Performance of the Avioq VioOne™ HIV Profile™ Supplemental Assay for Confirmation and Differentiation of HIV-1 and HIV-2 Antibodies

2022 Advancing HIV, STI and Viral Hepatitis Testing Conference

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Disclaimer

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Disclaimer: Tradenames are used for informational purposes and do not constitute an endorsement by the Florida Department of Health

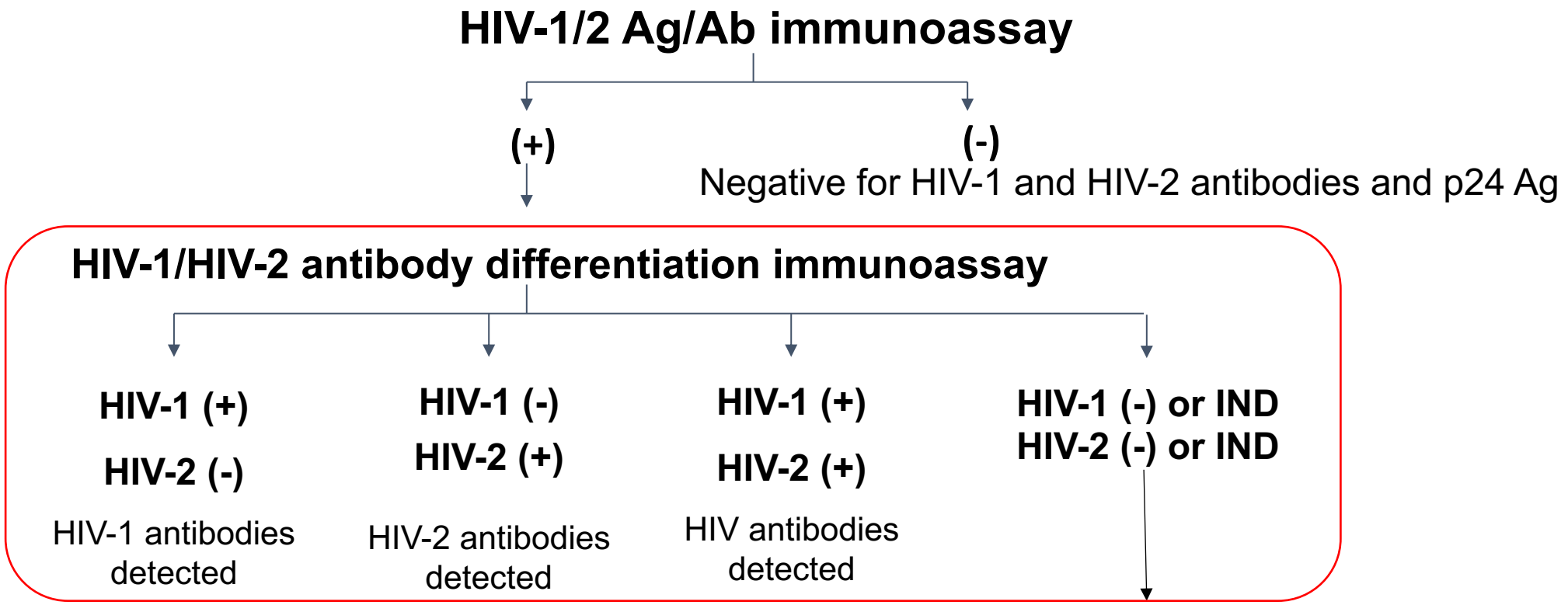
Disclosure: I do not have any financial relationship with commercial entities to disclose.

Background

- The Florida Bureau of Public Health Laboratories (BPHL) serves 67 county health departments (CHD) and contracted community-based organizations (CBO) statewide.

- The BPHL performs >90,000 HIV-1/2 diagnostic tests per year with approximately 2,800 specimens reflex to HIV-1/2 supplemental Ab testing. Of these approximately 89% are confirmed HIV-1 Ab positive, 9% HIV-1/2 Ab negative and the remaining 2% Ab indeterminate.

2014 HIV Diagnostic Algorithm[1]



[1]July 2014 new recommendations at;
www.cdc.gov/hiv/testing/lab/guidelines

Avioq VioOne™ HIV Profile™ Supplemental Assay

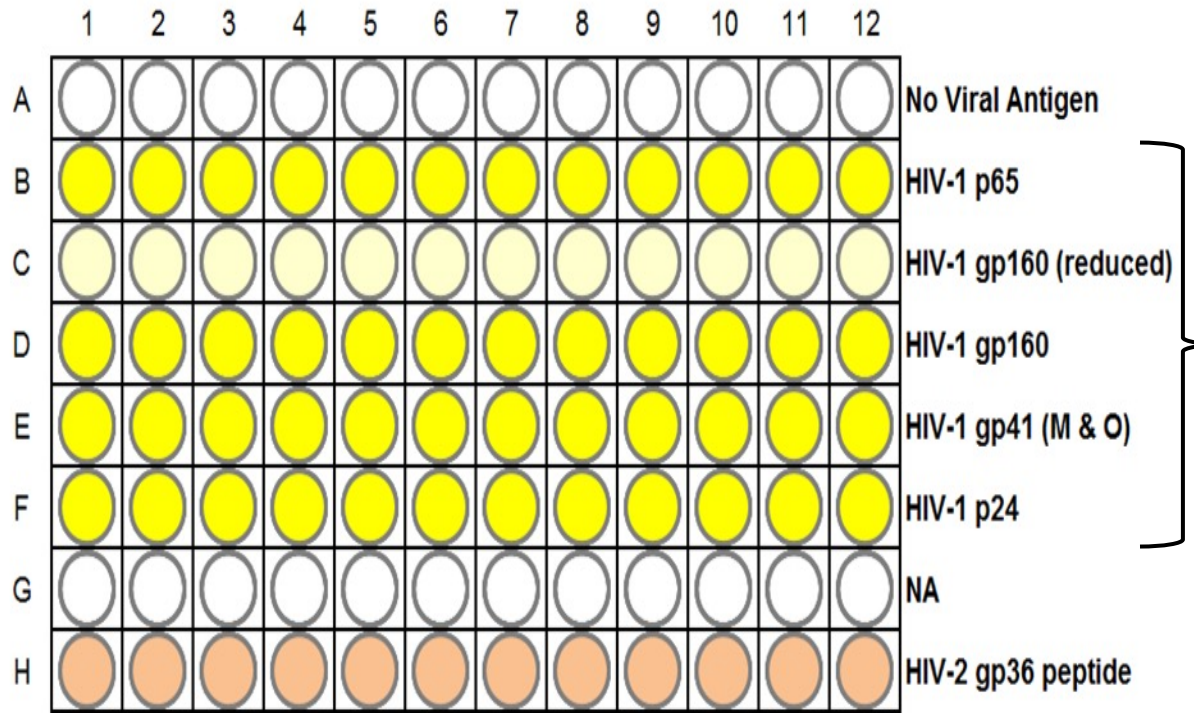
- ELISA microplate platform
  - Four HIV-1 antigens (p24, p65, gp41 and gp160)
  - One HIV-2 antigen (gp36)

- 96-well microplate washer/reader required

- An HIV-1/2 Positive control and a Negative control must be included in each run with up to 10 clinical specimens per plate

- FDA approved Oct 2020, intended for serum, plasma

Avioq VioOne™ HIV Profile™ Supplemental Assay



- Specimen wells with S/CO ≥1.0 are reactive

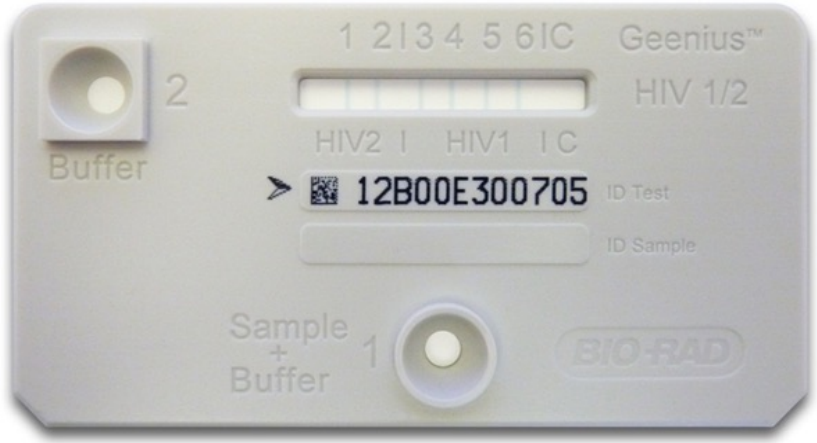
HIV-1 positive if S/CO ≥ 1.0 for 2 or more HIV-1 wells
(HIV-1 indeterminate if only 1 antigen well)

- HIV-2 positive if S/CO ≥1.0 for the HIV-2 gp36 well

Bio-Rad Geenius™ HIV-1/2 Supplemental Assay

- Single-use immunochromatographic assay for the confirmation and differentiation of antibodies to HIV-1 and HIV-2
- Detects IgG antibodies
  - Two HIV-2 bands (gp36, gp140)
  - Four HIV-1 bands (p31, gp160, p24, gp41)
  - Internal control band w/each cassette

1 = gp36
2 = gp140
3 = p31
4 = gp160
5 = p24
6 = gp41
C = Control



- Proprietary Geenius software and reader
- FDA approved October 2014,with mandatory software upgrade (APF V2.0) Oct 2020
- Intended use: whole blood, serum, plasma

HIV-1/2 Ab Supplemental Interpretations

Geenius Final Assay Interpretation	VioOne HIV Profile Result Interpretation
HIV (Antibody) Negative	HIV Negative
HIV-1 Indeterminate	HIV-1 Indeterminate
HIV-2 Indeterminate	No Equivalent
HIV Indeterminate	No Equivalent
HIV-1 Positive	HIV-1 Positive
HIV-2 Positive	HIV-2 Positive
HIV-2 Positive with HIV-1 Cross Reactivity	HIV-2 Positive with Reactivity to HIV-1 Antigens HIV-1 gp41 S/CO ≤ HIV-2 gp36 S/CO
No Equivalent	HIV-1 Positive with Reactivity to HIV-2 Antigen HIV-1 gp41 S/CO > HIV-2 gp36 S/CO
HIV Positive Untypable	No Equivalent

Courtesy of M Parker, NYDOH Wadsworth

Study Design

- Limited study (n=59) on the performance of the Profile Supplemental Assay
  - 44 in-house remnant serum/plasma
  - 15-member (7 HIV-1 reactive, 7 HIV-2 reactive and 1 HIV-1/2 nonreactive) antibody performance panel*
- In-house clinical specimen eligibility criteria:
  - Each characterized as one of 6 different Geenius "assay interpretations"
  - No more than one freeze-thaw cycle
  - Specimens deidentified and tested in singlet, minimum of 200ul for Profile and 20ul for Geenius
  - Clinical specimens routinely received for serostatus determination, April – August 2021
- Profile and Geenius assays performed in batches of 10 or less clinical specimens within 24 hours between August 3 – 18, 2021

*SeraCare HIV-1/2 Mixed Titer Accuset Performance Panel (Jan 2015)

Results: HIV Seropositive Specimens, n=43

"Assay Interpretations"		Profile HIV-1/HIV-2	
		HIV-1 Positive (36)	HIV-2 Positive (7)
Geenius HIV-1/HIV-2	HIV-1 Positive	33	
	HIV-1 Indeterminate	2[a]	
	HIV Untypable	1	
	HIV Ab Negative		
	HIV-2 Positive		7
	HIV-2 Indeterminate		
Positive % Agreement		95.3% (41/43)	

Results based on Geenius IFU (APF V2.0) and Profile IFU "assay interpretations".

- Profile identified 100% (43/43) as HIV seropositive w/o reflex HIV RNA testing.
- Geenius identified 95.3% (41/43) as HIV seropositive w/o reflex HIV RNA testing.

[a] Evidence of past HIV-1 diagnosis, in care

Results: Discordant HIV Specimens, n=16

"Assay Interpretations"		Profile HIV-1/HIV-2
		HIV antibody Negative (16)
Geenius HIV-1/HIV-2	HIV-1 Positive	
	HIV-1 Indeterminate	3[a]
	HIV Untypable	
	HIV Ab Negative	12[b]
	HIV-2 Positive	
	HIV-2 Indeterminate	1[c]
% Agreement		100% (16/16)

Results based on Geenius IFU (APF V2.0) and Profile IFU "assay interpretations" .

- All discordant algorithm specimens reflexed to HIV RNA testing.

[a] (2/3) HIV-1 RNA (-), (1/3) HIV-1 RNA (+)

[b] (10/12) HIV-1 RNA(-), (2/12) HIV-1 RNA (+)

[c] HIV-1 RNA plus HIV-2 RNA not detected

Conclusion

- Number of specimens requiring RNA testing to resolve serostatus,
  Profile = 27% (16/59)
  Geenius = 30.5% (18/59)

- Both assays provided same day reporting, up to 10 laboratory results available within 180 minutes (w/approx. 33% hands-on) with Profile and 45 minutes (100% hands-on) with Geenius.

- Both assays performed well in our PH laboratory setting, however technical staff with microplate immunoassay experience is recommended.

Discussion

- This study identified (13) Geenius HIV-1 Ab reactive/HIV-2 Ab indeterminate “analyte interpretations”. Laboratories are cautioned NOT to report “analyte interpretations”. *“The final assay interpretation should always be reported to the ordering healthcare provider” – Bio-Rad Geenius HIV-1/2 APF (Assay Protocol File) V1.3.*

- More data is needed to assess continued use of HIV-1/HIV-2 antibody differentiating assays in contrast with HIV-1/HIV-2 qualitative RNA.

- HIV-1/HIV-2 antibody assay results contribute to an algorithm-defined acute HIV-1 infection, regardless of its position in the algorithm design.

- Manual microplate washing and multi-channel pipetting is labor intensive, Avioq, Inc is evaluating robotic pipetting and/or automated washing options.

Limitations

- Only the Geenius repeatedly HIV-2 Indeterminate “assay interpretation” case reflexed to HIV-2 RNA.
- HIV-2 RNA testing was NOT performed on the thirteen (13) Geenius HIV-1 positive, HIV-2 indeterminate “analyte interpretations”.
- This study was not intended to assess the sensitivity and specificity of the HIV-1/2 Profile Supplemental Assay.

Acknowledgements

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Thank you & Questions

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