The High Positive Immunoassay Confirms HIV-1 Infection and Avoids the Need of Confirmatory Tests

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Background

• HIV IAs are traditionally interpreted in a qualitative manner
  – Reactive (positive) or non-reactive (negative)
  – A quantitative result is generated and expressed as a signal-to-cutoff ratio (reactivity index) of each individual sample
  – The S/CO ratio is directly related to the antibodies concentration

• Previous studies
  – A high S/CO of HIV IA was associated with true positive results
Objectives of the study

“To assess whether a high S/CO ratio of an HIV third-generation enzymatic IA is an accurate predictor of confirmatory results in patients with positive HIV antibodies test”
Materials & Methods

• Public Health Laboratory of Colima
• Diagnostic test design (retrolective)
• Eligible
  – Positive HIV IA (2)
  – ≥ 13 years
  – Not pregnant
  – Patients setting (High prevalence)
Laboratory Tests

– Vironostika 1 Microelisa System
  • Automated equipment
  • S/CO ratio recorded from the analyzer

– Cobas Amplicor HIV-1 Monitor, v 1.5
  • Quantitative HIV-1 RNA test
  • Reverse transcription–polymerase chain reaction

– Cambridge Biotech HIV-1, Western Blot Kit
Gold Standard

• A positive WB test by CDC’s criteria
  or
• HIV-1 RNA $\geq$ 2000 copies/ml

• Indeterminate WB result without HIV RNA test were considered as false-positive (or non confirmed)
Results

HIV Antibodies Test
n= 6330

Positivea
n= 493 (7.8%)

Included Subjects
n= 393

Negative
n= 5837

Excluded n= 100
No supp. testing 53
Different IA 16
Blood donors 12
<13 years 4
Pregnancy 2
No basic data 13
Receiver Operator Characteristics

S/CO ratio 11.6

AUC = 0.974 (IC 95% 0.94-1)
HIV Antibodies Immunoassay
n=6330

Negative
n=5837

Positive*
n=493

Excluded
n=100

Included Subjects
n=393

Low Positive HIV IA
(S/CO < 11.6) n=119

High Positive HIV IA
(S/CO ≥ 11.6) n=274

Supplemental Testing (Western Blot and HIV RNA Tests)

Negative
n=15 (12.6%)

Positive
n=104 (87.4%)

Negative
n=0

Positive
n=274 (100%)
Comparison of Two Different cutoffs of HIV IA

<table>
<thead>
<tr>
<th></th>
<th>S/CO ratio &gt; 3.0</th>
<th>S/CO ratio ≥ 11.6</th>
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</thead>
<tbody>
<tr>
<td>Sensitivity, % (95%CI)</td>
<td>99.7 (99.2-100)</td>
<td>72.5 (68.1-76.9)</td>
</tr>
<tr>
<td>Specificity, % (95%CI)</td>
<td>46.7 (41.8- 51.6)</td>
<td>100.0 (98.9-100)</td>
</tr>
<tr>
<td>PPV, % (95%CI)</td>
<td>97.9 (96.5-99.3)</td>
<td>100.0 (98.9-100)</td>
</tr>
<tr>
<td>NPV, % (95%CI)</td>
<td>87.5 (84.3-90.7)</td>
<td>12.6 (9.8-15.3)</td>
</tr>
<tr>
<td>+ Likelihood Ratio</td>
<td>1.9</td>
<td>72.5</td>
</tr>
<tr>
<td>- Likelihood Ratio</td>
<td>0.06</td>
<td>0.27</td>
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Proposal of a Diagnostic Algorithm Including the High Positive HIV IA Result

HIV Immunoassay

- Positive* → True positive IA
  - HIV Infection
- Negative → Low positive
  - Additional testing is required
  - False positive IA
  - Non-HIV Infection
- Supplemental Testing
  - Positive
  - Indeterminate
  - Negative

True positive IA HIV Infection
Conclusions

- A high positive HIV IA may confirm HIV-1 Infection (high prevalence population)
- Quantitative assessment of HIV IA
  - No additional efforts
  - May shortens required time for HIV confirmation
  - Avoids the need of unnecessary supplemental tests
- These findings warrant further research
  - Others HIV immunoassays
  - Other populations