Multispot HIV-1/HIV-2

Geenius HIV-1/HIV-2

Methods

We evaluated Geenius, an algorithm with a panel of 873 specimens previously tested with FDA-approved screening tests, Multispot and the Aptima RNA assay (NAT) and classified by the CDC algorithm. This panel consisted of:

- 638 classified as HIV by the CDC algorithm (HIV+).
- 8 classified as acute HIV-infected (acute) and
- 207 challenge specimens with reactive results on at least one HIV-1/HIV-2 screening test selected from 931 specimens classified as negative based on negative 4th generation screening and Aptima tests:

- 183 with a reactive HIV screening test result other than Multispot, and
- 26 with only a reactive Multispot screening test result.

We compared Geenius results to those from the CDC Algorithm and Multispot. The 26 samples that only screened reactive using Multispot were excluded from the Multispot/Geenius comparison because Multispot can not be used as a supplemental test after a reactive Multispot screening test result.

Figure 1: CDC’s recommended laboratory HIV testing algorithm

Results

Geenius results compared with CDC Algorithm

- Geenius classified 656 of 659 (99.7%) HIV-1 specimens as HIV Positive

- 1 specimen gave a false-positive Geenius result and 2 were false-positive HIV undifferentiated using Multispot

- For 207 challenge specimens with reactive screening test results that were algorithm negative,

- 2 [0.02% of 5415 algorithm negative specimens] was HIV-1 positive by Geenius [weakly reactive for p31 and gp41 only]

- 25 specimens were initially Geenius indeterminate, (2/25, 8%) were HIV-2 indeterminate with a weak gp140 band (Figure 3)

- 10/30(33%) HIV-2 Indeterminate specimens were HIV negative when retested as specified in the package insert

- After retesting a total of 11 indeterminate results remained (see Table 1)

Table 1: Comparison of Geenius results with CDC Algorithm results

<table>
<thead>
<tr>
<th>CDC Algorithm</th>
<th>Negative</th>
<th>Indeterminate</th>
<th>Positive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geenius Indeterminate</td>
<td>184</td>
<td>195</td>
<td>3</td>
<td>282</td>
</tr>
<tr>
<td>Geenius Positive</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Geenius Total</td>
<td>184</td>
<td>195</td>
<td>4</td>
<td>283</td>
</tr>
</tbody>
</table>

Table 2: Comparison of initial Geenius and Multispot results for 183 specimens classified as HIV-negative by the CDC algorithm but reactive on at least one screening test

<table>
<thead>
<tr>
<th>HIV positive</th>
<th>HIV indeterminate</th>
<th>HIV negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geenius</td>
<td>Multispot</td>
<td>Geenius</td>
</tr>
</tbody>
</table>
| 11 HIV-1+ specimens were initially Geenius indeterminate and remained indeterminate after the 1:10 dilution protocol | 2 HIV negatives were classified as HIV Positive after the 1:10 dilution protocol. | 2 specimens gave a false-positive Geenius result and 2 were false-positive using Multispot.

Discussion

The Geenius assay demonstrated 99.7% (5415/5421) agreement with HIV-1 samples identified by the CDC algorithm:

- 1 specimen gave a false-positive Geenius result.

- HIV-2 cross-reactivity is a well known problem

- 2 Geenius specimens were indeterminate and required additional testing to resolve HIV-2 cross-reactivity with Geenius than with Multispot

- 1 specimen was Geenius negative and Multispot reactive

- 1 specimen in Multispot was reclassified as HIV-2 only by Multispot and remained HIV-2 indeterminate after being repeated on Geenius.

- 1 specimen gave a positive Geenius result and 2 were false-positive using Multispot.

- 2 specimens classified as HIV negative or indeterminate would go on to HIV-1 testing, compared to 2 with undifferentiated Multispot results that required the dilution protocol.

- 2 specimens classified as HIV-1 low positive were indeterminate after the 1:10 dilution protocol and remained virally suppressed.

- Both HIV-2 indeterminate specimens were HIV negative after the 1:10 dilution and would have been categorized as HIV Positive [undeterminate].

- 11 HIV-1 specimens were initially Geenius indeterminate and remained indeterminate after the 1:10 dilution protocol.

- 1 specimen gave a positive Geenius result and 2 were false-positive using Multispot.

- Of 181 challenge specimens:

- 1 specimen gave a false-positive Geenius result and 2 were false-positive using Multispot.

- 2 specimens classified as HIV negative or indeterminate would go on to HIV-1 testing, compared to 2 with undifferentiated Multispot results that required the dilution protocol.

- 2 specimens classified as HIV-1 low positive were indeterminate after the 1:10 dilution protocol and remained virally suppressed

- Both HIV-2 indeterminate specimens were HIV negative after the 1:10 dilution and would have been categorized as HIV Positive [undeterminate].

- 11 HIV-1 specimens were initially Geenius indeterminate and remained indeterminate after the 1:10 dilution protocol.

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- Of 181 challenge specimens:

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- 11 HIV-1 specimens were initially Geenius indeterminate and remained indeterminate after the 1:10 dilution protocol.

- 1 specimen gave a positive Geenius result and 2 were false-positive using Multispot.