FIND Evaluation of NADAL COVID-19 Ag Rapid Test External Report

Version 2.1, 6 May 2022

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Evaluation process – private sector engagement

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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 website 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	26 April 2021	Initial release
2.0	3 February 2022	Data for Brazil added

2.1	6 May 2022	Omicron data added

1 Product info:

Manufacturer name	NADAL
Test name	COVID-19 Ag Rapid Test
Product code(s)	243103N-20
Pack size(s)	20 tests/kit
Contents of kit	Test cassettes, extraction tubes, dropper caps, buffer, sterile swabs, reagent holder, package insert
Equipment and consumables required, but not provided	PPE, timer, biohazard container
Product storage (temperature range)	2-30°C
Shelf-life (months)	24 months after date of production
Manufacturing site (country)	Subcontracting manufacturing site of Nal von minden, Hangzhou, China

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:	Verification of analytical sensitivity, i.e. Limit of detection, was performed at the Liverpool School of Tropical Medicine in which standardized serial dilutions of cultured viral isolate were prepared. Proprietary swab provided in the kit was soaked in viral dilution series. Dilutions were tested 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 NADAL COVID-19 Ag Rapid Test 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 NADAL COVID-19 Ag Rapid Test among all negatives by the reference method, and reported as a percentage. The 95% confidence intervals were calculated to assess the level of uncertainty introduced by sample size, using the Wilson's score method.

3 Evaluation details

Country of collaborator	Switzerland	Brazil
Location of clinical site(s) (city, town)	University Hospital of Geneva	São Paulo, Brazil
Health care level of site(s)	Community Testing Clinic	Hospital das Clínicas da Universidade de São Paulo
Study period (date to date)	24 November 2020 – 20 January 2021	13 September to 20 December 2021
Study cohort inclusion/exclusion	Individuals (age 16+) in community meeting Department of Public Health definition of a suspected COVID-19 case and being tested for SARS-CoV-2 part of routine medical care. Provided informed consent	Inclusion: • 18 years or older, who are undergoing testing for COVID-19 • Symptomatic for COVID-19 • Provided informed consent Exclusion: • Asymptomatic Younger than 18 years
Sample type, antigen test	Nasopharyngeal swab	Nasopharyngeal swab
Reference PCR method	Cobas SARS-CoV-2 (Roche Diagnostics Inc) (n=217) Cobas SARS-CoV-2 & Influenza A/B (Roche Diagnostics Inc) (n=72) TaqPath™ COVID-19 CE IVD RT PCR Kit (Thermo Fisher	Abbott RealTime SARS-CoV-2 Assay (Abbott Molecular) (n=93) QIAGEN (QIAprep&amp Viral RNA UM Kit + SARS-CoV-2 N1+N2 Assay Kit) (n=394)

	Scientific) (with Nimbus Presto Extraction instrument) (n=173)	
Sample type, PCR test	Nasopharyngeal swab	Combined nasopharyngeal and oropharyngeal swabs; Nasopharyngeal swabs

4 Results

4.1 Study cohort

Country	**Switzerland**	**Brazil**
Total N (valid PCR results)	462	487
Age [mean (min-max), N]	38.7 (16-82), 462	37.7 (17-80), 487
Gender [%F, (n/N)]	55.4%, (256/462)	66.1%, (322/487)
Symptoms present [%Yes, (n/N)]	94.2%, (65/69) [1]	100%, (487/487)
Hospitalized (n, % Yes)	Not applicable	Not applicable
Days from symptom onset [median (Q1-Q3); N]	2 (1-3), 54	4 (3-4), 487
Days < 0-3 (n, %)	45, 83%	243, 50%
Days 4-7 (n, %)	7, 13%	228, 47%
Days 8+ (n, %)	2, 4%	16, 4%
Positivity [%, (n/N)]	14.9%, (69/462)	4%, (20/487)
PCR Ct [median (Q1-Q3); N]	22.7 (20.3-26.7); 68	27.33 (20.8-33); 20
Ct > 33 (n, %)	2, 3%	0, 0%
Ct > 30 (n, %)	9, 13%	8, 40%
Ct > 25 (n, %)	23, 34%	11, 55%

[1]*Note: data on symptom onset only available for individuals who tested PCR positive.*

4.2 Estimation of clinical performance

Country	Switzerland	Brazil
Clinical Sensitivity (95% CI), N	88.4% (78.8, 94), 69	90% (69.9, 97.2), 20
Sensitivity days ≤7, N	88.5% (77, 94.6), 52	90% (69.9, 97.2), 20
Sensitivity Ct ≤ 33, N	92.4% (83.5, 96.7), 66	90% (69.9, 97.2), 20
Sensitivity Ct ≤ 25, N	97.8% (88.4, 99.6), 45	100% (70.1, 100), 9
Clinical Specificity (95% CI), N	99.2% (97.8, 99.7), 393	99.6% (98.4, 99.9), 466
Invalid rate (%, n/N)	0% (0/462)	0.2% (1/487)
Defective rate (%, n/N)	Not applicable	1.6% (8/495)

4.3 Estimation of analytical performance

- Supplier-reported LOD = 2 x 102.4 TCID50/ml ~ 1.4 x 102.4 pfu/ml (isolate hCoV-19/China/ZJ-NB841/2020)

- Verified LOD

Variant (lineage)	Lowest dilution detected	Verified LOD concentration	Viral Copy equivalent
UK wild type (B1)	**2.5 x10^2 pfu/ml ~** 3.525 x 10^2 $TCID_{50}$/ml	**2.5 x10^2 pfu/ml**	**5.9 x10^5 genome copies/ml** applied to test
Alpha (B.1.1.7)	**2.5 x10^2 pfu/ml** ~ 3.525 x 10^2 $TCID_{50}$/ml	**2.5 x10^2 pfu/ml**	**5.1 x10^3 genome copies/ml** applied to test
Gamma (P1)	**5.0 x10^2 pfu/ml** ~ 7.05 x 10^2 $TCID_{50}$/ml	**5.0 x10^2 pfu/ml**	**2.8 x10^5 genome copies/ml** applied to test
Delta (B.1617.2)	**1.0 x10^2 pfu/ml** ~ 1.41 x 10^2 $TCID_{50}$/ml	**1.0 x10^2 pfu/ml**	**1.64 x10^5 genome copies/ml** applied to test
Omicron (BA.1)	**2.50 x10^2 pfu/ml** ~ 3.525 x 10^2 $TCID_{50}$/ml	**2.5 x10^2 pfu/ml**	**4.42 x10^4 genome copies/ml** applied to test

Note: viral dilution was applied directly to the test cassette, not to the provided swab