FIND Evaluation of SD Biosensor, Inc.

STANDARD™ F COVID-19 Ag FIA

External Report

Version 1.0, 16 October 2020

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Evaluation Process – private sector engagement

FIND is a non-for-profit foundation, whose mission is to find diagnostic solutions to overcome diseases of poverty in lower- and middle-income countries. It works closely with the private and public sectors and receives funding from donors and some of its industry partners. It has internal fire walls, policies and processes to protect it against any undue influence in its work or the publication of its findings.

More information on our policy and guidelines for working with private sector partners can be found here: https://www.finddx.org/policies/

For the COVID-19 response, FIND has commissioned independent evaluations of in vitro diagnostics following an Expression of Interest (EOI) process available on FIND's webpage by which all test submissions were scored according to their regulatory status and time to market; the manufacturing and distribution capacity of the supplier; and the supplier-reported clinical and analytical performance.

Document History

Document Version	Date	Comment
1.0	16 October 2020	Interim Version

1 Product Info:

Manufacturer Name	SD Biosensor, Inc.
Test name	STANDARD F COVID-19 Ag FIA
Product Code(s)	F-NCOV-01G, 10COV30D
Pack size(s)	25
Contents of kit	Test device (individually in a foil pouch with desiccant), Extraction buffer tube, Nozzle cap, Sterile Swab, Paper stand, IFU
Equipment and consumables required, but not provided	Equipment: STANDARD F Analyzer, Timer, refrigerator (optional, for storage of specimens prior to testing, if applicable) Consumables: PPE
Product Storage (temperature range)	2-30°C
Shelf-life (months)	*To be confirmed*
Manufacturing Site (country)	Republic of Korea

2 Study details:

Study design:	Prospective diagnostic evaluation studies across multiple, independent sites to determine the accuracy of COVID-19 antigen RDTs, using consecutive enrolment. Interim analyses are performed at 25% and 50% enrolment, and the evaluation is stopped if tests do not meet 95% specificity. Presence of symptoms, date of symptom onset and hospitalization status is collected for all enrolled participants.
Index assays:	Novel lateral flow format tests that detect recombinant SARS-CoV-2 antigens.
Reference method:	Results of the index test are compared to the routine, diagnostic RT-PCR result, which is used for clinical management
Limit of detection:	Analytical sensitivity, i.e. Limit of detection, was performed at the Liverpool School of Tropical Medicine and/or the Institute of Virology, Charité-Universitätsmedizin Berlin in which standardized serial dilutions of cultured viral isolate were prepared. Dilutions were done in triplicate and the LOD was defined as the last dilution where all repeats were interpreted as positive.

Clinical Performance:	Sensitivity was calculated as the proportion of true positive results detected by STANDARD F COVID-19 Ag FIA among all positives by the reference method, and reported as a percentage Specificity was calculated as the proportion of true negative specimens, identified as negative by STANDARD F COVID-19 Ag FIA among all negatives by the reference method, and reported as a percentage. The 95% confidence intervals were calculated in order to assess the level of uncertainty introduced by sample size, using the Wilson's score method.
Ease of Use	A System usability survey and ease of use questionnaire assessing the quality of the test, test preparation, ease of test execution, procedure time, ease of result interpretation, storage conditions and perceived settings of use was completed by operators and a final score out of 100 was calculated.

3 Evaluation Details

Country of Collaborator	Brazil
Location of clinical site(s) (city, town)	1. Macae, state of Rio de Janeiro 2. UFRJ
Health care level of site(s)	1. Community testing clinic 2. Tertiary level hospital
Study period (date to date)	1. Macae: 17 Aug – 9 Sept 2020 2. UFRJ: 11 Jul – 8 Aug 2020
Study cohort inclusion/exclusion	Adults in community meeting national suspect definition Provided informed consent
Sample type, antigen test	Nasopharyngeal swab
Reference PCR Method	• Lab-developed assay based on the US CDC protocol, which targets two regions (N1 and N2) of the nucleocapsid (N) gene of SARS-CoV-2 (https://www.fda.gov/media/134922/download); ○ n = 407 • Lab-developed assay based on the Charité Universitätsmedizin Berlin protocol, which has 2 gene targets (E and RdRp) of SARS-CoV-2 (https://www.who.int/docs/default-source/coronaviruse/protocol-v2-1.pdf); ○ n = 46
Sample type, PCR test	Nasopharyngeal swab

4 Results

4.1 Study Cohort

Country	Brazil
Total N (valid PCR results)	453
Age [mean (min-max), N]	39 (0-95), 451
Gender [%F, (n/N)]	59% (268/453)
Symptoms present [%Yes, (n/N)]	93.6% (421/450)
Hospitalized (n, % Yes)	Not available
Days from symptom onset [median (Q1-Q3); N]	4 (3-6); 421
Days < 0-3 (n, %)	131, 31%
Days 4-7 (n, %)	248, 59%
Days 8+ (n, %)	42, 10%
Positivity [%, (n/N)]	26%, (120/453)
PCR Ct [median (Q1-Q3); N]	23.4 (19.9-27.7); 120
Ct > 33 (n, %)	10, 8.3%
Ct > 30 (n, %)	20, 16.7%
Ct > 25 (n, %)	54, 43.3%

4.2 Estimations of Clinical and Analytical Performance

Country	Brazil
Clinical Sensitivity (95% CI), N	77.5% (69.2, 84.1), 120
Sensitivity days ≤7, N	80.2% (71.1, 86.7), 100
Sensitivity Ct ≤ 33, N	80.9% (72.6, 87.2), 110
Sensitivity Ct ≤ 25, N	87.9% (77.9, 93.7), 66
Clinical Specificity (95% CI), N	97.9 (95.7, 99), 333

Invalid rate (%, n/N)	0%, (0/453)
Analytical Sensitivity (pfu/ml)	$2.5x10^4$ pfu/ml ~ 3.57×10^4 $TCID_{50}$/ml[1]

Note: We verified the LOD to be about 400 times higher than the claimed LOD by the supplier of 7.8 x $10^{1.2}$ $TCID_{50}$/ml, which is the equivalent of about 8.66 x 10^1 pfu/ml, using a different strain.

4.3 Ease of Use

STANDARD F	PENDING [XX] out of 100	[##] operators, [countr(ies)]