innovative.Diagnostics

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# iD Rapid® COVID-19 Antigen

Rapid diagnostic test for the qualitative detection of SARS-CoV-2 antigens in human nasopharyngeal swab samples.

IVD Σ 25 CE

**For *in-vitro* diagnostic professional use only**

## Intended Use

**iD Rapid® COVID-19 Antigen** is an *in vitro* rapid test designed for the qualitative detection of the SARS-CoV-2 antigen (Ag) in human nasopharyngeal swab samples. It is intended to be used on patients who meet the clinical and/or epidemiological criteria for COVID-19 defined in accordance with the recommendations of health authorities. This product is for healthcare professional use only and may be used in any laboratory or non-laboratory environment that meets the requirements specified in the instructions for use, and local regulations.

**iD Rapid® COVID-19 Antigen** is designed to help with the rapid diagnosis of SARS-CoV-2 infections and must not be used as the sole basis for treatment or other management decisions. All results must be associated with the clinical signs and history of the patient, as well as the epidemiological context.

## Introduction

SARS-CoV-2, causing COVID-19 disease (Corona Virus Disease-2019), is a single-stranded RNA virus from the *Coronaviridiae* family [(1)]. Coronaviruses are made of several proteins [(2)] including envelope protein (E), spicule or spike (S), nucleocapsid (N) and matrix protein (M). SARS-CoV-2 is mainly transmitted by droplets during sneezing or coughing [(3)]. If patients infected with the coronavirus are the main source of infection, asymptomatic infected people can also be an infectious source. The incubation period of SARS-CoV-2 is around 3 to 7 days, up to a predicted maximum of 14 days [(4)]. Common signs of infection include fever, fatigue, and dry cough. Nasal congestion, runny nose, sore throat, and diarrhea may also occur. The main laboratory assay used for COVID-19 diagnosis is the real-time reverse transcriptase-polymerase chain reaction (RT-PCR) [(5)]. Antigenic tests offer healthcare professionals a diagnostic aid and the possibility of carrying out screening in a targeted population with the aim of preventing further spread of the virus.

## Description and Principle

The **iD Rapid® COVID-19 Antigen** test is a rapid qualitative immunochromatographic assay that uses monoclonal antibodies to detect the core protein of SARS-CoV-2 in a nasopharyngeal swab (NS). The test is carried out on a strip consisting of a nitrocellulose membrane sensitized with an anti-nucleocapsid monoclonal antibody for SARS-CoV-2 (test area: T) and a non-relevant peptide (control area: C). Two types of conjugates are pre-coated on a reaction membrane: a SARS-CoV-2 anti-nucleocapsid antibody coupled to red colored beads, and an anti-non-relevant peptide antibody coupled to blue colored beads. When the strip is added to the sample tube, the dry conjugates pre-coated on the reaction membrane are solubilized and migrate with the sample.

If SARS-CoV-2 virus antigens are present in the sample, a complex forms between the anti-SARS-CoV-2 conjugate and the virus; it is captured by the pre-coated anti-SARS-CoV-2 monoclonal antibody located in the test line region (T). A blue line should appear on the control line (C); the presence of this line is required to indicate that the test result is valid. The absence of a T line suggests a negative result. The presence of even a slight red T band indicates a positive result. The test cannot be interpreted if the control line is not visible. Neither the test line nor the control line should be visible before applying the sample.

## Kit components, storage conditions and stability

• The kit can be stored at room temperature or refrigerated (2 to 30°C). ⚠ Do not freeze kit components.

| Reagents | Quantity | Storage conditions | |
|---|---|---|---|
| | | Before opening | After opening and until the expiry date |
| **iD Rapid® COVID-19 Ag test strips** packaged in 1 airtight tube with a desiccant cap. | 25 | +2°C/ +30°C | Disposable. ⚠**Do not open the tube until the components are at room temperature** to avoid condensation**.** ⚠Take the test strip out of the tube just before use. Any test strip that has been removed from the airtight tube for more than 30 min and not used, should be discarded. |
| **Elution buffer (inactivating SARS-CoV-2)** (ready to use). Phosphate saline solution containing 0.5% NP40, 0.2% bovine albumin and 0.03% Proclin300, in a dropper bottle. | 1 bottle of 10 ml | +2°C/ +30°C | The buffer bottle can be opened and closed between each use. The buffer is stable until expiration date. ⚠**Shake the bottle before use** ⚠**The buffer has an inactivating effect on SARS-CoV-2 [7] but not on other pathogens. Any sample should be treated as potentially infectious.** |
| **Flocked swab (CE 0197)** in individual packaging. | 25 | +2°C/ +30°C | Disposable. Discard in an infectious waste collector after use. |
| **Tube rack (1); Elution / test tubes (25) and associated caps (25) in a bag; Instructions for use (1); Quick guide (1)** | | | |

## Material required but not provided

Personal protective equipment (i.e. lab coat, face mask, face shield / eye goggles, gloves), timer, biohazard container.

## Notes and precautions for use

1. Read the instructions carefully before use. Only use the instructions version mentioned on the box label.
2. Do not use reagents if their packaging appears to be damaged or beyond the kit expiration date.
3. The kit is intended to be used by healthcare professionals.
4. Do not eat, drink, or smoke in the area where specimens and kits are handled.
5. All specimens should be considered potentially hazardous and handled in the same manner as an infectious agent.
6. Eliminate reagents and waste in accordance with current regulations.
7. Wear protective clothing: lab coat, disposable gloves, and eye protection when specimens are collected and tested.
8. The nasopharyngeal sample must be taken by an authorized person.
9. Do not mix components of different lots.
10. Use the swab provided in the kit to collect a nasopharyngeal specimen.
11. For accurate results, do not use samples that are too viscous or that visibly contain blood.
12. The test strip should be kept in its airtight tube until use; close the airtight tube as soon as possible. Humidity and temperature may adversely affect results.
13. The swabs, tubes and test strip are for single use only.
14. Avoid splashing or aerosol formation.
15. Clean up spills thoroughly using an appropriate disinfectant.
16. Do not touch the head of provided swab when opening the swab pouch before sampling.
17. Do no dilute the collected swab with any solution except for the provided extraction buffer.

## Specimen collection and storage

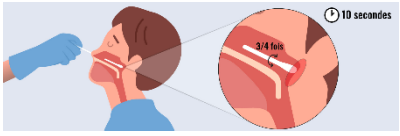
1. Tilt the patient's head back slightly (about 45°-70°) to straighten the passage from the front of the nose.

⚠***Caution:*** *do not collect sample from a patient who has a medical contra-indication to nasopharyngeal sampling.*

2. Insert the swab through the nostril parallel to the palate up to the wall of the posterior nasopharynx which has the most secretions: swab should reach depth equal to distance from nostrils to outer opening of the ear.

⚠***Caution:*** *if resistance is encountered during insertion of the swabs, remove the swab and attempt insertion in the opposite nostril.*

3. Gently rub and roll the swab (3 to 4 times). Leave the swab in place for several seconds (i.e.: 10 sec.) to absorb secretions.
4. Slowly remove swab while rotating.
5. The sample should be tested as soon as possible after collection.



► **Sample storage** :

Samples should be tested as soon as possible after collection. If immediate testing is not possible, the swab sample should be stored in a clean elution tube, labeled with patient information, filled with elution buffer (~300 µl) at room temperature (15-30° C) up to 2 hours after sample collection. Beyond that, a new sample must be taken.

## Testing procedure

⚠ **Allow all reagents to come to room temperature** (15-30°C) by taking them out of the box at least 30 min before use. homogenize the **elution buffer well**, before use, by inverting the dropper bottle 5 to 10 times.

1. Assemble the **rack** and place the **elution / test tube** into it. Make sure the tube is securely set vertically and is touching the bottom of the workstation.
2. Indicate the patient's name or specimen number on the tubes and/or strips. Shake the **Elution Buffer** bottle, remove the cap and add 12 drops (approximately 300 µL).

⚠ *Too much buffer in the tube can lead to incorrect migration and an invalid test.*

3. Collect the sample (refer to section*: Specimen collection and storage*) and insert the **swab** into **the elution / test tube** containing the **elution buffer**.
4. **Rotate** the tip of the swab at least 6 times, making sure that most of the tip is submerged in the solution. **Leave the swab submerged** in the elution buffer for at least **1 minute** (refer to section*: Specimen collection and storage*).
5. Take the swab out of the liquid and **squeeze the swab head along the inner wall of the elution tube** to keep the solution in the tube as much as possible. Discard the swab.
6. Take an **iD Rapid® COVID-19 Ag** test strip out of the tube, close it immediately. Immerse the test strip in the elution / test tube.

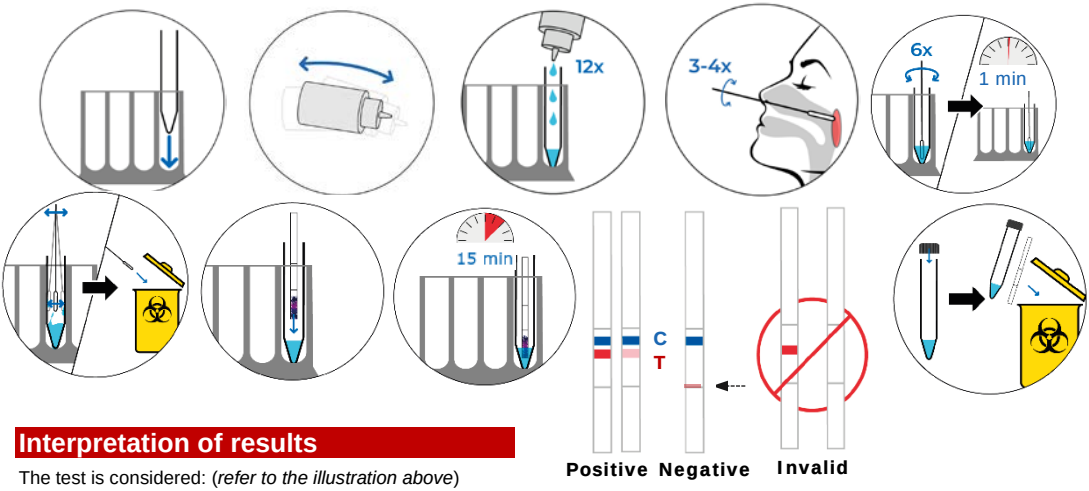
⚠ *Handle the strip only from the upper area.*

7. The sample begins to migrate towards the membrane.

⚠ *During the entire reaction time: do not remove the strip from the tube and keep it in a vertical position*.

8. **Read the result 15 minutes later**. Reading can be done through the tube. Read the test in natural light or with sufficient lighting to distinguish very low intensity bands. In case of doubt of interpretation, the strip can be taken out of the tube and read after an additional drying time of 10 minutes.

⚠ *Do not read the result 30 minutes after the start of the test.*




## Interpretation of results

The test is considered: (*refer to the illustration above*)

- **Negative :** Only the blue control line (C) is visible. No SARS-CoV-2 virus antigen is detected. The result does not exclude COVID-19 infection (refer to *Limitations* section)

⚠ *A thin red line can sometimes be visible where the arrow is positioned in the illustration. The test line (T) is located 5 mm below the blue strip, at the top. This phenomenon does not affect the results.*

- **Positive :** Colored bands appear at the control line (C, blue) and test line (T, red). The test is positive for SARS-CoV-2 virus antigen. Even a low intensity test band (T, red) should be considered positive.
- **Invalid** : The control line (C) is missing, **the test is invalid and cannot be interpreted or lead to a result.** The test should be repeated.

## Manufacturer / external quality control

• All products marketed by Innovative Diagnostics are placed under a quality assurance system. Each batch of finished product is subject to quality control and is only marketed if it meets the acceptance criteria. The documentation relating to the production and control of each batch is kept by the manufacturer.

• Internal procedural control is included in the test. The blue colored band that appears in the control area confirms a sufficient volume of sample and that the test has been correctly implemented.

• External controls are not supplied with this kit. It is recommended that the laboratory carry out a control (for example on each new lot or each new delivery) in order to confirm the correct procedure and to verify the correct performance of the test. Each laboratory must set up its own control procedure.

## Performance Characteristics

This test was evaluated on samples of patients from whom a molecular test, marked CE-IVD and validated by the French CNR, served as a reference method. The study included 255 samples (87 confirmed positive and 168 negative samples)

| | | PCR | | |
|---|---|---|---|---|
| | | Positive | Negative | TOTAL |
| **iD Rapid® COVID-19 Ag** | Positive | 79 | 0 | 79 |
| | Negative | 8 | 168 | 176 |
| | TOTAL | 87 | 168 | 255 |

The sensitivity of the test was also calculated based on Ct (target equivalent IP4 CNR [7,8]) of the positive clinical samples.

| | | PCR Positive (Ct) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0<Ct<20 | 20<Ct<25 | 25<Ct<30 | 30<Ct<33 | Ct >33 | TOTAL |
| **iD Rapid® COVID-19** | Positive | 12 | 40 | 19 | 8 | 0 | **79** |
| | Negative | 0 | 0 | 0 | 2 | 6 | **8** |
| | **TOTAL** | **12** | **40** | **19** | **10** | **6** | **87** |
| Agreement | | 100% | 100 | 100 | 80% | 0% | |

► **Sensitivity : 90.8%** ($CI_{95\%}$ 82.9 – 95.3)

**97,5%** ($CI_{95\%}$ 91,3 – 99,3%) **for samples Ct<33**[7,8]

► **Specificity : 100%** ($CI_{95\%}$ 97.8 – 100%)

► **Accuracy : 96.9%**

► **Repeatability and reproducibility :** Repeatability and reproducibility have been established using internal reference panels containing negative samples and a range of positive samples at different levels of positivity. No difference was observed within series, between series, between batches, between sites and between days.

► **Detection limit :**

The limit of detection obtained from an inactivated viral sample is 1.8 x $10^3$ $TCID_{50}$/mL (median Tissue Culture Infectious Dose).

► **Analytical specificity (exclusivity) :**

• False positive reactions due to high concentration of *Staphylococcus aureus* cannot be excluded but could not be tested.

• A cross reaction with the SARS-CoV (2003), explained by a very close nucleocapsid sequence homology, is possible.

• The antibodies in the test show no cross-reactivity with the following pathogens: Coronavirus NL63, Coronavirus 229E, Coronavirus OC43, MERS-CoV, Human Adenovirus type 1, Human Adenovirus type 3, Human Adenovirus type 8, Human Adenovirus type 18, Human Adenovirus type 23, Human Adenovirus type 7, Human Adenovirus type 5, Human Adenovirus type 11, Human Coronavirus OC43, Human Coronavirus 229E, Human Parainfluenza virus type 1, Human Parainfluenza virus type 2, Human Parainfluenza virus type 3, Human Parainfluenza virus type 4, Human Rhinovirus type 14, Human Rhinovirus type 42, Human Rhinovirus type 1, Human Metapneumovirus , Respiratory syncytial virus-A, Respiratory syncytial virus-B.

## Limits of use

• Failure to follow the instructions for sample collection, test procedure and interpretation of the test results may adversely affect test performance and/or produce invalid results.
• This test is a qualitative assay and should not be used as the sole criterion for the diagnostic or treatment of COVID-19.
• The diagnosis of SARS-CoV-2 infection should only be made by a physician after evaluation of a set of clinical and laboratory data (from an RT-qPCR test for example).
• A negative result does not exclude the possibility of SARS-CoV-2 infection and must be confirmed by an appropriate test (molecular).
• Positive test results do not rule out co-infections with other pathogens. This test cannot determine the etiology of respiratory infection caused by microorganisms other than SARS-CoV-2.
• Reading the test results earlier than 15 minutes or later than 30 minutes may give incorrect results.
• This test is not intended to detect low viral loads which could be detected by a molecular technique (RT-qPCR), in particular at the end of the viral excretion.
• Positive results may occur in cases of infection with SARS-CoV.

## Interfering substances

The endogenous and exogenous substances (nasal sprays, common chemical molecules) listed below were evaluated and do not interfere with the test : mucin, biotin, blood, nasal sprays or drops (Phenylephrine, Oxymetazoline), throat sprays, nasal corticosteroids (Beclomethasone, Mometasone, Fluticasone, propionate de fluticasone) antiviral drugs (Oseltamivir), antibiotics (Amoxicillin), acetaminophen, mouthwash solutions.

## Technical assistance and customer service

In case of question or technical issue, you can get help and assistance from Innovative Diagnostics (E-mail: info@innovative-diagnostics.com) or its local representative.

## Bibliography


(1) Zhou, Peng & Yang, et al. (2020). Discovery of a novel coronavirus associated with the recent pneumonia outbreak in humans and its potential bat origin.
(2) Chan, Jasper Fuk-Woo et al. "Genomic characterization of the 2019 novel human-pathogenic coronavirus isolated from a patient with atypical pneumonia after visiting Wuhan." Emerging microbes & infections vol. 9,1 221-236. 28 Jan. 2020.
(3) Fehr, A. R., & Perlman, S. (2015). Coronaviruses: An Overview of Their Replication and Pathogenesis. Coronaviruses Methods in Molecular Biol
(4) Wang G, JinX. The progress of 2019 Novel Coronavirus (2019-nCoV) event in China. J Med Virol.
(5) Laboratory testing for coronavirus disease (COVID-19) in suspected human cases, Interim Guidance, WHO,19 March 2020
(6) Welch SR, et al. 2020. Analysis of inactivation of SARS-CoV-2 by specimen transport media, nucleic acid extraction reagents, detergents, and fixatives. J Clin Microbiol 58:e01713-20.
(7) Avis de la Société Française de Microbiologie (SFM) relatif à l'interprétation de la valeur de Ct (estimation de la charge virale) obtenue en cas de RT-PCR SARS-CoV-2 positive sur les prélèvements cliniques réalisés à des fins diagnostiques ou de dépistage Vn 1 _ 25/09/2020
(8) Détection des antigènes à l'aide de tests immunologiques rapides pour le diagnostic de l'infection à SARS-CoV-2, OMS, 11 septembre 2020


## History of revision

Any major changes to the manual will be clearly described on the front page in a ref frame. Bullets are arranged in the instruction for use to alert the user of the changes made.

| Type of modification | Modification | Change of version | Revision update and references |
|---|---|---|---|
| **Correction of anomalies** in the document (writing, typography, layout, providing details on implementation) | Minor | No | Yes |
| **Update:** Add/changes of the validation data | Minor | No | Yes |
| **Technical modification:** technical modification of the reagent, composition, modus operandi | Major | Yes | Yes |

| Version | Edition date | Reference | Type | Modification description |
|---|---|---|---|---|
| 1120 | 21/12/2020 | DOC_11342 | First version | N/A. |

## Meaning of the symbols EN 980/ISO 15223

| | |
|---|---|
| CE | Conforme to the CE 98/79 |
| | Storage temperature limits |
| | Keep dry |
| | Do not re-use |
| | Read the instructions |
| | Manufacturer |
| | Number of test per kit |

| | |
|---|---|
| LOT | Batch number |
| | Do not use if packaging is damaged |
| | Warning |
| | Expiration date |
| REF | Reference–product code |
| IVD | *In vitro* diagnostic device |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