Point of Care COVID-19 Testing: Guidance for Practicing Physicians

As of July 10, 2020, we stand at a total of 137 test kits/test systems, this includes the Serology test and Home Collection kits (104 are PCR, 27 serological, two antigen, and four home collection kits). There are now six that can be run in laboratories with only a CLIA Certificate of Waiver (COW) and a total of nine that are considered moderate complexity. The ** denotes a test system that is portable and can be used outside the clinical laboratory like mobile, nursing homes, or temporary sites like a drive thru or health fair. Currently there are 194 serology test awaiting review by the FDA for an EUA. There is a list of 68 serology tests that have been removed by the FDA or voluntarily withdrawn. These tests cannot be use by any US laboratory or distributed in the US.

Please see Provider Guide to SARS-CoV-2 Testing re: further guidance for questions to ask manufacturers of tests/vendors as well as definitions of laboratory terms, CLIA-waived testing, etc. at: https://www.communitycarenc.org/provider-guide-to-sars-cov-2-testing.

CLIA-waived tests – MOLECULAR TESTING

1. **Xpert Xpress SARS-CoV-2 test - PCR (Cepheid):** Uses NP and nasal swabs. The test can provide rapid detection of the current pandemic coronavirus SARS-CoV-2 in as soon as 30 minutes for positive results* with less than a minute of hands on time to prepare the sample. Sensitivity 100% Specificity 100% on 30/30 negative samples and 30/30 "spiked" samples. **
2. **Accula SARS-Cov-2 Test – PCR (Mesa Biotech Inc.):** Using throat and nasal swabs, results are available in 30 minutes. Thirty (30) negative samples and 30 positive contrived samples were tested with the Accula SARS-CoV-2 Test. Positives were "spiked" samples of the negative samples collected from patients under IRB. Sensitivity 100% Specificity 99.8%. **
3. **ID NOW COVID-19 - PCR (Abbott Diagnostics Scarborough, Inc.):** This testing platform can deliver a POSTIVE test result in 5 minutes and NEGATIVE test results in 13 minutes targeting the coronavirus (COVID-19) RdRp Gene. Direct sample types include: Nasal, Throat, and Nasopharyngeal swabs. Urgent care clinic study shows ID NOW test performance of ≥94.7% positive agreement (sensitivity) and ≥98.6% negative agreement (specificity) compared to lab-based PCR reference tests.**
    - The Everett Clinic study shows 91.3% positive agreement and 100% negative agreement
    - Ongoing study of hospitalized and nursing home patients tested with late symptom onset shows ≥83.3% positive agreement and ≥96.5% negative agreement.
    - Abbott's studies suggest ID NOW performs best in patients tested earlier post symptom onset.
4. **Cue COVID-19 Test (Cue Health Inc.)** (waived, moderate and high complexity laboratories): The test is run using the Cue Health Monitoring System (Cue Cartridge Reader), the Cue COVID-19 Test Cartridge, the Cue Sample Wand, and the Cue Health App on the Apple® iPhone® 8+ or newer mobile smart device with iOS 13 (or higher).
    - Clinical Evaluation: The Cue COVID-19 Test was also evaluated with 45 frozen nasopharyngeal swab samples were collected from patients suspected of SARS-CoV-2

infection and transported in viral transport media. The Cue COVID-19 Test result was positive for 100% of the 45 samples.

- They also tested 60 negative patient samples and then spiked 30 of these with SARS-CoV-2. They were 30/30 on the negatives and were in agreement with expected results was ≥ 95% on the positives.

CLIA-waived tests – MOLECULAR TESTING – ANTIGEN

1. **Sofia 2 SARS Antigen FIA (Quidel Corporation)** (waived, moderate and high complexity laboratories) using the Sofia 2 instrument. The assay demonstrated acceptable clinical sensitivity (80%) when compared to an EUA molecular device. The assay demonstrated excellent clinical specificity (100%). There was no demonstrable cross-reactivity with seventy-nine (79) specimens containing seasonal CoVs detected by the BioFire® FilmArray® Respiratory Panel.
2. **BD Veritor System for Rapid Detection of SARS-CoV-2 (Becton Dickinson and Company [BD])** (waived, moderate and high complexity laboratories) using the BD Veritor™ Plus Analyzer. BD clinical studies performed at more than 20 sites across the U.S. demonstrated that the test is capable of achieving 84% sensitivity and 100% specificity. Similar to all immunoassay tests, FDA recommends that negative test results be confirmed by a molecular method to confirm the result, if necessary, for patient management.

CLIA moderate complexity labs – MOLECULAR TESTING

Company	Gene Target	Clinical Sensitivity (50 positives)	Clinical Specificity* (100 negatives)	Product Name	Made in
Altona Diagnostics	E	92% (95%CI: 81, 97)	100% (95%CI: 96, 100)	RealStar® SARS-CoV-2 RT-PCR Kit 1.0	Germany
	S	92% (95%CI: 81, 97)	100% (95%CI: 96, 100)		
Atila BioSystems Inc.	ORF1ab	100% (95%CI: 93, 100)	99%* (95%CI: 95, 100)	Atila iAMP COVID-19 Detection (isothermal detection)	USA
	N	100% (95%CI: 93, 100)	100% (95%CI: 96, 100)		
Primerdesign Ltd	RdRP	100% (95%CI: 93, 100)	100% (95%CI: 96, 100)	Coronavirus COVID-19 genesig® Real-Time PCR assay	England

SD Biosensor Inc.	E	100% (95%CI: 93, 100)	97%* (95%CI: 92, 99)	STANDARD M nCoV Real-Time Detection Kit	South Korea
	ORF1	100% (95%CI: 93, 100)	99%* (95%CI: 95, 100)		
Seegene Inc.	E	100% (95%CI: 93, 100)	100% (95%CI: 96, 100)	Allplex™ 2019-nCoV Assay	South Korea
	N	100% (95%CI: 93, 100)	100% (95%CI: 96, 100)		
	RdRP	100% (95%CI: 93, 100)	100% (95%CI: 96, 100)		

*These tests were included on our list because they all had third party validation (by FIND – Foundation for New Innovative Diagnostics) and were not manufactured in China. These results can be found at https://www.finddx.org/covid-19.

Special Mention

1. **Biofire Respiratory Panel 2.1 [RP 2.1] with COVID-19 test (Biofire Diagnostic, LLC):** (moderate and high complexity laboratories) to be used with the Biofire® Film Array® 2.0 system (Overall 97.1% Sensitivity and 99.3% Specificity1 (Sample Type: Nasopharyngeal swab in transport media).
2. **Biofire COVID-19 Test (BioFire Defense, LLC):** (moderate and high complexity laboratories) to be used with the FilmArray® 2.0 and/or the FilmArray® Torch Instrument Systems.

From the BioFire Instructions for Use packet: Clinical testing was performed using ten positive and five negative NPS specimens stored in transport media. The positive samples were collected from patients presenting with signs or symptoms of COVID-19, and previously identified as positive for SARS-CoV-2 by another test (nine specimens were determined positive by a validated laboratory developed test (NECOV19) and one was determined positive by the Roche cobas SARS-CoV-2 EUA Test). The negative samples were collected in 2018, and therefore were presumed negative for SARS-CoV-2. All samples were de-identified before testing on the BioFire COVID-19 Test.

Table 6. BioFire COVID-19 Test Performance Summary

Virus	PPA			NPA		
	TP/(TP + FN)	%	95% CI	TN/(TN + FP)	%	95% CI
SARS-CoV-2	9/10 [a]	90%	59.6-98.2%	5/5	100%	56.6-100.0%

[a] Specimen had a late Ct value when originally evaluated on the NECOV19 test. When the FN sample was retested on the NECOV19 test, the result was negative. These results indicate a near-LoD level of SARS-CoV-2 virus and/or sample degradation after the first NECOV19 test and prior to the BioFire COVID-19 Test.

They also did contrived clinical samples – n=34 with expected PPA and NPA of 100%.

CLIA moderate complexity labs – ANTIBODY TESTING

1. **SARS-CoV-2 IgG Assay (Abbott Laboratories):** (moderate and high complexity laboratories) to be used on the Architect i system both the i1000 or i2000 instruments and the Alinity I instrument.
    - This test is for the detection of IgG antibodies only.

Abbot Alinity i SARS-CoV-2 IgG
Developer: Abbott
Test: Alinity i SARS-CoV-2 IgG
Technology: High Throughput CMIA
Target: Nucleocapsid

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
IgG	Sensitivity (PPA)	100% (34/34)	(89.9%; 100%)
IgG	Specificity (NPA)	99.0% (99/100)	(94.6%; 99.8%)
IgG	PPV at prevalence = 5%	84.0%	(46.7%; 96.3%)
IgG	NPV at prevalence = 5%	100%	(99.4%; 100%)

Test Facts:

- Information for Healthcare Providers
- Information for Recipients
- Instructions for Use

2. **Platella SARS-CoV-2 Total Ab Assay (Bio-Rad Laboratories):** This test is for the detection of IgM/IgA/IgG antibodies.

Bio-Rad Platelia SARS-CoV-2 Total Ab
Developer: Bio-Rad Laboratories, Inc
Test: Platelia SARS-CoV-2 Total Ab
Technology: ELISA
Target: Nucleocapsid

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
Pan-Ig	Sensitivity (PPA)	92.2% (47/51)	(81.5%; 96.9%)
Pan-Ig	Specificity (NPA)	99.6% (684/687)	(98.7%; 99.9%)
Pan-Ig	PPV at prevalence = 5%	91.7%	(76.7%; 98.1%)
Pan-Ig	NPV at prevalence = 5%	99.6%	(99.0%; 99.8%)

Test Facts:

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- Information for Recipients
- Instructions for Use

3. **Cellex Inc. qSARS-CoV-2 IgG/IgM Rapid Test (Cellex Inc.):** (moderate and high complexity laboratories). This is a kit test no instrument required.

Developer: Cellex, Inc.
Test: qSARS-CoV-2 IgG/IgM Rapid Test
Technology: Lateral Flow
Target: Spike and Nucleocapsid

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
Combined	Sensitivity (PPA)	93.8% (120/128)	(88.2%; 96.8%)
Combined	Specificity (NPA)	96.0% (240/250)	(92.8%; 97.8%)
Combined	PPV at prevalence = 5%	55.2%	(39.2%; 69.8%)
Combined	NPV at prevalence = 5%	99.7%	(99.3%; 99.8%)

Test Facts:

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- Information for Recipients
- Instructions for Use

4. **Liaison SARS-CoV-2 S1/S2 IgG (DiaSorin Inc):** (moderate and high complexity laboratories) to be use with the Liaison XL Analyzer.
    - This test is for the detection of IgG antibodies only.

Developer: DiaSorin
Test: LIAISON SARS-CoV-2 S1/S2 IgG
Technology: High Throughput CMIA
Target: Spike

Antibody	Performance Measure	Estimate of Performance	95% Confidence Interval
IgG	Sensitivity (PPA)	97.6% (40/41)	(87.4%; 99.6%)
IgG	Specificity (NPA)	99.3% (1082/1090)	(98.6%; 99.6%)
IgG	PPV at prevalence = 5%	88.0%	(76.7%; 92.9%)
IgG	NPV at prevalence = 5%	99.9%	(99.3%; 100%)

Test Facts:

- Information for Healthcare Providers
- Information for Recipients
- Instructions for Use