WHO Emergency Use Assessment Coronavirus disease (COVID-19) IVDs PUBLIC REPORT

Product: Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold)
Manufacturer: Hangzhou Laihe Biotech Co., Ltd
EUL Number: EUL 0603-226-00
Outcome: Accepted

The EUL process is intended to expedite the availability of in vitro diagnostics needed in public health emergency situations and to assist interested UN procurement agencies and Member States in determining the acceptability of using specific products in the context of a Public Health Emergency of International Concern (PHEIC), based on an essential set of available quality, safety and performance data. The EUL procedure includes the following:

- Quality Management Systems Review and Plan for Post-Market Surveillance: desk-top review of the manufacturer's Quality Management System documentation and specific manufacturing documents;
- Product Dossier Review: assessment of the documentary evidence of safety and performance.

Novel Coronavirus (COVID-19) Antigen Test (Colloidal Gold), product codes 303035-25 and 303035-40, CE-mark regulatory version, manufactured by Hangzhou Laihe Biotech Co., Ltd, Floor 1, Room 505-512 Floor 5, Building B, 688 Bin 'an Road, Binjiang District, Hangzhou 3110052 Zhejiang, China was listed on 10 July 2023.

Intended use:

According to the claim of intended use from Hangzhou Laihe Biotech Co., Ltd, *"The Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold) is an in vitro immunoassay. The assay is for the direct and qualitative detection of antigen (nucleocapsid Protein) to SARS-CoV-2 from nasopharyngeal secretions specimens from those who have close contact with confirmed COVID-19 patients or symptomatic individuals. The kit is for in vitro diagnostic use and for professional use only.*
The Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold) is intended for use by trained laboratory professionals and health care providers and the kit may be used in any laboratory, point-of-care settings (POC) and non-laboratory environment that meets the requirements specified in the instructions for use and local regulation."

Validated specimen type: Nasopharyngeal swab specimens.

Test kit contents:

Component	25 Tests/kit (T/k) (303035-25)	40 T/kit (303035-25)
Test Device	25	40
Sterile swabs	25	40
Specimen tube prefilled with extraction buffer	25	40
Specimen tube dropper tips	25	40
Tube stand	1	1
Instruction For Use (pcs)	1	1
Operation Instructions Card	1	1

Materials required but not provided:
Timer, clock, or stopwatch

Storage
2-30°C.

Shelf-life upon manufacture:
18 months (real-time stability studies are ongoing).

Warnings/limitations:
Refer to the instructions for use (IFU).

Product dossier assessment

Hangzhou Laihe Biotech Co., Ltd submitted a product dossier for the Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold) for detecting severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) antigen as per the "*Instructions for Submission Requirements: In vitro diagnostics (IVDs) Detecting SARS-CoV-2 Nucleic Acid and rapid diagnostics tests detecting SARS-CoV-2 antigens (PQDx_0347)"*. The information (data and documentation) submitted in the product dossier was reviewed by WHO staff and external technical experts (assessors) appointed by WHO.

Post listing Commitments for EUL:

As commitments to listing, Hangzhou Laihe Biotech Co., Ltd committed to:

1. Provide additional information for storage conditions, including their specimen IDs and the equivalence between the live and inactivated virus for the specimen stability study.

2. Submit evidence of estimation of the product's Limit of Detection (LoD) with the WHO International Standard for SARS-CoV-2 antigen (NIBSC code: 21/368).

3. Submit a new flex study using positive specimens that comply with PQDx_347.
4. Submit the calculation of the concentration of specimen used for shelf-life and stability studies and the test in which the expected colour degrees were determined.
5. Submit the final study report for the real-time estimation of product shelf life where at least three lots of the product are first subjected to a simulated transport challenge that mimics extremes of the environmental conditions likely to be experienced during transportation of the product.

The risk-benefit assessment is acceptable.

Quality Management Systems Review

To establish eligibility for WHO procurement, Hangzhou Laihe Biotech Co., Ltd was asked to provide up-to-date information about the status of their quality management system.

Based on the review of the submitted quality management system documentation by WHO staff, it was established that sufficient information was provided by Hangzhou Laihe Biotech Co., Ltd to fulfil the requirements described in the "*Instructions for Submission Requirements: In vitro diagnostics (IVDs) Detecting SARS-CoV-2 Nucleic Acid and rapid diagnostics tests detecting SARS-CoV-2 antigens (PQDx_347)*".

The quality management documentation assessment is acceptable.

Plan for Post-Market Surveillance

Post-market surveillance, including monitoring all customer feedback, detecting and acting on adverse events, product problems, non-conforming goods and processes is a critical component of minimizing potential harm of an IVD listed for emergency use.

The following post-EUL activities are required to maintain the EUL listing status:
1. Notification to WHO of any planned changes to a EUL product, in accordance with "*WHO procedure for changes to a WHO prequalified in vitro diagnostic" (document number PQDx_121*); and
2. Post-market surveillance activities, in accordance with "*Guidance for post-market surveillance and market surveillance of medical devices, including in vitro diagnostics"* (ISBN 978-92-4-001531-9).

Hangzhou Laihe Biotech Co., Ltd is also required to report all categories of complaints in a summarized form. There are certain categories of complaints and changes to the product that must be notified immediately to WHO, as per the above-mentioned documents.

The manufacturer has committed to ensuring that post-emergency use listing safety, quality, and performance monitoring activities are in place, per WHO guidance "*Guidance for post-market surveillance and market surveillance of medical devices, including in vitro diagnostics*" (ISBN 978-92-4-001531-9).[1]

Scope and duration of procurement eligibility

Novel Coronavirus (COVID-19) Antigen Test (Colloidal Gold), product codes 303035-25 and 303035-40, manufactured by Hangzhou Laihe Biotech Co., Ltd, is considered to be eligible for WHO procurement for 12 months from the day of listing. The assay may be used for the detection of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) antigen. This listing does not infer that the product meets WHO prequalification requirements and does not mean that the product is listed as WHO-prequalified.

As part of the ongoing requirements for listing as eligible for WHO procurement, Hangzhou Laihe Biotech Co., Ltd must engage in post-market surveillance activities to ensure that the product continues to meet safety, quality and performance requirements. Hangzhou Laihe Biotech Co., Ltd is required to notify WHO of any complaints, including adverse events related to the use of the product, within 7 days and any changes to the product.

WHO reserves the right to rescind eligibility for WHO procurement if additional information on the safety, quality, and performance during post-market surveillance activities and if new data becomes available to WHO that changes the risk-benefit balance.

[1] Available on the web page https://www.who.int/publications/i/item/guidance-for-post-market-surveillance-and-market-surveillance-of-medical-devices-including-in-vitro-diagnostics

Labelling

1.0 Labels

2.0 Instructions for Use (IFU)

1.0 Product labels

1.1 Outer box artwork and labels

QTY: 25 PCS

Novel Coronavirus(COVID-19)
Antigen Test Kit (Colloidal Gold)

LYHER

CE IVD

LYHER

REF 303035-25

LOT

6 972412 610006

LYHER

COVID-19 Antigen Test Kit

LYHER

Hangzhou Laihe Biotech Co., Ltd.
Add.:1st Floor, Room 505 - 512, 5th Floor, No.2B Building, No.688 Bin'an Road, Changhe Jiedao, Binjiang District, Hangzhou, Zhejiang, People's Republic of China
Tel: +86 571 8765 3090 Fax: +86 571 8665 8000
E-mail: office@lyher.com Web: www.lyherbio.com
EC REP SUNGO Europe B.V.
Add: Olympisch Stadion 24, 1076DE Amsterdam, Netherlands
Tel/Fax:+31(0) 2021 11106
Email: ec.rep@sungogroup.com

For more details, pls see the instruction manual.

LYHER

COVID-19 Antigen Test Kit

LYHER

For in vitro diagnostic use only

QTY: 40 PCS

Novel Coronavirus(COVID-19)
Antigen Test Kit (Colloidal Gold)

LYHER

2-30°C

IVD

CE

LYHER

COVID-19 Antigen Test Kit

LYHER

Hangzhou Laihe Biotech Co., Ltd.
Add.:1st Floor, Room 505 - 512, 5th Floor, No.2B Building, No.688 Bin'an Road,
Changhe Jiedao, Binjiang District, Hangzhou, Zhejiang, People's Republic of China
Tel: +86 571 8765 3090 Fax: +86 571 8665 8000
E-mail: office@lyher.com Web: www.lyherbio.com
SUNGO Europe B.V.
Add: Olympisch Stadion 24, 1076DE
Amsterdam, Netherlands
Tel/Fax:+31(0) 2021 11106
Email: ec.rep@sungogroup.com
For more details, pls see the instruction manual.

LYHER

COVID-19 Antigen Test Kit

For in vitro diagnostic use only

LYHER

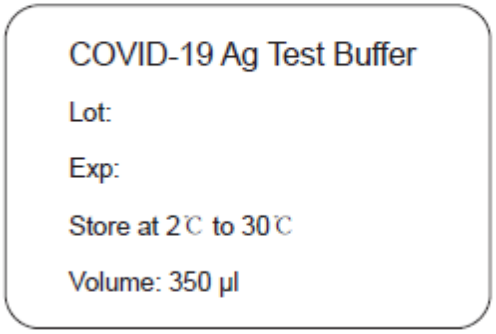
LYHER

REF 303035-40

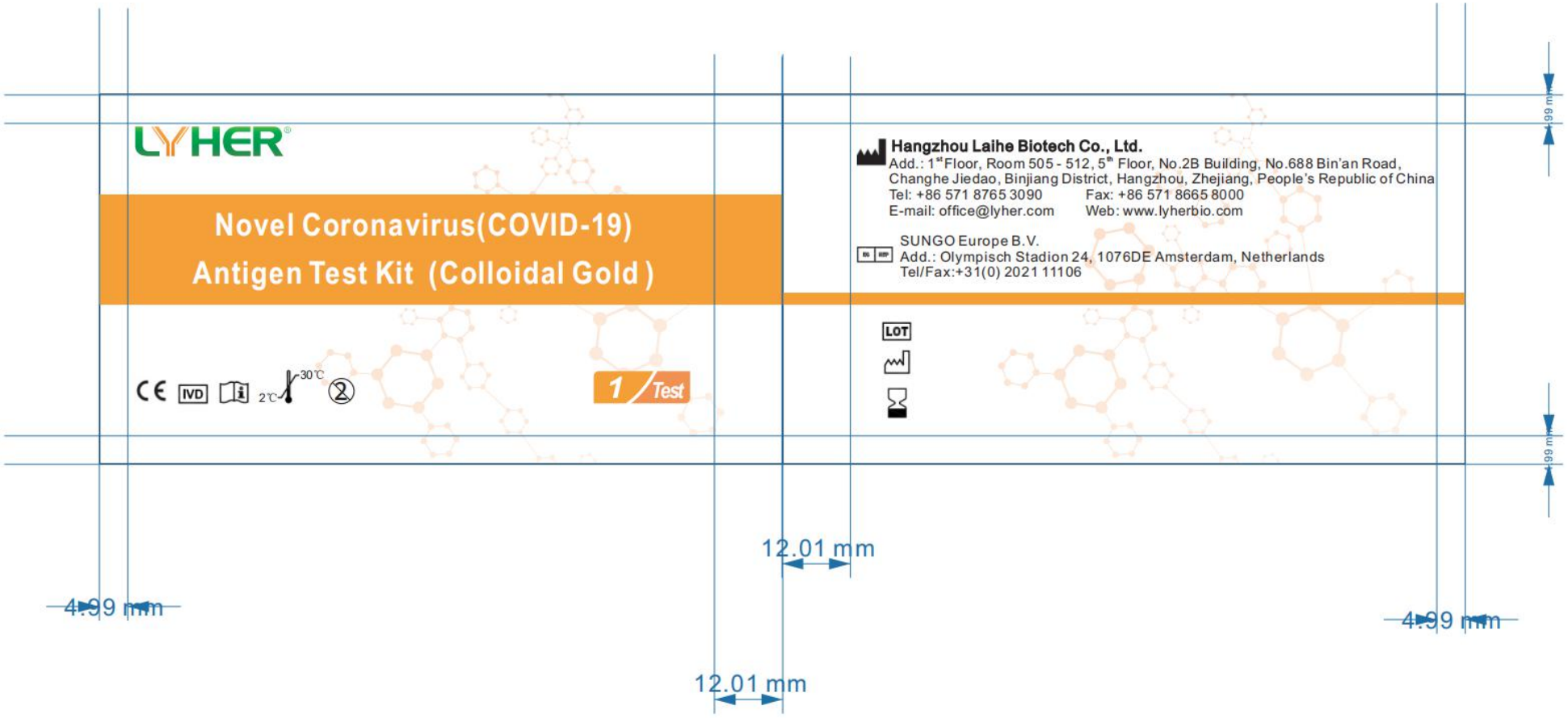
LOT

6 972412 610181

1.2 Buffer label



1.3 Test Device Pouch label


LYHER
Novel Coronavirus(COVID-19)
Antigen Test Kit (Colloidal Gold)
IVD
2℃
30℃
1 Test
Hangzhou Laihe Biotech Co., Ltd.
Add.: 1st Floor, Room 505 - 512, 5th Floor, No.2B Building, No.688 Bin'an Road,
Changhe Jiedao, Binjiang District, Hangzhou, Zhejiang, People's Republic of China
Tel: +86 571 8765 3090 Fax: +86 571 8665 8000
E-mail: office@lyher.com Web: www.lyherbio.com
SUNGO Europe B.V.
Add.: Olympisch Stadion 24, 1076DE Amsterdam, Netherlands
Tel/Fax:+31(0) 2021 11106
LOT
4.99 mm
4.99 mm
12.01 mm
4.99 mm
12.01 mm

1.4 Swab label


CITOSWAB® COLLECTION SWAB
NYLON
STERILE R
CE 0197
CITOTEST LABWARE MANUFACTURING CO.,LTD
339 Beihai Road, Haimen 226100,China
www.citotest.com
EC REP
WellKang Ltd
MADE IN CHINA
4090109500
STERILE UNLESS PACKAGE OPENED OR DAMAGED
LOT
REF
PEEL HERE
19.5mm
180mm

2.0 Instructions for use[2]

[2] English version of the IFU was assessed by WHO. It is the responsibility of the manufacturer to ensure correct translation into other languages.

LYHER®

CE

Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold)

REF 303035 Cassettes: 25 Tests/40 Tests

Intended Use

The LYHER® Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold) is an in vitro immunoassay. The assay is for the direct and qualitative detection of antigen (nucleocapsid Protein) to SARS-CoV-2 from nasopharyngeal secretions specimens from those who have close contact with confirmed COVID-19 patients or symptomatic individuals. The kit is **for *in vitro diagnostic use and for professional use only.***

The LYHER® Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold) is intended for use by trained laboratory professionals and health care providers and the kit may be used in any laboratory, point-of-care settings (POC) and non-laboratory environment that meets the requirements specified in the instructions for use and local regulation.

Principle

The immune colloidal gold technique is used in the assay to detect antigens to SARS-CoV-2. The reagent binding pad is coated with anti-SARS-CoV-2 monoclonal antibodies which is labeled with colloidal gold marker, respectively. A nitrocellulose membrane in test area of a strip is coated with anti-SARS-CoV-2 antibodies. The quality control area within the nitrocellulose membrane is coated with goat anti-mouse IgG antibodies. When testing, the antibodies against SARS-CoV-2 form immuno-complexes with the antigen protein of the virus in the specimen to be tested. As a result of chromatography, immuno-complexes move along the membrane and will be captured by the anti-SARS-CoV-2 antibodies coated in the test area to form a visible line with red color (T line). The free colloidal gold marker or immune complexes continue to move forward and specifically bind to the goat anti-mouse antibody coated in the quality control area to form a visible line (C line). If the specimen does not contain the antigen to SARS-CoV-2, no test line will show, only quality control line (C line) will appear.

Kit Presentation

Materials Supplied

Test device: There are two different packages with 25 or 40 test cassettes containing immobilized anti-SARS-CoV-2 antibodies labeled which is labeled with colloidal gold, anti-SARS-CoV-2 monoclonal antibodies, goat anti-mouse IgG antibodies as a control.

Swabs: 25 or 40 Pcs

Specimen tube prefilled with extraction buffer: 350 μL x 25 vials for 25 Tests or 350 μL x 40 vials for 40 Tests.

Specimen tube dropper tips: 25 or 40 Pcs

Tube stand: 1 per kit.

Instructions for use: 1 per kit.

Operation Instructions Card: 1 per kit.

Materials Required But Not Provided

Timer, clock or stopwatch

Storage and Stability

1. Store in a dry place at 2-30 ℃, protected from light. The validity is 18 months.
2. In general, the kit shall be used within 30 minutes after the aluminum foil bag is opened. If the temperature is higher than 30 ℃ or the humidity of the environment is higher than 70%, the kit shall be used as soon as possible after opening of the aluminum foil pouch.
3. The date for the manufacturing and the expiration date are printed on the outside of the package.

Precautions

- For in vitro diagnostic use only. For professional use only.
- Read the instructions for use carefully before performing the test. Follow the operations of specimen collection and test procedures strictly.
- Do not use kit or components beyond the expiration date.
- 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 discolored or turbid. Discoloration or turbidity may be a sign of microbial contamination.
- All patient specimens and used test components should be handled as if they are biologically hazardous and disposed in accordance with local laws and regulations. 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 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.

Specimen Collection and Storage

1. Handle all specimens as if they are capable of transmitting infectious agents.
2. Collection of Specimens:
   Nasopharyngeal specimen: Let the patient's head relax naturally. Turn the swab against the wall of the nostril slowly into the nostril, to the nasal palate, and then rotate while wiping and remove slowly.
   Treatment of Specimen: Teal off the seal of the specimen tube which is pre-filled with specimen extraction buffer, insert the swab head into the extraction buffer after specimen collection, mix well, squeeze the swab 10-15 times by compressing the walls of the tube against the swab, and let it stand for 2 minutes to keep as many samples as possible in the specimen extraction buffer. Discard the swab.
3. Swab specimens should be tested as soon as possible after collection. Use freshly collected specimens for best test performance.
4. Swab specimens should be tested immediately after collection.If it is not possible to test immediately, the swab specimen can be kept in an extraction tube filled with extraction buffer at 2-8°C for up to 24 hours prior to testing.
5. Do not use specimens that are obviously contaminate with blood, as it may interfere with the flow of sample with the interpretation of test results.
6. This test can detect out the live virus and inactivated virus that is inactivated by heating at 60℃ and inactivated by β-propiolactone.

Quality Control

The LYHER® Novel Coronavirus (COVID-19) Antigen 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 colored line located at the “C” region is present before reading the result.

Good laboratory practice suggests testing positive and negative external controls to ensure that the test reagents are working and that the test is correctly performed.

Test Procedures

1. Preparing

a) The specimens to be tested and the required reagents shall be removed from the storage condition and be balanced to room temperature;

b) The kit shall be removed from the packaging bag and placed flat on a dry bench.

2. Testing

2.1 Place the test kit horizontally on the table.

2.2 Add specimen

Place the clean dropper tip on the specimen tube and invert the specimen tube so that it is perpendicular to the sample hole (S) and add 3 drops (about 100ul) of the sample. Set timer for 15 minutes.

2.3 Reading the result

The positive specimens can be detected at 15 minutes after sample addition.

Interpretation of Results

POSITVE **NEGATIVE** **INVALID**

POSITIVE: Two colored lines appear on the membrane. One line appears in the control region (C) and the other line appears in the test.

NEGATIVE: Only one colored line appears in the control region (C). No apparent colored line appears in the test region (T).

INVALID: Control line fails to appear. Results from any test which has not produced a control line 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 color intensity in the test region (T) may vary depending on the concentration of analytes present in the specimen. Therefore, any shade of color 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 line failure.

Limitations

1. This product is only used for testing of individual nasopharyngeal secretions specimens.
2. A negative result does not rule out the possibility of infection with SARS-CoV-2.
3. A positive result does not mean that the individual is in a state of infection with SARS-CoV-2. The test results of this product are for clinical reference only and shall not be taken as the sole basis for clinical diagnosis and treatment. The clinical management of patients shall be considered in combination with their symptoms, signs, medical history, other laboratory tests (especially pathogen detection), response to treatment, epidemiology and other information.
4. The LYHER® Novel Coronavirus (COVID-19) Antigen 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 color in a positive test line should not be evaluated as “quantitative or semi-quantitative”.
5. Both viable and nonviable SARS-CoV-2 viruses are detectable with the LYHER® Novel Coronavirus (COVID-19) Antigen Test Kit.
6. Failure to follow the TEST PROCEDURE and RESULT INTERPRETATION may adversely affect test performance and/or invalidate the test result.
7. 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.

Performance Characteristics

CLINICAL EVALUATION:

Clinical evaluation was performed to compare the results obtained by the LYHER® Novel Coronavirus (COVID-19) Antigen Test Kit and RT-PCR. The results were summarized below:

Table 1: COVID-19 Rapid Test vs. RT-PCR

Test Results of Lyher Kit	Clinical diagnosis (PCR results)		
	Positive(+)	Negative(-)	Total
Positive(+)	**520**	**1**	**521**
Negative(-)	**41**	**344**	**385**
Total	**561**	**345**	**906**

Clinical Sensitivity:92.69% (90.22% -94.70%)*
Clinical Specificity:99.71% (98.40% -99.99%)*
Total coincidence rate:95.36% (93.79%-96.64%)*
*95% Confidence Interval

LIMIT OF DETECTION

The limit of detection has been evaluated at 0.5 ng/mL.

PRECISION

Tested three specimens with 3 different lots of the product and each specimen was tested for 20 times to demonstrate the repeatability of the product. Another study was conducted at 2 different sites by different operators using 3 different lots of product to demonstrate the reproducibility of the product. The results are given below:

Table 2:Repeatability

Specimen	Test Time	Results		
		Lot 1	Lot 2	Lot3
Negative Specimens	20	20/20	20/20	20/20
Cut-off Specimens	20	20/20	20/20	20/20
Positive Specimen	20	20/20	20/20	20/20

Table 3:Reproducibility

Specimen	n	Site 1	Site2
Negative Specimens	20	20/20	20/20
Cut-off Specimens	20	20/20	20/20
Positive Specimen	20	20/20	20/20

CROSS-REACTIVITY

Cross reactivity with the following organism and virus has been studied. Samples positive for the following organisms were found negative when tested with the LYHER® Novel Coronavirus (COVID-19) Antigen Test Kit. There is cross-reactivity between SARS and SARS-CoV-2.

Table 4: Cross-Reactivity

Organism	Organism	Organism
Influenza A (H1N1,H3N2,H5N1,H7N9)	Rotavirus	Haemophilus influenzae
Influenza B (Yamagata, Victoria)	Norovirus	Streptococcus pneumoniae
Rhinovirus (Group A,B,C)	Cytomegalovirus	Streptococcus pyogenes
Adenovirus (Type 1,2,3,4,5,7,55)	Measles virus	Candida albicans
Enterovirus (Group A,B,C,D)	Mumps virus	Bordetella pertussis
Respiratory syncytial virus	Legionella pneumonila	Mycoplasma pneumoniae
Varicella zoster virus	Coronavirus (HKU1,OC43,NL63,229E MERS)	Chlamydia pneumoniae
Herpes simplex virus	Human Metapneumovirus (hMPV)	Mycobacterium tuberculosis
Epstein-Barr virus	Parainfluenza virus (Type 1,2,3,4)	Pneumocystis jirovecii (PJP)

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 LYHER® Novel Coronavirus (COVID-19) Antigen Test Kit.

Table 5 : Substances having no interfering with Lyher Kit

Substance	Substance	Substance
α-interferon	Ceftriaxone	Hemoglobin
Zanamivir	Meropenem	White blood cells
Ribavirin	Tobramycin	Mucin
Paramivir	Phenylephrine	Mouthwash
Lopinavir	Oxymetazoline	Toothpaste
Ritonavir	Sodium chloride	Dexamethasone Acetate Adhesive Tablets
Abidol	Beclomethasone	Caoshanhu Spray
Levofloxacin	Dexamethasone	Mirabilitum praeparatum
Azithromycin	Flunisolide	Golden Throat Lozenge

Ordering Information

Catalogue No. 303035
Item: Novel Coronavirus (COVID-19) Antigen Test Kit (Colloidal Gold)
Specimen: Nasopharyngeal swab specimens
Format: Cassette

Catalogue No.	Pack Size	Test Cassette	Buffer	Swab	Tube Stand
303035-25	25 tests	25	25	25	1
303035-40	40 tests	40	40	40	1

Hangzhou Laihe Biotech Co., Ltd.
1st Floor, Room 505 - 512, 5th Floor, No.2B Building, No.688 Bin'an Road, Changhe Jiedao, Binjiang District, Hangzhou, Zhejiang, People's Republic of China
Tel.: +86 571 8765 3090 Fax: +86 571 8665 8000
E-mail:office@lyher.com Web:www.lyherbio.com

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Amsterdam, Netherlands
Tel/Fax:+31(0) 2021 11106
Email: ec.rep@sungogroup.com

Guide to Symbols

	Caution		Keep away from sunlight
	Manufacturer	LOT	Batch Code
	Consult instructions for use		Do not re-use
	Keep dry		Use-by date
REF	Catalogue number	IVD	*In vitro* diagnostic medical device
	Do not use if package is damaged	2℃ 30℃	Temperature Limitation (2-30℃)
CE	European Conformity	EC REP	Authorized Representative
	Date when manufactured		

（Size：175*110mm）

112058002 Effective date:25062023

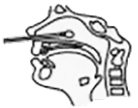
LYHER®

COVID-19 Antigen Test Operation Instructions

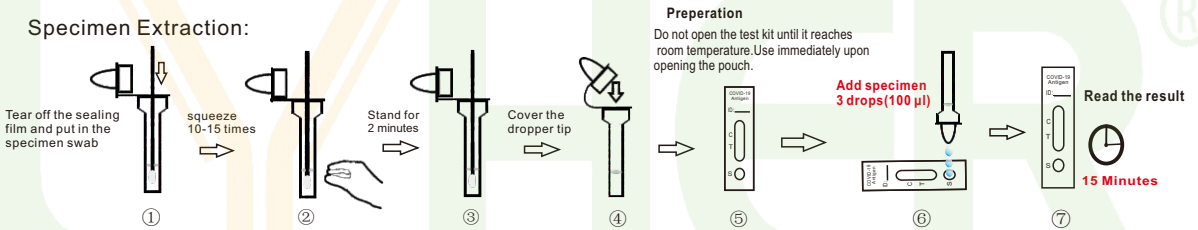
This test should only be used by trained healthcare professionals. It is not for "at home" use.

Specimen Collection:

Nasopharyngeal swab collection

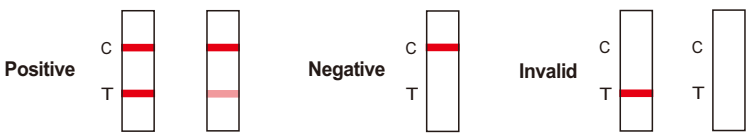


Specimen Extraction:



Note: Adding too much or too little of the specimen or diluent will lead to inaccurate results.

Interpretation of Results



*Please read the Package Inserts for complete directions. If those administering this test do not fully and faithfully follow the enclosed instructions, the manufacturer and distributor(s) cannot be held liable for any resulting errors.

Hangzhou Laihe Biotech Co., Ltd.