RapidFor™

SARS-CoV-2 & FLU A/B Antigen Combo Test
Reference Number: VSCD10
For professional use only

INTENDED USE
The SARS-CoV-2 & FLU A/B Antigen Combo Test is an in vitro immunochromatographic assay for the qualitative detection of SARS-CoV-2 and influenza A / B antigens in nasopharyngeal and nasal swab specimens collected from patients with signs and symptoms of respiratory infection. This test is intended for use as an aid in the differential diagnosis of SARS-CoV-2 and influenza A/ B viral infections in humans in conjunction with clinical and epidemiological risk factors.

SUMMARY AND EXPLANATION
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.

Influenza is a highly contagious acute viral infection of the respiratory tract. It is a communicable disease easily transmitted from person to person through aerosol droplets excreted when sneezing and coughing. Common symptoms include high fever, chills, headache, cough, sore throat, and malaise. The type A influenza virus is more prevalent and is the primary pathogen associated with serious epidemics. The type B virus causes a disease that is generally not as severe as that caused by the type A virus.

An accurate diagnosis of SARS-CoV-2 and influenza based on clinical symptoms is difficult because the initial symptoms of influenza are similar to those of numerous other illnesses. Therefore, it can be confirmed only by laboratory diagnostic testing. Early differential diagnosis of SARS-CoV-2 and influenza type A or type B can allow for proper treatment with appropriate antiviral therapy. Early diagnosis and treatment are of particular value in a clinical setting where accurate diagnosis can assist the healthcare professional with management of SARS-CoV-2 and influenza patients who are at risk for complications. The Combo Test is a rapid immunoassay to be used as an aid for the differential diagnosis of SARS-CoV-2 and influenza type A and type B.

PRINCIPLE OF THE TEST
The SARS-CoV-2 & FLU A/B Antigen Combo Test is an immunochromatographic membrane assay and contains two independent tests, the SARS-CoV-2 antigen test, and the FLU A/B antigen test. In the test procedure, a specimen is collected and placed for one minute into the Extraction Well of the test device containing extraction solution, during which time antigen is extracted from disrupted virus particles. The test device is then raised, tapped, and laid back down onto a level surface to allow the solution in the Extraction Well to migrate through the pads containing lyophilized detector antibodies conjugated to gold dye and then through the test membrane.

For the SARS-CoV-2 antigen test
The SARS-CoV-2 antigen test uses highly sensitive monoclonal antibodies to detect SARS-CoV-2 antigen in nasopharyngeal swab specimens. These antibodies and a control protein are immobilized onto a membrane support as two distinct lines and are combined with other reagents/pads to construct a Test Strip.
The SARS-CoV-2 antigen test has one test lines and one control line. If either Test line appears in the test result window, together with the Control line, the test result is positive for SARS-CoV-2.

For the Flu A/B antigen test
The Flu A/B antigen test uses highly sensitive monoclonal antibodies to detect influenza type A and B nucleoprotein antigens in nasopharyngeal swab specimens. These antibodies and a control protein are immobilized onto a membrane support as three distinct lines and are combined with other reagents/pads to construct a Test Strip.
The Flu A/B antigen test has two Test lines, one for influenza A and one for influenza B. The two Test lines allow for the separate and differential identification of influenza A and/or B from the same specimen. If either Test line appears in the test result window, together with the Control line, the test result is positive for influenza.

MATERIALS AND COMPONENTS
Materials provided with the test kits

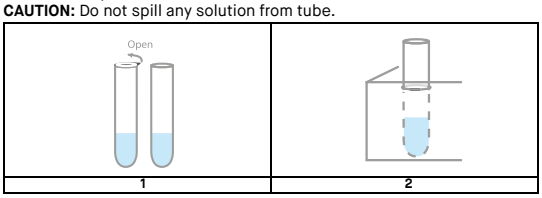
CAT No	VSCD10-SC05	VSCD10-SC25
COMPONENT	5 Tests /box	25 Tests /box
Test Device	5 Test cassettes (1 Test/pouch x 5 pouches)	25 Test cassettes (1 Test/pouch x 25 pouches)
Tube	5 single use sealed tube with 500 µL extraction solution	25 single use sealed tube with 500 µL extraction solution
Specimen sampling swabs	5 sterile, single use specimen sampling swabs	25 sterile, single use specimen sampling swabs
Dropper	5 single-use droppers	25 single-use droppers
Packing Insert	1 instruction for use	1 instruction for use

Note: The components in different batches of the kit cannot be mixed.

PRECAUTIONS/WARNINGS
1. For in vitro diagnostic use.
2. All users must read the instructions for use carefully before carrying out the test.
3. Do not use the kit contents beyond the expiration date printed on the outside of the box.
4. Use appropriate precautions in the collection, handling, storage, and disposal of patient samples and used kit contents.
5. The sample buffer and test card must be equilibrated to room temperature (18℃-30℃) before used, otherwise the results may be incorrect.
6. Use of Nitrile, Latex (or equivalent) gloves is recommended when handling patient samples.
7. Do not reuse the used Test Card, Reagent Tubes or Swabs.
8. Discard and do not use any damaged or dropped Test Card or material.
9. The Reagent Solution contains a salt solution (saline). If the solution contacts the skin or eye, flush with copious amounts of water.
10. Inadequate or inappropriate sample collection, storage, and transport may yield false test results.
11. Sample collection and handling procedures require specific training and guidance.
12. Users should test specimens as quickly as possible after specimen collection.
13. To obtain accurate results, do not use visually bloody or overly viscous samples.
14. If the sample volume is not enough, the chromatography cannot be carried out successfully.
15. To obtain accurate results, an opened and exposed test Card should not be used inside a laminar flow hood or in a heavily ventilated area.
16. Testing should be performed in an area with adequate ventilation.
17. Wash hands thoroughly after handling.

STORAGE AND STABILITY
1.Store the test kit at 2°C - 30°C. Do not store or freeze the kit below 2°C. All components must be brought to room temperature before testing.
2.The test cassette must be used within 15 minutes after removal from the foil pouch.
3.The kit must not be used after the expiry date. The expiry date is stated on the label/packaging.

TEST PROCEDURE
CAUTION: Read the instructions for use carefully before testing and carry out the following instructions as described.
CAUTION: Make sure that the test components are at room temperature when used.
The test procedure includes the following steps: sample collection, sample processing and test performance.
Before the Test:
1. Carefully open the sealed tube which include the extraction solution.
2.Place the open sealed tube to the holder.
CAUTION: Do not spill any solution from tube.



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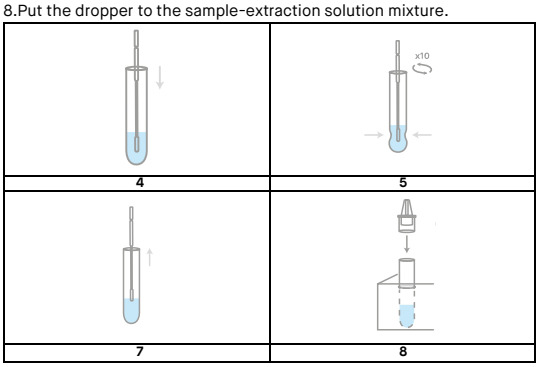
Sample Collection:
CAUTION: The sample collection procedure differs between the individual swab samples. Please perform only one of the indicated swab samples (3a – 3b).
3a. Nasopharyngeal swab: Ask the patient to place the head slightly in the neck. Then slowly insert the sterile swab headfirst trans nasally into the nasopharynx until you feel a slight resistance. Turn the swab 3 times close to the inner wall of the nasal cavity and carefully remove the swab from the nose. Avoid contact with the nasal mucosa when inserting and removing.
or 3b. Anterior nasal swab: Insert the sterile swab into the anterior nasal section and rotate the swab 3 times along the inner wall of the nasal cavity. Then remove the swab.


3a 3b

Sample Processing:
4.Insert the used swab with the swab headfirst into the extraction tube.
5.Rotate the swab in the extraction buffer 10 times along the inner wall of the extraction tube. Then push the swab head out along the inner wall to ensure that the sample on the swab is completely eluted into the buffer.
6.Squeeze the swab head along the inner wall to ensure that the sample is completely eluted from the swab.
7.Take off the swab from the extraction buffer.
8.Put the dropper to the sample-extraction solution mixture.



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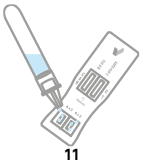
Test Operation
9.Take the required reagents and test cassette to equilibrate to room temperature.
CAUTION: Do not open the pouch until you are ready to perform a test, and the single-use test is suggested to be used under low environment humidity (RH≤70%) within 15 minutes.
10.Unpack the aluminum foil bag and remove the test cassette.
11. Add 3 drops from the extraction tube with the processed sample into the sample well and start a timer.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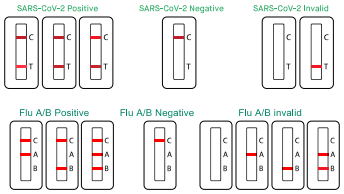
12.Read the test result after 15 minutes. After 20 minutes, the test result is no longer valid, and the test must be repeated.
13.Dispose of all samples and materials used in the test as biohazardous waste. Laboratory chemicals and biohazardous waste must be disposed of in accordance with local regulations.

INTERPRETATION OF RESULTS
Positive Result
For the SARS-CoV-2 test:
A reddish-purple Control line (C position) and a reddish-purple Test line indicate that SARS-CoV-2 antigen has been detected. Determination of a positive result can be made as soon as a visible Test line and Control line appear.
For the Flu A/B test:
A reddish-purple Control line (C position) and a reddish-purple Test line (A or B position) indicate that Influenza A or B antigen has been detected. Lines at the A and C positions indicate the presence of Influenza type A viral antigen, and lines at the B and C positions indicate the presence of Influenza type B viral antigen in the specimen. A positive result does not rule out co-infections with other pathogens or identify any specific influenza A virus subtype. Determination of a positive result can be made as soon as both a visible Test line (either A or B) and Control line appear.
NOTE: The Test line (reddish purple line) may vary in shade and intensity (light or dark, weak, or strong) depending on the concentration of antigen detected. The intensity of the Control line should not be compared to that of the Test line for the interpretation of the test result.

Negative Result:
For SARS-CoV-2 test:
Only a reddish-purple Control line (C position), with no Test line, indicates that SARS-CoV-2 antigen has not been detected. A negative result does not exclude SARS-CoV-2 viral infection. Determination of negative results should not be made before 15 minutes. If a line does not form at the Control line position in 15 minutes, the test result is invalid, and the test should be repeated with a new Test device.
For Flu A/B test:
Only a reddish-purple Control line (C position), with no Test line at the A or B position, indicates that Influenza A or B antigen has not been detected. A negative result does not exclude influenza viral infection. Determination of negative results should not be made before 15 minutes. If a line does not form at the Control line position in 15 minutes, the test result is invalid, and the test should be repeated with a new Test device.
Invalid Result :
The test result is invalid if a colored line does not form in the control region. The sample must be re-tested, using a new test cassette.



LIMITATIONS
1.The result of the product must not be considered as a confirmed diagnosis. The evaluation of the test results must be done together with RT-PCR results, clinical symptoms, epidemiological information, and further clinical data.
2.The contents of this kit are to be used for the qualitative detection of SARS- CoV-2 and influenza A / B antigens from nasopharyngeal and nasal swabs. Other specimen types may not be used.
3.The Flu A/B antigen test can distinguish between influenza A and B viruses, but it cannot differentiate influenza subtypes
4.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.
5.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.
6.Failure to follow the Test Procedure may adversely affect test performance and/or invalidate the test result.
7.React less than 10 minutes may lead a false negative result; React more than 20 minutes may lead a false positive result.
8.Individuals who received nasally administered influenza A vaccine may produce positive test results for up to three days after vaccination.
9. This test cannot rule out diseases caused by other bacterial or viral pathogens.
10. Performance of the Test has not been established for monitoring antiviral treatment of SARS-CoV-2 or influenza.

PERFORMANCE CHARACTERISTICS

1) Clinical Performance:

Nasopharyngeal:

The performance of the SARS-CoV-2 & FLU A/B Antigen Combo Test was determined for SARS-CoV-2 with 284 samples, for influenza A with 181 samples, for influenza B with 166 samples.

SARS-CoV-2 & Flu A/B Antigen Combo Test	RT-PCR comparative test result				
	SARS-CoV-2 Positive	Influenza A Positive	Influenza B Positive	Negative	Total
SARS-CoV-2 Positive	281	0	0	1	282
Influenza A Positive	0	179	0	0	179
Influenza B Positive	0	0	164	0	164
Negative	3	2	2	459	466
Total	284	181	166	460	1091

The sensitivity of the test kit for SARS-CoV-2 is 98.94%, for influenza A 98.90% and for influenza B 98.80%. The specificity of the test kit is 99.52%.

Nasal:

The performance of the SARS-CoV-2 & FLU A/B Antigen Combo Test was determined for SARS-CoV-2 with 284 samples, for influenza A with 181 samples, for influenza B with 166 samples.

SARS-CoV-2 & Flu A/B Antigen Combo Test	RT-PCR comparative test result				
	SARS-CoV-2 Positive	Influenza A Positive	Influenza B Positive	Negative	Total
SARS-CoV-2 Positive	280	0	0	1	282
Influenza A Positive	0	178	0	1	179
Influenza B Positive	0	0	163	0	163
Negative	4	3	3	458	468
Total	284	181	166	460	1091

The sensitivity of the test kit for SARS-CoV-2 is 98.59%, for influenza A 98.34% and for influenza B 98.19%. The specificity of the test kit is 99.57%.

2) Limit of Detection (LOD):

For SARS-CoV-2 Antigen Test:

When the virus culture concentration was 50 $TCID_{50}$/mL and above, the positive rate was greater than or equal to 95%. The minimum detection limit of the SARS-CoV-2 Rapid Antigen Test is 50 $TCID_{50}$/mL.

For Flu A/B Antigen Test

The analytical sensitivity (limit of detection or LOD) of the test was determined using quantified ($TCID_{50}$/mL) cultures of three influenza A strains and two influenza B strains, serially diluted in negative nasopharyngeal matrix. Each dilution was run as 20 replicates in the test. Analytical sensitivity (LOD) is defined as the lowest concentration at which at least 95% of all replicates tested positive. The demonstrated LOD for each strain tested is shown below:

Influenza Type	Strain	TCID $_{50}$/mL
A	A/California/7/2009 (H1N1)	2.4×10^2
A	A/Victoria/361/11(H3N2)	4.0×10^2
A	A/Wisconsin/588/2019 (H1N1pdm09)	2.0×10^2
A	A/Victoria/2570/2019 (H1N1pdm09)	4.0×10^2
A	A/Darwin/9/2021 (H3N2)	3.5×10^2
A	A/Darwin/6/2021 (H3N2)	3.5×10^2
B	B/Austria/1359417/2021	8.0×10^2
B	B/Phuket/3073/2013	5.0×10^2

3) Cross-reactivity:

The potential cross-reactivity of the respiratory pathogens and other microorganisms with which the majority of the population may be infected was tested using the SARS-CoV-2 & Flu A/B Antigen Combo Test at medically relevant levels, bacteria and viruses are given in the following tables. None of the organisms or viruses listed in the table below gave a positive result with the Test at the tested concentration.

A. Viruses Tested

Virus Type	Concentration
Adenovirus Type 3	$1.0\ x10^5$ $TCID_{50}$/mL
Adenovirus Type 5	$1.8\ x10^5$ $TCID_{50}$/mL
Adenovirus Type 7	$1.8\ x10^5$ $TCID_{50}$/mL
Human Parainfluenza Type 1	$1.8\ x10^5$ $TCID_{50}$/mL
Human Parainfluenza Type 2	$4.3\ x10^5$ $TCID_{50}$/mL
Human Parainfluenza Type 3	$1.6\ x10^5$ $TCID_{50}$/mL
Human Parainfluenza Type 4	$1.3\ x10^5$ $TCID_{50}$/mL
Human coronavirus OC43	$1.8\ x10^5$ $TCID_{50}$/mL
Human coronavirus NL63	$1.8\ x10^5$ $TCID_{50}$/mL
Human coronavirus 229E	$2.5\ x10^5$ $TCID_{50}$/mL
Respiratory syncytial virus Type A	$1.2\ x10^5$ $TCID_{50}$/mL
Respiratory syncytial virus Type B	$2.4\ x10^5$ $TCID_{50}$/mL
Rhinovirus Type 1	$1.0\ x10^5$ $TCID_{50}$/mL
Rhinovirus Type 14	$1.0\ x10^5$ $TCID_{50}$/mL
Rhinovirus B70	$1.0\ x10^5$ $TCID_{50}$/mL
Enterovirus CA16	$1.0\ x10^5$ $TCID_{50}$/mL
Enterovirus 70	$3.1\ x10^5$ $TCID_{50}$/mL
Avian influenza virus H7N9	$1.0\ x10^5$ $TCID_{50}$/mL
Avian influenza virus H5N1	$1.0\ x10^5$ $TCID_{50}$/mL
Human para-flu virus Type 1	$1.0\ x10^5$ $TCID_{50}$/mL
Human para-flu virus Type 2	$1.0\ x10^5$ $TCID_{50}$/mL
Human para-flu virus Type 3	$1.0\ x10^5$ $TCID_{50}$/mL
Human para-flu virus Type 4	$1.0\ x10^5$ $TCID_{50}$/mL
Cytomegalovirus	$1.0\ x10^5$ $TCID_{50}$/mL
Measles virus	$1.8\ x10^5$ $TCID_{50}$/mL
Boca virus	$1.0\ x10^5$ $TCID_{50}$/mL
Mumps virus	$3.2\ x10^5$ $TCID_{50}$/mL
Epstein Barr Virus	$1.0\ x10^7$ $TCID_{50}$/mL
Herpes simplex virus (HSV-1)	$1.0\ x10^5$ $TCID_{50}$/mL
Varicella-zoster virus	$1.0\ x10^5$ $TCID_{50}$/mL
Human metapneumovirus	$2.4\ x10^5$ $TCID_{50}$/mL
MERS coronavirus	$8.9\ x10^5$ $TCID_{50}$/mL
SARS-coronavirus	$2.5\ x10^5$ PFU/mL
Human coronavirus (HKU1)	10^6 $TCID_{50}$/mL (In-silico)

B. Bacteria Tested

Bacteria Type	Concentration
Bordetella pertussis	5.8×10^6 CFU/mL
Bordetella parapertussia	1.0×10^5 CFU/mL
Staphylococcus epidermidis	1.2×10^7 CFU/mL
Staphylococcus aureus	3.0×10^6 CFU/mL
Staphylococcus pneumoniae	1.0×10^5 CFU/mL
Streptococcus pyogenes	1.6×10^6 CFU/mL
Streptococcus pneumoniae	1.8×10^6 CFU/mL
Streptococcus salivarus	1.0×10^5 CFU/mL
Escherichia coli	1.0×10^5 CFU/mL
Candida albicans	1.3×10^6 CFU/mL
Mycobacterium tuberculosis	10^6 CFU/mL (In-silico)
Paramyxovirus parotitis	1.0×10^5 $TCID_{50}$/mL
Pneumocystis jirovecii	10^6 CFU/mL (In-silico)
Moraxella catarrhalis	1.0×10^5 CFU/mL
Pseudomonas aeruginosa	1.0×10^5 CFU/mL
Pneumocystis	1.0×10^5 CFU/mL
Legionella pneumophila	2.0×10^6 CFU/mL
Corynebacterium pneumophila	1.0×10^5 CFU/mL
Lactobacillus pneumophila	1.0×10^5 CFU/mL
Klebsiella pneumoniae	1.0×10^5 CFU/mL
Mycoplasma pneumoniae	1.3×10^7 CFU/mL
Chlamydia pneumoniae	1.0×10^5 $TCID_{50}$/mL
Neisseria pneumophila	1.0×10^5 CFU/mL
Neisseria meningitides	1.0×10^5 CFU/mL
Haemophilus influenza	2.7×10^6 CFU/mL

4) Interference:

The performance of SARS-CoV-2 & FLU A/B Antigen Combo Test was evaluated with potentially interfering substances that may be present in nasopharyngeal specimens. The potentially interfering substances were evaluated with influenza A (A/Taiwan/42/06), influenza B (B/Taiwan/2/62) and SARS-CoV-2 at concentrations of 2x LOD. There was no evidence of interference caused by the substances tested at the concentrations shown below.

Substances	Concentration
Whole Blood	4%
Mucin	1 mg/ml
Benzocaine	5 mg/ml
Menthol	10 mg/ml
Zanamivir	5 mg/ml
Mupirocin	1 mg/ml
Tobramycin	1 mg/ml
Fluticasone	1 mg/ml
Beclomethasone	1 mg/ml
Dexamethasone	5 mg/ml
Flunisolide	1 mg/ml
Triamcinolone	10 mg/ml
Mometasone	1 mg/ml
Sodium Chloride with preservative	20%
Phenylephrine	10 mg/ml
Afrin (Oxymetazoline)	10 mg/ml
Ibuprofen	1 mg/ml
Tetracycline	3 µg/ml
Chloramphenicol	3 µg/ml
Erythromycin	3 µg/ml
Arbidol	5 mg/ml
Ribavirin	5 mg/ml
Histamine dihydrochloride	10 mg/ml
Throat spray (Menthol)	15%
Mupirocine	10 mg/ml
Ice throat candy (Menthol)	1.5 mg/ml
Tamiflu (Oseltamivir)	10 mg/ml
Naphthoxoline hydrochloride nasal drops	15%
Fisherman's Friend	1.5 mg/ml
Cromoglycate	15%
Sinex (Phenylephrine Hydrochloride)	15%
Fluticasone propionate spray	15%
Chloraseptic (Menthol/Benzocaine)	1.5 mg/ml
Naso Gel (NeilMed)	5%
CVS Nasal Spray (Cromolyn)	15%
Saline Nasal Spray	15%
Zicam Cold Remedy	5%
Homeopathic (Alkalol)	10%
Sodium Cromolyn Eye Drops	15%
Alkalol Nasal Wash	10%
Throat Lozenge	1.5 mg/ml
Sore throat phenol throat spray	15%

5) Hook Effect

For SARS-CoV-2:

No hook effect was detected at a concentration of 5.0×10^6 $TCID_{50}$/mL SARS-CoV-2.

For Influenza A:

The highest concentration without Hook Effect was 2.5×10^7 $TCID_{50}$/mL.

For Influenza B:

The highest concentration without Hook Effect was 2.0×10^7 $TCID_{50}$/mL.

REFERENCES

1.WHO recommendations on the use of rapid testing for influenza diagnosis, July 2005.

2.Atmar, R.L. and Lindstrom, S.E. 2011. Influenza Viruses in Manual of Clinical Microbiology. 10th Edition. 1333–1334.

3.Lauer, S.A., et. Al. The incubation period of Coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application, Ann Intern Med. 2020.

INDEX OF SYMBOL

COMPONENT	Materials Included	TUBE	Tube
TEST CARD	Test Card	IFU	Instruction for Use
	Consult Instructions for Use		Expiration Date
2°C 30°C 36°F 86°F	Store at 2°C ~ 30°C		Manufacturer
	Keep Dry		Date of Manufacture
LOT	Lot Number		Do Not Reuse
DILUENT	Sample Diluent	REF	Reference Number
	Keep away from sunlight	Σ	Tests per Kit
IVD	In Vitro Diagnostic Device		Do not use if the package is damaged
%40 %60	Store at 40-60% humidity	SWAB	Swab
CE	This product fulfils the requirements of the Directive 98/79/EC on in vitro diagnostic medical device		

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Date of issue: 22.08.2023

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Version:22122022