Clinical Performance of the VITROS® Immunodiagnostic Products Anti-SARS-CoV-2 Total Antibody Assay

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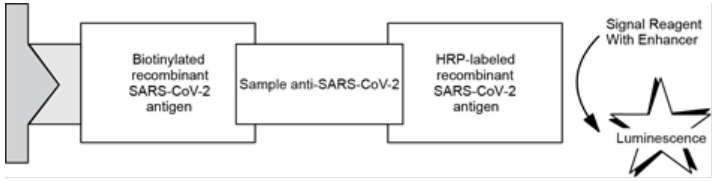
Introduction

This study was designed to assess the analytical and clinical performance of the VITROS Immunodiagnostic Products Anti-SARS-CoV-2 Total assay (VITROS SARS-CoV-2 Total) on the VITROS ECi/ECiQ/ 3600 Immunodiagnostic Systems and the VITROS 5600/ XT 7600 Integrated Systems.

Method

Antibody detection in VITROS SARS-CoV-2 Total assay is achieved using SARS-CoV-2 spike S1 protein antigen coated onto the well. Sample is added to the coated wells in the first stage of the reaction, and SARS-CoV-2 antibody from the sample is captured. After washing, HRP conjugated SARS-CoV-2 spike S1 protein antigens are added. Following a final wash, bound HRP conjugates are detected using the VITROS signal reagent. The assay cut-off for VITROS SARS-CoV-2 Total is 1.00; values equal to or above the cut-off are Reactive for SARS-CoV-2 antibodies and values below 1.00 are Non-reactive.

Assay Architecture



Precision

Precision was evaluated consistent with CLSI document EP05. Two replicates each of 12 fluids, a mix of human sample pools and commercial controls, were tested in duplicate on two separate occasions per day for five test days.

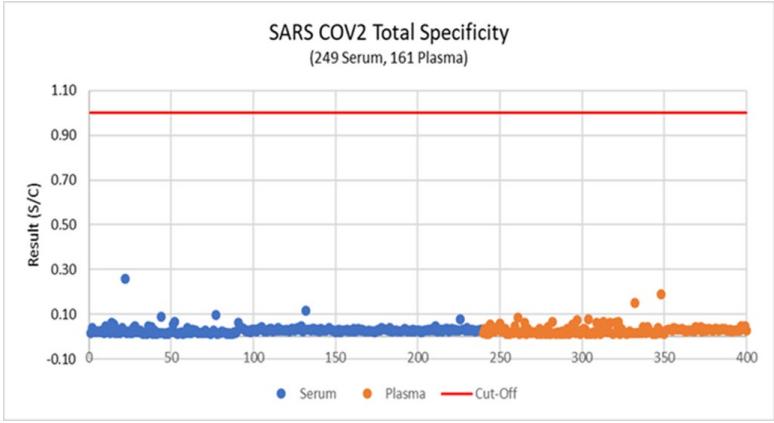
Mean (S/C)	Within-run*		Within-calibration**		No. Observations	No. Days
	SD	%CV	SD	%CV		
0.08	0.015	N/A***	0.021	N/A***	20	5
0.08	0.002	N/A***	0.015	N/A***	20	5
0.08	0.004	N/A***	0.017	N/A***	20	5
2.17	0.108	4.97	0.133	6.13	20	5
2.34	0.066	2.82	0.133	5.63	20	5
2.91	0.063	2.16	0.122	4.19	20	5
9.81	0.349	3.56	0.436	4.45	20	5
13.9	0.350	1.87	0.450	3.27	20	5
0.86	0.021	2.44	0.034	3.95	20	5
0.08	0.007	N/A***	0.021	N/A***	20	5
2.68	0.047	1.75	0.107	3.99	20	5
14.4	0.330	2.32	0.450	3.10	20	5

* Within-run (repeatability). Between duplicate precision averaged over all runs.
** Within-calibration. Total precision with weighted components of within-run, between-run, and between-day variation.
*** NA = Not Applicable, % CV are not meaningful when S/C approaches zero.

Clinical Specificity

Clinical specificity of the VITROS SARS-CoV-2 Total assay was evaluated using frozen serum and EDTA plasma samples from 400 healthy blood donors collected prior to 2019 and the COVID-19 pandemic. Specificity in the blood donor population for VITROS SARS-CoV-2 Total was 100% (400/400) with a 95% exact confidence interval of 99.1-100.0%.

Samples	Number of Test Samples	Number of Repeat Reactive	Number of Non-reactive	Observed Specificity
Blood Donors	400	0	400	100.0%



Potentially Cross-reacting Subgroups and Substances that don't Interfere

The VITROS Anti-SARS-CoV-2 Total test was evaluated for interference. Of the compounds tested, none was found to interfere with the clinical interpretation of the test in Non-reactive and weakly Reactive samples at the concentrations indicated. In addition potential cross-reactivity by Adenovirus, Influenza A and B, Coxsackie, Echovirus, HCV and ANA antibodies was evaluated with all samples testing Non-reactive.

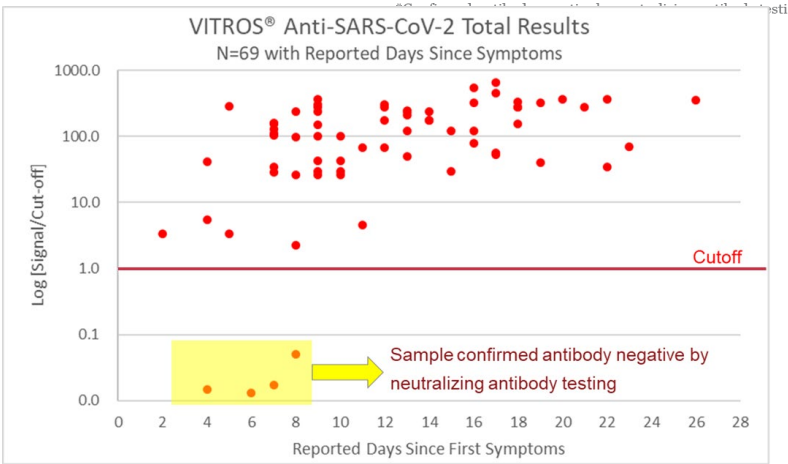
Compound	Concentration	
Bilirubin, conjugated	40.0 mg/dL	475 µmol/L
Bilirubin, unconjugated	40.0 mg/dL	684 µmol/L
Biotin	3510 ng/mL	14.3 µmol/L
Hemoglobin	1000 mg/dL	0.156 mmol/L
Intralipid	2000mg/dL	N/A

N/A = Not applicable (alternate units are not provided)

Clinical Sensitivity

Clinical sensitivity of the VITROS SARS-CoV-2 Total assay was evaluated using 86 samples from 86 individuals diagnosed as SARS-CoV-2 positive by PCR, frozen and then sent to the lab for evaluation. Date of reported onset of symptoms were reported for 69 of the 86 samples. The observed sensitivity (percent positive agreement with PCR) of VITROS SARS-CoV-2 Total assay was 100.0% (49/49) for samples collected >8 days after onset of symptoms were reported with a 95% exact confidence interval of 92.7 to 100.0%.

Days Since Symptoms Reported	Reactive	Non-Reactive	Total	PPA (95% CI)
≤8	16	4*	20	80.0% (56.3–94.3%)
>8	49	0	49	100.0% (92.7–100.0%)



Conclusion

The VITROS Anti-SARS-CoV-2 Total assay demonstrates excellent clinical sensitivity and specificity.

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