NG-Test® IgG-IgM COVID-19

A rapid test for the qualitative detection of IgG and IgM antibodies to SARS-CoV-2 in human whole blood, serum or plasma specimens.
Kit cassette (with all material included).
For professional in vitro diagnostic use only.

Ref: ENO004COV / Rev: 201001 / EN

Intended use

The NG-Test® IgG-IgM COVID-19 is a lateral flow chromatographic immunoassay for the qualitative detection of IgG and IgM antibodies to SARS-CoV-2 virus in human whole blood, serum or plasma.

Summary and Explanation

Early January 2020, a novel coronavirus (named "SARS-CoV-2") was identified as the infectious agent causing an outbreak of viral pneumonia in Wuhan, China, where the first cases had their symptom onset in December 2019. The disease it causes has been named "coronavirus disease 2019" (abbreviated "COVID-19").
Coronaviruses are enveloped RNA viruses that are distributed broadly among humans, other mammals, and birds and that cause respiratory, enteric, hepatic, and neurologic diseases. Six coronavirus species are known to cause human disease. Four viruses — 229E, OC43, NL63, and HKU1 — are prevalent and typically cause common cold symptoms in immunocompetent individuals. The two other strains — severe acute respiratory syndrome coronavirus (SARS-COV) and Middle East respiratory syndrome coronavirus (MERS-COV) — are zoonotic in origin and have been linked to sometimes fatal illness.
Common signs of infection include respiratory symptoms, fever, cough, shortness of breath and breathing difficulties. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure and even death.
Standard recommendations to prevent infection spread include regular hand washing, covering mouth and nose when coughing and sneezing, thoroughly cooking meat and eggs. Avoid close contact with anyone showing symptoms of respiratory illness such as coughing and sneezing.

Test principle

The NG-Test® IgG-IgM COVID-19 is a qualitative immunochromatographic assay for the detection of IgG and IgM antibodies to SARS-CoV-2 in whole blood, plasma and serum. During testing, the specimen reacts with SARS-CoV-2 antigen-coated gold nanoparticles in the test cassette. The mixture then migrates on the membrane chromatographically by capillary action and reacts with the anti-human IgG and/or IgM in their respective test line region. If the specimen contains IgG and/or IgM antibodies to SARS-CoV-2, a colored line will appear in the IgG (marked "G") and/or the IgM (marked "M") test line regions.
To serve as control procedure, a colored line will appear in the control line region (marked "C"), indicating that the migration of the liquid is complete and that the test can be interpreted correctly.
The test contains anti-human IgM and anti-human IgG as the capture reagent, and SARS-CoV-2 antigen-coated gold nanoparticles as the detection reagent.

Reagents and material provided

Each kit contains:

- 20 test cassettes, each sealed in foil pouch with dessicant.
- 20 calibrated micropipettes (capillary tubes) capable delivering 10µl accurately.
- 20 lancets (for finger prick whole blood).
- 20 alcohol prep swabs
- 1 buffer solution in plastic dropper bottle.
- 1 package insert.

Material required but not provided

- Timer
- Disposable gloves
- Specimen collection containers
- Centriguge (for plasma only)

Precautions

- For *in vitro* diagnostic professional use only.
- Do not use test if pouch is torn or damaged.
- In case the pouch has been stored at 4-8°C, allow at least 10 minutes for the device to come to room temperature.
- The test device should remain in the sealed pouch until use.
- Perform the test quickly after opening the aluminum pouch.
- The test must be placed on a flat surface while waiting for the results. The test should never be oriented upwards.
- The test device should not be reused.
- Handle all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout all procedures and follow the standard procedures for proper disposal of specimens.
- Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are assayed.
- Please ensure that an appropriate amount of samples are used for testing. Too much or too little sample size may lead to deviation of results.
- The used test should be discarded according to local regulations.
- Humidity and temperature can adversely affect results.
- Do not eat, drink or smoke in the area where the specimens or kits are handled.

Storage and stability

Store as packaged in the sealed pouch between 4 and 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 and procedure

The NG-Test® IgG-IgM COVID-19 can be performed using whole blood (from venipuncture or finger prick), serum or plasma.

Whole Blood – Capillary Collection:

1. Wear protective gloves.
2. Clean the patient's finger with the alcohol swab. Allow to dry.
3. Bring the kit components to room temperature before testing.
4. In case the pouch has been stored at 4-8°C, allow at least 10 minutes for the device to come to room temperature.
5. Open the pouch and remove the device. Once opened, the device must be used immediately.
6. Massage the hand without touching the puncture site by rubbing down the hand towards the fingertip of the middle or ring finger.
7. Open the lancet **by unscrewing the grey cap (do not pull it)** and prick the lateral side of the patient's fingertip to obtain a drop of blood (10 µL). Using gentle pressure, massage the finger towards the fingertip to encourage a drop of blood to form.
8. **Hold the capillary micropipette horizontaly, do not press the bulb**, and touch with the tip of the micropipette the blood sample.The sampling is realized automatically by capillarity until reaching the black mark.
9. To expel the sample, place the tip of the micropipette on the **Sample pad** hole marked **"S/R"** and squeeze the micropipette bulb. **Transfer to the sample pad must be immediate in order to avoid sample clotting.**
10. Add **3 drops** of buffer solution (2x40µL) into the **Reagent** hole marked **"S/R" while holding the bottle vertically.**
11. Interpret the results at **15 minutes**. Do not read after 20 minutes.

Whole Blood – Venous Puncture

1. Collect 10 µL of whole blood sample via a calibrated micropipette. Do not agitate the sample. Insert a pipette just below the surface of the sample for collection. Samples should be used immediately after collection and do not use hemolyzed blood samples.
12. Dispense sample into the **sample pad** hole marked **"S/R"**. Add 3 drops of buffer solution (2x40µL) into the **Reagent** hole marked **"S/R" while holding the bottle vertically.**
2.
3. Interpret the results at **15 minutes**. Do not read after 20 minutes.

Plasma & Serum (from a prepared sample in a laboratory):

1. Collect a 10 µL serum or plasma sample using a calibrated micropipette. Only samples that are clean, clear and with good fluidity can be used for the assay (do not use samples that are viscous or have high lipid levels).
13. Dispense sample into the **sample pad** hole marked **"S/R"**. **Add 3 drops** of buffer solution (2x40µL) into the **Reagent** hole marked **"S/R" while holding the bottle vertically.**
2. Interpret the results at **15 minutes**. Do not read after 20 minutes.

NG Biotech, Z.A. Courbouton, Secteur 1, 35480 Guipry, France
Phone : +33(0)2 23 30 17 83 Fax : +33(0) 9 71 70 53 10 email:contact@ngbiotech.com
www.ngbiotech.com

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Interpretation of results

IgG POSITIVE: * **Two colored lines appear**. One colored line should always appear in the control line region (**C**) and another line should be in the IgG line region (**G**).

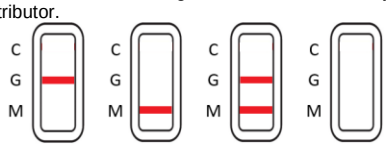
IgM POSITIVE: * **Two colored lines appear**. One colored line should always appear in the control line region (**C**) and another line should be in the IgM line region (**M**).

IgG and IgM POSITIVE: * **Three colored lines appear**. One colored line should always appear in the control line region (**C**) and two test lines should be in the IgG line region (**G**) and IgM line region (**M**).

***NOTE:** The intensity of the color in the test line regions may vary depending on the concentration of SARS-CoV-2 antibodies present in the specimen. Therefore, any shade of color in the test line region should be considered positive.

NEGATIVE: **One colored line appears in the control line region (C)**. No line appears in the IgG region (**G**) and IgM region (**M**)

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

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

Limitations

1. The NG-Test® IgG-IgM COVID-19 is for professional *in vitro* diagnostic use only. This test should be used for detection of IgG and IgM antibodies to SARS-CoV-2 in whole blood, plasma and serum. Neither the quantitative value nor the rate of increase in the concentration of IgG or IgM antibodies to SARS-CoV-2 can be determined by this qualitative test.
2. The NG-Test® IgG-IgM COVID-19 will only indicate the presence of IgG and IgM antibodies to SARS-CoV-2 in the specimen and should not be used as the sole criteria for the diagnosis of SARS-CoV-2 infections.
3. As with all diagnostic tests, all results must be considered with other clinical information available to the physician.
4. If the test result is negative and clinical symptoms persist, retesting after the window period or additional follow-up testing using other methods are suggested. A negative result at any time does not rule out the possibility of infection with SARS-CoV-2
5. The hematocrit level of the whole blood can affect the test results. Hematocrit level needs to be between 25% and 65% for accurate results.
6. The test will show negative results under the following conditions: The titer of the novel coronavirus antibodies in the sample is lower than the minimum detection limit of the test, or the novel coronavirus antibody has not appeared at the time of sample collection (Asymptomatic stage).

Performance characteristics

A total of 919 sera samples has been evaluated, among them 300 positive sera and 619 negative sera. The tests results were compared to the results of reference method RT-PCR or were obtained from samples collected before the pandemy (before September 2019).

Number of days after 1st symptoms apparition	0 to 9 days	10 to 14 days	> to 14 days
Sensitivity (IC 95%)	41.8% (34.4 – 49.5%) n=158	87.8% (78.7 – 93.3%) n=74	**95.6%** (88.2 – 98.2%) n=68
Specificity (IC 95%)	**98.2%** (96.8% - 99.1%) n=619		
PPV (IC 95%)	66.5% (42.3% - 84.2%)	80.7% (60.9% - 91.7%)	**82.0%** (63.0% - 92.3%)
NVP (IC 95%)	98.2% (98.0% - 98.4%)	96.7% (99.3% - 99.8%)	**99.4%** (99.6% - 100.0%)

NPV: Negative Predictive Value; PPV: Positive Predictive Value; TP: True Positive; FN: False Negative; TN: True Negative; FP: False Positive

Cross reactions: NG-Test® IgG-IgM COVID-19 were been tested on samples containing antibodies against : SARS-CoV, Influenza A&B, Adenovirus (ADV), Metapneumovirus (MPV), Para-Influenza, Rhinovirus (RV), Respiratory synthical virus (RSV).
The results didn't show any cross reaction specifically linked to those pathogens.

Interferences substances:
The following components were tested and no interferences were observed : Hemoglobin 500 mg/dL, Bilirubin 50 mg/dL, Triglyceride 1000 mg/dL, Rhumatoid factor 80 UI/mL, Antinuclear antibodies 1:240, Antimitochondrial antibodies 80 U/mL, Mouse IgG 250 µmol/L, Histamine hydrochloride 1%, Zanamivir 1 mg/mL,Tobramycin 2 mg/mL.

Bibliography:

1. *Cui J, Li F, Shi ZL. Origin and evolution of pathogenic coronaviruses. Nat Rev Microbiol 2019;17:181-192.PMID:30531947 DOI:10.1038/s41579-018-0118-9*
2. ***Dortet L, Emeraud C, Vauloup-Fellous C, et al. Rapid Determination of SARS-CoV-2 Antibodies Using a Bedside, Point-of-Care, Serological Test; Lancet 2020; 20 April 2020. Preprint DOI: http://dx.doi.org/10.2139/ssrn.3582814***
3. ***Dortet L, Ronat J, Vauloup-Fellous C, et al. Evaluating ten commercially-available SARS-CoV-2 rapid serological tests using the STARD (Standards for Reporting of Diagnostic Accuracy Studies) method. Emerging Microbes and infections ; 11 September 2020.. doi: https://doi.org/10.1101/2020.09.10.20192260***
4. *Su S, Wong G, Shi W, et al. Epidemiology, genetic recombination, and pathogenesis of coronaviruses. Trends Microbiol 2016;24:490-502. PMID:27012512 DOI:10.1016/j.tim.2016.03.003*
5. *Weiss SR, Leibowitz JL. Coronavirus pathogenesis. Adv Virus Res 2011;81:85-164. PMID:22094080 DOI:10.1016/B978-0-12-385885-6.00009-2*
6. *World Health Organization (WHO). WHO Statement Regarding Cluster of Pneumonia Cases in Wuhan, China. Beijing: WHO; 9 Jan 2020. [Accessed 26 Jan 2020]. https://www.who.int/china/news/detail/09-01-2020-who-statement-regarding-cluster-of-pneumonia-cases-in-wuhan-china*
7. *World Health Organization (WHO). Coronavirus. https://www.who.int/health-topics/coronavirus*

Symbols

Σ	Content sufficient for		Use By
IVD	*In Vitro* Diagnostic Medical Device		Do not reuse
LOT	Batch code	REF	Catalogue number
	Consult Instructions for Use-	+4°C +30°C	Temperature limitation
	Manufacturer	CE	

NG Biotech
Z.A. Courbouton, Secteur 1
35480 Guipry France

Tel: +33 (0) 2 23 30 17 83
Fax: +33 (0) 9 71 70 53 10
Email: contact@ngbiotech.com