Diazyme Laboratories, Inc.
12889 Gregg Court
Poway, CA 92064, USA
Tel: 858-455-4768 / Fax: 858-455-3701
Email: support@diazyme.com
Website: www.diazyme.com

DIAZYME DZ-LITE SARS-CoV-2 IgG CLIA KIT

For Emergency Use Authorization Only
For Prescription Use Only
For *in vitro* Diagnostic Use Only
The results of this semi-quantitative test should not be interpreted as an indication or degree of immunity or protection from infection.

CONFIGURATION

The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit is provided in the following kit configuration (100 tests) and is used in conjunction with the fully automated DZ-lite 3000 Plus Chemiluminescence Analyzers:

Component	Catalog # 130219015M
Magnetic Microbeads	2.5 mL
ABEI Label	23.5 mL
Diluent	23.5 mL
Buffer	23.5 mL
Negative Control	1.0 mL
Positive Control	1.0 mL
Calibrator Low	1.0 mL
Calibrator High	1.0 mL

INTENDED USE

The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit is a chemiluminescent immunoassay intended for the qualitative and semi-quantitative detection of IgG antibodies to SARS-CoV-2 in human serum and plasma (potassium EDTA, disodium EDTA and lithium heparin). The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit is intended for use as an aid in identifying individuals with an adaptive immune response to SARS-CoV-2, indicating recent or prior infection. At this time, it is unknown for how long antibodies persist following infection and if the presence of antibodies confers protective immunity. The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit should not be used to diagnose or exclude acute SARS-CoV-2 infection. Testing is limited to laboratories certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C 263a, that meet requirements to perform moderate or high complexity tests.

Results are for the detection of SARS CoV-2 antibodies. IgG antibodies to SARS-CoV-2 are generally detectable in blood several days after initial infection, although the duration of time antibodies are present post-infection is not well characterized. Individuals may have detectable virus present for several weeks following seroconversion.
Laboratories within the United States and its territories are required to report all results to the appropriate public health authorities.
The sensitivity of Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit early after infection is unknown. Negative results do not preclude acute SARS-CoV-2 infection. If acute infection is suspected, direct testing for SARS-CoV-2 is necessary.
False positive results for Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit may occur due to cross-reactivity from pre-existing antibodies or other possible causes.
The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit is only for use under the Food and Drug Administration's Emergency Use Authorization.

CLINICAL SIGNIFICANCE

The 2019-nCoV virus was first named by the World Health Organization on January 7, 2020. On February 11, 2020, the virus was renamed Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses (ICTV). On the same day, the World Health Organization (WHO) announced that SARS-CoV-2-associated respiratory disease will be officially named COVID-19.
The novel coronavirus (SARS-CoV-2) that is causing an acute respiratory syndrome in humans belongs to the family coronaviridae and the genus Betacoronavirus[1]. The virus has an envelope and its particles are round or oval, often polymorphic, with a diameter between 60 and 140 nm. The genetic characteristics of the virus are significantly different from those of SARSr-CoV and MERSr-CoV. Current research shows that SARS-CoV-2 has more than 85% homology with the bat SARS-like coronavirus (bat-SL-CoVZC45)[2].
SARS-CoV-2 is mainly transmitted through respiratory droplets and can also be transmitted through contact. The sources of infection seen mainly consist of patients with pneumonia infected by the novel coronavirus[2].
Research has shown that IgM and IgG antiviral antibodies can be detected in the serum samples of infected patients[3]. After infection with SARS-CoV-2, the virus antigen stimulates the immune system to produce antibodies that can be detected in the blood. Among these antibodies, SARS-CoV-2 IgM antibodies generally appear early and are mostly positive 8 to 14 days after onset of symptoms depending on the IgM assay used[2]. The SARS-CoV-2 IgM titers then decrease while the SARS-CoV-2 IgG antibody titers start to rise rapidly.

ASSAY PRINCIPLE

The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit is an indirect chemiluminescence immunoassay. The sample, buffer and magnetic microbeads coated with a SARS-CoV-2 recombinant antigen are mixed thoroughly and incubated, forming immune-complexes. After precipitation in a magnetic field and decanting of the supernatant, wash cycles are performed. Subsequently, ABEI-labeled anti-human IgG antibody is added and incubated to form additional complexes. After precipitation in a magnetic field and decanting of the supernatant, wash cycles are performed. Subsequently, the Starter 1+2 are added to initiate a chemiluminescent reaction. The light signal is measured by a photomultiplier in relative light units (RLUs), which is proportional to the relative concentration of SARS-CoV-2 IgG presented in the sample.

KIT CONTENTS

- Magnetic Microbeads: Magnetic microbeads coated with SARS-CoV-2 recombinant antigen, PBS buffer containing BSA, NaN_3 (<0.1%).
- ABEI Label: Anti-human IgG antibody labeled with ABEI, Tris-HCl buffer containing Mouse IgG, Goat IgG, and BSA, NaN_3 (<0.1%).
- Buffer: PBS buffer containing BSA, NaN_3 (<0.1%).
- Negative Control: PBS buffer containing BSA, NaN_3 (<0.1%).
- Positive Control: SARS-CoV-2 IgG, PBS buffer containing BSA, NaN_3 (<0.1%).
- Calibrator Low: SARS-CoV-2 IgG, PBS buffer containing BSA, NaN_3 (<0.1%).
- Calibrator High: SARS-CoV-2 IgG, PBS buffer containing BSA, NaN_3 (<0.1%).
- All components of the kit are provided ready-to-use.

MATERIALS REQUIRED BUT NOT PROVIDED

DZ-lite 3000 Plus Chemiluminescence Analyzer

Reaction Modules	REF: 630003
Starter 1 + 2	REF: 130299004M
Wash Concentrate	REF: 130299005M
Light Check	REF: 130299006M

STORAGE AND STABILITY

- Store at 2-8°C. Do not freeze.
- Keep upright for storage to facilitate later proper resuspension of magnetic microbeads.
- Keep away from sunlight.
- The stability study is still on-going, the following data is obtained by referring to similar products:

Stability of the reagent	
Unopened at 2-8°C	until the stated expiration date
Opened at 2-8°C	6 weeks
Onboard	4 weeks

- To ensure the best kit performance, it is recommended to place opened kits in the refrigerator after the end of the intraday test work.

SPECIMEN COLLECTION AND HANDLING

- Human serum or plasma may be used with the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit. For serum samples, standard serum tubes, tubes containing clot activator, or tubes containing clot activator and separating gel could be applied for the assay. For plasma samples, the anticoagulants including K_2-EDTA, K_3-EDTA, Na_2-EDTA, Li-Heparin were tested and found acceptable.
- Please pay attention to the risk of infection during sample collection and preparation. According to the "Diagnosis and treatment program of novel coronavirus pneumonia" issued in China, heat inactivation of the samples should be performed at 56°C for 30 minutes before testing[2]. Please refer to the CDC Interim Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with Coronavirus Disease 2019 (COVID-19): https://www.cdc.gov/coronavirus/2019-nCoV/lab/lab-biosafety-guidelines.html as well as your local, state and federal government's mandated requirements.
- Ensure that complete clot formation in specimens has taken place prior to centrifugation. Some specimens, especially those from patients receiving anticoagulant or thrombolytic therapy, may exhibit increased clotting time.
- If the specimen is centrifuged before complete clotting, the presence of fibrin may cause erroneous results. Samples must be free of fibrin and other particulate substances.
- Do not use grossly hemolyzed specimens as well as specimens containing particulate matter or exhibiting obvious microbial contamination. Inspect all specimens for bubbles and remove bubbles before analysis for optimal results.

- All samples (patient specimens and controls) should be tested within 3 hours of placing on board the DZ-Lite System. Refer to the instrument manual for more detailed discussion on onboard sample storage constraints.
- Specimens removed from the separator gel, cells or clot may be stored 3 days at 2-8°C. If longer storage is required, freeze the specimens at -20°C or colder[4].
- Avoid repeated freezing and thawing. Frozen specimens must be mixed thoroughly after thawing by low speed vortexing or by gently inverting.
- For optimal results, specimens should be free of fibrin, red blood cells, or other particulate matter. Such specimens may give inconsistent results and must be transferred to a centrifuge tube and centrifuged at ≥ 10,000 RCF (Relative Centrifugal Force) for 10 minutes. Transfer clarified specimen to a sample cup or secondary tube for testing. For centrifuged specimens with a lipid layer, transfer only the clarified specimen and not the lipemic material.
- Before shipping specimens, it is recommended that specimens be removed from the separator, red blood cells or clot. When shipped, specimens should be packaged and labeled in compliance with applicable local, state, federal and international regulations covering the transport of clinical specimens and infectious substances. It is recommended specimens should be shipped frozen.
- The sample volume required for a single determination is 10 µL.

PRECAUTIONS

- For use under an Emergency Use Authorization Only.
- For *in vitro* Diagnostic Use Only.
- The results of this semi-quantitative test should not be interpreted as an indication or degree of immunity or protection from infection.
- This test has not been FDA cleared or approved but has been authorized for emergency use by FDA under an EUA for use by authorized laboratories certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, that meet requirements to perform moderate or high complexity tests.
- This test has been authorized only for detecting IgG antibodies against SARS-CoV-2, not for any other viruses or pathogens.
- The emergency use of this test is only authorized for the duration of the declaration that circumstances exist justifying the authorization of emergency use of *in vitro* diagnostics for detection and/or diagnosis of COVID-19 under Section 564(b)(1) of the Federal Food, Drug and Cosmetic Act, 21 U.S.C. § 360bbb-3(b)(1), unless the declaration is terminated or authorization is revoked sooner.
- Follow the package insert carefully. Reliability of assay results cannot be guaranteed if there are any deviations from the instructions in this package insert.

Safety Precautions

- **CAUTION:** This product requires the handling of human specimens. It is recommended that all human sourced materials be considered potentially infectious and handled in accordance with the 29 CFR 1910.1030 Occupational exposure to blood borne pathogens. Biosafety Level 2 or other appropriate biosafety practices should be used for materials that contain or are suspected of containing infectious agents.
- All samples, biological reagents and materials used in the assay should be considered potentially able to transmit infectious agents. They should therefore be disposed of in accordance with the practices of your institution. Discard all materials in a safe and acceptable manner and in compliance with prevailing regulatory requirements.
- This product contains Sodium Azide. Dispose of contents and container must be in accordance with all local, regional and national regulations.
- Refer to safety data sheets, which are available on request.

Handling Precautions

- Do not use reagent kits beyond the expiration date.
- Do not interchange reagent components from different reagents or lots.
- Prior to loading the Reagent Kit on the system for the first time, the Reagent Kit requires mixing to re-suspend magnetic microbeads that have settled during shipment. For magnetic microbeads mixing instructions, refer to the Preparation of the Reagent section of this package insert.
- To avoid contamination, wear clean gloves when operating with a reagent kit and sample.
- Over time, residual liquids may dry on the septum surface. These are typically dried salts which have no effect on assay efficacy.
- To avoid evaporation of the liquid in the opened reagent kits in refrigerator, it is recommended that the opened reagent kits to be sealed with reagent seals contained within the packaging. The reagent seals are "single use".
- For detailed discussion of handling precautions during system operation, refer to the instrument manual.

WARNINGS

Please refer to the CDC Interim Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with Coronavirus Disease 2019 (COVID-19): https://www.cdc.gov/coronavirus/2019-nCoV/lab/lab-biosafety-guidelines.html as well as your local, state and federal government's mandated requirements[5].

ASSAY PROCEDURE

Preparation of the Reagent

- Take the reagent kit out of the box and check the sealing film and other parts of the reagent kit for any signs of leakage. In case of leakage, please contact Diazyme technical support immediately. Tear off the kit sealing film carefully.
- Open the reagent area door; hold the reagent handle to get the RFID label close to the RFID reader (for about 2 seconds); the buzzer will beep; one beep sound indicates successful sensing.
- Keeping the reagent cartridge upright and straight, insert to the bottom along the blank reagent track.
- Observe whether the reagent information is displayed successfully in the software interface, otherwise repeat the above steps.
- Resuspension of the magnetic microbeads takes place automatically when the kit is loaded successfully, ensuring the magnetic microbeads are resuspended and homogenous prior to use. Resuspension should be allowed for at least 30 minutes prior to testing controls and samples.

Assay Calibration

This test method has been standardized against an internal reference substance. Test of assay-specific calibrators allows the RLU values to adjust the assigned master curve. Results are determined via a calibration curve which is instrument-specifically generated by 2-point calibration signal adjustment of the master curve provided via the reagent Radio Frequency Identification (RFID) chip embedded in cartridge label.

To perform calibration:

- Click **<Calibration>** or **<Batch Calibration>** button to execute calibration operation. For specific information on ordering calibrations, refer to the Calibration Section of the Operating Instructions.
- Execute recalibration according to the calibration interval required in this package insert.
- Recalibration is recommended if any of the following conditions occurs:
  - After each exchange of lots (Reagent or Starter 1+2).
  - Every week and/or each time a new reagent kit is used.
  - After instrument service.
  - If controls fall outside the expected range

Quality Control

The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit Negative Control and Positive Control provided with the kits are required for quality control of the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit to ensure that the kit performs properly and to monitor system performance. The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit Negative Control contains no IgG antibodies to SARS-CoV-2; test results should be < 0.70 AU/mL and reported as non-reactive (<). The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit Positive Control contains IgG antibodies to SARS-CoV-2; results are typically within the expected range of 2.80 to 5.20 AU/mL and reported as Detected (>).

Follow government regulations or accreditation requirements for quality control frequency. Internal quality control is only applicable to this system. Treat all quality control samples with the same level of care as patient samples. A satisfactory level of performance is achieved when obtained quality control results match expected results. If the quality control results do not match expected results, quality controls should be repeated. If the quality control results still do not match expected results, do not report results and take the following actions:

- Verify that the materials are not expired.
- Verify that required instrument maintenance was performed.
- Verify that the assay was performed according to the instruction for use.
- Rerun the assay with fresh quality control samples.
- If necessary, contact Diazyme technical support for assistance.

For specific information on ordering quality controls, refer to the Quality Control Section of the Operating Instructions.

Sample Testing

Order the samples in the Sample Area of the software and click the **<Start>** button to execute testing. For specific information on ordering patient specimens, refer to the Sample Ordering Section of the Operating Instructions.

To ensure proper test performance, strictly adhere to the Operating Instructions of the fully automated chemiluminescence immunoassay analyzer.

INTERPRETATION OF RESULTS

The analyzer automatically determines the final result by comparing the RLU for each sample against the established cutoff. Results are reported as AU/mL accompanied by either Detected (>) or Non-Detected (<). For further information please refer to the Operating Instructions of the fully automated chemiluminescence immunoassay analyzer.

Result Interpretation

Results obtained with the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit are interpreted as follows:

Value in units	Interpretation
< 1.0 AU/mL	Not detected
≥ 1.0 AU/mL and ≤ 60 AU/mL	Detected; numerical value provided
> 60 AU/mL	Detected; value >60 AU/mL

The magnitude of the measured result above the cutoff is not indicative of the total amount of antibody present in the sample. The individual immune response following SARS-CoV-2 infection varies considerably and might give different results with assays from different manufacturers. Results of assays from different manufacturers should not be used interchangeably.

LIMITATIONS

For use under an Emergency Use Authorization Only

- This test is suitable only for investigating single samples, not for pooled samples.
- Bacterial contamination or repeated freeze-thaw cycles may affect the test results. Assay results should be interpreted only in the context of other laboratory finding and the total clinical status of the patient.
- The clinical applicability of semi-quantitative results is currently unknown and cannot

be interpreted as an indication or degree of immunity nor protection from reinfection, nor compared to other SARS-CoV-2 antibody assays.
- Results obtained with this assay may not be used interchangeably with values obtained with different manufacturers' test methods.
- A positive (detected) result may not indicate previous SARS-CoV-2 infection. Consider other information including clinical history and local disease prevalence, in assessing the need for a second but different serology test to confirm an immune response.
- A negative (not detected) result for an individual subject indicates absence of detectable anti-SARS-CoV-2 antibodies. Negative results do not preclude SARS-CoV-2 infection and should not be used as the sole basis for patient management decisions. A negative result can occur if the quantity of the anti-SARS-CoV-2 antibodies present in the specimen is below the detection limits of the assay, or the antibodies that are detected are not present during the stage of disease in which a sample is collected.
- Assay results should not be used for the diagnosis or exclusion of acute novel coronavirus infection. An assay that directly detects the virus should be used to evaluate symptomatic individuals for acute COVID-19.
- It is not known at this time if the presence of antibodies to SARS-CoV-2 confers immunity to reinfection.
- This test is for the semi-quantitative detection of anti-COVID-19 antibody in human serum or plasma and does not measure the quantity of the antibodies.
- Performance has only been established with the specimen types listed in the Intended Use. Other specimen types have not been evaluated and should not be used with this assay.
- If the SARS-CoV-2 IgG results are inconsistent with clinical evidence, additional testing is suggested to confirm the result.
- HAMA antibodies in test samples may cause interference in immunoassays.
- SARS-CoV-2 antibodies may not be detectable in patients with recent infections (7-10 days or less) or patients who have been exhibiting symptoms for less than 8 days.
- The performance of this test has not been established in individuals that have received a COVID-19 vaccine. The clinical significance of a positive or negative antibody result following COVID-19 vaccination has not been established, and the result from this test should not be interpreted as an indication or degree of protection from infection after vaccination.
- The performance of this test was established based on the evaluation of a limited number of clinical specimens. The samples for the negative agreement study were collected in USA and China prior to December 2019. The samples for the positive percent agreement study were collected in USA between March and June 2020. The clinical performance has not been established in all circulating variants but is anticipated to be reflective of the prevalent variants in circulation at the time and location of the clinical evaluation. Performance at the time of testing may vary depending on the variants circulating, including newly emerging strains of SARS-CoV-2 and their prevalence, which change over time.
- Not for the screening of donated blood.

CONDITIONS OF AUTHORIZATION FOR LABORATORIES

The Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit Letter of Authorization, along with the authorized Fact Sheet for Healthcare Providers, the authorized Fact Sheet for Recipients, and authorized labeling are available on the FDA website: https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/vitro-diagnostics-euas

Authorized laboratories using the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit ("your product" in the conditions below), must adhere to the Conditions of Authorization indicated in the Letter of Authorization as listed below:

1. Authorized laboratories* using your product must include with test result reports, all authorized Fact Sheets. Under exigent circumstances, other appropriate methods for disseminating these Fact Sheets may be used, which may include mass media.
2. Authorized laboratories using your product must use your product as outlined in the authorized labeling. Deviations from the authorized procedures, including the authorized clinical specimen types, authorized control materials, authorized other ancillary reagents and authorized materials required to use your product are not permitted.
3. Authorized laboratories that receive your product must notify the relevant public health authorities of their intent to run your product prior to initiating testing.
4. Authorized laboratories using your product will have a process in place for reporting test results to healthcare providers and relevant public health authorities, as appropriate.
5. Authorized laboratories must collect information on the performance of your product and report to DMD/OHT7-OIR/OPEQ/CDRH (via email: CDRH-EUA-Reporting@fda.hhs.gov) and Diazyme Laboratories, Inc. (email: support@diazyme.com; 858-455-4768 Option 2) any suspected occurrence of false positive (detected) or false negative (non-reactive) results and significant deviations from the established performance characteristics of your product of which they become aware.
6. All laboratory personnel using your product must be appropriately trained in immunoassay techniques and use appropriate laboratory and personal protective equipment when handling this kit and use your product in accordance with the authorized labeling. All laboratory personnel using the assay must also be trained in and be familiar with the interpretation of results of the product.
7. Diazyme Laboratories, Inc., authorized distributors, and authorized laboratories using your product must ensure that any records associated with this EUA are maintained until otherwise notified by FDA. Such records will be made available to FDA for inspection upon request.

*The letter of authorization refers to, "Laboratories certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, that meet requirements to perform moderate or high complexity tests" as "authorized laboratories."

PERFORMANCE CHARACTERISTICS

Precision

Precision for Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit was determined as described in the CLSI EP5-A3. Two controls and 3 samples containing different concentrations of analyte were assayed in duplicate at three sites over five days, with 3 runs per day, one lot of reagent for each run and 2 replicates per run. The results are summarized in the following table:

Sample	Mean (AU/mL)	n	Repeatability SD CV (%)	Between Lot SD CV (%)	Between Day SD CV (%)	Between Site SD CV (%)	Reproducibility SD CV (%)
NQC	0.293	90	0.024 N/A	0.005 N/A	0.008 N/A	0.023 N/A	0.035 N/A
PQC	3.915	90	0.199 5.08	0.069 1.76	0.032 0.82	0.265 6.77	0.340 8.68
S1	0.491	90	0.043 N/A	0.015 N/A	0.004 N/A	0.013 N/A	0.047 N/A
S2	3.468	90	0.212 6.08	0.060 1.72	0.050 1.43	0.071 2.04	0.237 6.80
S3	9.807	90	0.159 1.62	0.122 1.24	0.082 0.84	0.639 6.52	0.2675 6.88

Linearity

The linearity of the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit was determined according to CLSI EP6-A guideline. Based on the linearity data, the Analytical Measuring Range (AMR) is 0.5 to 60 AU/mL.

Analytical Measuring Interval

The analytical measuring interval of the assay is 0.499–60.00 AU/mL. The lower limit of the analytical measuring interval is defined by the LoQ (0.499 AU/mL). However, samples should be resulted as "Not Detected" when results of <1.0 AU/mL are obtained (Refer to Result Interpretation section for further instruction).

Detection Limits

The detection limit of the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit was determined according to CLSI EP17-A2. The Limit of Blank (LoB) was determined to be 0.098 AU/mL; the Limit of Detection (LoD) was determined to be 0.184 AU/mL; The Limit of Quantitation (LoQ) was determined to be 0.499 AU/mL.

The LoB corresponds to the highest measurement result that is likely to be observed for analyte free samples with a probability of 95 %. The LoB was estimated as the 95th percentile value from n =60 measurements of analyte-free serum samples, using two kit lots.

The LoB is the lowest concentration of antibodies to SARS-CoV-2 in a sample that can be detected with a probability of 95 %. The LoD was calculated based on the LoB and the standard deviation of serum samples with low concentration of antibodies to SARS-CoV-2, using two kit lots.

The LoQ is defined as the lowest amount of analyte in a sample that can be accurately quantified with a CV ⩽ 20 %. The LoQ was determined using serum samples with low concentrations of antibodies to SARS-CoV-2 using two kit lots.

Interference

Two samples, one negative and one positive sample (~1.8 AU/mL, were spiked with potential endogenous, and exogenous interference substances. The results are listed in the following table:

Substance	No interference up to
Bilirubin	40 mg/dL
Triglycerides	1000 mg/dL
Hemoglobin	2000 mg/dL
Rheumatoid Factor	1500 IU/mL
Anti-Mitochondrial	1:64(titer)
HAMA	30 ng/mL
Total IgG	1600 mg/dL
Total IgM	280 mg/dL
Interferon α	1500 U/mL
Ribavirin	90 mg/dL
Oseltamivir	1.0 mg/dL
Levofloxacin	1.776 mg/dL
Azithromycin	1.201 mg/dL
Ceftriaxone sodium	81.03 mg/dL
Meropenem	80.15 mg/dL
Tobramycin	2.4 mg/dL
Diphenhydramine Hydrochloride	4.5 mg/dL
Oxymetazoline	2.5 mg/dL
Sodium chloride	45 mg/dL
Beclomethasone	2.5 mg/dL
Dexamethasone	18 mg/dL
Triamcinolone acetonide	5.5 mg/dL

Budesonide	3.2 mg/dL
Mometasone	2.5 mg/dL
Fluticasone propionate	2.5 mg/dL

Clinical Sensitivity

A total of 77 samples from 51 patients with PCR-confirmed SARS-CoV-2 infections were tested with the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA assay. One or more consecutive specimens from these patients were collected after PCR confirmation at various times points. Both serum and plasma sample types were used in the study. Results were as follows:

Days Post Symptom Onset	n	Positives	Negatives	Sensitivity, % (95% CI)
≤ 7	23	10	13	43.5(25.6-63.2)
8 to 14	24	22	2	91.7 (74.2-97.7)
≥ 15	29*	29	0	100.0 (88.3-100)

*A patient who did not seroconvert died after having a positive PCR result for SARS-CoV-2 and was excluded from analysis.

Clinical Specificity

The clinical specificity was determined using non-novel coronavirus infected specimens collected before December 2019. The results are shown in the following table:

	n	Positives	Negatives	Specificity, % (95% CI)
Negative Specimens	852	22	830	97.4 (96.1-98.3)

Cross-Reactivity

The cross-reactivity of the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA Kit with the antibodies generated to various infectious viruses (including coronaviruses) and bacteria was tested during independent studies (Study 1 and Study 2). The obtained results show that the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA test does not cross-react to the following:

Study 1

Virus/Bacteria/Parasite Antibody Positive	Source/ Sample	n	Positive	Negative
Influenza A H1N1 IgM/IgG	Serum	6	0	6
Influenza A H1N1 seasonal IgM/IgG	Serum	6	0	6
Influenza A H3N2 IgM/IgG	Serum	6	0	6
Influenza A H5N1 IgM/IgG	Serum	6	0	6
Influenza A H7N9 IgM/IgG	Serum	6	0	6
Influenza B Yamagata IgM/IgG	Serum	6	0	6
Influenza B Victoria IgM/IgG	Serum	6	0	6
Respiratory syncytial virus IgM/IgG	Serum	7	0	7
Rhinovirus Type A IgM/IgG	Serum	6	0	6
Rhinovirus Type B IgM/IgG	Serum	6	0	6
Rhinovirus Type C IgM/IgG	Serum	6	0	6
Adenovirus Type 1 IgM/IgG	Serum	6	0	6
Adenovirus Type 2 IgM/IgG	Serum	6	0	6
Adenovirus Type 3 IgM/IgG	Serum	6	0	6
Adenovirus Type 4 IgM/IgG	Serum	6	0	6
Adenovirus Type 5 IgM/IgG	Serum	6	0	6
Adenovirus Type 7 IgM/IgG	Serum	6	0	6
Adenovirus Type 55 IgM/IgG	Serum	6	0	6
Enterovirus Type A IgM/IgG	Serum	6	0	6
Enterovirus Type B IgM/IgG	Serum	6	0	6
Enterovirus Type C IgM/IgG	Serum	6	0	6
Enterovirus Type D IgM/IgG	Serum	6	0	6
EBV VCA IgM/IgG	Serum	10	0	10
EBV NA IgG	Serum	6	0	6
Measles virus IgM/IgG	Serum	8	0	8
Human Cytomegalovirus IgM/IgG	Serum	9	0	9
Rotavirus IgM/IgG	Serum	6	0	6
Norovirus IgM/IgG	Serum	6	0	6
Mumps virus IgM/IgG	Serum	6	0	6
Varicella-zoster virus IgM/IgG	Serum	6	0	6
Mycoplasma pneumoniae IgM/IgG	Serum	7	0	7
SARS-CoV-2 IgM	Serum	6	0	6
Human coronavirus HKU1 IgM/IgG	Serum	6	0	6
Human coronavirus OC43 IgM/IgG	Serum	6	0	6
Human coronavirus NL63 IgM/IgG	Serum	6	0	6
Human coronavirus 229E IgM/IgG	Serum	6	0	6
Parainfluenza virus	Serum	23	0	23
Measles virus	Serum	2	0	2
Chlamydia pneumoniae IgM/IgG	Serum	6	0	6
Candida albicans	Serum	1	0	1
ANA	Serum	6	0	6
Total		**265**	**0**	**265**

Study 2

Virus/Bacteria/Parasite Antibody Positive	Source/Sample	n	Positive	Negative
Human Metapneumovirus	Serum	3	0	3
Rhinovirus/Enterovirus	Serum	4	0	4
HBV	Serum	2	0	2
HCV	Serum	5	0	5
HIV+	Serum	5	0	5
Human Coronavirus (229E, HKU1, NL63, OC43)	Serum	1	0	1
CMV	Serum	2	0	2
EBV	Serum	1	0	1
ENA+	Serum	2	0	2
Influenza A+	Serum	2	0	2
M. Pneumonia	Serum	1	0	1
Negative SARS-CoV-2 patients	Serum	25	0	25
Parainfluenza	Serum	2	0	2
Respiratory Syncytial Virus	Serum	1	0	1
Varicella	Serum	1	0	1
Total		**57**	**0**	**57**

Class Specificity

Upon treatment with DTT, five SARS-CoV-2 patient samples (initially positive for both IgG and IgM) remained positive for IgG when tested with the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA assay and became negative for IgM when tested with the Diazyme DZ-Lite SARS-CoV-2 IgM CLIA assay. This establishes the specificity of the Diazyme DZ-Lite SARS-CoV-2 IgG CLIA kit to the IgG class of antibodies.

Hook effect

The assay has a hook effect tolerance up to 1000 AU/mL.

REFERENCES

1. Zhou, P., Yang, X., Wang, X. et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature (2020). https://doi.org/10.1038/s41586-020-2012-7.
2. Diagnosis and treatment program of novel coronavirus pneumonia (Trial version 7).
3. Na Zhu, Ph.D., Dingyu Zhang, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019[J]. New England Journal of Medicine, 2020.
4. Prevention and control program of novel coronavirus pneumonia (version 5).
5. Center for Disease Control and Prevention. https://www.cdc.gov/
6. To KK, Tsang OT, Leung WS, Tam AR, Wu TC, Lung DC et al. (2020). Temporal profiles of viral load in posterior oropharyngeal saliva samples and serum antibody responses during infection by SARS-CoV-2: an observational cohort study. Lancet Infect Dis. 2020 Mar 23. pii: S1473-3099(20)30196-1.

Diazyme Laboratories, Inc.
12889 Gregg Court
Poway, CA 92064, USA
Tel: (858) 455-4754
Fax: (858) 455-4750
support@diazyme.com