SARS-CoV-2 Rapid Antigen Test

For *in vitro* diagnostics use only

REF 9901-NCOV-01G

PLEASE READ CAREFULLY BEFORE YOU PERFORM THE TEST

INTENDED USE

The SARS-CoV-2 Rapid Antigen Test is a lateral flow immunoassay intended for the qualitative detection of SARS-CoV-2 nucleoprotein antigen in nasopharyngeal (NP) swabs from individuals who are suspected of COVID-19 by their healthcare provider within the first 5 days of the onset of symptoms.
The SARS-CoV-2 Rapid Antigen Test is intended for use by trained laboratory personnel and healthcare professionals for laboratory use or point of care testing. Negative results do not preclude SARS-CoV-2 infection and should not be used as the sole basis for patient management decisions. Negative results must be combined with clinical observations, patient history, and epidemiological information. This assay is not intended to be used for diagnostics. This assay is not intended for home testing (or self-testing).

INTRODUCTION

Coronavirus is a family of single-stranded positive-sense RNA viruses with an envelope of about 80 to 120 nm in diameter. The size of the viruses' genetic material is the largest of all RNA viruses. The Coronavirus family is a common pathogen of many domestic animals, pets, and human diseases. It can cause a variety of acute and chronic diseases.
Common signs of a person infected with a coronavirus include respiratory symptoms, fever, cough, shortness of breath, and dyspnea. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure, and even death.
The 2019 new coronavirus (SARS-CoV-2 or COVID-19 virus), was discovered from Wuhan viral pneumonia cases in 2019 and was named by the World Health Organization (WHO) on January 12, 2020. The WHO declared COVID-19 a pandemic on March 11, 2020.

PRINCIPLE OF THE TEST

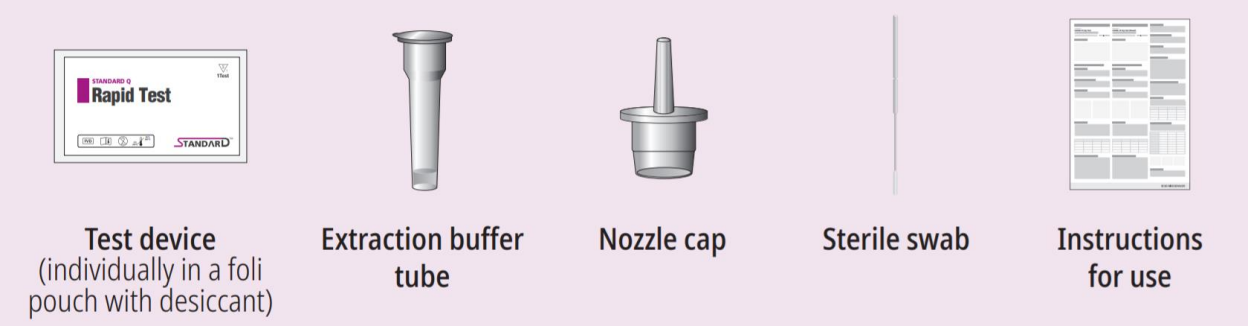
SARS-CoV-2 Rapid Antigen Test is a lateral flow immunoassay. It has two pre-coated lines, "C" Control line and "T" Test line on the nitrocellulose membrane. Both the control line and test line in the result window are not visible before applying any specimens.

Mouse monoclonal anti-SARS-CoV-2 antibodies are coated on the test line region and mouse monoclonal anti-Chicken IgY antibodies are coated on the control line region. Mouse monoclonal anti-SARS-CoV-2 antibodies conjugated with color particles are used as detectors for SARS-CoV-2 antigen. During the test, SARS-CoV-2 antigen in the specimen interact with

monoclonal anti-SARS-CoV-2 antibody conjugated with color particles forming an antigen-antibody color particle complex. This complex migrates on the membrane via capillary action until the test line, where it is captured by the mouse monoclonal anti-SARS-CoV-2 antibody.

A colored test line is visible in the result window if SARS-CoV-2 antigens are present in the specimen. The intensity of colored test line will vary depending upon the amount of SARS-CoV-2 antigen present in the specimen. If SARS- CoV-2 antigens are not present in the specimen, then no color appears in the test line. The control line is used for procedural control and should always appear if the test procedure is performed properly and the test reagents are working.

KIT CONTENTS



KIT STORAGE AND STABILITY

1. Store the kit at 2-30°C / 36-86°F out of direct sunlight.
2. Kit materials are stable until the expiration date printed on the outer box.
3. Do not freeze the kit.
4. Prior to starting the procedure, all reagents of the test kit must be brought to operating temperature (15-30°C/ 59-86°F).

MATERIALS REQUIRED BUT NOT SUPPLIED

• SARS-CoV-2 Antigen Control (REF: 9901-C-NCOV-01G)

WARNINGS AND PRECAUTIONS

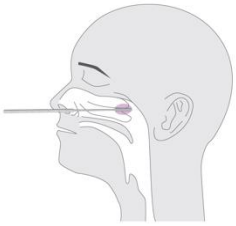
1. This package insert must be read completely before performing the test. Failure to follow directions in insert may yield inaccurate test results.
2. Test results should be read between 15 and 30 minutes after a specimen is applied to the sample well. Results read after 30 minutes may give erroneous results.
3. Do not re-use the test kit.
4. Do not use the test kit if the pouch is damaged or the seal is broken.
5. Do not use the buffer of another lot.
6. Do not use expired devices.
7. Bring all reagents to operating temperature (15-30°C/ 59-86°F) before use.
8. Do not smoke, drink or eat while handling specimen.
9. Wear personal protective equipment, such as gloves and lab coats when handling kit reagents. Wash hands thoroughly after the tests are done.
10. Clean up spills thoroughly using an appropriate disinfectant.

11. Handle all specimens as if they contain infectious agents.
12. Observe established precautions against microbiological hazards throughout testing procedures.
13. Dispose of all specimens and materials used to perform the test as bio-hazard waste. Laboratory chemical and biohazard wastes must be handled and discarded in accordance with all local, state, and national regulations.
14. Desiccant in foil pouch is to absorb moisture and keep humidity from affecting products. If the moisture indicating desiccant beads change from yellow to green, the test device in the pouch should be discarded.
15. Good laboratory practice recommends the use of the control materials. Users should follow the appropriate federal state, and local guidelines concerning the frequency of assaying external quality control materials.

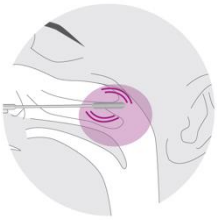
SPECIMEN COLLECTION, TRANSPORT AND STORAGE

[Specimen collection]

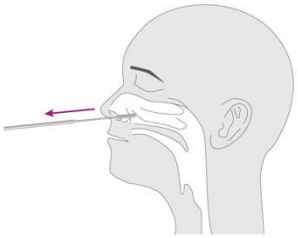
1. Insert a sterile swab into the nostril of the patient, reaching the surface of the posterior nasopharynx.



2. Swab over the surface of the posterior nasopharynx.



3. Withdraw the sterile swab from the nasal cavity.



[Transport and storage]

Samples should be tested as soon as possible after collection.
Specimen in extraction buffer are stable for up to 1 hour at room temperature (20±5℃), up to four hours when stored refrigerated at 5±3°C. If stored frozen at -20°C, specimen in extraction buffer are stable for only one (1) freeze/thaw cycle.

Dry swab specimen are stable for 60 minutes at room temperature (20±5℃).

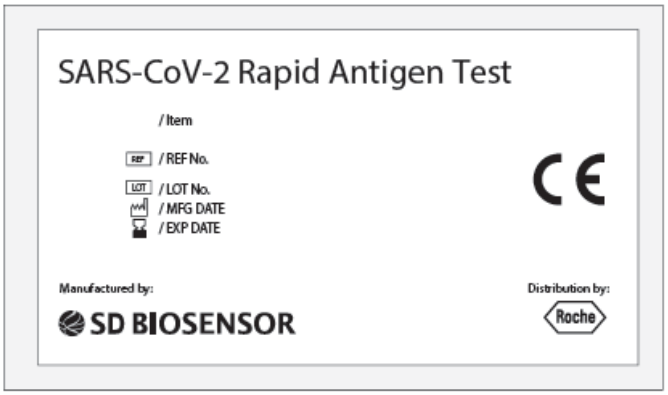
If the specimen should be stored for long time, use the recommended VTM and storage condition.

Viral Transport Medium(VTM)	Recommended Storage Condition	
	2°C to 8°C	25°C
Copan UTM™ Universal Transport Media	12 hours	8 hours
BD™ Universal Viral Transport	12 hours	8 hours
STANDARD™ Transport Medium	12 hours	8 hours
Hanks' Balanced Salt Solution	12 hours	8 hours

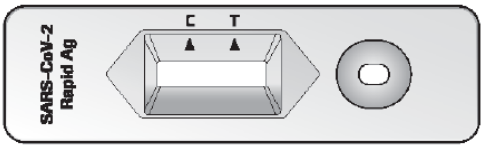
Note: When using viral transport medium (VTM), it is important to ensure that the VTM containing the specimen is warmed to room temperature (15 – 25°C). Cold specimens will not flow correctly and can lead to erroneous or invalid results. Several minutes will be required to bring a cold specimen to room temperature (15 – 25°C).

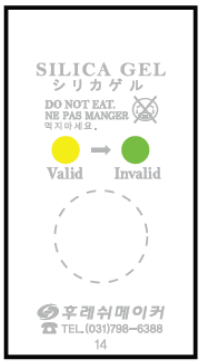
TEST PREPARATION

1. Carefully read instructions for using the SARS-CoV-2 Rapid Antigen Test.
2. Check the expiration date at the back of the foil pouch. Do not use the kit if expiration date has passed.



3. Open a pouch and check the test device and the desiccant pack in the foil pouch.



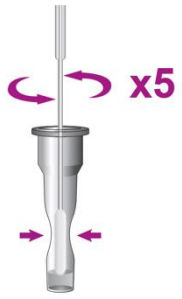


TEST PROCEDURE

Prior to starting the procedure, test devices and reagents must be brought to operating temperature (15-30°C/ 59-86°F).

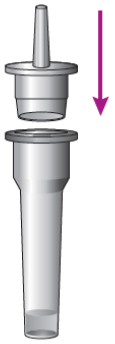
[Fresh specimen]

1. Insert the swab into an extraction buffer tube. While squeezing the buffer tube, stir the swab more than 5 times.

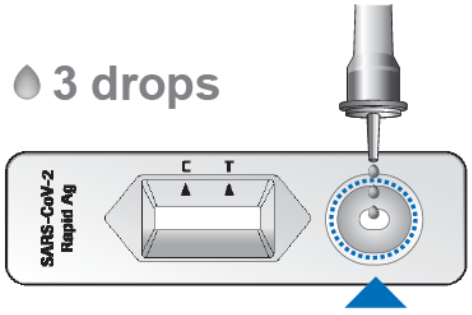


2. Remove the swab while squeezing the sides of the tube to extract the liquid from the swab.

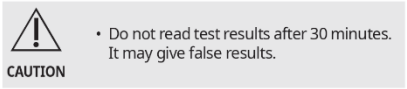
3. Press the nozzle cap tightly onto the tube.



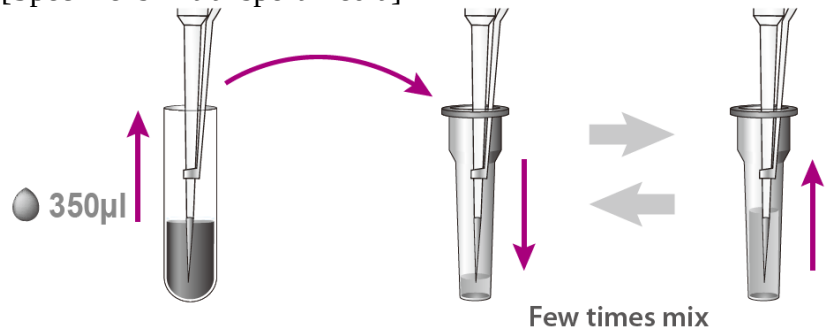
4. Apply 3 drops of extracted specimen to the specimen well of the test device.



5. Read test result at 15-30 minutes.
Caution: Do not read test results after 30 minutes. It may give false results.



[Specimens in transport media]



1. Using a micropipette, collect the 350µl of specimen from the collection cup or VTM. Mix the specimen with an extraction buffer.
2. Press the nozzle cap tightly onto the tube.

EXTERNAL QUALITY CONTROL

Positive and negative controls are optional contents (REF: 9901-C-NCOV-01G) and these controls can be provided as a means on additional quality control to demonstrate a positive or negative reaction.

Quality controls should be treated and tested the same as patient specimens.

It is recommended that positive and negative controls be run:

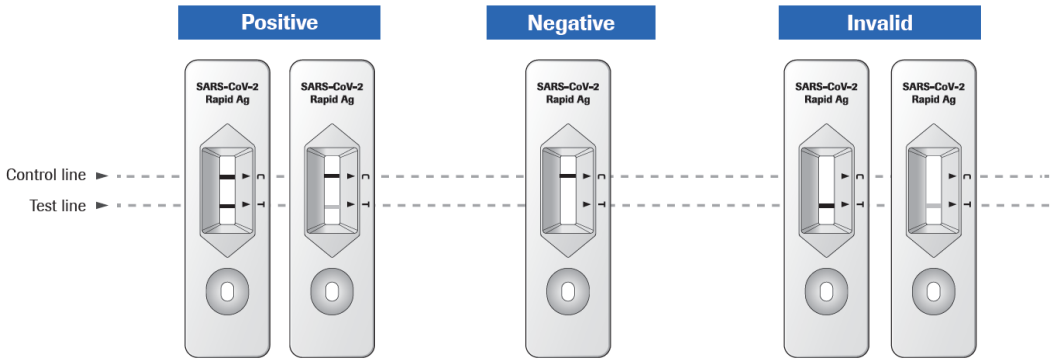
- Once for each new lot,
- Once for each untrained operator,
- Once for each new shipments of test kits,
- As required by test procedures in these instructions and in accordance with local, state and federal regulations of accreditation requirements.

INTERPRETATION OF TEST RESULT

A colored band will appear in the top section of the result window to show that the test is working properly. This band is control line (C).
A colored band will appear in the lower section of the result window. This band is test line of SARS-CoV-2 antigen (T).
Even if the control line is faint, or the test line isn't uniform, the test should be considered to have performed properly and the test result should be interpreted as a positive result.

Caution

The presence of any line no matter how faint the result is considered positive.
Positive results should be considered in conjunction with the clinical history and other data available.
In the valid test (“C” line is present), the presence of the “T” line of any intensity is considered as a positive result.



LIMITATIONS

1. The test procedure, precautions and interpretation of results of this test must be followed strictly.
2. Failure to follow the test procedure may adversely affect test performance and/or invalidate the test result.
3. The test should be used for the detection of SARS-CoV-2 antigen from human nasopharyngeal swab specimens.
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 specimen is below the detection limit of the test or if the sample was collected or transported improperly.
6. Test result must be evaluated in conjunction with other data available to the physician.
7. Neither the quantitative value nor the rate of SARS-CoV-2 antigen concentration can be determined by this qualitative test.
8. Negative results should be treated as presumptive and confirmed with an FDA authorized molecular assay, if necessary, for clinical management, including infection control.
9. If the differentiation of specific SARS viruses and strains is needed, additional testing, in consultation with state or local public health departments, is required.
10. Positive test results do not rule out co-infections with other pathogens
11. Positive tests do not differentiate between SARS-CoV-2 and SARS-CoV
12. Children tend to shed virus for longer periods of time than adults, which may result in differences in sensitivity between adults and children.
13. HBV, HCV, HIV, Pneumocystis jirovecii (PJP) and Staphylococcus salivarius are not tested.
14. When using VTM, sensitivity can be reduced due to dilution.
15. Performance of this device has not been assessed on specimens from individuals who have been infected with emerging new variants of SARS-CoV-2, including the UK SARS-CoV-2 variant, SARS-CoV-2 VOC 202012/01 (B.1.1.7) or the new South Africa SARS-CoV-2 variant, 501Y.V2
16. The performance of this device has not been assessed in a population vaccinated against COVID-19.

CLINICAL PERFORMANCE

The performance of SARS-CoV-2 Rapid Antigen Test with prospectively collected nasopharyngeal swab clinical samples was evaluated at three sites. Analysis of the sensitivity and specificity was performed using samples collected from patients with an onset of clinical symptoms of ≤5 days and included 89 SARS-CoV-2 positive clinical specimens and 1017 SARS-CoV-2 negative clinical specimens.

Country	Germany	Brazil
Sensitivity days ≤5, N	86.2% (69.4, 94.5); 29	90.0% (79.9, 95.3); 60
Specificity days ≤5, N	99.3% (98.4, 99.7); 824	97.9% (94.8, 99.2); 193

ANALYTICAL PERFORMANCE

[Limit of Detection]

The SARS-CoV-2 positive specimen was prepared by spiking Inactivated SARS-CoV-2 (2019-nCOV) NCCP 43326/2020/Korea strain to SARS-CoV-2 negative nasopharyngeal swab or the SARS-CoV-2 negative nasopharyngeal swab stored in VTM confirmed with PCR. LoD of each specimen type is determined as shown in the table below through a series of nine 2-fold dilutions with 20 replicates per dilution.

Specimen type	Applied VTM	Limit of Detection (TCID50/ml)
Nasopharyngeal swab	NA	$3.12 \times 10^{2.2}$
	UTM (COPAN Diagnostics Inc.)	$5 \times 10^{3.2}$
	UVT (BD)	$5 \times 10^{3.2}$
	STM (SD Biosensor Inc.)	$5 \times 10^{3.2}$
	HBSS	$2.5 \times 10^{3.2}$

[**Cross-Reactivity & Microbial Interference**]

There was no cross-reaction and interference with the potential cross-reacting microorganisms listed below except SARS-COV-1.

Pathogen	Name	Titer
Virus	Human coronavirus 229E	$1 \times 10^{5.5}$ $TCID_{50}$/mL
	Human coronavirus OC43	$1 \times 10^{7.77}$ $TCID_{50}$/mL
	Human coronavirus NL63	$1 \times 10^{5.07}$ $TCID_{50}$/mL
	MERS-coronavirus	4.17×10^{5} $TCID_{50}$/Ml
	SARS-coronavirus	35 μg/ml
	Adenovirus Type1	2.57×10^{8} $TCID_{50}$/mL
	Adenovirus Type2	1.15×10^{7} $TCID_{50}$/mL
	Adenovirus Type5	$1 \times 10^{7.53}$ $TCID_{50}$/mL
	Adenovirus Type6	$1 \times 10^{7.29}$ $TCID_{50}$/mL
	Adenovirus Type7A	$1 \times 10^{5.15}$ $TCID_{50}$/mL
	Adenovirus Type11	$1 \times 10^{7.29}$ $TCID_{50}$/mL

	Adenovirus Type14	$1 X 10^{5.39}$ $TCID_{50}$/mL
	Adenovirus Type40	$1 X 10^{6.58}$ $TCID_{50}$/mL
	Human Metapneumovirus3 type B1	$1 X 10^{6.34}$ $TCID_{50}$/mL
	Human Metapneumovirus16 type A1	$1 X 10^{6.98}$ $TCID_{50}$/mL
	Parainfluenza virus 1	$1 X 10^{8,49}$ $TCID_{50}$/mL
	Parainfluenza virus 2	$1 X 10^{6.10}$ $TCID_{50}$/mL
	Parainfluenza virus 3	$1 X 10^{6.82}$ $TCID_{50}$/mL
	Parainfluenza virus 4A	$1 X 10^{6.58}$ $TCID_{50}$/mL
	Influenza A H1N1 pdm/Michigan/45/15	$1 X 10^{6.10}$ $TCID_{50}$/mL
	Influenza A H1N1 Brisbane/59/07	$1 X 10^{5.86}$ $TCID_{50}$/mL
	Influenza A H3N2 Singapore/INFIMH-16-0019/16	$4.68 X 10^{4}$ $TCID_{50}$/mL
	Influenza A H3N2 South Australia/55/14	$1 X 10^{5.07}$ $TCID_{50}$/mL
	Influenza A H3N2 Hong Kong/8/68	$1 X 10^{5.70}$ $TCID_{50}$/mL
	Influenza A H3N2 Victoria/361/11	$1 X 10^{5.15}$ $TCID_{50}$/mL
	Influenza B Massachusetts/2/12	$1 X 10^{5.39}$ $TCID_{50}$/mL
	Influenza B Malaysia/2506/04	$1 X 10^{5.07}$ $TCID_{50}$/mL
	Influenza B Lee/40	$1 X 10^{5.39}$ $TCID_{50}$/mL
	Influenza B Yamagata/16/88	$1 X 10^{5.39}$ $TCID_{50}$/mL
	Influenza B Victoria/2/87	$1.86 X 10^{4}$ $TCID_{50}$/mL
	Influenza B Texas6/11	$1 X 10^{6.58}$ $TCID_{50}$/mL
	Influenza B Colorado6/17	$4.68 X 10^{4}$ $TCID_{50}$/mL
	Influenza B Florida/02/06	$3.8 X 10^{6}$ $TCID_{50}$/mL
	Enterovirus type 68 09/2014 Isolate 4	$3.55 X 10^{5}$ $TCID_{50}$/mL
	Respiratory syncytial virus A	$1 X 10^{6.58}$ $TCID_{50}$/mL
	Respiratory syncytial virus B	$5.01 X 10^{5}$ $TCID_{50}$/mL
	Rhinovirus 1A	$1 X 10^{5.55}$ $TCID_{50}$/mL
	Rhinovirus A16	$1 X 10^{6.1}$ $TCID_{50}$/mL
	Rhinovirus B42	$1.41 X 10^{5}$ $TCID_{50}$/mL
Bacteria	Haemophilus influenzae (NCCP 13815)	$2.54 X 10^{7}$ CFU/mL
	Haemophilus influenzae (NCCP 13819)	$3.39 X 10^{7}$ CFU/mL
	Haemophilus influenzae (NCCP 14581)	$4.10 X 10^{7}$ CFU/mL
	Haemophilus influenzae (NCCP 14582)	$1.06 X 10^{7}$ CFU/mL
	Streptococcus pneumoniae type1 (KCCM 41560)	$1.54 X 10^{6}$ CFU/mL
	Streptococcus pneumoniae type2 (KCCM 40410)	$1.04 X 10^{7}$ CFU/mL
	Streptococcus pneumoniae type3 (KCCM 41569)	$1.34 X 10^{7}$ CFU/mL

	Streptococcus pneumoniae type5 (KCCM 41570)	1.24×10^7 CFU/mL
	Streptococcus pyogenes (ATCC 12344)	3.22×10^7 CFU/mL
	Candida albicans (ATCC 10231)	1.78×10^6 CFU/mL
	Bordetella pertussis (NCCP 13671)	6.24×10^7 CFU/mL
	Mycoplasma pneumoniae (ATCC 15531)	2.48×10^9 CFU/mL
	Chlamydia pneumoniae (ATCC VR-2282)	9.1×10^7 IFU/mL
	Legionella pneumophila (ATCC 33155)	1.9×10^8 CFU/mL
	Staphylococcus aureus (NCCP 14647)	1.00×10^9 CFU/mL
	Staphylococcus epidermidis (KCCM 35494)	6.22×10^8 CFU/mL
Variant	Pooled human nasal wash – representative of normal respiratory microbial flora	N/A

* HBV, HCV, HIV, Pneumocystis jirovecii (PJP) and Staphylococcus salivarius were not tested.

[Interference study with Endogenous & Exogenous factor]
No interference was observed with the following pathogens or potential interfering substance.

Potential Interfering Substance	Concentration
Mucin: bovine submaxillary gland, type I-S	100 μg/ml
Blood (human), EDTA anticoagulated	5% (v/v)
Biotin	100 μg/ml
Neo-Synephrine (Phenylephrine)	10% (v/v)
Afrin Nasal Spray (Oxymetazoline)	10% (v/v)
Saline Nasal Spray	10% (v/v)
Rhinocort (Nasal corticosteroids - Budesonide)	10% (v/v)
Homeopathic Zicam Allergy Relief Nasal Gel	5% (v/v)
Sodium Cromoglycate	20 mg/ml
Olopatadine Hydrochloride	10 mg/ml
Anbesol (Benzocaine 20%)	5% (v/v)
Strepsils (flurbiprofen 8.75mg)	5% (w/v, 50mg/ml)
Throat candy (mint)	5% (w/v, 50mg/ml)
Zanamivir (Influenza)	5 mg/ml
Oseltamivir (Influenza)	10 mg/ml
Artemether-lumefantrine (Malaria)	50 μM
Doxycycline hyclate (Malaria)	70 μM
Quinine (Malaria)	150 μM
Lamivudine (Retroviral medication)	1 mg/ml
Ribavirin (HCV)	1 mg/ml
Daclatasvir (HCV)	1 mg/ml

Acetaminophen	200 µM
Acetylsalicylic acid	3.7 mM
Ibuprofen	2.5 mM
Mupirocin	10 mg/ml
Tobramycin	5 µg/ml
Erythromycin	81.6 µM
Ciprofloxacin	31 µM

[High-dose hook effect]
There was no observed hook-effect at virus titer up to $1x10^{6.2}$ $TCID_{50}$/ml.

BIBLIOGRAPHY

1. Clinical management of severe acute respiratory infection when novel coronavirus(nCoV) infection is suspected. Interim guidance. WHO 2020
2. Diagnostic detection of Wuhan coronavirus 2019 by real-time RT-PCR.2020
3. Diagnosis and treatment of pneumonia caused by new coronavirus (trial version 4) National Health Commission. 2020

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For all questions about the SARS-CoV-2 Rapid Antigen Test that are not answered in this package insert, there is a FAQ document available on the Roche Canada website (www.rochecanada.com). Please look for the documentation section via the search engine on the website. Please contact Roche Care Center for technical questions at 1-877-273-3433.
The SARS-CoV-2 Rapid Antigen Test is distributed in Canada by:
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