

SARS-CoV-2 Antigen Test Kit (Colloidal Gold)

INTENDED USE

The SARS-CoV-2 Antigen Test Kit is a gold immuno-chromatographic assay (GICA) that is intended for the qualitative detection of the nucleocapsid protein antigen from SARS-CoV-2 in nasopharyngeal (NP) swab and nasal (NS) swab specimens directly from individuals who are suspected of COVID-19 by their healthcare provider.

The SARS-CoV-2 Antigen Test Kit does not differentiate between SARS-CoV and SARS-CoV-2.

Results are for the identification of SARS-CoV-2 nucleocapsid protein antigen. Antigen is generally detectable in upper respiratory specimens during the acute phase of infection. Positive results indicate the presence of viral antigens, but clinical correlation with patient history and other diagnostic information is necessary to determine infection status. Positive results do not rule out bacterial infection or co-infection with other viruses. The agent detected may not be the definite cause of disease.

Negative results should be treated as presumptive and confirmed with a molecular assay, if necessary, for patient management. Negative results do not rule out COVID-19 and should not be used as the sole basis for treatment or patient management decisions, including infection control decisions. Negative results should be considered in the context of a patient's recent exposures, history and the presence of clinical signs and symptoms consistent with COVID-19.

The SARS-CoV-2 Antigen Test Kit is intended for use by trained clinical laboratory personnel and individuals trained in point of care settings.

And the test patient's COVID-19 symptoms onset no more than 7 days.

GENERAL INFORMATION

The novel coronaviruses belong to the β genus. COVID-19 is an acute respiratory infectious disease. People are generally susceptible. Currently, the patients infected by the novel coronavirus are the main source of infection; asymptomatic infected people can also be an infectious source. Based on the current epidemiological investigation, the incubation period is 1 to 14 days, mostly 3 to 7 days. The main manifestations include fever, fatigue and dry cough. Nasal congestion, runny nose, sore throat, myalgia and diarrhea are found in a few cases. The median incubation time is estimated to be 5.1 days with symptoms expected to be present within 12 days of infection. The symptoms of COVID-19 are similar to other viral respiratory diseases and include fever, cough and shortness of breath.

PRINCIPLE OF THE TEST

The SARS-CoV-2 Antigen Test Kit is a rapid lateral flow immuno-chromatographic sandwich assay to directly detect nucleocapsid protein of SARS-CoV-2 in nasopharyngeal swab and nasal swab and diagnosis of SARS-CoV-2 infection.

The patient sample is placed in the Sample Tube, during which time the virus particles in the sample are disrupted, exposing internal viral nucleoproteins. After disruption, the sample is added into the Test Cassette sample well. And the sample migrates through a test strip, if the SARS-CoV-2 virus antigen is present, a red color line will be showed on the T line. If SARS-CoV-2 viral antigen is absent, there is not a red line will be showed on the T line, however, a red line will be always showed on the C line indicating that the reaction system is properly happened.

REAGENTS AND MATERIALS PROVIDED

Specification	1 test/kit	1 test/kit	20 tests/kit	20 tests/kit
Test Cassette	1	1	20	20
Extraction Reagent	1x0.5mL	1x0.5mL	20x0.5mL	20x0.5mL

Specification	1 test/kit	1 test/kit	20 tests/kit	20 tests/kit
Nasal Swab	1	/	20	/
Nasopharyngeal Swab	/	1	/	20
Instruction for use	1	1	1	1

Materials needed but not provided

Timer or watch.

Vortex

1.0mL Calibrated Micropipette with pipette tips

PRECAUTIONS

- For in vitro diagnostic use only.
- Please read this manual carefully prior to using this test kit. And follow the testing procedures strictly described in the manual, otherwise it will lead to incorrect results.
- Do not use expired reagents.
- Do not re-use the test kit.
- All samples, used reagents, test cards, and other materials used during testing are considered to be infectious, and personal protection should be done during the experiment.
- Use of Nitrile, Latex (or equivalent) gloves is recommended when handling patient samples. Wear suitable protective clothing and eye/face protection when handling the contents of this kit.
- Sample handling and waste disposal must comply with relevant regulations. Wash hands thoroughly after handling.
- Avoid using visually bloody or overly viscous samples for testing.
- Do not use components from different batch lots.
- The sample tube contains a salt solution. If the solution contacts the skin or eye, flush with copious amounts of water.
- Sample collection and handling procedures require specific training and guidance.

STORAGE AND STABILITY

- The test device is sensitive to humidity as well as to heat.
- Store kit components at 2-30°C, out of direct sunlight. Kit components are stable until the expiration date printed on the outer box.
- After unsealing the aluminum foil bag, the test cassette should be used as soon as possible within Two hours.
- Do not freeze.

SPECIMEN COLLECTION AND PREPARATION

Test specimens immediately after collection for optimal test performance. Inadequate specimen collection or improper sample handling/storage/transport may yield erroneous results.

- Nasal swab:**
To collect a nasal swab sample, carefully insert the swab into the nostril that presents the most secretion under visual inspection. Using gentle rotation, rotate the swab against the wall of the nostril into the patient's nostril to the nasal palate, and then slowly remove it while wiping.
- Nasopharyngeal swab:**
To collect a nasopharyngeal swab sample, carefully insert the swab into the nostril that presents the most secretion under visual inspection. Keep the swab near the septum floor of the nose while gently pushing the swab into the posterior nasopharynx. Rotate the swab several times then remove it from the nasopharynx.

SAMPLE TRANSPORT AND STORAGE

Samples should be tested as soon as possible after collection. The nasal or nasopharyngeal swabs are stable for up to 24 hrs at room temperature or 2-8°C.

If the samples are needed for transporting with CDC media / viral transport medium (VTM), minimal dilution of the sample is

recommended, as dilution may result in decreased test sensitivity.

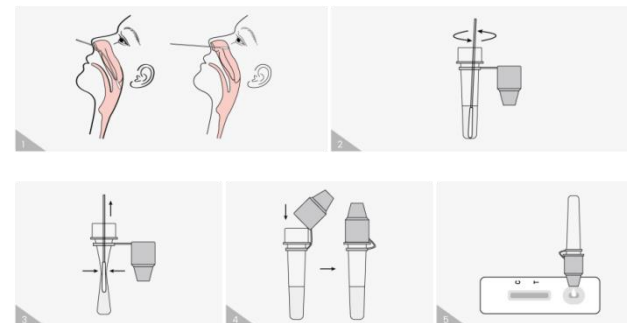
Nasal or nasopharyngeal swabs in CDC media or in VTM are stable for up to 72 hrs at 2-8°C.

TEST PROCEDURE

Please read the instructions for use carefully before testing, and complete the test in strict accordance with the directions of the manual, otherwise reliable results cannot be guaranteed.

- Open the aluminum foil bag, put the test cassette on a clean, horizontal bench.
- Bring the samples to room temperature prior to assay in case of the samples were stored at 2-8°C.

Swab Test Procedure (Nasal/Nasopharyngeal):

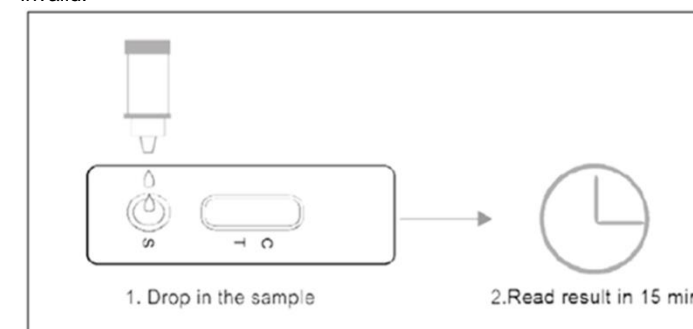


- Place the swab into the sample tube that has been pre-filled with 0.5 mL sample buffer, rotate the swab for about 10 seconds, and press the swab applicator against the tube wall to release the antigen in the swab.
- Roll the swab applicator against the inside of the sample tube as you remove it. Dispose of the used swab in a biohazard waste following the local government regulations.
- Install the dropper cap onto the sample tube, add two drops of the extraction solution into the sample well and start the timer.

CDC Media/ Viral Transport Media Test Procedure:

- Vortexing the sample tube containing the specimen in CDC media / VTM for a short time (about 5-10 seconds).
- Take 60-80 μ L of patient sample from the sample tube containing the specimen.
- Adding the specimen into the test cassette sample well and start the timer.

Read the results within 15 minutes, and the results after 15 minutes are invalid.



INTERPRETATION OF TEST RESULTS

Negative result	Positive result	Invalid result

- Positive:**
A red line appears on the test line (T) and the control line (C).
NOTE: A positive result does not rule out co-infections with other pathogens.
- Negative:**
Only the control line (C) appears, and no red line appears on the test line (T).
NOTE: A negative result does not exclude infection.
- Invalid:**
There is no red line at the position of the control line (C). Regardless of whether the TEST line (T) is displayed, it is an invalid result and the sample should be tested again.

PERFORMANCES

LoD:

The LoD of the test kit is 10 pg/ml for detection with recombinant SARS-CoV-2 nucleocapsid protein and is 1.5×10^2 TCID₅₀ with inactive viral culture.

The Negative Percent Agreement (NPA):

The NPA of the test kit should be 20/20 (-/-) using an internal negative reference panel.

The Positive Percent Agreement (PPA):

The PPA of the test kit should be 8/8 (+/+) using an internal positive reference panel.

Repeatability:

The repeatability of the test kit should be tested using same batch number, and all of the test results should be positive, and the T lines have even intensities.

ANALYTICAL PERFORMANCE

Limit of Detection (LoD)

The limit of detection (LoD) of SARS-CoV-2 Antigen Test Kit was determined by evaluating different concentrations of inactivated SARS-CoV-2 virus from viral cell culture and of recombinant nucleocapsid protein (rNp). Tested nasal swab samples were prepared by absorbing 20 μ L of each virus or rNp dilution onto the swab. The swab samples were tested according to the test procedure.

The LoD was determined as the lowest virus concentration that was detected $\geq 95\%$ of the time (i.e., concentration at which at least 19 out of 20 replicates tested positive).

The LoD of the test kit in nasal swab was confirmed as 1.5×10^2 TCID₅₀/swab and 10 ng/ml of rNp.

LoD Test Results

Concentration	Number Positive/Total	Detected Percentage (%)
1.5×10^2 TCID ₅₀ /Swab	20/20	100%
10 pg/ml	19/20	95%

High Dose Hook Effect

No high dose hook effect was observed when tested with up to a concentration of 1.0×10^5 TCID₅₀/ml of inactivated SARS-CoV-2 virus with the test kit.

Cross Reactivity

Cross reactivity of SARS-CoV-2 Antigen Test Kit was evaluated by testing normal respiratory track pathogenic microorganisms (bacteria, viruses, yeast) and a pooled human nasal wash that may be present in the nasal cavity. Each of the bacteria, viruses, and yeast were tested in duplicate in the absence or presence of heat inactivated SARS-CoV-2 virus (1.5×10^2 TCID₅₀/swab). No cross-reactivity or interference came out of these tests when tested at the concentration listed below.

Potential Cross-Reactant	Test Concentration
Respiratory Syncytial Virus A	1.0×10^5 PFU/mL
Measles Virus	1.0×10^5 TCID ₅₀ /mL
HCoV-NL63	1.0×10^5 TCID ₅₀ /mL
MERS	4.0×10^4 TCID ₅₀ /mL
Mumps Virus	1.0×10^5 TCID ₅₀ /mL
Adenovirus Type 3	1.0×10^5 TCID ₅₀ /mL

Potential Cross-Reactant	Test Concentration
Parainfluenza Type 2	1.0 x 10 ⁵ TCID ₅₀ /mL
Partial Pulmonary Virus	1.0 x 10 ⁵ TCID ₅₀ /mL
Human coronavirus OC43	1.0 x 10 ⁵ TCID ₅₀ /mL
Human coronavirus 229E	1.0 x 10 ⁵ TCID ₅₀ /mL
Influenza B (Victoria Strain)	1.0 x 10 ⁵ TCID ₅₀ /mL
Influenza B (Y Strain)	1.0 x 10 ⁵ TCID ₅₀ /mL
Influenza A (H1N1,2009)	1.0 x 10 ⁵ TCID ₅₀ /mL
Influenza A (H3N2)	1.0 x 10 ⁵ TCID ₅₀ /mL
Avian Influenza Virus H7N9	1.0 x 10 ⁵ TCID ₅₀ /mL
Avian Influenza Virus H5N1	1.0 x 10 ⁵ TCID ₅₀ /mL
Epstein Barr Virus	1.0 x 10 ⁵ TCID ₅₀ /mL
Enterovirus CA16	1.0 x 10 ⁵ TCID ₅₀ /mL
Rhinovirus	1.0 x 10 ⁵ PFU/mL
Bacteria	
Staphylococcus aureus	1.0 x 10 ⁶ CFU/mL
Streptococcus pneumoniae	1.0 x 10 ⁶ CFU/mL
Mycoplasma pneumoniae	1.0 x 10 ⁶ IFU/mL
Parapertussis	1.0 x 10 ⁶ cells/mL
Chlamydia pneumoniae	1.0 x 10 ⁶ IFU/mL
Pooled human nasal wash	N/A
Yeast	
Candida albicans	1.0 x 10 ⁶ cells/mL

CLINICAL PERFORMANCES

The clinical performance characteristics of SARS-CoV-2 Antigen Test Kit was evaluated with 230 patients who were suspected of COVID-19 and 249 persons who were no contact risk for COVI. An CE marked real-time Polymerase Chain Reaction (RT-PCR) assay for the detection of SARS-CoV-2 was used as the comparator method for this study.

Nasal swab samples

A total of 240 nasal swab samples were tested, and SARS-CoV-2 Antigen Test Kit Performance against the NAT Method is as following:

SARS-CoV-2 Antigen Test Kit	Comparator Method (NAT)		
	Positive	Negative	Total
Positive	113	2	115
Negative	4	121	125
Total	117	123	240
Sensitivity (95% CI): 113/117 96.58% (91.48% - 99.06%)			
Specificity (95% CI): 121/123 98.37% (94.25% - 99.80%)			

The data below is for understanding information refer to NAT cycle threshold (Ct):

The performance of SARS-CoV-2 Antigen Test Kit with positive results stratified by the NAT method Ct counts were assessed to more understand the correlation of assay performance to the NAT Ct value, estimating the viral amount present in the clinical sample. As showed in the following table, the positive agreement of the SARS-CoV-2 Antigen Test Kit is higher with samples of a Ct count < 33.

Performance against the NAT Method—by Ct Counts

SARS-CoV-2 Antigen Test Kit	NAT Method (Ct)	
	POS (Ct < 33)	POS (Ct ≥ 33)
Positive	90	23
Negative	0	4
Total	90	27
Sensitivity (95% CI) 100.0% (95.98%, 100.0%)		
85.19% (66.27%, 95.81%)		

Nasopharyngeal swab samples

A Total of 239 nasopharyngeal swab samples were tested, and SARS-CoV-2 Antigen Test Kit Performance against the NAT Method is as following:

SARS-CoV-2 Antigen Test Kit	Comparator Method (NAT)		
	Positive	Negative	Total

SARS-CoV-2 Antigen Test Kit	Comparator Method (NAT)		
	Positive	Negative	Total
Positive	110	2	112
Negative	3	124	127
Total	113	126	239
Sensitivity (95% CI): 110/113 97.35% (92.44% - 99.45%)			
Specificity (95% CI): 124/126 98.41% (94.38% - 99.81%)			

The data below is for understanding information refer to NAT cycle threshold (Ct):

The performance of SARS-CoV-2 Antigen Test Kit with positive results stratified by the NAT method Ct counts were assessed to more understand the correlation of assay performance to the NAT Ct value, estimating the viral amount present in the clinical sample. As showed in the following table, the sensitivity of the SARS-CoV-2 Antigen Test Kit is higher with samples of a Ct count < 33.

Performance against the NAT Method—by Ct Counts

SARS-CoV-2 Antigen Test Kit	NAT Method (Ct)	
	POS (Ct < 33)	POS (Ct ≥ 33)
Positive	86	24
Negative	0	3
Total	86	27
Sensitivity (95% CI) 100.0% (95.80%, 100.0%)		
88.89% (70.84%, 97.65%)		

Total samples

As a total conclusion, a total of 479 samples were tested which included nasal swab specimens and nasopharyngeal swab specimens, and SARS-CoV-2 Antigen Test Kit Performance against the NAT Method is as following:

SARS-CoV-2 Antigen Test Kit	Comparator Method (NAT)		
	Positive	Negative	Total
Positive	223	4	227
Negative	7	245	252
Total	230	249	479
Sensitivity (95% CI): 223/230 96.96% (93.83% - 98.77%)			
Specificity (95% CI): 245/249 98.39% (95.94% - 99.56%)			

The data below is for understanding information refer to NAT cycle threshold (Ct):

The performance of SARS-CoV-2 Antigen Test Kit with positive results stratified by the NAT method Ct counts were assessed to more understand the correlation of assay performance to the NAT Ct value, estimating the viral amount present in the clinical sample. As showed in the following table, the sensitivity of the SARS-CoV-2 Antigen Test Kit is higher with samples of a Ct count < 33.

Performance against the NAT Method—by Ct Counts

SARS-CoV-2 Antigen Test Kit	NAT Method (Ct)	
	POS (Ct < 33)	POS (Ct ≥ 33)
Positive	176	47
Negative	0	7
Total	176	54
Sensitivity (95% CI) 100.0% (97.93%, 100.0%)		
87.04% (75.10%, 94.63%)		

Endogenous Interfering Substances

The following interfering substances, that may be introduced into the nasal cavity or nasopharynx, were evaluated with the SARS-CoV-2 Antigen Test Kit at the concentrations listed below and were no affect to the performance of the test kit.

Substance	Active Ingredient	Concentration
Endogenous	Whole Blood	1.2 % v/v
	Mucin	2.0 % w/v
Nasal Drops	Sodium Chloride	5% v/v

Substance	Active Ingredient	Concentration
Nasal Spray	Fluticasone Propionate	0.3 ng/mL
	Gluconic Acid Zinc	5 % w/v
	Fluconazole	5 % w/v
	Oxymetazoline	12 % v/v
Sore Throat Phenol Spray	Phenol	15 % v/v
		Cromolyn
Throat Lozenge	Benzocaine, Menthol	0.15% w/v
Anti-viral Drug	Tamiflu (Oseltamivir Phosphate)	1.3 mg/mL
	Ribavirin	12.9 mg/mL
Antibacterial, Systemic	Tobramycin	4.0 ug/mL

LIMITATIONS

- This test is for in vitro diagnostic use only.
- A negative test result may occur if the level of antigen in a sample is below the detection limit of the test or if the sample was collected or transported improperly.
- Test performance depends on the amount of virus (antigen) in the sample and may or may not correlate with viral culture results performed on the same sample.
- Test results must be evaluated in conjunction with other clinical data available to the physician.
- This test cannot distinguish between asymptomatic carriers and infected persons of the SARS-CoV-2.
- A false negative result may be obtained if the concentration of the viral antigen in the nasopharyngeal and nasal swab is below the sensitivity.
- Negative results should be treated as presumptive and confirmed with an approved molecular assay.
- Clinical performance was evaluated with frozen samples, and performance may be different with fresh samples.

DESCRIPTION OF SYMBOLS USED

The following graphical symbols used in or found on DVST Kit are the most common ones appearing on medical devices and their packaging. They are explained in more details in the European Standard EN 980:2008 and International Standard ISO 15223-1:2016.

Key to symbols used			
	Manufacturer		Expiration date
	Do not reuse		Date of manufacture
	Instructions for use		Batch code
	Temperature limitation		In vitro diagnostic medical device
	CE Symbol		Authorized representative in the European Community
	Do not use if package is damaged		

CONTACT

CONTACT	
	<p>Manufacturer: Shenzhen Dymind Biotechnology Co., Ltd.</p> <p>Address: 10th Floor, Building B, High-tech park, Guangqiao Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen, 518107, P.R.China</p> <p>Contact Number: +86 755 26746162</p> <p>Website: http://www.dymind.com</p>
	<p>EC Representative</p> <p>SUNGO Europe B.V.</p> <p>Address: Olympisch Stadion 24, 1076DE Amsterdam, Netherlands</p>