Novel Coronavirus IgM/IgG Combo Rapid Test

INTENDED USE

The Novel Coronavirus IgG/IgM Combo Rapid Test is a lateral flow immunoassay for the simultaneous detection and differentiation of IgG and IgM anti–novel coronavirus nucleoprotein in human serum, plasma or whole blood. It is intended to be used by professionals as a screening test and provides a preliminary test result to aid in the diagnosis of infection with novel Coronavirus.

Any interpretation or use of this preliminary test result must also rely on other clinical findings as well as on the professional judgment of health care providers. Alternative test method(s) should be considered to confirm the test result obtained by this device.

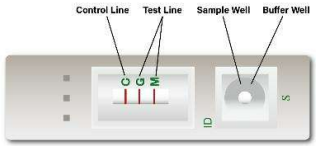
SUMMARY AND EXPLANATION OF THE TEST

Coronaviruses (CoV) are a large family of viruses that cause illness ranging from the common cold to severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). A novel coronavirus (nCoV) is a new strain that has not been previously identified in humans in 2019. The clinical manifestations are systemic symptoms such as fever and fatigue, accompanied by dry cough and dyspnea, which can rapidly develop into severe pneumonia, respiratory failure, and acute breathing. Distress syndrome, septic shock, multiple organ failure, severe acid-base metabolism disorders, etc. are even life-threatening.

Serological detection is a common method for the diagnosis of infection with novel coronavirus. IgM anti-novel coronavirus starts to appear 3 days after initial exposure and remains in circulation for about 30-60 days. IgG anti-novel coronavirus levels rise around 7 days, peak at 2-3 weeks and persist for the duration of life4-6.

The Novel Coronavirus IgG/IgM Combo Rapid Test detects IgG and IgM anti- novel Coronavirus nucleoprotein in human serum, plasma or whole blood. It can be performed within 15-25 minutes by minimally skilled personnel without the use of laboratory equipment.

TEST PRINCIPLE



The Novel Coronavirus IgG/IgM Combo Rapic Test is a lateral flow chromatographic immunoassay. The test strip in the cassette consists of: 1) a burgundy colored conjugate pad containing novel coronavirus recom-binant nucleoprotein antigens conju-gated with colloida gold (novel coronavirus Ag conjugates) and a control antibody conjugated with colloidal gold, 2 a nitrocellulose membrane strip containing two test lines (G and M lines) and a control line (C line). The G line is pre-coated with antibodies for the detection of IgG anti-novel coronavirus, the M line is pre-coated with antibodies for the detection of IgM anti-novel coronavirus, and the C line is pre-coated with a control line antibody.

When an adequate volume of test specimen is dispensed into the sample well of the test cassette, the specimen migrates by capillary action along the cassette. IgG anti-novel coronavirus, if present in the specimen, will bind to the novel coronavirus Ag conjugates. The immunocomplex is then captured by the pre-coated anti-human IgG, forming a burgundy colored G line, indicating an IgG anti- novel coronavirus positive test result and suggesting a secondary or past infection with novel coronavirus.

IgM anti- novel coronavirus, if present in the specimen, will bind to the novel coronavirus Ag conjugates. The immunocomplex is then captured by the pre-coated anti-human IgM, forming a burgundy colored M line, indicating an IgM anti-novel coronavirus positive test result and suggesting either an acute primary or secondary novel coronavirus infection. An IgM and IgG positive result indicates a late primary or early secondary acute infection.

Absence of any G, M or T lines suggests a negative result. Each test contains an internal control (C line) which should exhibit a burgundy colored line of the control antibodies regardless of color development on any of the test lines. If the C line does not develop, the test result is invalid and the specimen must be retested with another device.

REAGENTS AND MATERIALS PROVIDED

1. Individually sealed foil pouches containing:
   a. One cassette device
   b. One desiccant
2. 10μL capillary tubes
3. Sample diluent (5 mL/bottle)
4. One package insert (instruction for use)

MATERIALS REQUIRED BUT NOT PROVIDED

1. Clock or timer
2. Lancet

WARNINGS AND PRECAUTIONS

For in Vitro Diagnostic Use

1. This package insert must be read completely before performing the test. Failure to follow the insert gives inaccurate test results.
2. Do not open the sealed pouch, unless ready to conduct the assay.
3. 3. Do not use expired devices.
4. Bring all reagents to room temperature (15-30°C) before use.
5. Do not use the components of any other type of test kit as a substitute for the components in this kit.
6. Do not use hemolyzed blood specimen for testing.
7. Wear protective clothing and disposable gloves while handling the kit reagents and clinical specimens. Wash hands thoroughly after performing the test.
8. Users of this test should follow the US CDC Universal Precautions for prevention of transmission of HIV, HBV and other blood-borne pathogens.
9. Do not smoke, drink, or eat in areas where specimens or kit reagents are being handled.
10. Dispose of all specimens and materials used to perform the test as bio-hazardous waste.
11. Handle the Negative and Positive Controls in the same manner as patient specimens.
12. The testing results should be read 20-25 minutes after a specimen is applied to the sample well of the device. Any results interpreted outside of the 20-25 minute window should be considered invalid and must be repeated.
13. Do not perform the test in a room with strong air flow, i.e. an electric fan or strong air conditioning.

REAGENT PREPARATION AND STORAGE INSTRUCTIONS

All reagents are ready to use as supplied. Store unused test devices unopened at 2-30°C. If stored at 2-8°C, ensure that the test device is brought to room temperature before opening. The test device is stable until the expiration date printed on the sealed pouch. Do not freeze the kit or expose the kit to temperatures above 30°C.

SPECIMEN COLLECTION AND HANDLING

Consider any materials of human origin as infectious and handle them using standard bio-safety procedures.

Plasma

1. Collect blood specimen into a lavender, blue or green top collection tube (containing EDTA, citrate or heparin, respectively in Vacutainer®) by venipuncture.
2. Separate the plasma by centrifugation.
3. Carefully withdraw the plasma into new pre-labeled tube.

Serum

1. Collect blood specimen into a red top collection tube (containing no anticoagulants in Vacutainer®) by venipuncture.
2. Allow the blood to clot.
3. Separate the serum by centrifugation.
4. Carefully withdraw the serum into a new pre-labeled tube.

Test specimens as soon as possible after collecting. If not tested immediately, store specimens at 2-8°C for up to 5 days. For longer storage, specimens should be kept frozen at -20°C.

Avoid multiple freeze-thaw cycles. Prior to testing, bring frozen specimens to room temperature slowly and mix gently. Specimens containing visible particulate matter should be clarified by centrifugation before testing. Do not use samples demonstrating gross lipemia, gross hemolysis or turbidity in order to avoid interference on result interpretation.

Whole Blood

Drops of whole blood can be obtained by either finger tip puncture or venipuncture. Collect blood specimen into a lavender, blue or green top collection tube (containing EDTA, citrate or heparin, respectively, in Vacutainer®). Do not use any hemolyzed blood for testing.

Whole blood specimens should be stored at 2-8°C if not tested immediately. The specimens must be tested within 24 hours of collection.

ASSAY PROCEDURE

Step 1: Bring the specimen and test components to room temperature, if refrigerated or frozen. Once the specimen is thawed, mix well prior to performing the assay.

Step 2: When ready to test, open the pouch at the notch and remove device. Place the test device on a clean, flat surface.

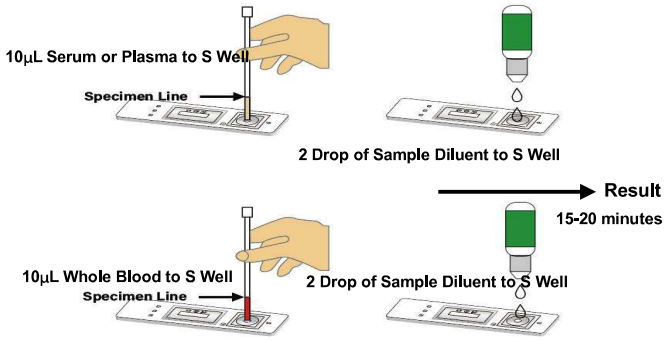
Step 3: Be sure to label the device with specimen's ID number.

Step 4: Fill the capillary tube with the serum, plasma or whole blood specimen not exceeding the specimen line as shown in the image below. The volume of the specimen is around 10μL. ***For better precision, transfer the specimen by a pipette capable of delivering 10μL of volume.***

Holding the capillary tube vertically, dispense the entire specimen (10μL) into the center of the sample well (S well) making sure that there are no air bubbles.

Immediately add 2 drops (about 60-80μL) of Sample Diluent into the buffer well (S well) with the bottle positioned vertically.

Step 5: Set up a timer. Step 6: Read the result at 20-25 minutes. Positive results may be visible in as short as 1 minute. Negative results must be confirmed at the end of the 25 minutes



Novel Coronavirus IgM/IgG Combo Rapid Test-Cassette(Serum/Plasma/Whole blood)

only. ***Any results interpreted outside of the 20-25 minute window should be considered invalid and must be repeated. Discard used devices after interpreting the result following local laws governing the disposal of devices.***

QUALITY CONTROL

1. Internal Control: This test contains a built-in control feature, the C line. The C line develops after adding specimen and sample diluent. If there is no visible C line, review the whole procedure and repeat the test using a new device.
2. External Control: Good Laboratory Practice recommends using the external controls, positive and negative, to assure the proper performance of the assay, particularly under the following circumstances:
   a. A new operator uses the kit, prior to performing testing of specimens.
   b. A new lot of test kit is used.
   c. A new shipment of kits is used.
   d. The temperature during storage of the kit falls outside of 2-30℃.
   e. The temperature of the test area falls outside of 15-30℃.
   f. To verify a higher than expected frequency of positive or negative results.
   g. To investigate the cause of repeated invalid results.

INTERPRETATION OF ASSAY RESULT

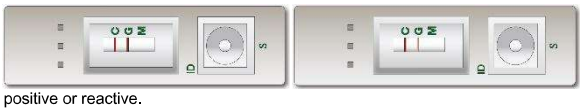
1. **NEGATIVE RESULT**: If only the C line is present, the absence of any burgundy color in both test lines (G and M) indicates that no anti-novel coronavirus antibodies are

detected. The result is negative or non-reactive.

2. **POSITIVE RESULT:**

2.1 In addition to the presence of C line, if only the M line develops, the test result indicates that IgM anti- novel coronavirus is detected. The result is IgG anti- novel coronavirus positive or reactive.

2.2 In addition to the presence of C line, if only the M line develops, the test result indicates that IgG anti- novel coronavirus is detected. The result is IgG anti- novel coronavirus

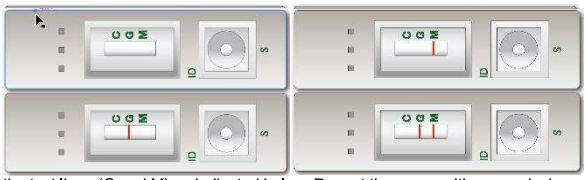


positive or reactive.

2.3 In addition to the presence of C line, if both G and M lines develop, the test result indicates that IgG and IgM anti-novel coronavirus are detected. The result is IgG and IgM anti- novel coronavirus positive or reactive.

Samples with positive results should be confirmed with alternative testing method(s) and clinical findings before a diagnosis is made.

3. **INVALID:** If no C line develops, the assay is invalid regardless of any burgundy color in



the test lines (G and M) as indicated below. Repeat the assay with a new device.

PERFORMANCE CHARACTERISTICS

1. **Clinical Performance for IgM Test**

A total of 300 specimens were collected from susceptible subjects and tested with the novel coronavirus IgG/IgM Combo Rapid Test and by a commercial PCR and CT. Comparison for all subjects is shown in the following table:

	Novel Coronavirus IgG/IgM Combo Rapid Test		
IgM EIA Test	Positive	Negative	Total
Positive	33	3	36
Negative	3	261	264
Total	36	264	300

Relative Sensitivity:91.6%, Relative Specificity:98.9%, Overall Agreement:96.7%

2. **Clinical Performance for IgG Test**

A total of 268 specimens were collected from susceptible subjects and tested with the novel coronavirus IgG/IgM Combo Rapid Test and by a commercial EIA. Comparison for all subjects is shown in the following table:

	Novel Coronavirus IgG/IgM Combo Rapid Test		
IgG EIA Test	Positive	Negative	Total
Positive	29	2	31
Negative	3	234	237
Total	32	236	268

Relative Sensitivity:93.%%, Relative Specificity:98.7%, Overall Agreement:98.1%

3. **Cross Reactivity**

No false positive IgG and IgM anti- novel coronavirus test results were observed on 1-13 specimens from the following disease states or specific conditions, respectively:

HAV	HBV	HCV	HEV	HIV	*H.pylori*
CMV	hCG	ANA	HAMA	Rubella	*T.gondii*
Chagas	Chikungunya	*Typhi*	*T.pallidum*	RF(up to 8,400 IU/mL)	

4. **Interference**

Common substances (such as pain and fever medication and blood components) may affect the performance of the novel coronavirus IgG/IgM Combo Rapid Test. This was studied by spiking these substances into IgG anti-novel coronavirus negative and positive, and IgM anti-novel coronavirus negative and positive specimens, respectively. The results demonstrate that at the concentrations tested, the substances studied do not affect the performance of the Novel Coronavirus IgG/IgM Combo Rapid Test.

List of potentially interfering substances and concentrations tested:

1.Albumin	60g/L	9.Caffeine	20mg/dL
2.Acetominophen	20mg/dL	10.EDTA	3.4μmol/L
3.Atropine	20mg/dL	11.Hemoglobin	2g/L
4.Aspirin	20mg/dL	12.Heparin	3,000U/L
5.Ascorbic acid	20mg/dL	13.IgG	1,000mg/dL
6.Bilirubin	20mg/dL	14.Glucose	55mmol/L
7.Creatinine	442μmol/L	15.Salicylic acid	4.34mmol/L
8.Sodium	3.8%		

LIMITATIONS OF TEST

1. The Assay Procedure and the Test Result Interpretation must be followed closely when testing the presence of antibodies to novel coronavirus in serum, plasma and whole blood from individual subjects. Failure to follow the procedure may lead to inaccurate results.
2. The Novel Coronavirus IgG/IgM Combo Rapid Test is limited to the qualitative detection of IgG and IgM anti–novel coronavirus in human serum, plasma and whole blood. The intensity of the test band does not have linear correlation with the antibody titer in the specimen.
3. Information about the novel coronavirus serotype(s) present in a specimen cannot be provided from this test.
4. The Novel Coronavirus IgG/IgM Combo Rapid Test cannot differentiate primary or secondary infection.
5. Serological cross-reactivity with other flaviviruses is common (e.g., Japanese encephalitis, West Nile virus, yellow fever, etc.). Therefore, it is possible that patients who were exposed to these viruses may show some level of reactivity with this test.
6. A negative or non-reactive result for an individual subject indicates absence of detectable novel coronavirus antibodies. However, a negative or non-reactive test result does not preclude the possibility of exposure to or infection with novel coronavirus.
7. A negative or non-reactive result can occur if the quantity of antibodies to novel coronavirus present in the specimen is below the limits of detection, or if the antibodies that are detected are not present during the stage of disease in which a sample is collected.
8. Some specimens containing unusually high titer of heterophile antibodies or rheumatoid factor may affect expected results.
9. Infection may progress rapidly. If the symptoms persist, while the result from Novel Coronavirus IgG/IgM Combo Rapid Test is negative or non-reactive, it is recommended to test with an alternative test method.
10. The results obtained with this test should be interpreted in conjunction with other diagnostic procedures and clinical findings.

Index of CE Symbols

Consult instructions for use	For *in vitro* diagnostic use only	Use by
Catalog #	Lot Number	Tests per kit
Store between 2-30°C	Authorized Representative	Do not reuse
Manufacturer	Date of manufacture	

Manufacturer: Shenzhen Highcreation Technology Co.Ltd

Europe Sales Office: IEM S.r.L.

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