

COV-S23

COVID-19 Antigen Rapid Test Device

(Nasopharyngeal/Oropharyngeal Swab)

INTENDED USE

The COVID-19 Antigen Rapid Test Device is an *in vitro* immunoassay. The assay is for the direct and qualitative detection of SARS-CoV-2 viral nucleoprotein antigens from nasopharyngeal secretions and Oropharyngeal secretions. This test is intended for professional use only.

PRINCIPLE

The COVID-19 Antigen Rapid Test Device 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 buffer
- Extraction tube
- Nozzle with filter
- Individually packed swabs
- Tube stand
- Package insert

Materials Required but Not provided

- Clock, timer or stopwatch
- Transfer pipette
- Pipette

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 COVID-19 Antigen Rapid Test Device at 2–30°C 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):

- Remove the swab from its packing
- Insert the swab into the nostril parallel to the palate. Rotating against the nasal wall.(to ensure swab

contains cells as well as mucus)

- Process the swab as soon as possible after collecting the specimen

-Oropharyngeal swab (OP swab):

- Remove the swab from its packing
- 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
- Process the swab as soon as possible after collecting the specimen

Note:

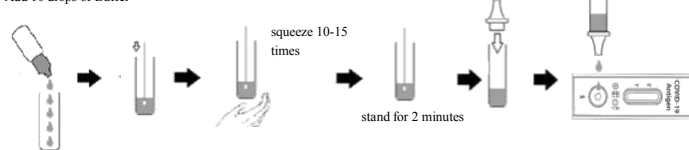
- Use only synthetic fiber swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit further testing.
- Swabs specimens should be tested as soon as possible after collection. Use freshly collected specimens for best test performance.
- If not tested immediately, swab specimens may be stored at 2–8°C for 24 hours after collection.
- If viral transport medium (VTM) is required, minimal dilution of the sample is recommended. If possible, 0.5–1.0 mL is recommended to avoid excessive dilution of each sample. Specimens in VTM may be stored at 2–8°C for 72 hours if not tested immediately.
- 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°C) before use.

- 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.
- Gently mix extraction buffer. Add 10 drops into the extraction tube.
- 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.
- 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.
- Insert nozzle into sample extraction tube. Invert the tube and add 2 drops of solution into the sample well by gently squeezing the tube.
- Read results at 15 minutes.

Add 10 drops of Buffer



RESULT INTERPRETATION

C **T**
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).

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

C **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:

- 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.
- Insufficient specimen volume, incorrect operating procedure or expired tests are the most likely reasons for control band failure.

QUALITY CONTROL

Internal Procedural Controls

The COVID-19 Antigen Rapid Test Device 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

- The COVID-19 Antigen Rapid Test Device 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”.
- Both viable and nonviable SARS-CoV-2 viruses are detectable with The COVID-19 Antigen Rapid Test Device.
- 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.
- Failure to follow the TEST PROCEDURE and RESULT INTERPRETATION may adversely affect test performance and/or invalidate the test result.
- 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.
- 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 2×10^2 TCID₅₀/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 COVID-19 Antigen Rapid Test and RT-PCR. The results were summarized below:

Table: COVID-19 Rapid Test vs. RT-PCR

COVID-19 Antigen Rapid Test	RT-PCR		Total
	Positive	Negative	
Positive	150	0	150
Negative	37	161	198
Total	187	161	348

Relative Sensitivity: 80.2 % (73.9%–85.3%) *
Sensitivity threshold 97.0% on samples with Ct <25 (91.6%–99.0%)*
Relative Specificity: 100 % (97.7%–100%)*
Overall Agreement: 89.4 % (85.7 %–92.2 %)*
*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 COVID-19 Antigen Rapid Test Device (Nasopharyngeal/Oropharyngeal Swab).

Organism	Organism	Organism
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	<i>Legionella pneumophila</i>
Measles virus	Influenza B Yamagata lineage	<i>Mycoplasma pneumoniae</i>
<i>Streptococcus pneumoniae</i>	Respiratory syncytial virus	<i>Chlamydia pneumoniae</i>
Epstein-Barr virus	Adenovirus	<i>Streptococcus pyogenes</i>
<i>Bordetella parapertussis</i>	Parainfluenza 1/2/3 virus	<i>Streptococcus agalactiae</i>
InfluenzaA (H1N1)pdm09	Human metapneumovirus	Group C <i>Streptococcus</i>

Influenza A (H3N2)	Rhinovirus	<i>Staphylococcus aureus</i>
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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 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
Doxylaminesuccinate	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

	Catalog number		Temperature limitation
	Consult instructions for use		Batch code
	In vitro diagnostic medical device		Use by
	Do not reuse		Contains sufficient for <n> tests
	Authorized representative in the European Community		CE marking according to IVD Medical Devices Directive 98/79/EC



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