MICROGEN BIOPRODUCTS

Pathflow COVID 19 Rapid Antigen Pro (Swab) Package Insert

M600CE	English

Pathflow COVID-19 Rapid Antigen Pro (Swab) is a rapid chromatographic immunoassay for the qualitative detection of SARS-CoV-2 Nucleocapsid Protein antigens present in swab specimen.
For professional in vitro diagnostic use only.

【INTENDED USE】

The Pathflow COVID 19 Rapid Antigen Pro (Swab) is a rapid chromatographic immunoassay for the qualitative detection of SARS-CoV-2 Nucleocapsid protein antigens in swab specimen from individuals with suspected SARS-CoV-2 infection in conjunction with clinical presentation and the results of other laboratory tests.
Results are for the detection of SARS-CoV-2 Nucleocapsid protein Antigens. An 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 do not preclude SARS-CoV-2 infection and should not be used as the sole basis for treatment or patient management decisions. Negative results should be treated as presumptive and confirmed with a molecular assay, if necessary for patient management. 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.

【SUMMARY】

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.

【PRINCIPLE】

The Pathflow COVID 19 Rapid Antigen Pro (Swab) is a qualitative membrane-based immunoassay for the detection of SARS-CoV-2 Nucleocapsid protein Antigens in swab specimen. SARS-CoV-2 Nucleocapsid protein antibody is coated in the test line region. During testing, the specimen reacts with SARS-CoV-2 Nucleocapsid protein antibody-coated particles in the test. The mixture then migrates upward on the membrane by capillary action and reacts with the SARS-CoV-2 Nucleocapsid protein antibody in test line region. If the specimen contains SARS-CoV-2 Antigens, a coloured line will appear in test line region as a result of this. If the specimen does not contain antigens to SARS-CoV-2, no coloured line will appear in the test line region, indicating a negative result. To serve as a procedural control, a coloured line will always appear in the control line region, indicating that the proper volume of specimen has been added and membrane wicking has occurred.

【REAGENTS】

The test contains anti-SARS-CoV-2 Nucleocapsid protein antibody as the capture reagent and anti-SARS-CoV-2 Nucleocapsid protein antibody as the detection reagent.

【PRECAUTIONS】

1. This package insert must be read completely before performing the test. Failure to follow directions in package insert may yield inaccurate test results.
2. For professional *in vitro* diagnostic use only. Do not use after expiration date.
3. Do not eat, drink or smoke in the area where the specimens or kits are handled.
4. Do not use test if pouch is damaged.
5. Handle all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout in the collection, handling, storage and disposal of patient samples and used kit contents.
6. Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are assayed.
7. Wash hands thoroughly after handling.
8. Please ensure that appropriate amounts of samples are used for testing. Too much or too little sample size may lead to deviation of results.
9. Sterile Swabs for the collection of Nasopharyngeal specimen and Nasal specimen are different, Do not mix the using of the two types of sampling swabs.
10. Viral Transport Media (VTM) may affect the test result; extracted specimens for PCR tests cannot be used for the test.
11. The used test should be discarded according to local regulations.
12. Humidity and temperature can adversely affect results.

【MATERIALS】

Material Provided

- Test cassettes
- Extraction buffer
- Procedure card
- Sterile swabs
- Extraction tubes and tips (Optional)
- Package insert
- Workstation

Materials required but not provided

- Timer

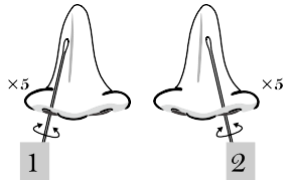
【STORAGE AND STABILITY】

Store as packaged in the sealed pouch at room temperature or refrigerated (2-30 °C). The test is stable through the expiration date printed on the sealed pouch. The test must remain in the sealed pouch until use. **DO NOT FREEZE.** Do not use beyond the expiration date.

【SPECIMEN COLLECTION, TRANSPORT AND STORAGE】

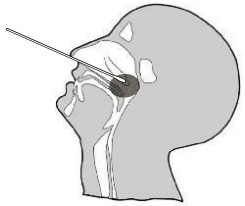
Nasal Swab Specimen Collection

1. Insert a sterilized swab less than one inch (about 2 cm) into a nostril (until resistance is met at the turbinates).
2. Rotate the swab 5-10 times against the nasal wall. Using the same swab repeat the collection procedure with the second nostril.
3. Withdraw the sterile swab; avoid excess volume and high-viscous nasal discharge.



Nasopharyngeal Swab Specimen Collection

1. Insert a sterile swab into the nostril of the patient, reaching the surface of the posterior nasopharynx.
2. Swab over the surface of the posterior nasopharynx 5-10 times.
3. Withdraw the sterile swab from the nasal cavity and avoid excess volume and highly-viscous nasopharyngeal discharge.



Caution: If the swab stick breaks during specimen collection, repeat specimen collection with a new swab.

Specimen Transport and Storage

Specimens should be tested as soon as possible after collection.
If swabs are not being processed immediately, it is highly recommended the swab sample is placed into a dry, sterile and tightly sealed plastic tube for storage. The swab specimen in dry and sterile condition is stable for up to 24 hours at 2-8 °C.

【SPECIMEN PREPARATION】

Only the extraction buffer and tubes provided in the kit is to be used for swab specimen preparation.
Please refer to the Procedure card for detailed information of Specimen Extraction.

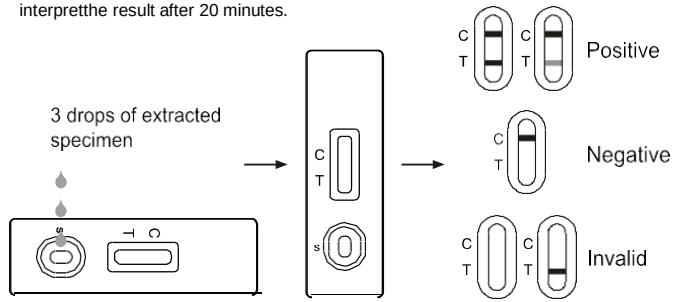
1. Place the swab specimen in the Extraction tube with Extraction buffer. Rotate the swab for **10-15 seconds** while pressing the head against the inside of the tube to release the antigen in the swab.
2. Remove the swab while squeezing the swab head against the inside of the Extraction tube as you remove it to expel as much liquid as possible from the swab. Discard the swab in accordance with your biohazard waste disposal protocol.

***NOTE**: The storage of the specimen after extraction is stable for 2 hours at room temperature and 24 hours at 2-8 °C.

【DIRECTIONS FOR USE】

Allow the test, extracted specimen and/or controls to equilibrate to room temperature (15-30 °C) prior to testing.

1. Remove the test cassette from the sealed foil pouch and use it within one hour. Best results will be obtained if the test is performed immediately after opening the foil pouch.
2. Invert the specimen extraction tube and add **3 drops of extracted specimen** (approx.75-100µl) to the sample well(S) and then start the timer.
3. Wait for the coloured line(s) to appear. Read the result at **15 minutes**. Do not interpretthe result after 20 minutes.



【INTERPRETATION OF RESULTS】

(Please refer to the illustration above)

POSITIVE:* Two coloured lines appear. One coloured line should be in the control region (C) and another coloured line should be in the Test region (T). Positive result in the Test region indicates detection of SARS-CoV-2 antigens in the sample.
***NOTE**: The intensity of the colour in the test line region (T) will vary based on the amount of SARS-CoV-2 antigen present in the sample. So any shade of colour in the testregion (T) should be considered positive.
NEGATIVE: One coloured line appears in the control region (C). No apparent coloured line appears in the test line region (T).
INVALID: Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

【QUALITY CONTROL】

External Quality Control

Positive/negative controls are not included in this kit. However, in compliance with Good Laboratory Practice (GLP), these controls are recommended.[1]

Internal Quality Control

Internal procedural controls are included in the test. A coloured line appearing in the control region (C) is an internal procedural control. It confirms sufficient specimen volume and correct procedural technique.

【EXPECTED VALUES】

The Pathflow COVID 19 Rapid Antigen Pro (Swab) has been compared with a leading commercial RT-PCR test. The correlation between these two systems is no less than 97%.

【LIMITATIONS】

1. The performance of the Pathflow COVID-19 Rapid Antigen Pro (Swab) was evaluated using the procedures provided in this product insert only. Modifications to these procedures may alter the performance of the test. Viral Transport Media (VTM) may affect the test result; extracted specimens for PCR tests cannot be used for the test.
2. The test Procedure and the Interpretation of test Result must be followed closely when testing for the presence of SARS-CoV-2 Nucleocapsid protein antigens in the human nasopharynx from suspected individuals. For optimal test performance, proper sample collection is critical. Failure to follow the procedure may give inaccurate results.
3. The Pathflow COVID-19 Rapid Antigen Pro (Swab) is for *in vitro* diagnostic use only. This test should be used for detection of SARS-CoV-2 Nucleocapsid protein Antigens in swab specimens as an aid in the diagnosis of patients with suspected SARS-CoV-2 infection in conjunction with clinical presentation and the results of other laboratory tests. Neither the quantitative value nor the rate of increase in the concentration of SARS-CoV-2 antigens can be determined by this qualitative test.
4. The Pathflow COVID-19 Rapid Antigen Pro (Swab) will only indicate the presence of SARS-CoV-2 Antigens in the specimen and should not be used as the sole

criteria for the diagnosis of SARS-CoV-2 infections.

5. The results obtained with the test should be considered with other clinical findings from other laboratory tests and evaluations.
6. If the test result is negative or non-reactive and clinical symptoms persist. It is recommended to re-sample the patient and test again or test with a molecular diagnostic device to rule out infection in these individuals.
7. The test will show negative results under the following conditions:
   a) The concentration of the novel coronavirus antigens in the sample is lower than the minimum detection limit of the test.
   b) The optimal sampling time (peak virus concentration) after infection has not been verified, so collecting samples at different times for the same patient may avoid false negatives.
8. Negative results do not rule out SARS-CoV-2 infection, particularly in those who have been in contact with the virus. Follow-up testing with a molecular diagnostic should be considered to rule out infection in these individuals.
9. The accuracy of the test depends on the quality of the swab sample. False negatives may result from improper sample collection or storage.
10. Positive results of SARS-CoV-2 may be due to infection with non-SARS-CoV-2 coronavirus strains or other interference factors.

【PERFORMANCE CHARACTERISTICS】

Sensitivity, Specificity and Accuracy

The Pathflow COVID-19 Rapid Antigen Pro (Swab) has been evaluated with swab specimens obtained from the patients. RT-PCR (Nasopharyngeal Swab) is used as the reference method for the Pathflow COVID-19 Rapid Antigen Pro (Swab). Specimens were considered positive if RT-PCR (Nasopharyngeal Swab) indicated a positive result. Specimens were considered negative if RT-PCR (Nasopharyngeal Swab) indicated a negative result.

Nasopharyngeal Swab Specimen

Pathflow COVID-19 Rapid Antigen Pro (Swab)		RT-PCR (Nasopharyngeal Swab)		Total
		Positive	Negative	
SARS-CoV-2 Antigen	Positive	99	2	101
	Negative	7	2016	2023
Total		106	2018	2124
Relative Sensitivity		93.4% (95%CI*: 86.9%~97.3%)		
Relative Specificity		99.9% (95%CI*: 99.6%~ > 99.9%)		
Accuracy		99.6% (95%CI*: 99.2%~99.8%)		

*Confidence Intervals

Nasal Swab Specimen

Pathflow COVID-19 Rapid Antigen Pro (Swab)		RT-PCR (Nasopharyngeal Swab)		Total
		Positive	Negative	
SARS-CoV-2 Antigen	Positive	115	2	117
	Negative	8	298	306
Total		123	300	423
Relative Sensitivity		93.5% (95%CI*: 87.6%~97.2%)		
Relative Specificity		99.3% (95%CI*: 97.6%~99.9%)		
Accuracy		97.6% (95%CI*: 95.7%~98.9%)		

*Confidence Intervals

Limitation of Detection

The Pathflow COVID-19 Rapid Antigen Pro (Swab) can detect out SARS-CoV-2 heat-inactivated virus strain as low as $1X10^2$ $TCID_{50}$/ml.

Specificity Testing with Various Viral Strains

The Pathflow COVID-19 Rapid Antigen Pro (Swab) was tested with the following viral strains. No discernible line at either of the test-line regions was observed at these concentrations:

Description	Test Level
Human coronavirus 229E	$5x\ 10^5$ $TCID_{50}$/ml
Human coronavirus NL63	$1x\ 10^6$ $TCID_{50}$/ml
Human coronavirus OC43	$1 x\ 10^6$ $TCID_{50}$/ml
MERS coronavirus Florida	$1.17x10^4$ $TCID_{50}$/ml
Human coronavirus HKU1	$1x\ 10^6$ $TCID_{50}$/ml
Influenza A H1N1	$3.16 x\ 10^5$ $TCID_{50}$/ml
Influenza A H3N2	$1 x\ 10^5$ $TCID_{50}$/ml
Influenza B	$3.16 x\ 10^6$ $TCID_{50}$/ml
Parainfluenza virus 2	$1.58 x\ 10^7$ $TCID_{50}$/ml
Parainfluenza virus 3	$1.58 x\ 10^8$ $TCID_{50}$/ml
Respiratory syncytial virus	$8.89 x\ 10^4$ $TCID_{50}$/ml
Adenovirus type 3	$3.16 x\ 10^4$ $TCID_{50}$/ml
Adenovirus type 7	$1.58 x\ 10^5$ $TCID_{50}$/ml
Human Rhinovirus 2	$2.81 x\ 10^4$ $TCID_{50}$/ml
Human Rhinovirus 14	$1.58 x\ 10^5$ $TCID_{50}$/ml
Human Rhinovirus 16	$8.89 x\ 10^6$ $TCID_{50}$/ml
Measles	$1.58 x\ 10^4$ $TCID_{50}$/ml
Mumps	$1.58 x\ 10^4$ $TCID_{50}$/ml

$TCID_{50}$ = Tissue Culture Infectious Dose is the dilution of virus that under the conditions of the assay can be expected to infect 50% of the culture vessels inoculated.

Specificity Testing with Various Organisma

The following organisms were tested at $1.0x10^8$ org/ml and all found to be negative when tested with the Pathflow COVID-19 Rapid Antigen Pro (Swab):

Arcanobacterium	*Pseudomonas aeruginosa*
Candida albicans	*Staphylococcus aureus subspaureus*
Corynebacterium	*Staphylococcus epidermidis*
Escherichia coli	*Streptococcus pneumoniae*
Moraxella catarrhalis	*Streptococcus pygenes*
Neisseria lactamica	*Streptococcus salivarius*
Neisseria subflava	*Streptococcus sp group F*

Interfering Substances

The interfering substances below were spiked with negative, SARS-CoV-2 Antigen weak positive. No substances showed any interference with the Pathflow COVID-19 Rapid Antigen Pro (Swab).

Substance	Concentration
Whole Blood	20µl/ml
Mucin	50µg/ml
Budesonide Nasal Spray	200µl/ml
Dexamethasone	0.8mg/ml
Flunisolide	6.8ng/ml
Mupirocin	12mg/ml
Oxymetazoline	0.6mg/ml
Phenylephrine	12mg/ml
Rebetol	4.5µg/ml
Relenza	282ng/ml
Tamiflu	1.1µg/ml
Tobramycin	2.43mg/ml

Precision

Intra-Assay&Inter-Assay

Within-run and Between-run precision has been determined by using three specimens of SARS-CoV-2 standard control. Three different lots of Pathflow COVID-19 Rapid Antigen Pro (Swab) have been tested using negative, P1 and P5 specimens. Ten replicates of each level were tested each day for 3 consecutive days. The specimens were correctly identified>99% of the time.

【BIBLIOGRAPHY】

1. Westgard JO, Barry PL,Hunt MR, Groth T. A multi-rule Shewhart for quality control in clinical chemistry, Clinical Chemistry 1981;27:493-501

Index of Symbols

IVD	For in vitro diagnostic use only	Σ	Tests per kit	EC REP	Authorized Representative
2°C 30°C	Store between 2-30°C		Use by		Do not reuse
	Do not use if package is damaged	LOT	Lot Number	REF	Catalog #
	Manufacturer		Consult Instructions For Use		Single use only

EC REP

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