COVID-19 IgG/IgM Rapid Test Cassette (WB/S/P)

English

For professional healthcare providers and in vitro diagnostic use only.

[INTENDED USE]

The COVID-19 IgG/IgM Rapid Test Cassette (Device) is a lateral flow immunoassay designed for the qualitative detection of IgG and IgM antibodies to the SARS-CoV-2 virus in whole blood, serum or plasma specimens. The Device provides an aid for identifying persons who may have been exposed to, and developed an immune response to the SARS-CoV-2 virus.

[SUMMARY]

SARS-CoV-2 is a new strain of coronavirus causing the disease COVID-19 in humans. The symptoms range from a mild respiratory infection to more severe pneumonia with acute respiratory distress.

The SARS-CoVCOV-2 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or speaks. According to WHO, incubation time is up to 14 days, with an average of five days, before a person becomes symptomatic. Symptoms of COVID-19 are fever, tiredness, dry cough mild respiratory infection to more severe pneumonia with acute respiratory distress. Deaths have mainly occurred among patients who were elderly and/or had prior underlying chronic illnesses. Furthermore, it has been reported that persons have been infected by asymptomatic individuals.

When the SARS-CoV-2 virus infects an organism, RNA, the genetic material of the virus, is the first marker that can be detected. The viral load profile of SARS-CoV-2 is similar to that of influenza, which peaks at around the time of symptom onset, and then begin to decline thereafter. During development of COVID-19, the immune system will commence producing antibodies, where the IgM variant is one of the early produced antibodies after infection, indicating acute/past-acute phase of the infection. The SARS-CoV-2 IgG antibody is developed later. Positive results for both IgG and IgM antibodies indicate a time window at the end of, or passed the acute phase. Positive results for the IgG antibody alone, indicates the convalescent phase of the infection or a history of past infection. Typically, the IgM antibody is only detectable after the onset of symptoms and hence lags behind nucleic acid detection, which makes the sensitivity lower compared to nucleic acid detection. Therefor the Device should not be used for diagnosis of acute COVID-19.

Due to the later and longer lasting IgG response, the Device may be useful for identifying individuals that have been infected with SARS-CoV-2 and recovering from the COVID-19 and hence developed a degree of immunology response to SARS-COV-2. Whether all or most recovered patients have developed an immunology response and for how long that response is lasting, is currently being researched.

[PRINCIPLE]

The COVID-19 IgG/IgM Rapid Test Cassette consists of: 1) a burgundy colored conjugate pad containing SARS-CoV-2 recombinant antigens conjugated with colloid gold (SARS-CoV-2 conjugates), 2) a nitrocellulose membrane strip containing two test lines (IgG and IgM lines) and a control line (C line). The IgM line is pre-coated with the Mouse anti-Human IgM antibody, IgG line is coated with Mouse anti-Human IgG antibody. When an adequate volume of test specimen is dispensed into the sample well of the test cassette, the specimen migrates by capillary action across the cassette. IgM antibodies to SARS-CoV-2, if present in the specimen, will bind to the SARS-CoV-2 conjugates. The immunocomplex is then captured by the reagent pre-coated on the IgM band, forming a burgundy colored IgM line, indicating a anti-SARS-CoV-2 IgM positive test result. IgG antibodies to SARS-CoV-2 if present in the specimen will bind to the SARS-CoV-2 conjugates. The immunocomplex is then captured by the reagent coated on the IgG line, forming a burgundy colored IgG line, indicating a anti-SARS-CoV-2 IgG positive test result. Absence of any T lines (IgG and IgM) suggests a negative result. To serve as a procedural control, a colored line will always appear at the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred.

[WARNINGS AND PRECAUTIONS]

- For in vitro diagnostic use only.
- For use by professional healthcare providers only.
- Results should not be used for diagnosis of acute COVID-19.
- Do not use this Device as the sole basis to diagnose or exclude SARS-CoV-2 infection or to inform infection status of COVID-19 but instead as information about whether a person may have been exposed.
- Negative results do not rule out SARS-COV-2 infection.
- Positive results may be due to past or present infection with non-SARS-CoV-2 coronavirus strains.
- Do not use after the expiration date.
- Please read all the information in this leaflet before performing the test.
- The test cassette should remain in the sealed pouch until use.
- All specimens should be considered potentially hazardous and handled in the same manner as an infectious agent.
- The used test cassette should be discarded according to federal, state and local regulations.

[COMPOSITION]

The test contains a membrane strip coated with Mouse anti-Human IgM antibody and Mouse anti-Human IgG antibody on the test line, and a dye pad which contains colloidal gold coupled with SARS-CoV-2 virus recombinant antigen.
The quantity of tests was printed on the labeling.

Materials Provided

•Test cassette	• Lancet	•Alcohol Pad
•Buffer	•Specimen collection pipette	•Package insert

Materials Required But Not Provided

• Timer

[STORAGE AND STABILITY]

- Store as packaged in the sealed pouch at the temperature (4-30℃ or 40-86℉). The kit is stable within the expiration date printed on the labeling.
- Once open the pouch, the test should be used within one hour. Prolonged exposure to hot and humid environment will cause product deterioration.
- The LOT and the expiration date were printed on the labeling.

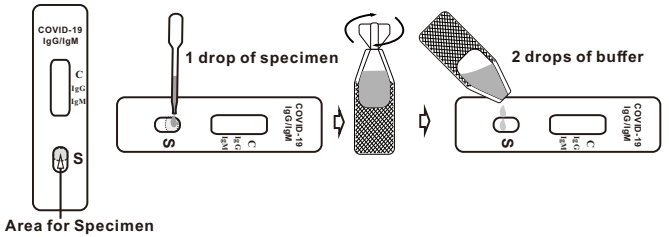
[SPECIMEN]

- The test can be used to test whole blood (venipuncture blood and capillary finger prick blood) /serum /plasma (EDTA, heparin, citrate) specimens.
- To collect whole blood, serum or plasma specimens following regular clinical laboratory procedures.
- Separate serum or plasma from blood as soon as possible to avoid hemolysis. Use only clear non-hemolyzed specimens.
- Store specimens at 2-8℃ (36-46℉) if not tested immediately. Store serum/ plasma/ anticoagulated venipuncture whole blood specimens at 2-8℃ for up to 3 days. The serum/plasma specimens should be frozen at -20℃ (-4℉) for longer storage. Do not freeze whole blood specimens.
- Fresh fingerstick blood specimens should be collected and tested immediately.
- 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.

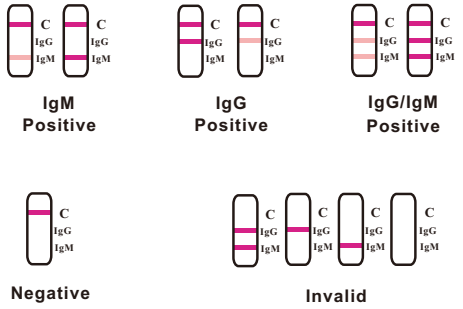
[TEST PROCEDURE]

Allow the test device and specimens to equilibrate to temperature (15-30℃ or 59-86℉) prior to testing.

1. Remove the test cassette from the sealed pouch.
2. Add 1 drop of specimen (approximately 10μl) from the pipette into the specimen well (S) making sure that there are no air bubbles. For better precision, transfer specimen by a pipette capable of delivering 10μl of specimen. See the illustration below.
3. Add 2 drops (approximately 70μl) of buffer immediately into the specimen well (S).
4. Start the timer.
5. Wait for colored lines to appear. Interpret the test results at 15 minutes. Do not read results after 20 minutes.



[INTERPRETATION OF RESULTS]



Presumptive Positive: Control line and at least one test line appear on the membrane, irregardless of the intensity of the test line. The appearance of IgG test line indicates the presence of IgG antibodies to SARS-CoV-2 virus. The appearance of IgM test line indicates the presence of IgM antibodies to SARS-CoV-2 virus. Appearnace of both the IgG and IgM lines, indicates the presence of both IgG and IgM antibodies to SARS-CoV-2 virus.

Negative: One colored line appears in the control region (C). No apparent colored line appears in the test line region.

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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 cassette. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

Negative results do not rule out SARS-CoV-2 infection, particularly for patients who have been in contact with known infected persons or in areas with high prevalence of active infection. Follow-up testing with a molecular diagnostic test is necessary to rule out infection in these individuals.

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

[QUALITY CONTROL]

A procedural control is included in the test. A colored line appearing in the control region (C) is considered an internal procedural control. It confirms sufficient specimen volume, adequate membrane wicking and correct procedural technique.

Control standards are not supplied with this kit. However, it is recommended that positive and negative controls be tested as good laboratory practice to confirm the test procedure and to verify proper test performance.

[LIMITATIONS]

- The Device is limited to provide a qualitative detection. The intensity of the test line does not necessarily correlate to the concentration of the antibody in the blood.
- A physician must interpret the results in conjunction with the patient's history, physical findings, and other diagnostic procedures.
- If symptoms persist and the result from the Device is negative, it is recommended to re-sample the patient a few days later or test with an alternative test methodology.
- A negative result can occur if the quantity of antibodies for the SARS-CoV-2 virus present in the specimen is below the detection threshold of the assay, or the virus has undergone amino acid mutation(s) in the epitope recognized by the antibody utilized in the test.
- Proper sample collection is critical, and failure to follow the procedure may give inaccurate results. Improper sample collection, improper sample storage or repeated freezing and thawing of samples can lead to inaccurate results.

[PERFORMANCE CHARACTERISTICS]

Clinical Performance

To estimate the positive percent agreement (PPA), between the COVID-19 IgG/IgM Rapid Test Cassette and the PCR comparator, 123 serum and plasma specimens were collected at different times from 75 subjects who tested positive for SARS-CoV-2 by a RT-PCR method and who also presented with COVID-19 symptoms. Each specimen was tested using the Device. The PPA and the 95% confidence interval (CI) were calculated.

To estimate the negative percent agreement (NPA), 142 serum and plasma specimens were collected from subjects who tested negative for SARS-CoV-2 by RT-PCR method. Each specimen was tested using the Device. The NPA and the 95% confidence interval (CI) were calculated.

The results of both groups are summarized in the following 4 tables.

Table 1: Overall Clinical Study Results

			RT-PCR Comparator		Total
			Positive	Negative	
CLUNGENE Device	Positive	IgM+/IgG+	81	0	81
		IgM+/IgG-	1	1	2
		IgM-/IgG+	30	4	34
	Negative	IgM-/IgG-	11	137	148
Total			123	142	265

Positive Percent Agreement (PPA)= (IgM positive or IgG positive)/ (PT-PCR positive)

PPA: 91.06% (112/123) (95%CI: 84.56% - 95.45%)

Negative Percent Agreement (NPA) = (IgM negative and IgG negative)/ (RT-PCR negative)

NPA: 96.48% (137/142) (95%CI: 91.97% - 98.85%)

Table 2: PPA of IgM According to Days Post Onset of Symptoms

Days post onset of symptoms	# RT-PCR Total positive	CLUNGENE Device		
		# of positive	PPA	95%CI
1-7	19	6	31.58%	12.58%-56.55%
8-14	25	18	72.00%	50.61%-87.93%
15-21	24	17	70.83%	48.91%-87.39%
22-28	12	11	91.67%	61.52%-99.79%
29-35	21	15	71.43%	47.83%-88.72%
36-42	22	15	68.18%	45.13%-86.14%
Total	123	82	66.67%	57.60%-74.91%

Table 3: PPA of IgG According to Days Post Onset of Symptoms

Days post onset of symptoms	# RT-PCR Total positive	CLUNGENE Device		
		# of positive	PPA	95%CI
1-7	19	9	47.37%	24.45%-71.14%
8-14	25	23	92.00%	73.97%-99.02%
15-21	24	24	100.00%	85.75%-100.00%
22-28	12	12	100.00%	73.53%-100.00%
29-35	21	21	100.00%	83.89%-100.00%
36-42	22	22	100.00%	84.56%-100.00%
Total	123	111	90.24%	83.58%-94.86%

Table 4: PPA of IgM+IgG According to Days Post Onset of Symptoms

Days post onset of symptoms	# RT-PCR Total positive	CLUNGENE Device		
		# of positive	PPA	95%CI
1-7	19	9	47.37%	24.45%-71.14%
8-14	25	24	96.00%	79.65%-99.90%
15-21	24	24	100.00%	85.75%-100.00%
22-28	12	12	100.00%	73.53%-100.00%
29-35	21	21	100.00%	83.89%-100.00%
36-42	22	22	100.00%	84.56%-100.00%
Total	123	112	91.06%	84.56%-95.45%

Cross-Reactivity and Interference

1. Other common causative agents of infectious diseases were evaluated for cross reactivity with the test. Some positive specimens of other common infectious diseases were spiked into the SARS-CoV-2 positive and negative specimens and tested separately. No cross reactivity was observed with specimens from patients infected with HIV, HAV, HBsAg, HCV, TP, HTLV, CMV, FLUA, FLUB, RSV, MP, CP, HPIVs.
2. Potentially cross-reactive endogenous substances including common serum components, such as lipids, hemoglobin, bilirubin, were spiked at high concentrations into the Novel coronavirus positive and negative specimens and tested, separately. No cross reactivity or interference was observed to the device.

Analytes	Conc.	Specimens	
		Positive	Negative
Albumin	20mg/ml	+	-
Bilirubin	20μg/ml	+	-
Hemoglobin	15mg/ml	+	-
Glucose	20mg/ml	+	-
Uric Acid	200μg/ml	+	-
Lipids	20mg/ml	+	-

3. Some other common biological analytes were spiked into the Novel coronavirus positive and negative specimens and tested separately. No significant interference was observed at the levels listed in the table below.

Analytes	Conc. (μg/ml)	Specimens	
		Positive	Negative
Acetaminophen	200	+	-
Acetoacetic Acid	200	+	-
Acetylsalicylic Acid	200	+	-
Benzoylecgonine	100	+	-
Caffeine	200	+	-
EDTA	800	+	-
Ethanol	1.0%	+	-
Gentisic Acid	200	+	-
β - Hydroxybutyrate	20,000	+	-
Methanol	10.0%	+	-
Phenothiazine	200	+	-
Phenylpropanolamine	200	+	-
Salicylic Acid	200	+	-

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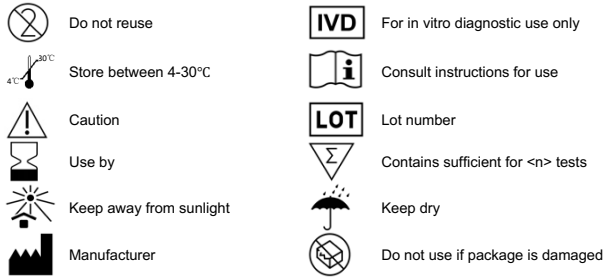

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Version No.: 3.0
Effective Date: May 16, 2020