SARS-CoV-2 Ag Saliva Rapid Test

Package Insert

REF VCD17-01-019	English

INTENDED USE AND PRINCIPLE

SARS-CoV-2 Ag Saliva Rapid Test is for the rapid, qualitative detection of the nucleocapsid protein antigen from SARS-CoV-2 in human saliva[1]. The test is for *in vitro* diagnostic use only. For professional use only. It is intended for clinical laboratories and healthcare professional use only for point-of-care testing[3]. It provides only an initial screening test result. More specific alternative diagnosis methods (molecular diagnostic and / or CT) should be performed in order to obtain the confirmation of SARS-CoV-2 infection. Not for at-home testing.

SARS-CoV-2 Ag Saliva Rapid Test is based on immunochromatography technology. Each test device has one line of anti-SARS-CoV-2 monoclonal antibody on the detection line (T line) and one line of anti-mouse IgG polyclonal antibody on the quality control line (C line). When extracted specimen is added to the specimen well, it will react with the labeled antibody to form a complex, the mixture then migrates through the membrane by capillary action and interacts with the coated anti-SARS-CoV-2 monoclonal antibody on the detection line. If the specimen contains SARS-CoV-2 antigen, the detection line will appear purplish-red indicating the SARS-CoV-2 antigen is positive. Otherwise, the test result will be negative. The test device also contains a quality control line C which should appear purplish-red for all valid tests. If the quality control line C does not appear, the test result will be invalid even if the detection line appears.

COMPOSITION

Each test kit contains the test devices and package insert.

Materials required but not provided: timer and plastic bag for waste.

STORAGE AND HANDLING

- Store the test kit in a cool, dry place between 36-86°F (2-30°C). Keep away from light. Exposure to temperature and / or humidity outside the specified conditions may cause inaccurate results.
- Do not freeze. Use the test kit at temperatures between 59-86°F (15-30°C).
- Use the test kit between 10-90% humidity.
- Do not use the test kit beyond the expiration date (printed on the foil pouch and box).

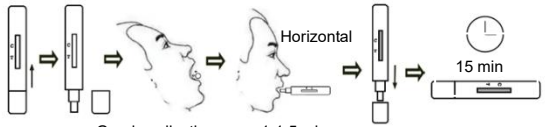
Note: *All expiration dates are printed in Year-Month-Day format. 2022-06-18 indicates June18, 2022.*

WARNINGS, PRECAUTIONS AND LIMITATIONS

- Results from SARS-CoV-2 antigen testing should not be used as the sole basis to diagnose or exclude SARS-CoV-2 infection or to inform infection status[2].
- 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 and / or CT should be considered to rule out infection in these individuals.
- Positive results may be due to present infection with SARS-coronavirus strains, see “cross-reactivity” for details. Follow-up testing with a molecular diagnostic and / or CT should be considered to confirm the testing result.
- False results may be due to sticky specimen, insufficient specimen volume or bubbles during applying.
- Do not use unverified UTM, which may lead to false positive or false negative results.
- For *in vitro* diagnostic use only. Not for at-home testing.
- Further molecular diagnostic and / or CT is recommended to identify the actual physical situation.
- Do not open the foil pouch of the test device exposing it to the ambient environment until the test device is ready for immediate use.
- Do not use any damaged test device or material. Do not reuse the test device.
- Do not use test kit beyond the expiration date.
- Specific training or guidance is recommended if operators are not experienced with specimen collection and handling procedures.
- Only use saliva as specimen. Follow the package insert to obtain accurate results.
- Wear protective gears such as laboratory coats, disposable gloves, and eye protection when specimens are collected and evaluated.
- All parts of kit are considered biohazardous and can potentially transmit infectious diseases from pathogens, even after you have performed cleaning and disinfection. Follow proper precautions and all local regulations when disposing of the used test kits.
- Wash hands thoroughly after handling.
- Please use it carefully, do not swallow the accessories.
- Since the outbreak of the pandemic, the SARS-CoV-2 variant with D614G mutations in the spike protein has replaced the original form in the most regions all over the world[5]. In December 2020, a novel strain of the virus, named ‘VUI-202012/01’, was identified in the England with a set of 17 mutations[6]. Another mutant strain 501Y.V2 of SARS-CoV-2, originally detected in South Africa, shares the same key mutation N501Y. The N501Y mutation locates the receptor-binding domain (RBD) of the spike protein that the virus uses to bind to the human ACE2 receptor, which might be associate with increased transmissibility[7]. The nucleocapsid phosphoprotein (N Protein), linking the viral envelope to the viral RNA, plays a central role in the packaging signal RNA recognition and subsequent RNA encapsidation[8]. Based on its vital role in transcription and replication of the virus, the N protein is suggested to be more sensitive for the early detection of infections[9]. SARS-CoV-2 Ag rapid tests produced by VivaChek employ the interaction with antigen sites in N protein. Till now, there is no clear evidence indicating that mutations found in Spike protein can affect the performance of N protein based antigen tests.

TEST PROCEDURE

Allow the test device and specimens to equilibrate to room temperature (15-30℃ or 59-86℉) prior to testing. Please instruct the person who need to test to not place anything in the mouth for at least 10 minutes prior to collection including food, drink, gum, tobacco, and etc.



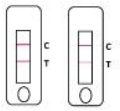
1. Gargle with 5~10 mL water for about 10 seconds,
2. Finished gargling and no water in the mouth, raise head and cough deeply and collect sputum/oropharyngeal saliva or mucus which from the deep throat at the same time.
3. Put the tampon of the test card into the mouth, gently bite the end of the plastic card housing, and keep the horizontal state of the test card, and wait for 1-1.5 minutes until the wet liquid reaches the top of the observation window.
4. When the wet liquid arrives at the top of the results window, remove the test card and close the cover. Read the test result at 15 minutes. Don't read the result after 20 minutes.

Note:

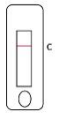
- *Please follow local regulations to handle the used materials.*
- *No water in your mouth when you cough.*

INTERPRETATION OF TEST RESULTS

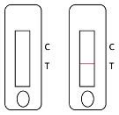
1. Positive Result:
Both the quality control line C and the detection line T appear. Any shade of color in the test line region (T) should be considered positive.
2. Negative Result:
Only the quality control line C appears, with no other line appearing on the detection line.
3. Invalid Result:
Quality control line C fails to appear indicating the test is invalid, no matter if the detection line appears or not. Collect a new specimen and perform another test with a new test device.



Positive：Both the quality control line C and the detection line T appear.



Negative：Only the quality control line C appears, with no other line appearing on the



Invalid：Quality control line C fails to appear indicating the test is invalid, no matter if the detection line appears or not.

QUALITY CONTROL

Internal procedural controls are included in the test. A colored line appearing in the control region (C) is the internal procedural control. This procedural control line indicates that sufficient flow has occurred, and the functional integrity of the test device has been maintained. Control standards are not supplied with this kit; however, it is recommended that positive and negative controls be tested as a good laboratory practice to confirm the test procedure and to verify proper test performance.

PERFORMANCE

1. Limit of Detection
SARS-COV-2 National Standard Reference sample of SARS-CoV-2 were used for Limit of Detection (LoD) tests. The LOD of the SARS-CoV-2 Ag Saliva Rapid Test is 1×10^3 $TCID_{50}$/mL SARS-COV-2 .

National Standard Reference sample	Saliva
1×10^6 $TCID_{50}$/mL	30/30 (100%)
1×10^5 $TCID_{50}$/mL	30/30 (100%)
1×10^4 $TCID_{50}$/mL	30/30 (100%)
1×10^3 $TCID_{50}$/mL	29/30 (96.7%)
1×10^2 $TCID_{50}$/mL	6/30 (20%)
0 $TCID_{50}$/mL	0/30 (0%)

2. Recognition performance for mutant viruses:
Spiked different kind of National Standard Reference sample of SARS-CoV-2 mutant virus (1×10^3 $TCID_{50}$/mL) to saliva sample. According to the test results,The detection performance of SARS-CoV-2 Ag Saliva Rapid Test is suitable for a variety of SARS-CoV-2 mutant virus strain.

	Saliva		Saliva
B.1.618	50/50 (100%)	B.1.1.7	50/50 (100%)
B.1.617.1	50/50 (100%)	P.1	50/50 (100%)
B.1.617.2	50/50 (100%)	D614G	50/50 (100%)
B.1.1.351	50/50 (100%)	501Y.V2	50/50 (100%)

3. Clinical Sensitivity/Clinical Specificity
A total of 212 specimens are tested using the SARS-CoV-2 Ag Saliva Rapid Test. The performance of the SARS-CoV-2 Ag Saliva Rapid Test is compared to a commercialized molecular assay.
Table Summary of sensitivity/specificity of the Ag Saliva Rapid Test compared to PCR.

SARS-CoV-2 Ag Saliva Rapid Test	PCR		
	Positive	Negative	Total
Positive	98	0	98
Negative	9	105	114
Total	107	105	212
Sensitivity	91.59% (98/107, 95%CI, 84.78%~95.51%)		
Specificity	>99.99% (105/105, 95%CI, 96.47%~100%)		
Accuracy	95.75% (203/212, 95%CI, 92.13%~97.75%)		

The SARS-CoV-2 Ag Saliva Rapid Test shows a clinical sensitivity of 91.59%.
The SARS-CoV-2 Ag Saliva Rapid Test shows a clinical specificity of>99.99%.
The SARS-CoV-2 Ag Saliva Rapid Test shows a clinical accuracy of 95.75%.

Note: *Results from SARS-CoV-2 antigen testing should not be used as the sole basis to diagnose or exclude SARS-CoV-2 infection or to inform infection status. Follow-up testing with a molecular diagnostic and / or CT should be considered to confirm the testing result.*

CROSS-REACTIVITY

1. **Cross-reactivity**
The cross-reactivity with the following organism and virus was examined. The following substances will not produce false positive or false negative reactions when tested with the SARS-CoV-2 Ag Saliva Rapid Test.

Organism	Concentration ($TCID_{50}$/mL)	Organism	Concentration ($TCID_{50}$/mL)
HKU1	1.5×10^6	Enterovirus D	4×10^5
OC43	1.5×10^6	Epstein-Barr virus	2.5×10^5
NL63	1.5×10^6	Measles virus	3×10^5
229E	1.5×10^6	Human cytomegalovirus	3×10^5
MERS	1.5×10^6	Rotavirus	5×10^5
Influenza A H1N1	3×10^5	Norovirus	5×10^5

Seasonal Influenza H1N1	2×10^5	Mumps virus	5×10^5
Influenza A H3N2	3×10^5	Rhinovirus C	2.5×10^5
Influenza A H5N1	3×10^5	Adenovirus type 1	5×10^5
Influenza A H7N9	3×10^5	Adenovirus type 2	5×10^5
Influenza B	5×10^5	Adenovirus type 3	5×10^5
Syncytial virus	4×10^5	Adenovirus type 4	3.5×10^5
Rhinovirus A	2.5×10^5	Adenovirus 5	5×10^5
Rhinovirus B	2.5×10^5	Adenovirus type 7	3.5×10^5
Adenovirus 55	4×10^5	Enterovirus B	4×10^5
Enterovirus A	4×10^5	Enterovirus C	4×10^5
Varicella-zoster virus	5×10^5	Chlamydia pneumoniae	4.5×10^4 cells/mL
Human Metapneumovirus (hMPV)	4×10^5	Legionella pneumophila	6×10^4 cells/mL
Parainfluenza virus 1	4×10^5	Staphylococcus aureus	6×10^4 cells/mL
Parainfluenza virus 2	2.5×10^5	Streptococcus pneumoniae	5×10^4 cells/mL
Parainfluenza virus 3	3×10^5	Streptococcus pyogenes	5×10^4 cells/mL
Parainfluenza virus 4	3×10^5	Candida albicans	5×10^4 cells/mL
Respiratory syncytial virus	3.5×10^5	Pooled human sampling site wash – representative of normal respiratory microbial flora	14% v/v
Haemophilus influenzae	5×10^5	Bordetella pertussis	4.5×10^4 cells/mL
Mycoplasma pneumoniae	6×10^4 cells/mL	/	/

2. **Endogenous/exogenous material interference test**

Interference Substances: there is no interference for potential interfering substances listed below.

Sample	Concentration	Sample	Concentration
Purified Mucin	100μg/mL	Abidol	25mg/mL
Bilirubin	200μM	Levofloxacin	1mg/mL
Blood lipids	10%(v/v)	Azithromycin	5mM
Hemoglobin	10mg/mL	Ceftriaxone	20mg/mL
Rheumatoid factor	10mg/mL	Meropenem	20mg/mL
Antinuclear antibody	10mg/mL	Tobramycin	1.51mM
Antimitochondrial antibody	20mg/mL	Histamine hydrochloride	5mg/mL
HAMA	10mg/mL	Benfurin	5mM
Total IgG	20mg/mL	Oxymetazoline	500μg/mL
Total IgM	20mg/mL	Sodium chloride	20mg/mL
Hematocrit	20mg/mL	Beclomethasone	35mM
alpha-interferon	10mg/mL	Dexamethasone	11mg/mL
Zanamivir	1mg/mL	Flunisolone	20mg/mL
Ribavirin	1mg/mL	Triamcinolone	2.54mM
Oseltamivir	1mg/mL	Budesonide	20mg/mL
Paramivir	1mg/mL	Momisson	20mg/mL
Lopinavir	100μg/mL	Fluticasone	5mg/mL
Ritonavir	20mg/mL	/	/

3. **Hook effect**

The hook effect refers to the false-negative phenomenon caused by the incorrect ratio of antigen to antibody, even if the concentration of SARS-CoV-2 nucleocapsid protein reaches 200μg/mL, the SARS-CoV-2 Ag Saliva Rapid Test still has no hook effect.

REFERENCES

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INDEX OF SYMBOLS

	Consult instructions for use		Use by		Contains sufficient for <n> tests
IVD	For *in vitro* diagnostic use only	LOT	Lot number	REF	Catalog number
2℃ 30℃	Storage temperature limitations		Manufacturer		Do not reuse
EC REP	Authorized Representative				

VivaChek™

VivaChek Biotech (Hangzhou) Co., Ltd.
Level 2, Block 2, 146 East Chaofeng Rd.
Yuhang Economy Development Zone
Hangzhou 311100 Zhejiang P.R. China
Email: info@vivachek.com
www.vivachek.com

EC REP Lotus NL B.V.
Koningin Julianaplein 10, 1e Verd,
2595AA, The Hague, Netherlands.
Tel: +31644168999
Email: peter@lotusnl.com

CE IVD

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