COVID-19 Antigen Rapid Test Device
Product Insert
REF COV-19C25

INTENDED USE

The Rapid Response™ COVID-19 Antigen Rapid Test is an in vitro immunochromatographic assay for the direct and qualitative detection of SARS-CoV-2 viral nucleoprotein antigens from nasopharyngeal secretions and oropharyngeal secretions from individuals suspected of COVID-19 within the first two weeks of symptom onset. This test is intended for professional use only. Testing is limited to laboratories certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, to perform high complexity tests.
The Rapid Response™ COVID-19 Antigen Rapid Test Device is only for use under the Food and Drug Administration's Emergency Use Authorization.
The Rapid Response™ COVID-19 Antigen Rapid Test Device has been validated but FDA's independent review is pending.

PRINCIPLE

The Rapid Response™ COVID-19 Antigen Rapid Test detects SARS-CoV-2 viral antigens through visual interpretation of color development. Anti-SARS-CoV-2 antibodies are immobilized on the test region of the nitrocellulose membrane. Anti-SARS-CoV-2 antibodies conjugated to colored particles are immobilized on the conjugated pad. A sample is added to the extraction buffer which is optimized to release the SARS-CoV-2 antigens from specimen.
During testing, the extracted antigens bind to anti-SARS-CoV-2 antibodies conjugated to colored particles. As the specimen migrates along the strip by capillary action and interacts with reagents on the membrane, the complex will be captured by the anti-SARS-CoV-2 antibodies at the test region. Excess colored particles are captured at the internal control zone.
The presence of a colored band in the test region indicates a positive result for the SARS-CoV-2 viral antigens, while its absence indicates a negative result. A colored band at the control region serves as a procedural control, indicating that the proper volume of specimen has been added and membrane wicking is working.

MATERIALS

Materials Provided

- Individually packed test devices
- Extraction tube
- Individually packed swabs
- Package insert
- Extraction buffer
- Nozzle with filter
- Tube stand

Materials Required but Not provided

- Clock, timer, or stopwatch

PRECAUTIONS

- For *in vitro* Diagnostic Use Only.
- Read the Package Insert prior to use. Directions should be read and followed carefully.
- Do not use kit or components beyond the expiration date.
- The device contains material of animal origin and should be handled as a potential biohazard. Do not use if pouch is damaged or open.
- Test devices are packaged in foil pouches that exclude moisture during storage. Inspect each foil pouch before opening. Do not use devices that have holes in the foil or where the pouch has not been completely sealed. Erroneous result may occur if test reagents or components are improperly stored.
- Do not use the Extraction Buffer if it is discolored or turbid. Discoloration or turbidity may be a sign of microbial contamination.
- All patient specimens should be handled and discarded as if they are biologically hazardous. All

specimens must be mixed thoroughly before testing to ensure a representative sample prior to testing.

- Failure to bring specimens and reagents to room temperature before testing may decrease assay sensitivity. Inaccurate or inappropriate specimen collection, storage, and transport may yield false negative test results.
- Avoid skin contact with buffer.
- If infection with SARS-CoV-2 is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions and sent to state or local health departments for testing.
- Viral isolation in cell culture and initial characterization of viral agents recovered in cultures of SARS-CoV-2 specimens are NOT recommended, except in a BSL3 laboratory using BSL3 work practices.

STORAGE AND STABILITY

- Store the Rapid Response™ COVID-19 Antigen Rapid Test at 2~30℃ when not in use.
- **DO NOT FREEZE.**
- Kit contents are stable until the expiration dates marked on their outer packaging and containers.

SPECIMEN COLLECTION AND STORAGE

-Nasopharyngeal swab (NP swab):

1) Remove the swab from its packing
2) Insert the swab into the nostril parallel to the palate. Rotating against the nasal wall.(to ensure swab contains cells as well as mucus)
3) Process the swab as soon as possible after collecting the specimen

-Oropharyngeal swab (OP swab):

1) Remove the swab from its packing
2) Insert the swab completely from the mouth into the throat, centering on the red part of the throat wall and maxillary tonsils and rub the bilateral throat tonsils and throat wall moderately. Avoid touching the tongue and remove the swab
3) Process the swab as soon as possible after collecting the specimen

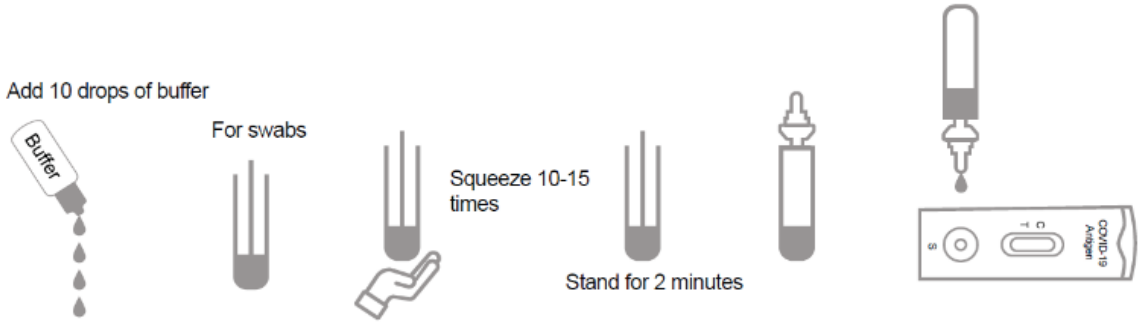
Note:

1. Use only synthetic fiber swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit further testing.
2. Swabs specimens should be tested as soon as possible after collection. Use freshly collected specimens for best test performance.
3. If not tested immediately, swab specimens may be stored at 2-8℃ for 24 hours after collection.
4. Do not use specimens that are obviously contaminate with blood, as it may interfere with the flow of sample with the interpretation of test results.

TEST PROCEDURE

Bring devices, reagents, and specimens and/or controls to room temperature (15~30℃) before use.

1. For each specimen, open the foil pouch just before testing and remove the test device, and put it on a clean, level surface. Label the tube with the patient identification. For best results, the assay should be performed within one hour.
2. Gently mix extraction buffer. Add 10 drops into the extraction tube.
3. Insert the swab into the extraction tube. Mix well and squeeze the swab 10-15 times by compressing the walls of the tube against the swab. **Stand for 2 minutes.**
4. Roll the swab head against the inner wall of the tube as you remove it. Try to release as much liquid as possible. Dispose of the used swab in accordance with your biohazard waste disposal protocol.
5. Insert nozzle into sample extraction tube. Invert the tube and add 2 drops of solution into the sample well by gently squeezing the tube.
6. Read results at 15 minutes.



RESULT INTERPRETATION

POSITIVE: Two colored bands appear on the membrane. One band appears in the control region (C) and another band appears in the test region (T).

NEGATIVE: Only one colored band appears, in the control region (C). No apparent colored band appears in the test region (T).

INVALID: Control band fails to appear. Results from any test which has not produced a control band at the specified read time must be discarded. Please review the procedure and repeat with a new test. If the problem persists, discontinue using the kit immediately and contact your local distributor.

NOTE:

1. The color intensity in the test region (T) may vary depending on the concentration of analytes present in the specimen. Therefore, any shade of color in the test region should be considered positive. Note that this is a qualitative test only and cannot determine the concentration of analytes in the specimen.
2. Insufficient specimen volume, incorrect operating procedure or expired tests are the most likely reasons for control band failure.

QUALITY CONTROL

Internal Procedural Controls

The Rapid Response™ COVID-19 Antigen Rapid Test has built-in (procedural) controls. Each test device has an internal standard zone to ensure proper sample flow. The user should confirm that the colored band located at the "C" region is present before reading the result.

External Positive and Negative Controls

Good laboratory practice suggests testing positive and negative external controls to ensure that the test reagents are working and that the test is correctly performed.

LIMITATIONS OF THE TEST

1. Rapid Response™ COVID-19 Antigen Rapid Test is for professional *in vitro* diagnostic use and should only be used for the qualitative detection of SARS-CoV-2 antigen. The intensity of color in a positive band should not be evaluated as "quantitative or semi-quantitative".
2. Both viable and nonviable SARS-CoV-2 viruses are detectable with Rapid Response™ COVID-19 Antigen Rapid Test.
3. As with all diagnostic tests, a definitive clinical diagnosis should not be based on the results of a single test but should only be made by the physician after all clinical and laboratory findings have been evaluated.
4. Failure to follow the TEST PROCEDURE and RESULT INTERPRETATION may adversely affect test performance and/or invalidate the test result.
5. Results obtained with this assay, particularly in the case of weak test lines that are difficult to

interpret, should be used in conjunction with other clinical information available to the physician.
6. Negative results do not preclude SARS-CoV-2 infection and should be confirmed via molecular assay.

PERFORMANCE CHARACTERISTICS

Analytical Sensitivity (Limit of Detection):
The limit of detection was determined with a quantified SARS-CoV-2 virus and has been evaluated at $2x10^{2.4}$ $TCID_{50}$/mL. The limit of detection was also determined with recombinant SARS-CoV-2 nucleoprotein and has been evaluated at 0.4 ng/mL.

Clinical Evaluation:
Clinical evaluation was performed to compare the results obtained by Rapid Response™ COVID-19 Antigen Rapid Test and a reverse transcription polymerase chain reaction (RT-PCR) comparator assay. Patients who presented with symptoms within 14 days were included in the study.
The performance was evaluated for 85 prospective clinical specimens which included 43 specimens of nasopharyngeal swab and 42 specimens of oropharyngeal swab. 55 positive specimens and 30 negative specimens were confirmed by RT-PCR.
Another 131 retrospective clinical specimen who are either asymptomatic or with mild symptoms (within 14 days of symptom onset) were collected to confirm the specificity. All of these are confirmed negative through PCR. 59 specimens were of nasopharyngeal swab and 72 specimens of oropharyngeal swab.
The performance of Rapid Response™ COVID-19 Antigen Rapid Test Device results based on the various parameters is summarized below:

Table 1: Oropharyngeal Swab Specimen vs. RT-PCR Positive

Days from onset of symptoms	PCR positive at any time	Rapid Response™ COVID-19 Antigen Rapid Test		
		Antigen Positive	PPA	95% Confidence Interval
≤7	6	6	100.00%	51.68% to 100%
8-14	24	22	91.67%	71.52% to 98.54%
≤14	30	28	93.33%	76.49% to 98.83%

Table 2: Nasopharyngeal Swab Specimen vs. RT-PCR Positive

Days from onset of symptoms	PCR positive at any time	Rapid Response™ COVID-19 Antigen Rapid Test		
		Antigen Positive	PPA	95% Confidence Interval
≤7	4	4	100.00%	39.57% to 100%
8-14	21	20	95.24%	74.13% to 99.75%
≤14	25	24	96.00%	77.67% to 99.79%

Table 3: Oropharyngeal and Nasopharyngeal Swab Specimen vs. RT-PCR Positive

Days from onset of symptoms	PCR positive at any time	Rapid Response™ COVID-19 Antigen Rapid Test		
		Antigen Positive	PPA	95% Confidence Interval
≤7	10	10	100%	65.55% to 100%
8-14	45	42	93.33%	80.69% to 98.26%
≤14	55	52	94.55%	83.93% to 98.58%

Table 4: Summary of Rapid Response™ COVID-19 Antigen Rapid Test Clinical Evaluation:

		RT-PCR		Total
		Positive	Negative	
Rapid Response™ COVID-19 Antigen Rapid Test	Positive	52	0	52
	Negative	3	161	164
Total		55	161	216

Relative Sensitivity: 94.55% 83.93%~98.58%) *
Relative Specificity: 100% (97.1%~100%)*
Overall Agreement: 98.61% (95.66%~99.64 %)*
*95% Confidence Interval

Cross Reactivity:
Cross reactivity with the following organisms has been studied. Samples positive for the following organisms were found negative when tested with the Rapid Response™ COVID-19 Antigen Rapid Test (Nasopharyngeal/Oropharyngeal Swab).

HCoV-HKU1	Influenza A (H5N1)	Coxsackie virus A16
HCoV-OC43	Influenza A (H7N9)	Norovirus
HCoV-NL63	Influenza A (H7N7)	Mump virus
HCoV-229E	Influenza B Victoria lineage	*Legionella pneumophila*
Measles virus	Influenza B Yamagata lineage	*Mycoplasma pneumoniae*
Streptococcus pneumoniae	Respiratory syncytial virus	*Chlamydia pneumoniae*
Epstein-Barr virus	Adenovirus	*Streptococcus pyogenes*
Bordetella Para pertussis	Parainfluenza 1/2/3 virus	*Streptococcus agalactiae*
Influenza A (H1N1) pdm09	Human metapneumovirus	Group C *Streptococcus*
Influenza A (H3N2)	Rhinovirus	*Staphylococcus aureus*

Microbial Interference Study:
Potential microbial interference was evaluated to demonstrate that false negatives will not occur when SARS-CoV-2 is present in a specimen with other microorganisms. Low concentration of SARS-CoV-2 (3 X LOD) was spiked into the higher concentrations of interfering organism and it was found that there is no microbial interference for following organisms.

HCoV-HKU1	Influenza A (H5N1)	Coxsackie virus A16
HCoV-OC43	Influenza A (H7N9)	Haemophilus influenzae
HCoV-NL63	Influenza A (H7N7)	Candida albicans
HCoV-229E	Influenza B Victoria lineage	Mycobacterium tuberculosis
Measles virus	Influenza B Yamagata lineage	Norovirus
Streptococcus pneumoniae	Respiratory syncytial virus	Mump virus
Epstein-Barr virus	Adenovirus	Legionella pneumophila
Bordetella Para pertussis	Parainfluenza 1/2/3 virus	Mycoplasma pneumoniae
Influenza A (H1N1) pdm09	Human metapneumovirus	Chlamydia pneumoniae
Influenza A (H3N2)	Rhinovirus	Streptococcus pyogenes
Group C Streptococcus	Staphylococcus aureus	Streptococcus agalactiae
Pooled human nasal wash – representative of normal respiratory microbial flora		

Interfering Substances
The following substances, naturally present in respiratory specimens or that may be artificially introduced into the respiratory tract, were evaluated at the concentrations listed below. None of them were found to affect test performance of the Rapid Response™ COVID-19 Antigen Rapid Test Device.

Substance	Concentration	Substance	Concentration
3 OTC nasal sprays	10%	Guaiacol glyceryl ether	20 mg/ml
3 OTC mouthwashes	10%	Mucin	1%
3 OTC throat drops	10%	Mupirocin	250 µg/ml
4-acetamidophenol	10 mg/ml	Oxymetazoline	10 mg/ml
Acetylsalicylic acid	20 mg/ml	Phenylephrine	10 mg/ml
Albuterol	20 mg/ml	Phenylpropanolamine	20 mg/ml
Chlorpheniramine	5 mg/ml	Relenza ® (zanamivir)	20 mg/ml
Dexamethasone	5 mg/ml	Rimantadine	500 ng/ml
Dextromethorphan	10 mg/ml	Tamiflu ® (oseltamivir)	100 mg/ml
Diphenhydramine	5 mg/ml	Tobramycin	40 mg/ml
Doxylamine succinate	1 mg/ml	Triamcinolone	14 mg/ml
Flunisolide	3 mg/ml		

LITERATURE REFERENCES

1. Forni, D., Cagliani, R., Clerici, M. & Sironi, M. Molecular evolution of human coronavirus genomes. Trends Microbiol. 25, 35–48 (2017).
2. Ithete, N. L. et al. Close relative of human Middle East respiratory syndrome coronavirus in bat, South Africa. Emerg. Infect. Dis. 19, 1697–1699 (2013).

GLOSSARY OF SYMBOLS


Consult instructions for use


Test per Kit

REF Catalogue number

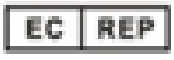
Store between 2°C to 30°C


Use by date


Do Not Reuse

In vitro diagnostic medical device

Lot Number



Authorized Representative

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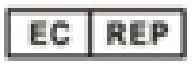

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