Over the counter Rapid Antigen Test for detection of SARS-CoV-2 virus: Human Usability Study

August 13, 2021

Protocol Number: EDP-SOP-TNC-013

Performed at:
EDP Biotech Corporation
6701 Baum Drive, Suite 110
Knoxville, TN 37919

Sponsored by:
MP Biomedicals, LLC
29525 Fountain Parkway
Solon, OH 44139

Rev. B

For Investigational Use Only.
The performance characteristics of this device have not been established

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Study Personnel and Approvals

Role	Name, Title and Contact	Approval Signature and Date
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1.0 Introduction

1.1 Device Name (working name)

Rapid SARS-CoV-2 Antigen Test (MP Biomedicals, LLC 29525 Fountain Parkway, Solon, Ohio 44139 USA).

1.2 Intended Use

The Rapid SARS-CoV-2 Antigen Test is an immunochromatography based one step in vitro test. It is designed for the rapid qualitative determination of SARS-CoV-2 virus antigen in anterior nasal swabs from symptomatic and asymptomatic individuals. The Rapid SARS-CoV-2 Antigen Test Card shall not be used as the sole basis to diagnose or exclude SARS-CoV-2 infection.

1.3 Background

Coronavirus disease (COVID-19) is a disease caused by a newly discovered coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)[1]. The SARS-CoV-2 is a ß-coronavirus, which is enveloped non-segmented positive-sense RNA virus 2[2]. It is spread by human-to-human transmission via droplets or direct contact, and infection has been estimated to have mean incubation period of 6.4 days and a basic reproduction number of 2.24–3.58. Among patients with pneumonia caused by SARS-CoV-2, fever was the most common symptom, followed by cough[3]. On 11 March 2020, the COVID-19 outbreak was characterized as a pandemic by the WHO[4]. Since then, over 70 million people worldwide have been infected with the virus with over 1.5 million deaths attributed to the virus[5]. Laboratory testing for SARS-CoV-2 is currently being performed to determine if an individual has active infection via detection of viral RNA or if an individual has an immune response to the virus from a previous infection via detection of antibodies.

Specimen collection is a crucial first step in the evaluation of an individual's SARS-CoV-2 infection status. The goal of this project is to evaluate human usability of a rapid SARS-CoV-2 antigen test for over the counter (OTC) use. Study subjects under EDP supervision, either in-person or via video conference, will collect and test anterior nasal swab samples. The Rapid SARS-CoV-2 Antigen Test collection and testing methodology is viewed as a convenient and inexpensive method to test clinical specimens for SARS-CoV-2 and OTC access will improve the availability of COVD-19 testing.

1.4 Principles of the Device

The COVID-19 Antigen Rapid Test Device detects SARS-CoV-2 viral antigens through visual interpretation of color development. Anti-SARS-CoV-2 antibodies

are immobilized on the test region of the nitrocellulose membrane. Anti-SARS-CoV-2 antibodies conjugated to colored particles are immobilized on the conjugated pad. A sample is added to the extraction buffer which is optimized to release the SARS-CoV-2 antigens from specimen. During testing, the extracted antigens bind to anti-SARS-CoV-2 antibodies conjugated to colored particles. As the specimen migrates along the strip by capillary action and interacts with reagents on the membrane, the complex will be captured by the anti-SARS-CoV-2 antibodies at the test region. Excess colored particles are captured at the internal control zone. The presence of a colored band in the test region indicates a positive result for the SARS-CoV-2 viral antigens, while its absence indicates a negative result. A colored band at the control region serves as a procedural control, indicating that the proper volume of specimen has been added and membrane wicking is working. (See Appendix 1).

2.0 Scientific Objectives

2.1 Study Rationale

Traditional specimen collection techniques used in conjunction with respiratory infectious agent identification, for examples nasopharyngeal (NP) swabbing or aspiration, are often uncomfortable for the patient. Anterior nasal (AN) swab samples have provided a more comfortable sampling alternative to NP swabs that is also less technically challenging. With ease of use and convenience for OTC home specimen collection with the Rapid SARS-CoV-2 Antigen Test, the patient experience may lead to better patient sampling for SARS-CoV-2 testing.

2.2 Study Objectives

The objective of the study is to evaluate the usability of the Rapid SARS-CoV-2 Antigen Test in a home setting. The main focus will be to assess the clarity and robustness of the instructions for use.

3.0 Study Materials

EDP Biotech Corp. will obtain the Rapid SARS-CoV-2 Antigen Test kits and materials to perform the collection and testing from the respective manufacturers. EDP Biotech Corp. will maintain proper storage conditions of all reagents per the manufacturers' product package inserts.

3.1 Specimen Collection Materials/Equipment

All Rapid SARS-CoV-2 Antigen Test materials are ready for use as per Manufacturer's instructions. The materials will be used prior to expiration dating.

Table 1 Rapid SARS-CoV-2 Antigen Test Materials

Material	Manufacturer	Catalog Number	Storage
Rapid SARS-CoV-2 Antigen Test Card (sealed foil pouch)	MP Biomedicals Solon, OH USA		Ambient (15-25ºC)
Sterile swab	Goodwood Medical Care Ltd. 1-2 Floor, 3-919 Yongzheng Street, Jinzhou District, Dalian, 116100 Liaoning, China		Ambient (15-25ºC)
Extraction tube	MP Biomedicals Solon, OH USA		Ambient (15-25ºC)
Extraction solution bottle	MP Biomedicals Solon, OH USA		Ambient (15-25ºC)
Instructions for use (IFU)	MP Biomedicals Solon, OH USA		Ambient (15-25ºC)
Tube stand	MP Biomedicals Solon, OH USA		Ambient (15-25ºC)

3.2 Computer Hardware and Software

For this study, results will be analyzed using:

- PC Computer Platform.
- Microsoft Office Excel, version 2003 (or higher).

3.3 Collection/Storage/Transfer of Data Files

All data will be collected and stored by EDP Biotech Corp. using its established laboratory information systems (LIS) upon completion of the initial testing or resolution of incomplete or disqualified runs. Results will be compiled as a specimen log as part of the clinical study documentation.

If applicable, all original instrument data printouts will be maintained as part of the study records. Additionally, records of personnel performing all assays, all instruments, reagent and control lots used for each assay run will be maintained.

Note: All required ancillary equipment and materials for the study are specified in appropriate Standard Operating Procedures (SOPs), along with the instrument operator's manuals and reagent instructions for use (package insert) at EDP Biotech Corp.

4.0 Study Design

This is a clinical study to evaluate the feasibility of using anterior nasal (AN) swabs on Rapid SARS-CoV-2 Antigen Test kits for OTC use in symptomatic and asymptomatic individuals following recommendations from the FDA's July 29, 2020 Template for Manufacturers of Molecular and Antigen Diagnostic COVID-19 Tests for Non-Laboratory Use, Section J 7. EDP Biotech Corp. will recruit subjects for an at home human usability study through the internet as well as by referral throughout the United States. Rapid SARS-CoV-2 Antigen Test specimen collection and testing will be done under the supervision of EDP Biotech Corp. either in person or via video conference. Testing will be observed by EDP Biotech Corp. medical professionals or designees either in person or via video conference. The study subjects shall perform the entire workflow including sample collection, testing, and results interpretation. Following results interpretation, subjects will complete a usability and ease of use questionnaires. The data collected in study may be submitted as a regulatory filing to the US FDA or other agencies. All specimens will be collected from participating consenting subjects. Additional testing of the specimens for research purposes may be performed. The study acceptance criteria is a 95% success rate for subjects producing the control line on the Rapid SARS-CoV-2 Antigen Test and a SUS average score of 68 or greater.

4.1 Site Characteristics

EDP Biotech Corp. is currently offering specimen collection for patient SARS-CoV-2 testing in a clinic setting. For referral and internet recruiting and specimen collection, EDP personnel will observe specimen collection and testing from patients in their homes or by remote visual monitoring via video conference after consenting. The site has a CLIA certificate (44D2184836) and has the requisite infrastructure to perform molecular testing. EDP Biotech Corp. is currently offering SARS-CoV-19 testing to patients. All personnel involved in the study will be qualified by education and experience to conduct this study and agree to follow the study protocol.

4.2 Site Personnel

EDP Biotech Corp. management of the laboratory involved in this evaluation is responsible for assignment of qualified personnel and for maintaining documented required qualifications for those personnel.

4.3 Specimen Collection

Each potential subject will be asked to complete a form describing any symptoms of respiratory illness being experienced, education level, and basic demographics (Appendices 2 and 3). Subjects will be observed by EDP Biotech Corp. personnel or

designees during sample collection, testing, and shipment preparation either in person or via video conference.

Each study volunteer who agrees to participate in the study will be asked to complete an Informed Consent Form (Appendix 6). A parent or guardian will need to consent for subjects under 18 years old. Study subjects between the ages of 7 and 17 years old will be asked to complete an Assent form (Appendix 7). Specimens will be collected and tested only after the Informed Consent form is completed. Each study volunteer will be assigned a unique specimen identification number (SID). The Clinical Investigators or designees will observe AN swab collection and testing. Subjects will collect AN swab samples and perform the Rapid SARS-CoV-2 Antigen Test using only the IFU for instruction or video linked from the IFU. The collection devices and storage tubes will be appropriately labeled with the SIDs and not the names of the participants to maintain confidentiality.

Rapid SARS-CoV-2 Antigen Test AN swab specimens will be collected and tested per the product directions that accompany the device (Appendix 1). Following Rapid SARS-CoV-2 Antigen Test, subjects will complete a System Usability Scale questionnaire (Appendix 4) and an Ease of Use assessment including interpretation of mock test cassettes (Appendix 5).

4.4 Sample Types and Numbers

Subjects will be enrolled in an "all comers" style, including both symptomatic and asymptomatic patients. The study population will include subjects from 2 years old to greater than 65 years old. Minors must be consented by their parent or legal guardian. The parent or legal guardian should collect the samples and perform testing if the child is between 2 and 13 years old. Older children ages 14-17 should collect their samples and perform their tests without their parent or legal guardian intervening. The study will include two sections, 50 subjects testing themselves and 50 subjects testing another person such as children between the ages of 2 and 13 years old. Enrollment efforts in various zip codes will be pursued in order to represent different socioeconomic and educational backgrounds and this information will be captured in the tester questionnaire (Appendix 2) and subject questionnaire (Appendix 3). A portion of the study population should include Spanish speaking users. High risk individuals will not be excluded. Participants who regularly use home diagnostic tests, such as glucose meters, will be excluded. Study testing will continue until the full range of 2-65+ ages are tested including at least 50 self-tests and 50 tests performed by subjects on other participants.

4.5 Sample Handling and Management

Study specimens will be accessioned into the EDP Biotech Corp. system using assigned unique identifying number to facilitate tracking and identification during analysis. A visual inspection (in person or via online observation) of the specimens will be made to ensure the specimens meet study requirements for proper appearance.

5.0 Sample Preparation and Testing Procedure

5.1 Instrument Set-Up (Calibration and Quality Control)

All lateral flow kit quality controls and instrument quality control and calibration procedures will be performed per manufacturer's recommendations or the laboratory's QA/QC manual, as appropriate. Instrument calibration and instrument performance will be documented on each day that testing is performed. All documentation related to the operation of the instrument will be completed, verified and recorded per the laboratory's standard procedures.

5.2 Reagent Preparation

All reagents will be prepared for use by lateral flow kit manufacturer or EDP Biotech Corp. laboratory personnel, as appropriate or as specified in their respective manufacturer's package insert/instruction for use documents.

5.3 Specimen Processing

Individuals participating in the usability study will process their own specimens or specimens of another individual, as appropriate, at the time of enrollment and testing EDP Biotech Corp personnel will process the collected AN swab specimen data as it is generated.

5.4 Sample Preparation

SARS-CoV-2 antigen will be extracted from the collected specimens using procedures provided by the investigational lateral flow kit manufacturers. The specifications for specimen integrity described in the manufacturer's instrument instructions will be followed, i.e., storage conditions prior to testing.

5.5 Control/Calibrator Preparation

Assay controls will be included in each test run per manufacturers' directions.

5.6 Assay Testing

Testing of the study specimens will be performed as follows.

AN swab specimens will be evaluated at the time of collection by study subjects observed by EDP Biotech Corp. personnel either in person or via video conference (Appendix 6). Testing will be performed according to the specific EDP Biotech Corp. Standard Operating Procedures associated with this test. Specimens will be tested per specimen stability parameters in the product instructions (Appendix 1). There is no specific requirement to run a pre-defined number of specimens per run.

5.7 Reporting of Results

The results obtained with the Rapid SARS-CoV-2 Antigen Test will be captured electronically in the EDP Biotech Corp. LIMS system by observers.

6.0 Data Management and Analysis

6.1 Sample ID Numbers and Identification

Each sample entered into the study will be assigned the study sample number during accessioning. A data management log listing each sample number and storage information will be maintained.

6.2 Data Evaluation and Accessibility

A report tabulating and analyzing the data will be prepared by the Clinical Investigator including tables of the results and a description of any deviations from the protocol.

6.2.1 Acceptability of Data for Analysis

Valid individual specimen results generated in invalid runs are not acceptable for inclusion in final data analysis. Samples tested in invalid runs must be re-tested if the remaining specimen volume is available. Only valid results from specimens in valid runs will be included in the final data analysis.

6.2.2 Exclusion of Data from Analysis

Data from invalid runs results will be excluded. All excluded results will be documented with rationale for exclusion and a summary of these cases will be provided.

6.2.3 Data Entry and Corrections to Study Documents

All entries must be legible and made in indelible ink (preferably black); do not use pencil. Strike incorrect entries with a single line (do not obliterate or put "white-out" on the original entry). Then enter the correct information next to the original entry, initial, and date the correction.

6.2.4 Assay Run Data

Any Printouts corresponding to assay runs will be maintained and a copy placed in a study binder. A record will be maintained regarding assay reagents and calibrators by lot number and expiration date.

6.2.5 Invalid Results

Invalid results will be repeated either by the same subject or a different subject until the criteria found in section 4.4 is met.

6.3 Data Analysis

6.3.1 Acceptance Criteria for Method Comparison

The study sponsor will ensure that all specimens are analyzed appropriately, and results are accurately transcribed to an excel spreadsheet for analysis.

7.0 Documentation

7.1 Data Reporting Forms and Tracking Log Sheets

Any required forms regarding study data or material inventory tracking (for specimens or assay reagents) will be completed in ink (black ball-point pen is preferred). Entries made with pencil are not allowed. When completing forms, do not leave blanks. If an item is missing, complete the entry with 'ND' for 'not done' or 'NA' for 'not available/applicable,' as appropriate.

All changes or corrections to any original document must be made in ink and initialed and dated by the person making the change. Incorrect data should be indicated by lining through the entry with a single line. Do not erase or use correction fluid ("White-Out" or "Liquid Paper") or eradicate the entry in any other way. The correct value should be written next to the item in question and circled. Each page with corrections must be initialed and dated by the technician performing the assay.

Assigned EDP Biotech Corp. personnel responsible for entries made to any study form will provide a signature and date on each form sheet upon completion. The

Clinical Investigators (or designee) must review all study forms related to data reporting or material tracking. The Clinical Investigators are ultimately responsible for the integrity of the data recorded or submitted on the data reporting form.

7.2 Tester and Subject Questionnaires

Each tester will complete a tester information form including race and ethnic categories, zip code, and language self-assessment (Appendix 2). Each subject will be asked to complete a form providing information about exhibited symptoms consistent with COVID-19 infection (Appendix 3).

7.3 Instrument-Generated Printouts

Any instrument-generated data printed results for each assay run (including all valid and invalid runs) must be reviewed for accuracy and signed and dated by the Principal Investigator (or designee) and then included in the study regulatory binder.

7.4 Specific Tracking Log Sheets

All test materials and controls used during the study will be recorded to indicate lot and expiration date.

8.0 IRB Requirements

8.1 Informed Consent

The study described in this protocol presents a nonsignificant risk of harm to the human subjects, as standard procedures are used for the AN swab specimen collections. EDP Biotech Corp. has determined Informed Consent (IC) is appropriate from individuals to provide specimens for the research study. A proposed Informed Consent Form is presented as Appendix 6.

For this study:

a) This investigation meets the IDE exemption criteria at 21 CFR 812.2(c)(3).

b) The specimens will not be individually identifiable, i.e., the identity of the subject is not known after specimen collection based on the unique identifier and may not readily be ascertained by EDP Biotech Corp. employees or any other individuals associated with the investigation after the unique SID is assigned. In this manner, the specimens will be coded but deidentified, and will be individually identifiable by the clinical investigator(s).

c) The study will be reviewed by an IRB in accordance with 21 CFR Part 56.

8.2 IRB Approval

This study will be initiated only after IRB Approval of the study has been granted. A copy of the IRB approval document will be maintained by the Clinical Investigators in a study binder.

9.0 Risk Analysis

This is a non-significant risk device study. The study presents no potential for serious risk to the health, safety, or welfare of any human subject as it uses only commonly employed techniques for the AN swab specimens. There will be subject recruitment at the EDP Biotech Corp. investigative site using public posting, e-mail correspondence, and referrals. Study results will be used to demonstrate that the Rapid SARS-CoV-2 Antigen Test technique is suitable for home use without a prescription.

10.0 Study Master File (SMF)

The Clinical Investigator (CI) or Designee(s) will collect and review copies of the required essential documents (ED) listed below in the form of a Study Master File (SMF). EDP Biotech Corp. is the sponsor of the study and will maintain the SMF and copies of the required EDs; the Investigator Site File (ISF) will contain original documents.

10.1 Required Essential Documents

A binder(s), which for purposes of this clinical study will be defined as the investigator site file (ISF), will be maintained at the trial site and serves as the central source for ED maintenance at the site.

The following documents represent a complete site essential document packet and are to be maintained in the ISF:

- Clinical Investigator's (CI) Curriculum Vitae (CV) or Resume.
- CI Human Subject Protection Training documentation.
- Institutional Review Board (IRB)-Approved Protocol and Protocol Amendments.
- Protocol/Protocol Amendment(s) Signature Pages.
- IRB Compliance Documentation.
- Signed informed consent forms.
- Laboratory Certifications, e.g. CLIA.

11.0 Monitoring

The sponsor of this study shall be responsible for ensuring adequate monitoring for the study occurs. The Clinical Investigators will grant the sponsor or designee access to the testing site and all applicable study information. Access will be granted to review all study documents and all Regulatory documentation (site binders containing completed ICFs and IRB approval). Monitoring of the study will be conducted on a periodic basis throughout the evaluation. Closeout monitoring of the study will be conducted. Reports of the monitoring will be prepared. Any deficiencies observed during the monitoring will be discussed with the Clinical Investigator for remediation. Monitoring may be conducted remotely.

12.0 Investigational Study Site Compliance

12.1 Investigator Responsibility

The Clinical Investigators (CI) are expected to ensure that the methods and study design outlined in this protocol are followed. No changes to protocol methods or study design can be made without the written consent of the sponsor. It is the responsibility of the sponsor and the CIs to ensure subject confidentiality and IRB approval for the study.

12.2 Site Monitoring and Inspection

The sponsor will maintain close liaison with the study Investigators to answer any questions that may arise and to ensure that the study is being conducted according to this protocol. The study site will permit the sponsor and or its designee to visit the site at reasonable times to audit or inspect the study records and materials. Sponsor personnel will audit the progress and compliance of the study and at the end of the study for closeout.

12.3 Record Retention

Study records will be maintained by the Clinical Investigators and Study Sponsor per EDP Biotech Corp. SOPs. Copies of all data generated from the study, all data reporting forms, and records of reagent disposition are to be maintained for a period of 5 years following the date on which the entire clinical investigation is terminated or discontinued.

13.0 Biological Safety

13.1 Toxicity and Complications

Not applicable.

13.2 Sample Handling

All volunteer specimens and materials with which the study personnel come into contact should be handled as if capable of transmitting infection, and dispensed of with precautions in accordance with Federal, State, and Local regulations.

14.0 Modifications to the Protocol

14.1 Protocol Amendments

Neither the Clinical Investigators nor study laboratory personnel will modify this protocol without contacting the Study Sponsor.

14.2 Study Termination

For any reasonable cause, the Study Sponsor may terminate the study, provided a written notice is submitted at least 30 days in advance of the intended termination. The IRB will be notified if the study is terminated.

15.0 Abbreviations

The abbreviations that are given below apply:

15.1 Abbreviations

°C	Celsius (Centigrade)
µg	Microgram
µl	Microliter
AMR	Analytical Measurement Range
AN	Anterior nasal (nares)
CFR	Code of Federal Regulations
dL	One-tenth of a liter
d	Day
FDA	Food and Drug Administration
hrs	Hours
IC	Informed Consent
ID	Identification or identification number
IDE	Investigational Device Exemption
IFU	Instructions for use
IRB	Institutional Review Board
IUO	Investigational use only
LIS	Laboratory information system
mL	Milliliter
N	Number
NA	Not applicable or not available

ND	Not done
Ng	Nanogram
OTC	Over the counter
PI	Principal Investigator
QC	Quality Control
RT	Room temperature (ambient)
RUO	Research Use Only
SOP	Standard Operating Procedure
wks	Weeks

16. References

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19) outbreak. J Autoimmun. 2020;109:102433. doi:https://doi.org/10.1016/j.jaut.2020.102433

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