | 0 | 100.0% | 267 | 261 | 97.8% |
| Biotech Uni-Gold Recombigen HIV (Trinity) | 83 | 415 | 347 | 65 | 3 | 83.6% | 82 | 82 | 0 | 82 | 0 | 100.0% | 497 | 429 | 86.3% |
| Biotech Uni-Gold (Trinity) | 9 | 45 | 41 | 4 | 0 | 91.1% | 9 | 9 | 0 | 9 | 0 | 100.0% | 54 | 50 | 92.6% |
| Biotech Capillus (Trinity) | 5 | 25 | 24 | 1 | 0 | 96.0% | 5 | 5 | 1 | 4 | 0 | 80.0% | 30 | 28 | 93.3% |
| Multispot HIV-1/HIV-2 (Bio-Rad) | 7 | 35 | 33 | 1 | 1 | 94.3% | 7 | 7 | 0 | 7 | 0 | 100.0% | 42 | 40 | 95.2% |
| J. Mitra & Co.Ltd. HIV-TRIDOT | 1 | 5 | 2 | 3 | 0 | 40.0% | 1 | 1 | 0 | 1 | 0 | 100.0% | 6 | 3 | 50.0% |
| Serodia HIV (Fujirebio) | 2 | 10 | 10 | 0 | 0 | 100.0% | 2 | 2 | 0 | 2 | 0 | 100.0% | 12 | 12 | 100.0% |
| Serodia HIV 1/2 (Fujirebio) | 4 | 20 | 20 | 0 | 0 | 100.0% | 4 | 4 | 0 | 4 | 0 | 100.0% | 24 | 24 | 100.0% |
| Chembio HIV 1/2 Stat-Pack (CASSETTE) | 7 | 35 | 35 | 0 | 0 | 100.0% | 7 | 7 | 0 | 7 | 0 | 100.0% | 42 | 42 | 100.0% |
| Other | 21 | 110 | 106 | 1 | 3 | 96.4% | 21 | 22 | 0 | 22 | 0 | 100.0% | 132 | 128 | 97.0% |

## Kit Types Used By Participants

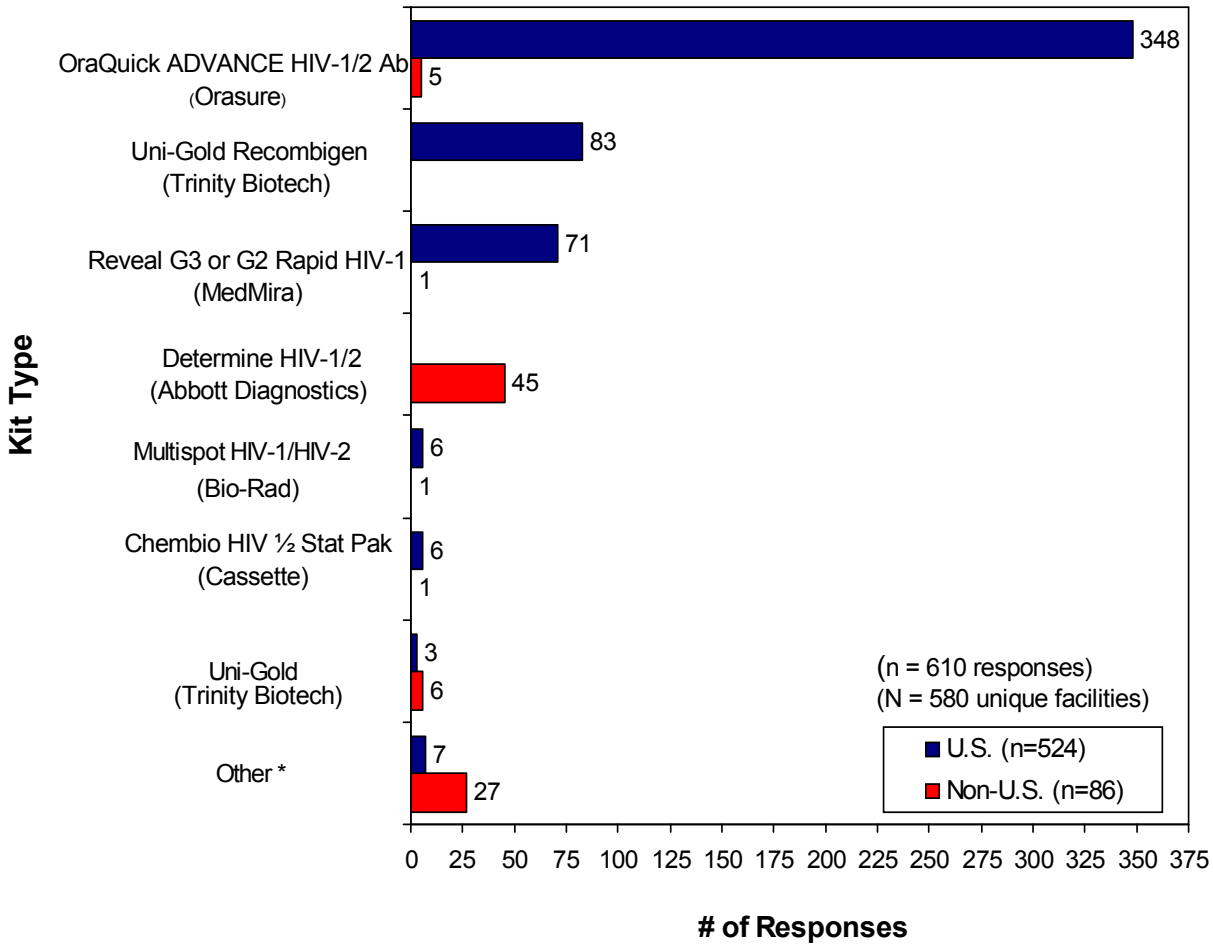
**Overview**

This section describes the kit types used by participants.

- The predominant kit type used in the U.S. was OraQuick ADVANCE Rapid HIV 1/2 Ab test (68.1%, 348/511 ), as shown in ***Figure 3***:
- The predominant kit type used in non-U.S. testing sites was Abbott Determine HIV-1/2 (65.2%; 45/69).
- Kit usage by lab type is shown in ***Figure 4.***

**Figure 3:**

**Kit types**




* "Other" kit types include:

Standard Diagnostics Bioline (6 non-US, 0 US responses)
Inverness Medical Clearview HIV 1/2 Stat-Pak (0 non-US, 6 US responses)
Trinity Biotech Capillus (4 non-US, 1 US responses)
Fujirebio Serodia HIV-1/2 (4 non-US, 0 US responses)
Fujirebio Serodia HIV (2 non-US, 0 US responses)
J. Mitra & Co. LTD HIV-TRIDOT (1 non-US, 0 US responses)
Other kit type, specified (10 non-US, 0 US responses)

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## Kit Types Used By Participants, Continued

The following figure illustrates the usage of the kit types by type of testing site. The methods for which there were twelve or less results are included in the "other kit type" category.

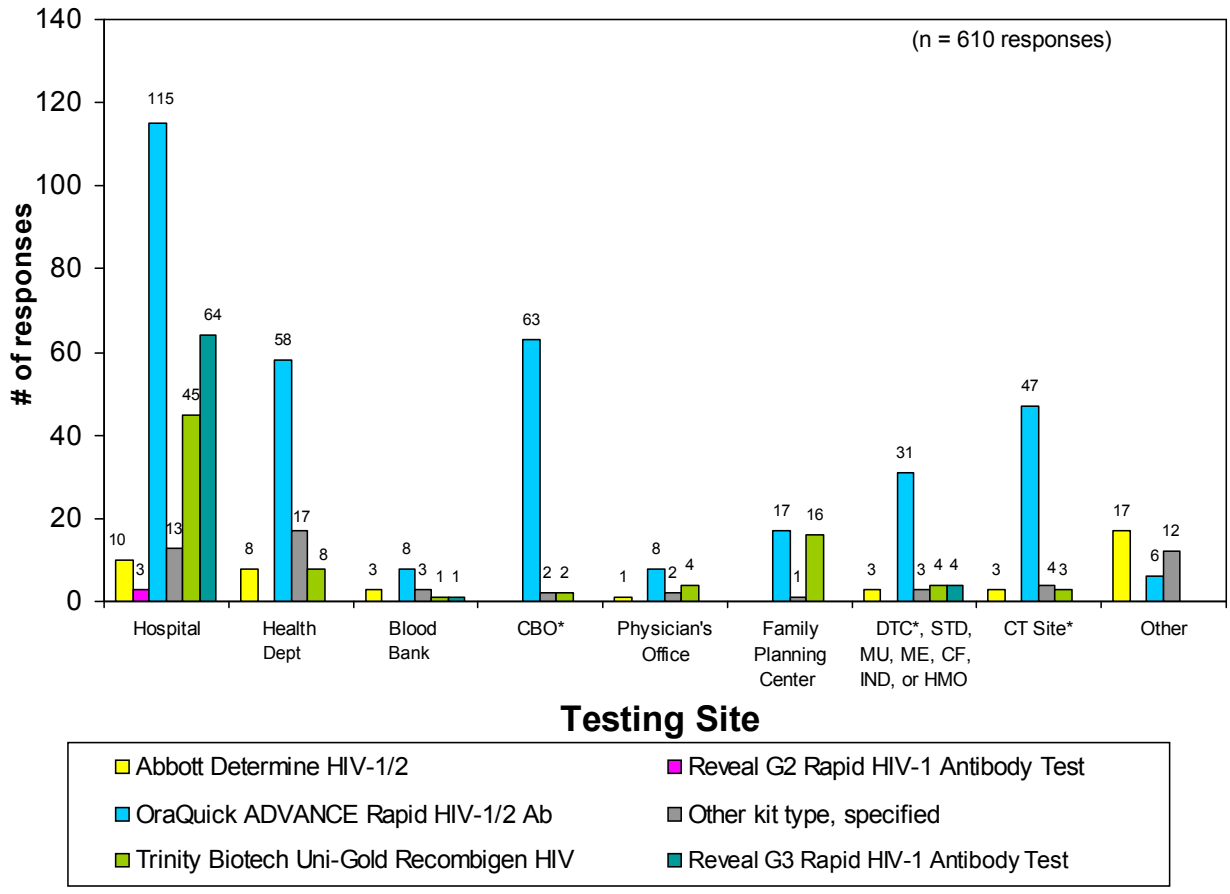
The predominate test kit used was OraQuick ADVANCE Rapid HIV 1/2 Ab Test. The percent of sites using this kit, by type of facility, is as follows:

- hospitals, 46.0%
- health departments, 63.7%
- outreach sites (DTCs, STD clinics, CT sites, family planning centers, mobile units)*, 69.9%
- CBOs*, 94.0%
- blood banks, 50.0%
- physician offices, 53.3%

Note: Some testing sites used more than one type of testing kit.

**Figure 4:**

**Testing site by kit type**




*Abbreviations:

CBO = community based organization
DTC = drug treatment center
STD = sexually transmitted disease clinic
IND = independent
CT Site = counseling and testing site
CF = correctional facility
ME = Medical Examiner
MU = mobile unit
HMO = health maintenance organization

## Specimen Types Used By Participants

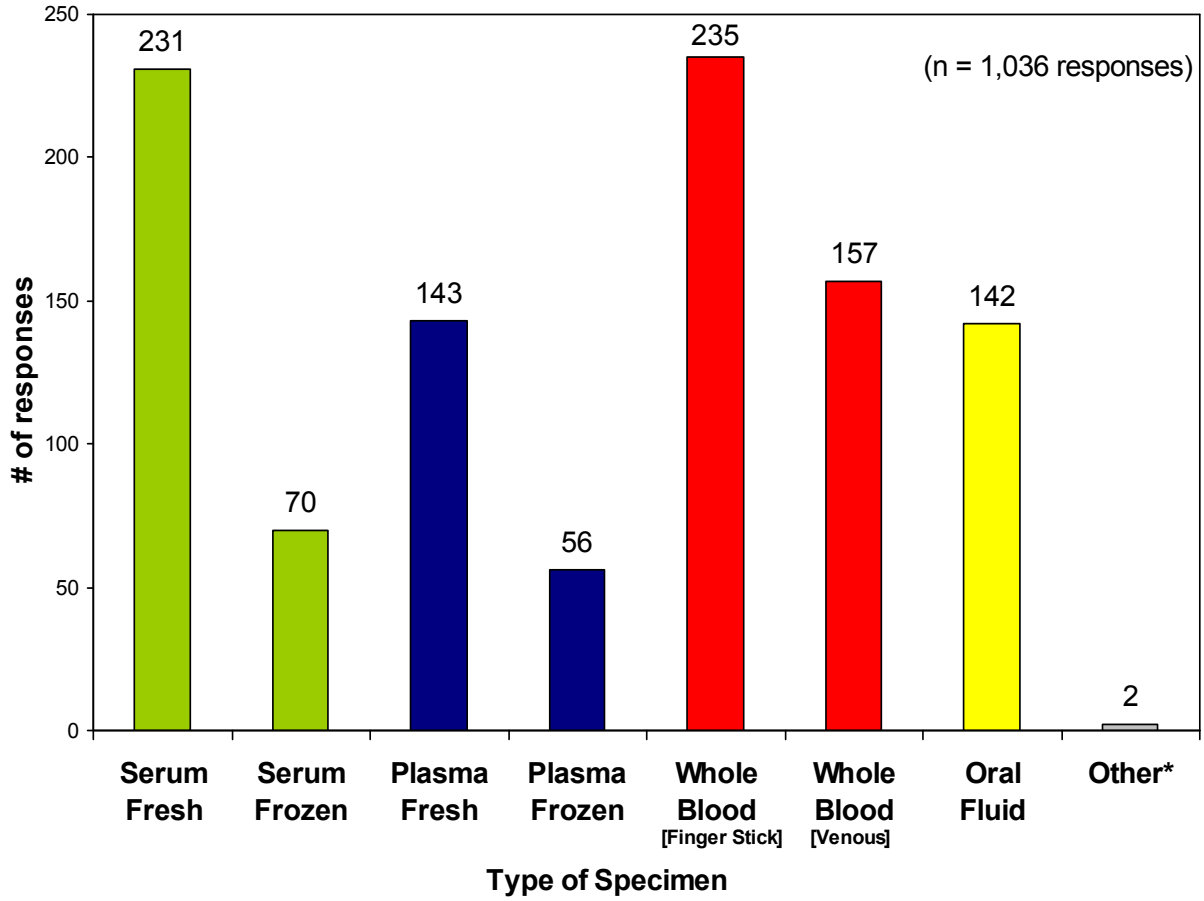
**Overview**

Participants were asked what type of specimens they normally use for HIV rapid tests.

- The breakdown in specimen types reported is shown in ***Figure 5***.
- Testing sites could report using more than one specimen type.

**Figure 5:**

**Specimen types**




* One "Other" specimen type was indicated as dried blood spot and one was not specified

The type of specimen(s) used in performing HIV rapid testing varied by the type of facility and the method of rapid testing (kit type).

As compared to the previous survey, the number of reports indicating oral fluid use increased slightly, while the actual percentage of use decreased: from 103 (19.5%) to 142 (13.7%).

## Quality Control (QC)

**Overview**

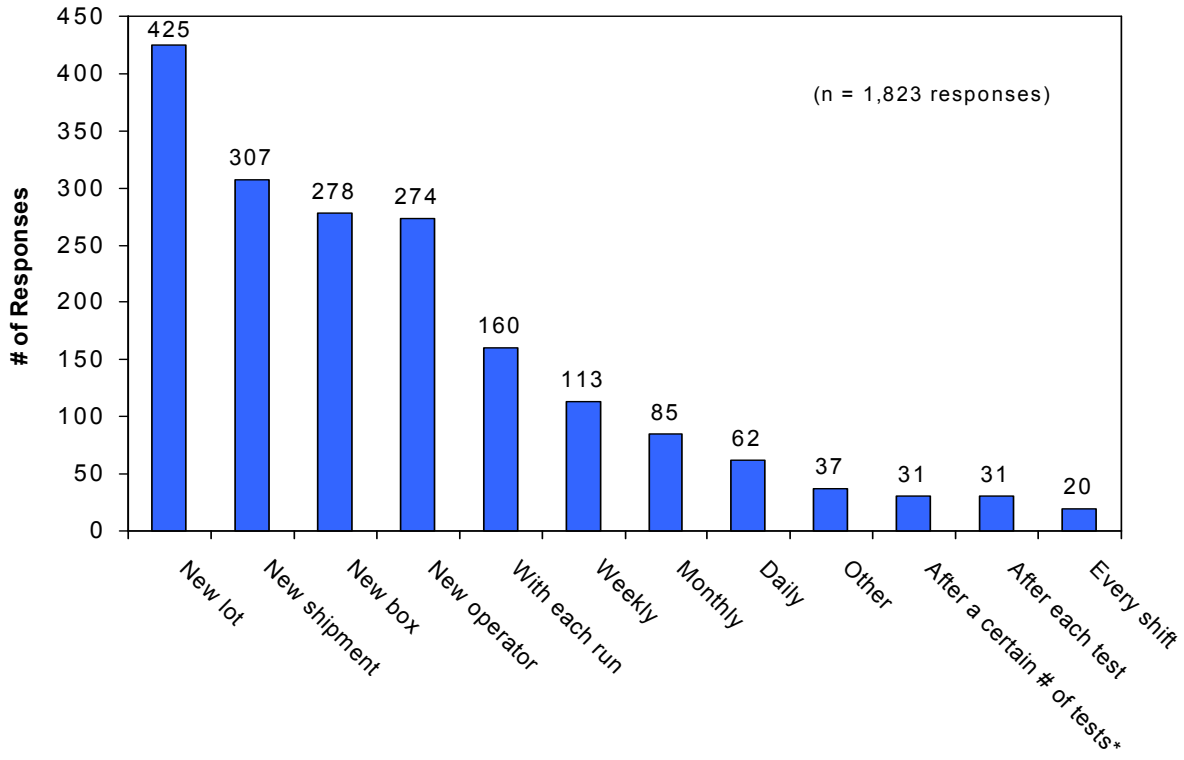
Testing sites were asked if they used quality control (QC) samples, either positive or negative, when performing HIV rapid tests. The frequency of use of quality control materials is shown in ***Figure 6***.

- 577 of the 580 facilities that returned responses answered the question regarding use of quality control samples (question #5).
- Most of these facilities (94.8%, 547/577) indicated the use of QC samples for at least one of the kit types they use at their testing site.
- Of the 1,572 responses indicating the source(s) from which the QC samples (positive and/or negative) were obtained, the sources identified were as follows:
  - controls obtained from the same manufacturer as the test kit (88.4%, 1390/1572),
    - 35.8% (497/1390) were included in the test kit, and
    - 64.2% (893/1390) were purchased from the kit manufacturer separately.
  - in-house controls (5.7%, 89/1572).
  - "Other" manufacturer (manufacturer not the same as for the test kit) controls (5.9%, 93/1572).

Notes: 1. Testing sites could provide more than one answer.
2. Testing sites reporting the use of multiple kit types answered the question separately for each kit type.

**Figure 6:**

**Frequency of use of quality controls**




* The most frequent response was 25 tests (Range 20-100)

## Confirmatory Testing

**Overview**

The types of confirmatory testing reported by laboratories varied (as shown in ***Figure 7)***. ***Note:*** Testing sites could answer by indicating more than one confirmatory test.

- Most responses given (597/937; 63.7%) indicated that reactive (preliminary positive) specimens were sent to another facility.
- In several cases, EIA was performed alone (24/937; 2.6%) or in combination with other testing (210/937; 22.4%).
- Some responses given (132/937; 14.1%) indicated using a second rapid test for confirmatory testing. Of these, 19/132 (14.4%) indicated using a second rapid test with no other type of confirmatory testing.

Twenty-eight respondents indicated that no confirmatory testing was required to confirm a positive result for the HIV rapid testing kit listed on at least one form. Of these:

- twenty-three sites did not indicate the use of confirmatory testing with any HIV rapid test kit;
    - fourteen were U.S. facilities, with the purpose for using the specified kit being
        - HIV initial testing (e.g. for patients/clients, needlestick and/or source patient): nine testing sites.
        - non-clinical testing (e.g. research, training, etc.) and determination of HIV-1 vs. HIV-2 reactivity: four testing sites.
        - no purpose specified: one testing site.
    - nine were non-U.S. facilities, with the purpose for using the specified kit being
        - HIV initial testing: six testing sites.
        - non-clinical HIV testing: three testing sites.

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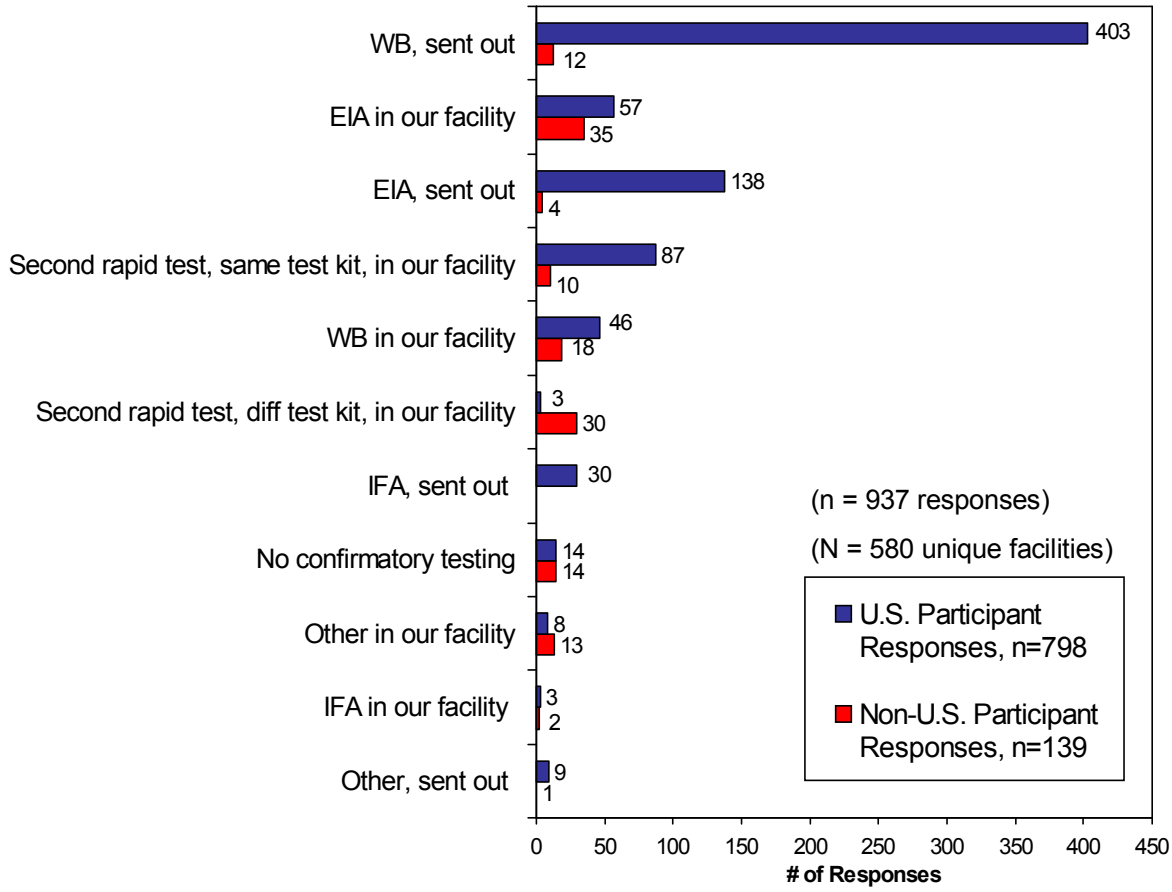
## Confirmatory Testing, continued

**Figure 7:**

**Types of confirmatory testing**



## Conclusions and Discussion

**Overall performance**

Overall accuracy in this shipment was 93.8%:

- 92.9% for the positive samples;
  - 99.6% for Donor 12 (strong positive),
  - 93.0% for Donor 21 (weak positive), and
  - 79.3% for Donor 20 (weak positive).

- 98.6% for the negative samples (Donor 6).

**Specimen types**

The number of testing sites reporting the use of oral fluid increased from 103 to 142 responses, while the actual percentage of use decreased from 19.5% to 13.7%. Of these, 139 were U.S. testing sites that tended to be community based organizations (CBOs) (49/140), counseling and testing sites (33/140), health departments (21/140), or family planning centers (12/140).

In this survey, 36 U.S. testing sites reported using serum and/or frozen plasma as specimen types for the OraQuick ADVANCE HIV-1/2 Antibody test kits. It should be noted that:

- The OraQuick test is not FDA approved for serum (fresh or frozen) or for frozen plasma specimens.

Use of non-FDA approved specimen types for either of these test kits is considered a modification of the OraQuick testing procedure and makes these non-waived under the Clinical Laboratory Improvement Amendments (CLIA). U.S. facilities should be aware of the CLIA regulations requiring the establishment of performance specifications when modifying an FDA-approved test (Sec. 493.1253).[5]

**Errors on positive samples**

The results from the current survey show a high number of errors on the positive challenge plasma samples (216/3043, 7.1%), similar to the December 2006 survey. As a comparison, the error rates in the previous four surveys were:

- 169/2184 (7.7%) for the December 2006 survey
- 21/1489 (1.4%) for the June 2006 survey,
- 4/1464 (0.3%) for the December 2005 survey, and
- 27/2414 (1.1%) for the June 2005 survey.

The majority of the false-negative errors in the current survey (119/196, 60.7%) were reported for the weak Donor 20 samples in the performance evaluation panels, as was the case in the previous survey of December 2006 (118/153 ; 77.1%).

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## Conclusions and Discussion, Continued

**Errors on positive samples (continued)**

It should be emphasized that all donor material undergoes extensive validation testing prior to inclusion in an HIV Rapid Testing MPEP survey panel. It was previously noted (in the HIV Rapid Testing Report of Sample Shipment Results, December 2006 at http://wwwn.cdc.gov/mpep/pdf/rapid/RT0612ResultReport.pdf ) that the Western blot results for the weak positive samples (Donors 20 and 21) showed highly reactive gp41 and p24 bands, while the gp120 bands were absent. This pattern indicates that these sera come from donors in the early stages of HIV infection (i.e. the donors are seroconverters).

Due to the unusually high error rate associated with weak positive Donor 20 noted previously in the December 2006 sample survey, additional validation testing was performed post-sample shipment. These tests confirmed the HIV-positive status of these samples and indicated results as "reactive/preliminary positive" by all FDA-approved HIV rapid testing kits. The reason for such a large number of false-negatives for the Donor 20 samples in the December 2006 and current survey remains unclear.

As suggested in the December 2006 report, "The errors on the Donor 20 samples may reflect that the concentration of antibody in this donor's plasma was at the limit of detectability for these test kits. In this case, within the acceptable bounds of quality control variability for sensitivity, a particular lot number for a rapid test kit could have a sensitivity just below that required to detect the antibodies in such a weak sample.

"Alternatively, this weakly-reactive positive challenge sample might have been missed more frequently due to testing technique or the testing/interpretation conditions at the testing site. An extremely light-colored 'reactive' test line (or dot) can be so difficult to detect that it requires a particularly high level of confidence by the person interpreting the test to report a 'reactive' result. In addition to this confidence, which comes from training and experience, good lighting in the testing area is necessary to correctly interpret a result from a very faint reaction."

We are considering additional investigation in order to identify the reason(s) for the unusually high false negative rate.

**Confirmatory testing**

Some U.S. testing sites that use HIV rapid tests for HIV initial testing purposes (i.e. screening) continue to use confirmatory testing algorithms that do not include Western blot (WB) or indirect immunofluorescence assay (IFA) as recommended by the CDC.

U.S. participants are reminded that:

1) HIV rapid tests (RT) are screening tests and reactive results are considered to be "preliminary positives" that must be confirmed by either a WB or IFA test.[1,3]

2) EIA tests for HIV are also considered to be screening, not confirmatory, tests. Some RT reactive specimens confirmed positive by WB or IFA produce negative results using EIAs.

3) CDC Guidelines recommend that preliminary positive (reactive) HIV rapid tests be confirmed with WB or IFA, even if a subsequent EIA test is nonreactive.[3]

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## Conclusions and Discussion, Continued

**Guidelines**

Testing sites are advised to follow appropriate guidelines with respect to performing HIV rapid tests and reporting results.[1,2,3] Attention to recognized guidelines and good testing practices is crucial to patient safety and to the delivery of accurate test results.

For example, the CDC has published quality assurance guidelines for testing using the OraQuick rapid test.[1] These guidelines can be applied to other HIV rapid tests performed in U.S. sites.

The guidelines:

- stress that a testing site must have an adequate quality assurance (QA) program in place before offering rapid HIV testing,
- provide recommendations for a comprehensive QA program,
- include recommendations regarding test verification to ensure that the test kits work as expected in a given testing environment, and
- encourage participation in an external quality assessment program, such as the MPEP, and address the logistics for providing confirmatory testing for preliminary positive (reactive) results.[1,3]

**References**


1. Quality Assurance Guidelines for Testing Using Rapid HIV Antibody Tests Waived Under the Clinical Laboratory Improvement Amendments of 1988. Centers for Disease Control and Prevention, U.S. Dept. of Health and Human Services. July 24, 2007. http://www.cdc.gov/hiv/topics/testing/resources/guidelines/qa_guide.htm

2. Quality Assurance Guidelines for Testing Using the OraQuick Rapid HIV-1 Antibody Test. Centers for Disease Control and Prevention, U.S. Dept. of Health and Human Services. 2003. http://www.cdc.gov/hiv/rapid_testing/materials/QA-Guide.htm

3. CDC. Revised guidelines for HIV counseling, testing, and referral. MMWR 2001; 50(No. RR-19):1-57. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5019a1.htm

4. Notice to Readers: Protocols for Confirmation of Reactive Rapid HIV Tests. MMWR 2004; 53(10): 221-222. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5310a7.htm

5. Notice to Readers: Approval of a New Rapid Test for HIV Antibody. MMWR 2002; 51(46): 1051-1052. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5146a5.htm

6. Code of Federal Regulations: Laboratory Requirements, 42 C.F.R. Chapter IV, Part 493 (2003). http://www.phppo.cdc.gov/clia/regs/toc.aspx

## Topical Issues in HIV Rapid Testing

**Introduction**

The HIV Rapid Testing Model Performance Evaluation Program (HIV-RT MPEP) strives to be a resource for facilities using HIV rapid testing kits. This section of the HIV-RT MPEP Report of Results, "Topical Issues in HIV Rapid Testing," is intended to address that part of our mission. We are including:

- ***Frequently Asked Questions (FAQs)*** by HIV RT MPEP participants to share with all participants our responses to some recent queries,
- ***CDC websites*** to provide participants with access to timely relevant material published online by the CDC, and
- ***HIV Rapid Testing Resources*** as a link to long-term references.

**FAQs: June 2007 survey**

This section provides answers to some of our participants' frequently asked questions (FAQs).

**Q: (from U.S. testing sites) If we participate in your program, will we be satisfying the legal requirements for performing HIV rapid testing on client/patient samples?**

A: Not necessarily. The MPEP is not part of any regulatory body; we maintain the confidentiality of our participants' results. You should check with your state department of health for specific information regarding legal approval for performing HIV rapid testing on clinical specimens.

**Highlights of previous FAQs**

**Q: Can I use an expired kit to do my MPEP sample panel (or patients) if the device control (the control line/dot) within the testing device develops properly?**

A: No.

The expiration dates set by the manufacturers reflect the ability of the test kits to produce a valid result for all samples over a specific time frame; while proper development of the device control must occur for a valid test, a valid test result also depends on the tester adhering to ALL of the manufacturer's instructions–including using a non-expired test kit.

**Q: May we use as QC material the positive and/or negative MPEP samples left over from the panels you send us?**

A: No, this is an inappropriate use of MPEP samples.

Our samples are validated only for the purpose of performance evaluation (PE) in HIV rapid testing. While we recognize that extra sample volume (i.e. not used to do the test for the survey shipment) in our panels has been, and will continue to be used effectively for training/practice purposes, the "left-over" sample material is not designed to be used in the very important role of Quality Control (QC) samples. Appropriate QC material can be purchased from a number of commercial sources.

For more information on proper specimen labeling and other good laboratory testing practices, please see *Good Laboratory Practices for Waived Testing Sites*, [MMWR 54(RR13):1-25] at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5413a1.htm

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## Topical Issues in HIV Rapid Testing, Continued

**Highlights of previous FAQs (continued)**

**Q: What types of specimens can be used in performing HIV rapid testing?**
A: The type(s) of specimens (e.g. whole blood, serum, plasma, oral fluid, etc.) that are appropriate to use for HIV rapid testing depends on the test kit used. Each manufacturer includes information regarding approved specimen type(s) in the package insert for their HIV rapid testing kit.

**Q: Can I read my HIV rapid test results as soon as the control line/spot appears?**
A: You need to wait the minimum time as specified in the directions given by the manufacturer (as found in the package insert) before reading the result for a client/patient. Even if the within-device control line/spot can be seen, positive specimens may need the full minimum time for the color to develop properly. Please note that you should not read results after the specified maximum time limit.

To view other FAQs in previous HIV RT MPEP reports, please visit our website at:
http://wwwn.cdc.gov/mpep/hiv-1rt.aspx

**CDC websites**

*Quick Facts: Rapid Testing*
http://www.cdc.gov/hiv/topics/testing/index.htm

*MMWR: Notice to Readers: Protocols for Confirmation of Reactive Rapid HIV Tests*
http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5310a7.htm

*Quality Assurance Guidelines for Testing Using the OraQuick® Rapid HIV-1 Antibody Test*
http://www.cdc.gov/hiv/topics/testing/resources/guidelines/qa_guide.htm

*International Laboratory-related Resource and Activity Directory*
http://wwwn.cdc.gov/dls/default.aspx

*MMWR: Good Laboratory Practices for Waived Testing Sites*
http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5413a1.htm

**HIV rapid testing resources**

HIV Rapid Testing MPEP website: http://wwwn.cdc.gov/mpep/hiv-1rt.aspx

Model Performance Evaluation Program (MPEP) Home page: http://wwwn.cdc.gov/mpep/

Food and Drug Administration (FDA) Licensed / Approved HIV, HTLV and Hepatitis Tests
http://www.fda.gov/cber/products/testkits.htm

The National Center for HIV, STD, and TB Prevention (NCHSTP)
Divisions of HIV/AIDS Prevention (DHAP) website: http://www.cdc.gov/hiv/default.htm

The National Center for HIV, STD, and TB Prevention (NCHSTP) Home page
http://www.cdc.gov/nchhstp/

The World Health Organization: http://www.who.int/en/