COVID-19 Antigen Saliva Test Kit
Product Insert
REF COV-2PEN, COV-2PEN1, COV-2PEN20

INTENDED USE

The Rapid Response® COVID-19 Antigen Saliva Test Pen Kit is an in vitro immunoassay. The assay is for the direct and qualitative detection of SARS-CoV-2 viral nucleoprotein antigens from saliva samples. This test is intended for professional use only.

SUMMARY AND EXPLANATION

The novel coronaviruses belong to the β genus. COVID-19 is an acute respiratory infectious disease. People are generally susceptible. Currently, 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.

PRINCIPLE

The Rapid Response® COVID-19 Antigen Saliva Test Kit detects SARS-CoV-2 viral antigens through visual interpretation of colour development. Anti-SARS-CoV-2 antibodies are immobilized on the test region of the nitrocellulose membrane. Anti-SARS-CoV-2 antibodies conjugated to coloured 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, target antigens, if present in the saliva samples, will be released into the Extraction Buffer individually packed in the kit. Consequently, the extracted antigens will bind to anti-SARS-CoV-2 antibodies conjugated to coloured 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 coloured particles are captured at the internal control zone.

The presence of a coloured band in the test region indicates a positive result for the SARS-CoV-2 viral antigens, while its absence indicates a negative result. A coloured 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 packaged Saliva Collection Pen with Test Strip
- Individually packaged Extraction Buffer Cap
- Product Insert

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.
- DO NOT eat, drink, smoke, brush teeth or chew gum for 30 minutes before collecting saliva.
- 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 discoloured or turbid. Discolouration 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 Extraction 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.

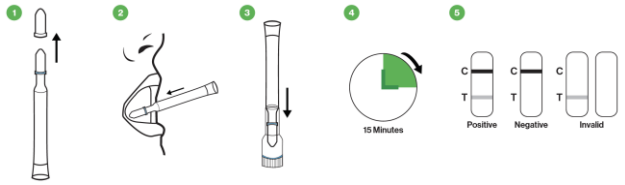
STORAGE AND STABILITY

- Store the Rapid Response® COVID-19 Antigen Saliva Test Kit 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.

TEST PROCEDURE

Bring devices to room temperature (18~30°C) before use.

1. Open the pouch and remove the Saliva Collection Pen and Extraction Buffer Cap from the packaging. Label the Saliva Collection Pen with patient identification. For best results, the assay should be performed within two hours.
2. Clear throat, then cough deeply four times with mouth closed before collecting the samples.
3. Remove the plastic guard from the tip of the Saliva Collection Pen.
4. Place the Saliva Collection Pen in the mouth above the tongue. Hold in place for 2 minutes.
5. Remove the Saliva Collection Pen from the patient's mouth. Holding the Saliva Collection Pen vertically, place it into the Extraction Buffer Cap. Press down to break the seal of the Extraction Buffer Cap, which will release the buffer solution.
6. Start the timer immediately after breaking the seal. Read the results at 15 minutes.



RESULT INTERPRETATION

POSITIVE: Two coloured 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 coloured band appears, in the control region (C): No apparent coloured 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 colour intensity in the test region (T) may vary depending on the concentration of analytes present in the specimen. Therefore, any shade of colour 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 Saliva Test Kit has built-in (procedural) controls. Each test device has an internal standard zone to ensure proper sample flow. The user should confirm that the coloured band located at the "C" region is present before reading the result.

LIMITATIONS OF THE TEST

1. The Rapid Response® COVID-19 Antigen Saliva Test Kit is for professional *in vitro* diagnostic use and should only be used for the qualitative detection of SARS-CoV-2 antigen. The intensity of colour 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 the Rapid Response® COVID-19 Antigen Saliva Test Kit.
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 $1.25x10^{1.4}$ $TCID_{50}$/mL. The limit of detection was also determined with recombinant SARS-CoV-2 nucleoprotein and has been evaluated at 37 pg/mL.

Clinical Evaluation:

Clinical evaluations were performed in Switzerland using retrospective saliva samples. The clinical performance of the Rapid Response® COVID-19 Antigen Saliva Test Kit was compared with RT-PCR. The results are summarized below:

Table: COVID-19 Antigen Saliva Test Kit vs. RT-PCR

		RT-PCR		Total
		Positive	Negative	
COVID-19 Antigen Saliva Test Kit	Positive	10	0	10
	Negative	0	12	12
Total		10	12	22

Relative Sensitivity: 100.0 % (69.2% ~ 100.0%)*
Relative Specificity: 100.0 % (73.5% ~ 100.0%)*
Overall Agreement: 100.0 % (84.6% ~ 100.0%)*
*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 Saliva Test Kit.

Adenovirus 1	MERS-coronavirus	*Bordetella parapertussis*
Adenovirus 2	SARS-coronavirus	*Bordetella pertussis*
Adenovirus 3	Human metapneumovirus	*Candida albicans*
Adenovirus 4	Influenza A (H1N1)pdm09	*Chlamydia pneumoniae*
Adenovirus 5	Influenza A (H3N2)	*Group C Streptococcus*
Adenovirus 7	Influenza B Victoria lineage	*Haemophilus influenzae*
Adenovirus 55	Influenza B Yamagata lineage	*Legionella pneumophila*
Epstein-Barr virus	Norovirus	*Mycoplasma pneumoniae*
Enterovirus EV70	Parainfluenza virus 1	*Mycobacterium tuberculosis*
Enterovirus EV71	Parainfluenza virus 2	*Staphylococcus aureus*
Enterovirus A16	Parainfluenza virus 3	*Staphylococcus epidermidis*
Enterovirus A24	Parainfluenza virus 4	*Streptococcus agalactiae*
Enterovirus B1	Respiratory syncytial virus A	*Streptococcus pneumoniae*
Echovirus 6	Respiratory syncytial virus B	*Streptococcus pyogenes*
HCoV-229E	Rhinovirus A30	
HCoV-OC43	Rhinovirus B52	
HCoV-NL63		

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 Saliva Test Kit.

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%	Whole Blood	4%
4-acetamidophenol	10 mg/ml	Mupirocin	250 µg/ml
Acetylsalicylic acid	10 mg/ml	Oxymetazoline	25 µg/ml
Albuterol	10 mg/ml	Phenylephrine	10 mg/ml
Chlorpheniramine	5 mg/ml	Phenylpropanolamine	1 mg/ml
Dexamethasone	50 µg/ml	Zanamivir	10 mg/ml
Dextromethorphan	10 µg/ml	Adamantanamine	500 ng/ml
Diphenhydramine	5 mg/ml	Oseltamivir phosphate	10 mg/ml
Doxylamine	1 mg/ml	Tobramycin	10 mg/ml
Flunisolide	25 µg/ml	Triamcinolone	14 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		Contains sufficient for <n> tests	REF	Catalogue number
	Temperature limitation		Use by date		Do Not Reuse
IVD	*In vitro* diagnostic medical device	LOT	Lot Number		Manufacturer
EC REP	Authorized Representative				

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