

## COVID-19/Influenza A+B/RSV Antigen Combo Rapid Test Cassette English

*For in vitro diagnostic use only.*

### INTENDED USE

The COVID-19/Influenza A+B/RSV Antigen Combo Rapid Test Cassette is a lateral flow immunoassay intended for the qualitative detection of SARS-CoV-2, influenza A, influenza B and RSV viral nucleoprotein antigens in nasal swab from individuals suspected of respiratory viral infection consistent with COVID-19, influenza A, influenza B and RSV by their healthcare provider. Symptoms of respiratory viral infection due to SARS-CoV-2, influenza and RSV can be similar. The COVID-19/Influenza A+B/RSV Antigen Combo Rapid Test Cassette is intended for the detection and differentiation of SARS-CoV-2, influenza A, influenza B and RSV viral nucleoprotein antigens. Antigens are generally detectable in nasopharyngeal 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. Negative results do not rule out SARS-CoV-2, influenza A, influenza B and RSV infection and should not be used as the sole basis for treatment or patient management decisions, including infection control decisions. Negative results must be combined with clinical observations, patient history and epidemiological information, and confirmed with a molecular assay, if necessary for patient management.

### SUMMARY

The novel coronavirus (SARS-CoV-2) belong to the  $\beta$  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.

Influenza (flu) is a contagious respiratory illness caused by influenza viruses. It can cause mild to severe illness. Serious outcomes of flu infection can result in hospitalization or death. Some people, such as older people, young children, and people with certain health conditions, are at high risk of serious flu complications. There are two main types of influenza (flu) virus: Types A and B. The influenza A and B viruses that routinely spread in people (human influenza viruses) are responsible for seasonal flu epidemics each year.

Respiratory syncytial virus (RSV) belongs to the genus pneumovirus of Paramyxoviridae, with only one serotype. It mainly causes lower respiratory tract infections such as bronchiolitis and pneumonia in infants under 6 months old, as well as upper respiratory tract infections such as rhinitis and colds in older children and adults.

### PRINCIPLE

The COVID-19 Antigen Rapid Test is a lateral flow immunoassay based on the principle of the double-antibody sandwich technique. SARS-CoV-2 nucleocapsid protein monoclonal antibody conjugated with color micro-particles is used as detector and sprayed on conjugation pad. During the test, SARS-CoV-2 antigen in the specimen interact with SARS-CoV-2 antibody conjugated with color microparticles making antigen-antibody labeled complex. This complex migrates on the membrane via capillary action until the test line, where it will be captured by the pre-coated SARS-CoV-2 nucleocapsid protein monoclonal antibody. A colored test line (T) would be visible in the result window if SARS-CoV-2 antigens are present in the specimen. Absence of the T line suggests a negative result. The control line (C) is used for procedural control, and should always appear if the test procedure is performed properly.

The Influenza A+B Rapid Test is a lateral flow immunoassay based on the principle of the double-antibody sandwich technique. The monoclonal antibodies against influenza A and influenza B conjugated with color microparticles are used as detectors and sprayed on conjugation pad. During the test, antigen and labeled antibody complexes are formed and migrate on the membrane via capillary action. If the specimen contains influenza A antigen, the complex will be captured by the pre-coated influenza A monoclonal antibody to form a visible colored line at the A region in the result window. If the specimen contains influenza B antigen, the complex will be captured by the pre-coated influenza B monoclonal antibody to form a visible colored line at the B region in the result window. The control line (C) is used for procedural control, and should always appear if the test procedure is performed properly.

The RSV Rapid Test is a lateral flow immunoassay based on the principle of the double-antibody sandwich technique. The monoclonal antibodies against RSV conjugated with color microparticles are used as detectors and sprayed on conjugation pad. During the test, antigen and labeled antibody complexes are formed and migrate on the membrane via capillary action. If the specimen contains RSV antigen, the complex will be captured by the pre-coated RSV monoclonal antibody to form a visible colored line at the region in the result window. The control line (C) is used for procedural control, and should always appear if the test procedure is performed properly.

### WARNINGS AND PRECAUTIONS

- in vitro diagnostic use only. This test cassette is for one-time use and cannot be reused or used by multiple people.
- Do not use this product as the sole basis to diagnose or exclude SARS-CoV-2, influenza A, influenza B or RSV infection, or to inform infection status of COVID-19 or influenza.
- Do not use after the expiration date.
- Please read all the information in this leaflet before performing the test.
- The test cassette should remain in the sealed pouch until use.
- All specimens should be considered potentially hazardous and handled in the same manner as an infectious agent.
- The used test cassette should be discarded according to federal, state and local regulations.

### COMPOSITION

#### Materials Provided

- Test Cassettes: a test cassette includes the COVID-19 Antigen Test Strip, the Influenza A+B Test Strip and the Influenza RSV Test Strip, which are fixed inside a plastic device
- Extraction Reagents: extraction reagent
- Sterilized Swabs: single use swab for specimen collection
- Work Station
- Package Insert

#### Materials Required but not Provided

- Timer

### STORAGE AND STABILITY

- Store as packaged in the sealed pouch at the temperature (4-30°C or 40-86°F). The kit is stable within the expiration date printed on the labeling.
- Once open the pouch, the test should be used within one hour. Prolonged exposure to hot and humid environment will cause product deterioration.
- The LOT and the expiration date were printed on the labeling.

### SPECIMEN

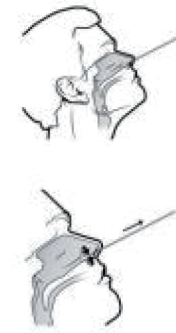
#### Specimen Collection

Only the swab provided in the kit is to be used for specimen collection.



1. Remove the swab from the package.

2. Tilt patient's head back about 70°.



3. Insert the swab through the nostril parallel to the palate (not upwards) until resistance is encountered or the distance is equivalent to that from the ear to the nostril of the patient, indicating contact with the nasopharynx. (Swab should reach depth equal to distance from nostrils to outer opening of the ear.) Gently rub and roll the swab. Leave swab in place for several seconds to absorb secretions.

4. Slowly remove swab while rotating it. Specimens can be collected from both sides using the same swab, but it is not necessary to collect specimens from both sides if the minitip is saturated with fluid from the first collection. If a deviated septum or blockage creates difficulty in obtaining the specimen from one nostril, use the same swab to obtain the specimen from the other nostril.

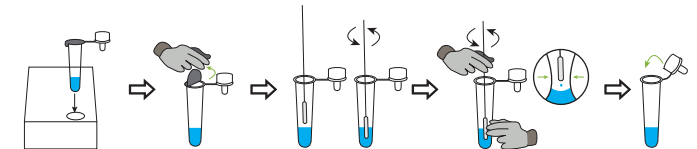
#### Specimen Transport and Storage

Do not return the nasalswab to the original swab packaging. Freshly collected specimens should be processed as soon as possible, but no later than one hour after specimen collection. Specimen collected may be stored at 2-8°C for no more than 24 hours; Store at -70°C for a long time, but avoid repeated freeze-thaw cycles.

### TEST PROCEDURE

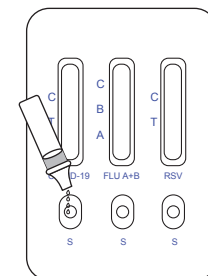
**Note:** Allow the test devices, reagents and specimens to equilibrate to room temperature (15-30°C or 59-86°F) prior to testing.

1. Place the extraction tube in the workstation.
2. Peel off aluminum foil seal from the top of the extraction tube containing the extraction tube containing the extraction buffer.
3. Sampling refers to section 'Specimen Collection'.
4. Insert the nasal swab specimen into the extraction tube which contains extraction reagent. Roll the swab at least 5 times while pressing the head against the bottom and side of the extraction tube. Leave the nasal swab in the extraction tube for one minute.
5. Remove the nasal swab while squeezing the sides of the tube to extract the liquid from the swab. The extracted solution will be used as test sample.
6. Cover the extraction tube with a dropper tip tightly.



7. Remove the test cassette from the sealed pouch.




8. Reverse the specimen extraction tube, holding the specimen extraction tube upright, transfer 3 drops (approximately 100µL) to each specimen well (S) of the test cassette, then start the timer. See illustration below.
9. Wait for colored lines to appear. Interpret the test results at 15 minutes. Do not read results after 20 minutes.










## INTERPRETATION OF RESULTS

### For COVID-19/RSV Antigen Rapid Test

<b>Positive</b>		<b>Two lines appear.</b> One colored line appears at the control region (C), and another colored line appears at the test region (T), regardless of the intensity of the test line.
<b>Negative</b>		One colored line appears at the control region (C), and no line appears at the test region (T).
<b>Invalid</b>		<b>Control line fails to appear.</b> Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test using a new test cassette. If the problem persists, discontinue using the lot immediately and contact your local distributor.

### For Influenza A+B Rapid Test

<b>Flu A Positive</b>		One colored line appears at the control region (C), and another colored line appears at the A test region, regardless of the intensity of the test line.
<b>Flu B Positive</b>		One colored line appears at the control region (C), and another colored line appears at the B test region, regardless of the intensity of the test line.
<b>Flu A &amp; B Positive</b>		One colored line appears at the control region (C), and both the A and B lines appear at the test region, regardless of the intensity of the test line.
<b>Negative</b>		One colored line appears at the control region (C), and no lines appear at the test region.
<b>Invalid</b>		<b>Control line fails to appear.</b> Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test using a new test cassette. If the problem persists, discontinue using the lot immediately and contact your local distributor.

## QUALITY CONTROL

A procedural control is included in the test. A colored line appearing at the control region (C) is considered an internal procedural control. It confirms sufficient specimen volume, adequate membrane wicking and correct procedural technique.

Control standards are not supplied with this kit. However, it is recommended that positive and negative controls be tested as good laboratory practice to confirm the test procedure and to verify proper test performance.

## LIMITATIONS

The product is limited to provide a qualitative detection. The intensity of the test line does not necessarily correlate to the concentration of the antigens in the specimens.

Negative results are presumptive. Negative test results do not preclude infection and should not be used as the sole basis for treatment or other patient management decisions, including infection control decisions, particularly in the presence of clinical signs and symptoms consistent with COVID-19, or in those who have been in contact with the virus. It is recommended that these results be confirmed by a molecular testing method, if necessary, for patient management.

A physician must interpret the results in conjunction with the patient's history, physical findings, and other diagnostic procedures.

A negative result can occur if the quantity of antigens present in the specimen is below the detection threshold of the assay, or the virus has undergone minor amino acid mutation(s) in the target epitope region recognized by the monoclonal antibodies utilized in the test.

## PERFORMANCE CHARACTERISTICS]

### Clinical Performance

The clinical performance of COVID-19/Influenza A+B/RSV Antigen Combo Rapid Test Cassette was established in single-blinded studies with 508 nasal swabs collected from individual symptomatic patients (within 7 days of onset) who were suspected of COVID-19. The commercialized molecular (RT-PCR) assay for detection of SARS-CoV-2, influenza A, influenza B and RSV were used as the reference method.

Summary of the performance of COVID-19/Influenza A+B/RSV Antigen Combo Rapid Test Cassette compared to RT-PCR:

### For COVID-19 Antigen Rapid Test

The RT-PCR cycle threshold (Ct) is the relevant signal value. Lower Ct value indicate higher viral load. The sensitivity was calculated for the different Ct value range (Ct value  $\leq 37$ ).

COVID-19 antigen		RT-PCR(Ct value $\leq 37$ )		Totale
		Positive	Negative	
HEO*	Positive	146	0	146
	Negative	10	352	362
Total		156	352	508

PPA (Ct  $\leq 37$ ): 93.6% (146/156), (95%CI: 88.5%~96.9%)

NPA: 100% (352/352), (95%CI: 99.2%~100%)

PPA - Positive Percent Agreement (Sensitivity)

NPA - Negative Percent Agreement (Specificity)

### For Influenza A+B Rapid Test

Virus	Sensitivity (PPA)	Specificity (NPA)
Influenza A	89% (65/73), 95%CI: 79.8%~94.3%	99.7% (434/435), 95%CI: 98.7%~100%
Influenza B	84.7% (50/59), 95%CI: 73.5%~91.8%	99.6% (447/449), 95%CI: 98.4%~99.9%

### For RSV Rapid Test

Virus	Sensitivity (PPA)	Specificity (NPA)
RSV	84.9% (45/53), 95%CI: 72.4%~93.3%	99.78% (454/455), 95%CI: 98.7%~100%

### Limit of Detection (Analytical Sensitivity)

The study used cultured viruses, which are heat inactivated and spiked into nasopharyngeal swab specimen. The Limit of Detection (LoD) was confirmed as follows:

Virus Lineage	Limit of Detection (LoD)
SARS-CoV-2	$1.0 \times 10^7$ TCID <sub>50</sub> /mL
Influenza A (H1N1)	$1.0 \times 10^7$ TCID <sub>50</sub> /mL
Influenza A (H3N2)	$1.0 \times 10^7$ TCID <sub>50</sub> /mL
Influenza B (Yamagata)	$3.7 \times 10^6$ TCID <sub>50</sub> /mL
Influenza B (Victoria)	$1.0 \times 10^7$ TCID <sub>50</sub> /mL
RSV	$3.18 \times 10^7$ TCID <sub>50</sub> /mL

### Cross Reactivity (Analytical Specificity)

Cross reactivity was evaluated by testing 26 commensal and pathogenic microorganisms that may be present in the nasal cavity. No cross-reactivity was observed with recombinant MERS-CoV NP protein when tested at the concentration of 50 pg/mL.

No cross-reactivity was seen with the following viruses when tested at the concentration of  $1.0 \times 10^6$  PFU/mL: Adenovirus (type 1, 2, 3, 5, 7, 55), Human metapneumovirus, Parainfluenza virus (type 1, 2, 3, 4), Respiratory syncytial virus, Enterovirus, Rhinovirus, Human coronavirus 229E, Human coronavirus OC43, Human coronavirus NL63, Human coronavirus HKU1. No cross-reactivity was seen with the following bacteria when tested at the concentration of  $1.0 \times 10^7$  CFU/mL: Mycoplasma pneumoniae, Chlamydia pneumoniae, Legionella pneumophila, Haemophilus influenzae, Streptococcus pyogenes (group A), Streptococcus pneumoniae, Staphylococcus aureus.

### Interference

The following potential interference substances were evaluated with the COVID-19/Influenza A+B/RSV Antigen Combo Rapid Test Cassette at the concentrations listed below and were found not to affect test performance.

Substance	Concentration	Substance	Concentration
Mucin	2%	Whole blood	4%
Benzocaine	5 mg/mL	Menthol	10 mg/mL
Saline nasal spray	15%	Phenylephrine	15%
Oxymetazoline	15%	Histamine	10 mg/mL
Tobramycin	5 µg/mL	dihydrochloride	
Oseltamivir phosphate	10 mg/mL	Mupirocin	10 mg/mL
Arbidol	5 mg/mL	Zanamivir	5 mg/mL
Fluticasone propionate	5%	Ribavirin	5 mg/mL
Triamcinolone	10 mg/mL	Dexamethasone	5 mg/mL

### High-dose Hook Effect

No high-dose hook effect was observed up to  $1.0 \times 10^5$  TCID<sub>50</sub>/mL of inactivated SARS-CoV-2,  $1.0 \times 10^5$  TCID<sub>50</sub>/mL of inactivated influenza A (H1N1),  $1.0 \times 10^6$  TCID<sub>50</sub>/mL of inactivated influenza A (H3N2),  $7.5 \times 10^6$  TCID<sub>50</sub>/mL of inactivated influenza B (Yamagata),  $1.0 \times 10^5$  TCID<sub>50</sub>/mL of inactivated influenza B (Victoria) and  $1.0 \times 10^7$  TCID<sub>50</sub>/mL of inactivated RSV with the COVID-19/Influenza A+B/RSV Antigen Combo Rapid Test.



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### Index of Symbol

	Consult instructions for use		Test per kit		Authorized Representative
	For in vitro diagnostic use only		Use by		Do not reuse
	Store between 4-30°C		Lot Number		Catalogue number

Version No.: 002

Effective Date: 2021-5-15