Utility of Multispot HIV-1 spot reaction intensity & immunoassay S/CO ratio for determining HIV infection status

Linda Styer, Tim Sullivan, Monica Parker

Wadsworth Center
New York State Department of Health
FIGURE 3. Proposed diagnostic algorithm for HIV diagnosis. *Denotes if Ag/Ab combo test is used.

In addition to the +/- result, the first two tests in algorithm also provide quantitative or semi-quantitative results.

**EIA**

\[
S/CO = \frac{\text{OD value of sample}}{\text{OD value of neg ctrl}}
\]

**Multispot Intensity**

0 = non-reactive  
1 = barely visible reactive  
2 = weak but easily visible  
3 = strong but less than control  
4 = strong or stronger than control spot
Goal: Can EIA S/CO or Multispot spot intensity provide helpful diagnostic information?

- Clinical data from 2007-2012
- Reactive on Bio-Rad HIV-1/2 +O and tested by Multispot
- Exclude HIV-2 + or HIV undifferentiated
- If EIA OD = OVER, ratio = ‘13’
- Total of 2,574 specimens
EIA +, MS tested specimens were classified as HIV positive or negative

<table>
<thead>
<tr>
<th>HIV-1 Positive (n=2,497)</th>
<th>HIV Negative (n=77)</th>
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<tbody>
<tr>
<td>HIV-1 WB P</td>
<td>HIV-1 RNA ND</td>
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<tr>
<td>or</td>
<td>or</td>
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<tr>
<td>HIV-1 RNA D</td>
<td>Unknown with ‘negative’ follow-up specimen</td>
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<tr>
<td>or</td>
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<tr>
<td>Unknown with ‘positive’ follow-up specimen</td>
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EIA S/CO and Multispot intensity – HIV negative specimens

HIV-1 Peptide spot intensity

HIV-1 Recombinant spot intensity
HIV negative specimens have wide range of S/CO and some MS false +
HIV Positive specimens have high S/CO and several MS false negatives

HIV-1 Peptide spot intensity

HIV-1 Recombinant spot intensity
Neither MS spot alone separates HIV positive and negative specimens
Sum of intensity scores for both spots provides better separation.
Can EIA S/CO or Multispot intensity (sum) provide useful diagnostic information?

1) Distinguish between false positive and true positive Multispot

2) No Western blot banding pattern to suggest recency
Using Multispot spot intensity (sum) \( \geq 2 \) eliminates FP

99.8% of HIV positive specimens
Revised algorithm recommends RNA testing for discordant MS HIV-1 spots

16 specimens w/ discordant HIV-1 spots (P=0, R=1-4)

Or discordant HIV-1 spots

3 HIV neg

13 HIV pos

FIGURE 3. Proposed diagnostic algorithm for HIV diagnosis. *Denotes if Ag/Ab combo test is used.
EIA S/CO distinguishes b/w HIV(+) and HIV(−) Multispot discordant specimens
Relationship between WB + bands and EIA S/CO or Multispot intensity?
Number of positive WB bands correlates with Multispot spot intensity
Number of positive WB bands increases with Multispot intensity
Conclusion: EIA S/CO and Multispot spot intensity can provide useful diagnostic information.

EIA S/CO distinguishes between TP and FP Multispot results (discordant HIV-1 spots)

Relationship between Multispot intensity and number of + WB bands