Iowa Adopts New HIV Testing Algorithm
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Objectives
At the completion of this webinar, participants will:
• Be familiar with the difference between HIV antibody, antigen, and RNA
• Have a basic understanding of the new HIV testing algorithm that will be used at the State Lab after 11/6/2012
• Understand the new “diagnostic window of detection” and possible test results for serum samples that are tested at the State Lab after 11/6/2012
• Be familiar with the advantages and disadvantages of rapid vs. conventional HIV testing
• Timeframe and processes for submitting specimens to the lab.

Terms
• HIV Testing Algorithm
  — Sequence in which different diagnostic tests are used to arrive at a definitive diagnosis
• Conventional HIV Test Algorithm
  — Blood (serum) sample taken from client via venipuncture; sample sent to laboratory for testing
  — Screening and supplemental tests performed at lab as necessary
  — Result sent back to provider for delivery to client
• Rapid HIV Test Algorithm
  — Blood or oral fluid sample taken from client via finger stick or oral swab; screening test performed onsite
  — Non-reactive result can be shared with client in less than 1 hour
  — Reactive result requires confirmation with conventional test as described above

HIV Testing Processes Then and Now

HIV Antibody Testing
• Antibodies are proteins produced by the immune system to neutralize infections or malignant cells
• Most people develop detectable HIV antibodies 2-8 weeks after infection (average 25 days)
• Current HIV testing algorithm used at the State Lab:
  – EIA screen (3rd Generation)
  – Confirmed by Western Blot (WB)

1989: CDC recommended two-test algorithm for HIV diagnosis

<table>
<thead>
<tr>
<th>T1: HIV-1 EIA</th>
<th>T2: Western blot (WB) or immunofluorescence assay (IFA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-reactive</td>
<td>Reactive</td>
</tr>
<tr>
<td>Report as</td>
<td>Report as</td>
</tr>
<tr>
<td>HIV Neg.</td>
<td>HIV Neg. indeterminate</td>
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<tr>
<td></td>
<td>Report as</td>
</tr>
<tr>
<td></td>
<td>HIV-1 Pos.</td>
</tr>
</tbody>
</table>
**HIV Testing has changed over time**

<table>
<thead>
<tr>
<th>Year</th>
<th>Blood Banks</th>
<th>Inpatients where HIV &gt; 1%</th>
<th>More public and private health care settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
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<td>1987</td>
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<td>2001</td>
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<td>2006</td>
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**HIV Progression and Detectable Response**

![HIV Antibody](Slide courtesy of Bernie Branson)

**HIV Progression and Immune Response**

![HIV Antibody](Das G et al. BMJ 2010;341:bmj.c4583)

**Progression of HIV Viral Markers**

![HIV Antibody](Das G et al. BMJ 2010;341:bmj.c4583)

**p24 Antigen**

- An antigen is a virus, part of a virus, or a foreign body that triggers the production of antibodies in the body.
- p24 is the antigen on HIV-1 that most commonly provokes an antibody response.
- First marker of HIV-1 infection.
- Can be detected at 2 weeks from infection.

**HIV Progression and Detectable Response**

![HIV Antibody](Slide courtesy of Bernie Branson)
**4th Generation Ag/Ab Test**

- 2 FDA-approved kits available
  - ARCHITECT HIV Ag/Ab Combo (Abbott)
  - GS HIV Ag/Ab Combo EIA (Bio-Rad)
- Detects HIV-1 p24 Ag, HIV-1 and HIV-2 antibodies
- Reactive result:
  - Doesn’t distinguish between Ag and Ab
  - Preliminary positive
  - Supplemental testing required

**Why do we need new HIV testing strategies/algorithms?**

- Evolving technology
  - Tests recently approved by FDA are not included
  - Availability of rapid tests
  - Increased sensitivity of screening assays
    - Western blot and IFA now less sensitive than some screening assays which they are intended to “confirm”

**Diagnostic Window of Detection**

- The time from infection to detection
- Varies depending on the test used

**Windows of Detection**

<table>
<thead>
<tr>
<th>Test</th>
<th>Window of Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th Gen:</td>
<td>2 weeks</td>
</tr>
<tr>
<td>• Conventional</td>
<td></td>
</tr>
<tr>
<td>3rd Gen:</td>
<td>2-8 weeks (avg. 25 days)</td>
</tr>
<tr>
<td>• Conventional</td>
<td></td>
</tr>
<tr>
<td>• Rapid HIV Test</td>
<td></td>
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</tbody>
</table>

**Acute HIV Infection**

- The risk of transmitting HIV to others is high during acute infection. Therefore, **risk reduction measures are especially important** during this time.
- Initiating antiretroviral treatment during acute HIV infection may:
  - Reduce the HIV viral set point and preserve key immune response functions that may slow disease progression
  - Reduce the likelihood of transmission to others.
- These advantages may be outweighed by practical concerns about an individual patient’s ability or readiness to take multiple medications.
- Decisions about treatment are individualized. However, with acute infections, initiating care with an Infectious Disease clinician is crucial and very time-sensitive.
What are we looking for from these new testing strategies?

- Resolution of indeterminates
- Ability to confirm HIV-2 infections
- Increased detection of acute infection
- Use of assays as screening or confirmatory/supplemental tests and as part of multi-test algorithms

The New (Conventional) HIV Testing Algorithm: Get to Know It!

**New HIV Testing Algorithm**

**Step 1**

- **4th Gen EIA (antigen/antibody)**
  - reactive
  - non-reactive
Multispot HIV Ab Test

- Supplemental test
  - used after a reactive 4th Gen EIA
- Replaces WB
  - More sensitive and specific than WB
  - Faster and less expensive than WB
- Will differentiate HIV-1 and HIV-2

Nucleic Acid Amplification Test for HIV-1 RNA

- Supplemental test
  - Used after a reactive EIA and a non-reactive Multispot
- Highly sensitive test which can detect the presence of viral RNA
- HIV-1 RNA/NAAT testing can detect acute HIV-1 infection

HIV Progression and Detectable Response

- HIV-1 RNA (plasma)
- HIV p24 Antigen

Days since infection

New HIV Testing Algorithm

Step 2

- 4th Gen EIA (antigen/antibody)
  - reactive
  - Multispot (antibody)
    - HIV 1+
    - HIV 2+
    - HIV 1 and 2 -

What if you get a non-reactive result from the Multispot antibody test?

Step 3

- 4th Gen EIA (antigen/antibody)
  - reactive
  - Multispot (antibody)
    - HIV 1+
    - HIV 2+
    - HIV 1 and 2 -

New HIV Testing Algorithm Results

<table>
<thead>
<tr>
<th>Lab Report</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative. HIV-1 p24 antigen, HIV-1 and HIV-2 antibodies not detected.</td>
<td>If client did not have risk in the two weeks before the test or since, the client does not have HIV.</td>
</tr>
<tr>
<td>Positive. HIV-1 antibodies detected.</td>
<td>The client has HIV-1.</td>
</tr>
<tr>
<td>Positive. HIV-2 antibodies detected.</td>
<td>The client has HIV-2.</td>
</tr>
<tr>
<td>Positive. A reactive HIV antigen/antibody test and a positive HIV-1 RNA test indicate acute HIV-1 infection.</td>
<td>The client has HIV-1 and the test result indicates that s/he was recently infected (likely 2-8 weeks before taking the test).</td>
</tr>
<tr>
<td>Negative. HIV antibodies not detected. No detectable HIV-1 RNA/NAAT.</td>
<td>The client does not have HIV-1. The client should be retested in two weeks to rule out possibility of acute HIV-2.</td>
</tr>
</tbody>
</table>
What if the Multispot is Negative?

- SHL will send the serum to Florida’s State Public Health Lab for NAAT testing.
  - If NAAT is positive, the patient is HIV positive
  - If NAAT is negative, the patient is HIV negative

HIV Testing Instructions

Submission Requirements:
- Serum, plasma and oral fluid samples are accepted for HIV antibody testing.
- Acceptable specimens for HIV Ag/Ab Combo testing include serum and plasma DNA.
- Label tube with patient’s name or unique identifier; date of birth (DOB), and the date of collection.
- UNLABELED SPECIMENS WILL NOT BE TESTED.
- A completed HIV Test Request Form must accompany specimens.

Specimen Collection and Handling:
- Blood samples must be collected in a red stopper, serum separator (SST), or a tube without anticoagulants. Other possible samples should be centrifuged to separate serum from cells.
- Following collection, serum samples may be stored at room temperature for 3 days or 2-8°C for 7 days.
- A 1 red blood color is the minimum recommended volume for submission.
- Oral fluid samples must be collected in an OraSure collection device. See directions for collection instructions.
- OraSure specimens may be stored from 4-37°C for a maximum of 21 days from the time of collection.
- Include the time for shipping and handling.
- Label specimen, wrap the collection tube in absorbent material, and place into a biohazard bag.

HIV Testing Instructions (continued)

Complete Test Request Form:
- Complete test Request Form which includes the following information:
  - Two unique identifiers, including the patient’s name if no unique test site, other states can use unique identifiers
  - Date of collection
  - Specimen type and date of collection
  - Test ordered should be clearly marked.
  - Previous reactive test method (if applicable).
  - Clinic name and a unique identifier.
  - Include a completed HIV Test Request Form with each submitted test

Shipping Instructions:
- Include completed HIV Test Request Form in outside package of biohazard bag.
- Roll up the bag and place in mailing tube.
- Seal outer edge is to the label of collection unopened and provided with the kit or request.
- ships at ambient temperature as soon as possible and first class mail.
- Includes and a unique identifier and a unique identifier.
- Include a completed HIV Test Request Form with each submitted test.

Contact Information:
- For test requests, call 515-331-3133.
- Test results may be obtained online at http://www.shl.uiowa.edu/testmenu/clinicaltestmenu.xml
- Any questions should be directed to Shlui@uiowa.edu
- We appreciate your continued support.

Also Remember

- Test must be received in 3 days by SHL or refrigerate for up to 7 days.
Iowa Guidelines

• Use Clearview Rapid
• Architect Ag/Ab Test is performed at SHL and confirms positive Clearview Rapid

For More Information

Proposed HIV Test Algorithms:
http://www.hivtestingconferencearchive.org/hivtesting2010/
Click on "HIV Testing Algorithms: A Status Report"

CDC HIV testing resources:
http://www.cdc.gov/hiv/topics/testing/index.htm
http://www.cdc.gov/dls/waivedtests

APHL resources:
http://www.aphl.org/aphlprograms/infectious/hiv/Pages/default.aspx

NASTAD resources:
http://www.nastad.org/resources.aspx?searchkey=hiv%20prevention

Questions?