EMERGENCY USE AUTHORIZATION (EUA) SUMMARY

UCSD EXCITE COVID-19 Test

For In vitro Diagnostic Use
For use under Emergency Use Authorization (EUA) only
For prescription use only
For use with anterior nasal swabs collected with adult assistance from individuals 2 years of age or older, or self-collected by any individuals 15 years of age or older

INTENDED USE

The UCSD EXCITE COVID-19 Test is an in vitro diagnostic real-time reverse transcription polymerase chain reaction (RT-PCR) test for the qualitative detection of nucleic acid from SARS-CoV-2 in anterior nasal swab specimens that are either Healthcare Provider collected from individuals of any age, or collected at home (which includes in a community-based setting) with adult assistance from individuals 2 years of age or older, or self-collected by any individuals 15 years of age or older, including from individuals without symptoms or other reasons to suspect COVID-19, when determined to be appropriate by a healthcare provider, using the UCSD EXCITE COVID-19 Sampling Kit.

Anterior nasal swab specimens collected at home or at a testing site and dropped off at temperature-controlled collection sites are transported within 36 hours at ambient temperature to the laboratory for testing.

Testing is limited to UCSD BCG EXCITE Lab located at 9500 Gilman Drive, San Diego, CA 92161 that is certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, and meets requirements to perform high complexity tests.

Results are for the identification of SARS-CoV-2 RNA. The SARS-CoV-2 RNA is generally detectable in nasal swab specimens during the acute phase of infection. Positive results are indicative of the presence of SARS-CoV-2 RNA; clinical correlation with patient history and other diagnostic information is necessary to determine patient infection status. Positive results do not rule out bacterial infection or co-infection with other viruses. The agent detected may not be the definite cause of disease. Laboratories within the United States and its territories are required to report all test results to the appropriate public health authorities.

Negative results do not preclude SARS-CoV-2 infection and should not be used as the sole basis for patient management decisions. Negative results must be combined with clinical observations, patient history, and epidemiological information.

The UCSD EXCITE COVID-19 Test is intended for use by qualified clinical laboratory personnel specifically instructed and trained in the techniques of real-time RT-PCR and in vitro diagnostic procedures. The assay is only for use under the Food and Drug Administration’s Emergency Use Authorization.

DEVICE DESCRIPTION AND TEST PRINCIPLE

1. Test Principle

The assay is a real-time reverse transcription polymerase chain reaction (RT-qPCR) test based upon the TaqPath COVID-19 Combo Kit. The SARS-CoV-2 primer and probe set(s) is designed to detect RNA from the SARS-CoV-2 in nasal swab specimens from patients as recommended for testing by public health authority guidelines. The assay simultaneously detects four targets: three SARS-CoV-2 viral targets, the Nucleocapsid gene (N gene), the ORF1ab gene and the Spike protein gene (S gene), and one primer/probe set detecting endogenous RNaseP RNA present in the sample as an extraction, RT-PCR, and process control.

RNA extraction is performed automated and according to the Laboratories SOP using the MagMax Viral/Pathogen II (MVP II) Nucleic Acid Isolation kit. The TaqPath 1-Step Multiplex Master Mix is then used for the BCG Exite RT-PCR reaction on extracted RNA. All key processing steps have been modified from the original TaqPath COVID-19 Combo kit procedures and all modifications have been adequately validated (see performance section below). RT-PCR is performed using the Applied Biosystems TaqPath COVID-19 Combo Kit thermal cycling conditions in 384-well plates. RT-PCR reactions are performed with the QuantStudio 7 Pro PCR Real Time PCR Instrument using the QuantStudio RealTime PCR Software v2.5.

2. Collection Device Description

The UCSD EXCITE COVID-19 Sampling Kit collects and stabilizes viral RNA from anterior nares swab specimens using MAWI iSwab-Microbiome collection media. MAWI iSwab-Microbiome collection media has been demonstrated to be non-hazardous. Swabs can be transported and stored at ambient temperature for up to 66 hours (please see sample stability testing study, below) and are to be tested with the molecular UCSD EXCITE COVID-19 RT-PCR Assay that is authorized for use with the UCSD EXCITE COVID-19 Sampling Kit. The UCSD EXCITE COVID-19 Sampling Kit consists of either:

Kit A (for distribution to individuals for home collection without supervision by a healthcare provider or trained staff member)**:** A flocked anterior nares swab, a collection tube containing MAWI iSwab-Microbiome collection media, and specimen collection instructions placed into a recyclable "clamshell" type of container.

Kit B (For use by individuals at a designated testing site under supervision of a healthcare provider or trained staff member)**:** A flocked anterior nares swab and collection tube containing MAWI iSwab-Microbiome collection media. Specimen collection instructions will be displayed at the collection sites.

a) Ordering, Prescription, and Result Communication

Individuals who may be tested under this process are students and employees of UC San Diego or San Diego State University, and have orders placed for COVID-19-RT-PCR testing from the UCSD BCG EXCITE Lab using an Electronic Health Record (such as the UCSD EPIC EHR). Only persons who are registered in the EHR with valid orders are able to access test kits. All UCSD students/employees being tested are registered in the EHR, and the kits are distributed to them either by staff who verify that the person receiving the test is registered, or through using vending machines that are activated using student/employee ID card swipes.

1. Orders for an individual test for an individual patient will be placed using an Electronic Health Record (EHR) system and transmitted to the BCG EXCITE Lab's Laboratory

Information System. For tests ordered in this manner, all tested persons will be registered patients of the EHR's health care system. Test results will be transmitted back to the EHRs of the tested individuals. All positive, inconclusive, and invalid results will be communicated to individuals by a health care provider for the health care system by telephone and appropriate follow-up care will be offered at the health care system.

2. Orders for multiple tests for multiple patients will be placed using an Electronic Health Record (EHR) system and transmitted to the BCG EXCITE Lab's Laboratory Information System. For tests ordered in this manner, all tested persons will be registered patients of the EHR's health care system. Test results will be transmitted back to the EHRs of the tested individuals. All positive, inconclusive, and invalid results will be communicated to individuals by a health care provider for the health care system by telephone and appropriate follow-up care will be offered at the health care system. For tests ordered in this manner, individual sample collection tubes will be linked to individual patients using an application that is accessible using a patient's smartphone or tablet computer, or tablet computer provided by the testing institution. The patient will log into their account, and then use the application to scan the unique barcode on the collection tube. In institutions where this system is in place, Information Technology services will be available 24/7, and at least one testing site staffed by testing personnel will be open during normal business hours to assist patients who encounter barriers with this system.

3. Orders for individual tests for multiple patients will be placed by direct upload of a spreadsheet including all demographics needed to link the sample to the patient, and to report results to state and county public health authorities into the BCG EXCITE Lab's Laboratory Information System. For tests ordered in this manner, test results will be transmitted back to the ordering physician by spreadsheet.

b) Collection Kit Dispensing

Individuals will have access to the UCSD EXCITE COVID-19 Sampling Kit device as follows:

- **For Kit A**: Kits are picked up at designated locations on the UCSD and SDSU campuses. These locations may be monitored by staff designated by the institution or by security camera within secure badge-access indoor locations, or access to kits may be controlled by use of vending machines or other similar dispensation equipment that control access to kits using ID badge-activated systems, which are either located indoors or have a built-in temperature control system to maintain temperature between 15-30 ºC. Vending machines will be activated by patients' ID cards, preventing distribution of test kits to individuals without a test order.
- **For Kit B**: Kits are provided at a designated testing site staffed by a healthcare provider or trained staff member, where instructions are posted.

c) Sample Self-Collection & Transport

At the time of sample collection, the individual being tested will be asked to wash/sanitize their hands, and then utilize a smartphone- or electronic device-accessible student/employee application to link their individual-specific identification code to the unique specimen barcode that is affixed to each collection tube; the application will log the time of sample collection, and this information will be transmitted to the UCSD BCG EXCITE Lab laboratory information system. The individual will then collect the sample per the collection instructions. For kit A this is performed unobserved (e.g., at home), for kit B the collection will be under the supervision of the healthcare provider or trained staff member.

- **For Kit A,** the tube containing the sample will then be placed into a drop box that is lined with a large biohazard bag with absorbent pad that will be dropped-off at one of the designated drop boxes on the same day of collection. Drop boxes are in temperature-controlled locations and/or contain electronic monitors that record the minimum and maximum temperature. If the temperature monitor inside the dropbox reports that the temperature has been $\geq 40^{o}C$ or $\leq 0^{o}C$ since the last pickup, the samples in the dropbox will be rejected and the patients will be asked to submit a new sample. Samples are collected from each collection box within 24 hours, and transported to the testing lab by ground transportation consistent with US Department of Transportation Category B.

- **For Kit B**: Kit distribution and sample collection will be monitored by institutional staff, and the tube containing the sample will then be dropped into a collection bag on site. Samples will be transported within 24 hours of collection. Transport conditions are consistent with US Department of Transportation Category B.

d) Specimen Accessioning:

To minimize the risk of cross-contamination between sample tubes, the outside of each sample tube will be wiped with a disinfectant wipe containing a disinfectant listed in the EPA "List N: Disinfectants for Coronavirus (COVID-19)." Specimens received at the clinical laboratory for testing with the UCSD EXCITE COVID-19 Test will then undergo the following accessioning prior to acceptance for testing through visual inspection of the specimen:

- Prescription (Test Order) from testing partner received
- Sample received within 36 hours of collection
- Swab present
- Barcode is present and readable by an electronic scanner.
- Collection tube is undamaged.
- Tube cap is properly screwed onto tube
- Collection tube contains an adequate volume of collection media (at least 200 μL)

For specimens that are rejected at the time of accessioning, the ordering physician or designee is notified within 12 hours.

To minimize the risk of cross-contamination between sample tubes, the outside of each sample tube will be wiped with a disinfectant wipe containing a disinfectant listed in the EPA "List N: Disinfectants for Coronavirus (COVID-19)."

e) Specimen Collection Control:

To ensure that an adequate human specimen has been collected, RT-PCR for RNaseP is performed as part of the UCSD EXITE COVID-19 RT-PCR assay.

INSTRUMENT REQUIREMENTS

RT-PCR reactions are performed with the QuantStudio 7 Pro PCR Real Time PCR Instrument using the QuantStudio RealTime PCR Software v2.5. In addition, the RT-PCR procedure will use the following liquid handling systems to set up extraction and RT-PCR plates:

- Hamilton Microlab STAR liquid handler:
- Thermo Kingfisher Flex automated extraction instrument (for RNA extraction).

- Eppendorf epMotion 5075 liquid handler:
- Biotek Multiflo FX liquid dispenser:
- Thermo Kingfisher Flex automated extraction instrument:
- Agilent Bravo liquid handler
- SPT Labtech Mosquito HV (for RT-PCR reaction setup).
- SPT Labtech Mosquito X1 (for RT-PCR reaction setup).

REAGENTS AND MATERIALS

Components of UCSD EXCITE COVID-19 Sampling Kit:

- pre-packaged sterile anterior nares swab
- pre-filled collection tube containing 1.5 mL MAWI iSwab-Microbiome collection media
  A Masterfile was submitted by the manufacturer of the MAWI iSwab-Microbiome collection media and a Right-of-Reference Letter was provided to UCSD.
- specimen collection instructions " IFU_COVID_self-test_short swab"
- recyclable "clamshell" type of container

Samples are dropped off, not mailed. Therefore, there is no individual sample packaging and mailers.

Reagents and Materials of the UCSD EXCITE SARS-CoV-2 RT-PCR Test

Material ID	Vendor	Catalog #
MagMax Viral/Pathogen II (MVP II) Nucleic Acid Isolation kit	ThermoFisher	A48383
TaqPath COVID-19 Combo Kit	ThermoFisher	A47814
TaqPath 1-Step Multiplex Master Mix	ThermoFisher	A28523
RNase P (ATTO™ 647) Probe	IDT	10007062
Hs_RPP30 Control sequence	IDT	10006626

QUALITY CONTROLS

The UCSD EXITE COVID-19 RT-PCR assay incorporates the following controls:

1. Internal Positive Control (IPC) – The endogenously expressed human RNaseP gene. This endogenous control, which is naturally present in all human samples, ensures adequate sample collection, and adequate performance of the RNA extraction process, PCR assay reagents, and RNaseP Probe.
2. External positive control - TaqPath COVID-19 Control contains the SARS-CoV-2 RNA genomic regions targeted by the kit. This positive control is used to monitor for expected performance of the PCR assay reagents, and viral N/S/Orf1ab gene probes but does not contain RNase P. One positive control sample will be included with each plate.
3. No Viral Template Control - molecular-grade, nuclease-free, non-DEPC-treated water to which RPP30 plasmid is added and is used to monitor non-specific amplification, performance of the RNaseP probe, cross-contamination during experimental setup, and nucleic acid contamination of reagents. One negative control sample will be included on each plate.

INTERPRETATION OF RESULTS

Interpretation of Control Results

All control wells must pass for the patient results to be considered valid and acceptable. A positive result for a target is defined as a Cq < 37 based on the TaqPath COVID-19 Combo Kit IFU. Refer to the table below for a summary of control results. If the controls are not valid, the customer results cannot be interpreted.

Control Interpretation: Cq Values for Controls that Must Be Observed to Obtain Valid Results

	N gene	**S gene**	**Orf1ab**	**RNaseP**
External Positive Control	Cq<37	Cq<37	Cq<37	Undetermined* Cq>37
No Template Control	Undetermined Cq>37	Undetermined Cq>37	Undetermined Cq>37	Cq<35**
RNaseP Internal Control	Any Cq	Any Cq	Any Cq	Cq<35

Undetermined/Negative corresponds to Cq>37 or No Detectable Cq for the viral N, S, and Orf1ab genes, and Cq>35 or No Detectable Cq for RNaseP.

*RNaseP Control sequence is not added to the External Positive Control, and thus no signal for RNaseP should be present.

**RNaseP Control sequence is added to the No Template Control, and thus signal for RNaseP should be present.

Interpretation of Clinical Sample Results:

Assessment of clinical sample test results must be performed after the positive and negative controls have been examined and confirmed to be valid and acceptable. If the controls are not valid, the patient results cannot be interpreted, and a root cause investigation should be performed. Once the root case has been eliminated sample testing should be repeated. A Cq value of <37 is considered detected for the N gene, S gene, and Orf1ab gene; a Cq value of <35 is considered detected for RNase P. The assay interpretation and reporting of results is described in the table below.

Result Interpretation Clinical Samples

N gene	S gene	Orf1ab	RNaseP	Status	Result	Action
NEG	NEG	NEG	NEG	Invalid	Invalid	Repeat test. If repeat test is also invalid, consider collecting a new sample.
NEG	NEG	NEG	POS	Valid	SARS-CoV-2 Not Detected	Report results to healthcare provider. Consider testing for other viruses.
Only one SARS-CoV-2 target = POS			POS or NEG	Valid	SARS-CoV-2 Inconclusive	Repeat test. If repeat test is inconclusive, consider additional testing if clinically indicated.
Two or more SARS-CoV-2 targets = POS			POS or NEG	Valid	Positive for SARS-CoV-2	Report results to healthcare provider and appropriate public health authorities.

PERFORMANCE EVALUATION

1. Analytical Sensitivity (LoD)

The LoD was performed by spiking in gamma irradiated inactivated SARS-CoV-2 virus (SARS-Related Coronavirus 2, Isolate USA-WA1/2020, Gamma-Irradiated BEI Catalog No. NR-52287, Lot #70033322) in negative anterior nares clinical matrix in MAWI iSwab-Microbiome using a two-fold dilution series. Specifically, anterior nasal swabs were collected from healthy volunteers and placed into iSwab-Microbiome collection media (9 swabs) to create a negative matrix pool. Gamma irradiation inactivated SARS-CoV-2 virus was then added to each sample to the final concentrations indicated in the "Range Finding Study" section of the table below. RNA was extracted from each of these contrived samples and PCR was performed on the resulting RNA. Three extraction replicates were performed per concentration. The preliminary LoD was defined as the lowest concentration with 3 of 3 replicates that test positive which was 500 GCE/mL (=0.5 cp/µL) for samples collected in MAWI iSwab-Microbiome (see LoD Table).

To confirm reproducible detection at 1000 GCE/mL testing was performed by spiking in gamma irradiation inactivated SARS-CoV-2 virus (BEI NR-52287) in negative anterior nasal clinical matrix in iSwab-Microbiome collection media at 1000 GCE/mL (=1 cp/µL). Specifically, anterior nasal swabs were collected from healthy volunteers and placed into iSwab-Microbiome collection media (20 swabs). Gamma irradiation inactivated SARS-CoV-2 virus (BEI NR-52287) was then added to each sample to a final concentration of 1 cp/µL (as indicated in the "Confirmatory Study" section of the table below. 20 individual extraction replicates were tested.

LoD Study Results –Anterior Nares Swab Samples Collected in MAWI iSwab-Microbiome

Target Level* [cp/µL]	Valid tested replicates	SARS-CoV-2 Target 1 (N gene) Positive			SARS-CoV-2 Target 2 (Orf1ab) Positive			SARS-CoV-2 Target 3 (S-gene) Positive			Internal Control Positive (RNase P)			Final Detection Rate*
		n	Mean Ct	Detection Rate	n	Mean Ct	Detection Rate	n	Mean Ct	Detection Rate	n	Mean Ct	Detection Rate	
Range Finding Study														
1	3	3	31.18	3/3 100%	3	31.73	3/3 100%	3	30.42	3/3 100%	3	29.82	3/3 100%	3/3 (100%)
0.5	3	2	32.40	2/3 67%	3	32.71	3/3 100%	3	31.07	3/3 100%	3	29.22	3/3 100%	3/3 (100%)
0.25	**3**	**3**	**32.39**	**3/3 100%**	**3**	**32.94**	**3/3 100%**	**2**	**30.97**	**2/3 67%**	**3**	**30.47**	**3/3 100%**	**3/3 (100%)**
0.125	3	0	N/D	0/3 0%	3	33.42	3/3 100%	0	N/D	0/3 0%	3	31.39	3/3 100%	0*/3 (100%)
0.063	3	0	N/D	0/3 0%	1	33.68	1/3 33%	0	N/D	0/3 0%	3	30.58	3/3 100%	0*/3 (100%)
Confirmatory Study														
1	**20**	**20**	**31.0**	**20/20 100%**	**20**	**30.1**	**20/20 100%**	**20**	**30.0**	**20/20 100%**	**20**	**29.1**	**20/20 100%**	**20/20 (100%)**
0.5	20	9	31.8	9/20 45%	20	33.2	20/20 100%	12	30.1	12/20 60%	20	27.6	20/20 100%	14*/20 (70%)
0.25	20	2	32.1	2/20 10%	16	33.3	16/20 80%	10	30.1	10/20 50%	20	27.3	20/20 100%	10*/20 (50%)

* Final Detection Rate is based on the result interpretation for samples with only 1 of the 3 targets being detected. Samples with 1/3 positive targets have a result call of ‘inconclusive’ which is not considered a ‘positive’ result for determining the LoD.

The final LOD of the UCSD EXCITE COVID-19 Test per its result interpretation is 1 copy/µL (1000 copies/mL).

2. Inclusivity

The UCSD EXCITE COVID-19 Test utilizes the identical oligonucleotide sequences for the spike (S), nucleocapsid (N) and ORF 1ab regions as those used in the TaqPath COVID-19 Combo Kit. Inclusivity was assessed by Thermo Fisher Scientific as part of the EUA granted to this manufacturer for the TaqPath COVID-19 Combo Kit. A Right of Reference (RoR) Letter was provided by ThermoFisher granting the sponsor the right to include the inclusivity information into their EUA by reference.

3. Cross-Reactivity

Cross Reactivity was assessed by Thermo Fisher Scientific as part of the EUA granted to this manufacturer for the TaqPath COVID-19 Combo Kit. A Right of Reference (RoR) Letter was provided by ThermoFisher granting the sponsor the right to include the Cross-Reactivity information into their EUA by reference.

4. Fresh vs. Frozen Study

A study was performed to evaluate the performance of the EXCITE COVID-19 Test with fresh and frozen anterior nasal swab samples collected in MAWI iSwab-Microbiome media. Clinical samples were initially run fresh using the UCSD EXCITE COVID-19 Test. The remnants of these clinical samples were then stored at -80ºC, and then re-run using the same assay to produce the "frozen result." The results from the 30 positive and 30 negative samples are summarized below. Six of the 30 samples (20%) were low positive samples with Ct values above Ct 29.0. Comparability of Ct values for fresh and frozen samples in MAWI iSwab-Microbiome media are shown.

Summary Fresh vs Frozen Results from anterior nasal swab samples

Gene	a. Fresh		b. Frozen	
	Negative	Positive	Negative	Positive
N-gene	0/30	30/30	0/30	30/30
Orf1ab	0/30	30/30	0/30	30/30
S-Gene	0/30	28/30	0/30	28/30
RNaseP	30/30	27/30	30/30	30/30
Detection Rate	0/30 (0%)	30/30 (100%)	0/30 (0%)	30/30 (100%)

Comparability of fresh and frozen (-80 ºC) anterior nasal swab samples collected in iSwab-Microbiome – Difference in Ct [Fresh – Frozen]

	N	Orf1ab	S*	RP
Mean Difference	0.52	0.53	0.42	-2.16
Median Difference	0.64	0.53	0.36	0.15
SD	0.87	0.84	0.89	9.04
Min	-1.47	-1.44	-1.67	-30.01**
Max	2.39	2.47	2.30	10.80

* Two replicates were positive without S-Gene amplification and were excluded from the calculations in this column for the S-Gene target.

** Three replicates had no RNase P IC signal in the fresh testing but were high positive for SARS-CoV-2 with Cts around 16. After freezing the samples had similar Ct values for SARS-CoV-2 (i.e., no impact on SARS-CoV-2) but the samples also had RNase P amplification.

5. Clinical Performance

a. Performance in Suspected Individuals

The UCSD EXCITE COVID-19 Test was validated with fresh remnant patient clinical samples (anterior nares swab) collected in MAWI iSwab-Microbiome media. Samples were sequential positives and sequential negatives collected across a defined period of time and tested with the investigational device (Candidate Test).

The results with the UCSD EXITE COVID-19 Test were compared to the results of an EUA authorized highly sensitive RT-PCR test with 3 targets (S, N and Orf). Not all samples were tested with the EUA authorized comparator test.

The study included 30 selected subjects with Candidate Test positive results and all 30 subjects were positive by the comparator. Also, 30 subjects with Candidate Test negative results were selected, and all 30 subjects were negative by the comparator. 6 of the 30 positive samples (20%) qualified as being "low positive" samples as defined as having a median Ct values within three (3) Ct values of the comparator assay's LOD. Results are summarized in the table below.

Performance of the Test with Clinical Specimens Collected from Suspected Individuals in MAWI Collection Media.

		EUA Authorized Comparator Assay		**Total**
		Positive	**Negative**	
EXCITE COVID-19 Test	**Positive**	30	0	30
	Negative	0	30	30
	Total	30	30	60
PPA (95% CI)		100% (30/30)	(83.8*% - 100.0%)	
NPA (95% CI)		100% (30/30)	(88.7% - 100.0%)	

PPA: Positive Percent Agreement
NPA: Negative Percent Agreement
95% CI: 95% Confidence Interval
*Adjusted statistically to address the sampling scheme in the study design.

b. Performance in a Screening Population (Asymptomatic Individuals)

The following study was performed to support a claim for screening an asymptomatic population without risk factors and/or exposure. From UCSD back-to-school/work program, frozen remnant samples (prospectively collected and archived) collected in MAWI iSwab-Microbiome media over a defined period of time and tested using the UCSD EXCITE COVID-19 Test were included in this testing.

The study cohort consisted of 30 consecutively collected asymptomatic positive cases and 110 consecutive collected asymptomatic negative cases, all identified based on the UCSD EXCITE COVID-19 Test. However, the total number of tests performed over that time was 37,437. Out of these 37,437 samples, 155 positive results derived from individuals who admitted in the questionnaire to having symptoms of an upper respiratory infection. These 155 samples were excluded for a remaining intend-to-test cohort of 37,282 asymptomatic individuals representative of a screening population.

The number of Candidate Test Positive tests from asymptomatic individuals in this period was 30 and all were tested with a comparator test.

The number of Candidate Test Negative tests in this period was: 37,252 (negative rate: 99.12 %) out of which a fraction of 110 consecutive samples was send for comparator testing.

Inclusion criteria:

- Anterior nasal swab sample collected from person ≥18 years of age.
- Patient was asymptomatic at the time of sample collection.
- For positive cases: Positive COVID-19 test result from a CLIA-accredited PCR assay (the UCSD EXCITE COVID-19 Test).
- For negative controls: Negative COVID-19 test result from a CLIA-accredited PCR assay (the UCSD EXCITE COVID-19 Test).

Exclusion criteria: Not meeting the inclusion criteria.

Results from the UCSD EXCITE COVID-19 Test were compared to results from a highly sensitive EUA Authorized Comparator Assay and are summarized in the table below. All samples were RNase P positive.

Test Performance in an Asymptomatic Screening Population.

		EUA Authorized Comparator Assay		**Total**
		Positive	**Negative**	
EXCITE COVID-19 Test	**Positive**	29	1	30
	Negative	0	110	110
	Total	29	111	140
PPA (95% CI)		100% (29/29)	(48.6%* - 100.0%)	
NPA (95% CI)		99.1% (110/111)	(95.1%* - 99.8%)	

*Adjusted statistically to address the sampling scheme in the study design (see consult comments below this section).

6. Sample Stability / Transport Stability

The table below shows the time and temperature profiles of the stability studies that were performed. The time frame and temperatures well exceed the ranges of what the collected samples are likely to experience, as all of the collection sites are located in San Diego, samples are stored in temperature controlled locations and will be transported to the laboratory within 36 hours of collection.

Tested Temperature Profiles

	Summer Profile			**Winter Profile**		
Cycle Period	**Temperature**	**Cycle Period Hours**	**Total Time Hours**	**Temperature**	**Cycle Period Hours**	**Total Time Hours**
1	40°C	12	12	-20°C	12	12
2	22°C	4	16	18°C	4	16
3	40°C	2	18	-20°C	2	18
4	30°C	42	60	18°C	42	60
5	40°C	6	66	-20°C	6	66

The table below shows that while individual target genes drop out upon storage (particularly upon exposing the sample to the summer profile) 95% of samples at a 2x LoD concentration, and 100% of samples at the 10x LoD were detected in all temperature profiles.

Detection Results for MAWI Microbiome Media

	Control			Summer			Winter		
Gene	**Negative**	**2XLOD**	**10xLOD**	**Negative**	**2XLOD**	**10xLOD**	**Negative**	**2XLOD**	**10xLOD**
N-gene	0/10	19/20	10/10	0/10	27/30	10/10	0/10	28/30	10/10
Orf1ab	0/10	19/20	10/10	0/10	29/30	10/10	0/10	30/30	10/10
S-Gene	0/10	19/20	10/10	0/10	24/30	10/10	0/10	29/30	10/10
RNaseP	10/10	20/20	10/10	10/10	20/20	10/10	10/10	20/20	10/10
Detection Rate	0/10 (0%)	19/20* (95%)	10/10 (100%)	0/10 (0%)	29/30** (96.7%)	10/10 (100%)	0/10 (0%)	29/30* (96.7%)	10/10 (100%)

* Based on the combination of target results in the result interpretation algorithm, one replicate was not detected.
** Based on the combination of target results in the result interpretation algorithm, one replicate was indeterminate.

In addition, an analysis of the Cq values of the test samples demonstrated a difference in Cq values of equal or less than 2.2 cycles between the test and the control condition when exposed to summer conditions and equal or less than 1.9 cycles when exposed to winter conditions.

Given that samples will not be shipped but dropped off on the same day as sample collection into bins located in temperature-controlled areas, and are then transported locally within 36 hours in bins to the testing lab at least once per day, a final sample stability claim for the device of 66 hours at > 40°C or < 0°C is supported. Samples must be received by the laboratory within 36 hours.

7. Usability Studies

a. Observed Usability Study (Adults)

A 19-person self-collection study was performed on low-risk adults (>=18 years of age) to determine the usability of the instructions for adequate samples collected (using PCR for RNase P to detect endogenous human material) (see RNase P Detection table below). The only instruction provided to these participants was a written instruction sheet (earlier version of the IFU) and an instructional video (Video Anterior Nares Collection RTL).

Observed Usability Study Population - Demographics

Characteristic	**N**	**Percent of Population**
Total population (number)	19	
Age (yr)	4-14	0
	15-17	0
	>18	19
	Mean	43.21
	SD	12.17
	Range	28 - 69
Gender		
Female	N: 5	26.32%
Male	N: 14	73.68%

Characteristic	N	Percent of Population
Trans female	N: 0	0.00%
Trans male	N: 0	0.00%
Intersex	N: 0	0.00%
Other	N: 0	0.00%
Prefer not to answer	N: 0	0.00%
Do not know	N: 1	5.26%
Education level:		
No formal school	N: 0	0.00%
Elementary school	N: 0	0.00%
Middle school	N: 0	0.00%
High school	N: 3	15.79%
Some college	N: 4	21.05%
College Degree	N: 11	57.89%
Prefer not to answer	N:0	0.00%
Do not know	N: 1	5.26%

This shows that 19 out of 19 participants were able to self-collect an adequate sample with detectable RNaseP signal. Characteristics of the study population are shown in the demographics table below.

RNaseP Detection Results

# Samples RNAse P detected	# of Samples RNAse P not detected	Total # of Samples	Detection Rate (%)
19	19	19	19 /19 **(**100 **%)**

The following frequent Difficulties and failures were observed by the study staff. However, the failures were not considered critical because they were either artifacts of the study environment or were demonstrated to not impact the sample quality (i.e., RNase P detection):

- Sanitize Hands prior to start (37% Failure Rate)
- Scanning the tube's barcode prior to collection (21% Failure Rate)
- Making the exact number of rotations with the swab in the nostril (26% Failure Rate)
- Sanitizing Hands after the procedure (53% Failure Rate)
- Removal of the absorbent pad (37% Failure Rate)

Per the Post-Collection Survey individuals generally understood the different steps of the collection instructions, including where to turn for questions. Individuals also understood that if they did not follow the procedure exactly, they might get a false result. In contrast to the observations by study staff, most participants answered "yes" to the questions whether they sanitized their hands indicating that this instruction step was deliberately ignored and cannot be mitigated by additional labeling.

b. Unobserved Usability Study (Adults)

A 56-person self-collection study was performed on low-risk adults (>=18 years of age) to determine the rate of adequate samples collected (using RT-PCR for RNase P to detect endogenous human material). The only instruction provided to these participants was a written instruction sheet and an instructional video. Participant demographics are included in the table below.

Unobserved Usability Study Population – Age Distribution

Characteristic	N	Percent of Population
Total Population	56	
Age (yr)		
4-14	0	0
15-17	0	0
18-20	6	10.7%
21-30	33	58.9%
31-50	12	21.4%
>51	5	8.9%
Mean	**27.9 years**	
Range	**18-67 years of age**	

The study demonstrated that 55 out of 56 participants were able to self-collect an adequate sample with detectable RNaseP signal (see RNase P result table below).

RNaseP Detection Results

# Samples RNAse P detected	# of Samples RNAse P not detected	Total # of Samples	Detection Rate (%)
55	**1**	**56**	**55/56 (98%)**

c. Real-World Usability

In addition, RNaseP in self-collected (12 years old and up) and adult-collected (under 12 years old) samples (without health-care provider observation) was compiled from real-world clinical testing.

Real World Evidence – Age Distribution

Characteristic	N	Percent of Population	Inconclusive*		Invalid	
			n	Rate in Age Group [%]	n	Rate in Age Group [%]
Total Population	124,320		151	0.12	990	0.8
Age (yr)						
<5	1,044	0.8	1	0.10	13	1.2
6-11	7,099	5.7	9	0.15	49	0.7
12-15	6,685	5.4	8	0.12	55	0.8
16-17	4,715	3.8	4	0.08	34	0.7
18-20	35,439	28.5	43	0.12	295	0.8
21-30	46,197	37.2	54	0.12	367	0.8
31-40	9,867	7.9	12	0.12	81	0.8
41-50	5,767	4.6	7	0.12	34	0.6
51-60	5,228	4.2	7	0.13	36	0.7
61-70	2,020	1.6	5	0.25	24	1.2
71-83	258	0.2	1	0.39	2	0.8

* Only one of three targets positive

Results are provided below. This shows that there is no significant differences in the proportion of positive (detected), inconclusive, invalid, and negative (not detected) test results for patients 0-3 years of age, 4-14 yo, 15-17 yo, and >=18 years of age.

UCSD EXCITE COVID-19 Test Results in Clinical Samples (5 Months Data)

Total number of tests, all ages	**124,319**
Number of positive (does not matter what Rp is)	**257**
Percent positive tests	0.21%
Number of negative tests (tests that should have detectable Rp)	**122,920**
Percent negative tests	98.87%
Number of inconclusive tests (does not matter what Rp is)	**151**
Percent inconclusive tests	0.12%
Number of invalid tests (tests that should have detectable Rp)	**991**
Percent invalid tests	0.80%
Total number of tests, <4 yo	**301**
Number of positive (does not matter what Rp is)	**0**
Percent positive tests	0.00%
Number of negative tests (tests that should have detectable Rp)	**296**
Percent negative tests	98.34%
Number of inconclusive tests (does not matter what Rp is)	**1**
Percent inconclusive tests	0.33%
Number of invalid tests (tests that should have detectable Rp)	**4**
Percent invalid tests	1.33%

WARNINGS:

- For Emergency Use Authorization (EUA) only.
- For in vitro diagnostic use.
- This product has not been FDA cleared or approved, but has been authorized for emergency use by FDA under an EUA for use by the authorized laboratory.
- This product has been authorized only for the detection of nucleic acid from SARS-CoV-2, not for any other viruses or pathogens.
- The emergency use of this product 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 Cosmetics Act, 21 U.S.C. § 360bbb-3(b)(1), unless the declaration is terminated or authorization is revoked sooner.
- The solution in the collection tube contains hazardous ingredients. if the solution contacts the skin or eye, flush with plenty of water.

LMITATIONS:

1. The use of this assay as an *in vitro* diagnostic under FDA Emergency Use Authorization (EUA) is limited to a single laboratory that is certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. § 263a, and meets requirements perform high complexity tests.
2. This kit is used for the qualitative detection of SARS-CoV-2 RNA from human nasal swab samples. The results cannot directly reflect the viral load in the original sample.

3. The UCSD EXCITE COVID-19 Test performance has only been established with the sample types described in the Intended Use section. Testing other types of samples may cause inaccurate results.
4. Extraction and amplification of nucleic acid from clinical samples must be performed as specified in the methods listed in the Laboratory SOP. Other extraction approaches and processing systems have not been evaluated.
5. A false negative result may occur if a specimen is improperly collected, transported, stored or processed. False negative results may also occur if amplification inhibitors are present in the specimen or if inadequate numbers of organisms are present in the specimen.
6. Negative results do not preclude SARS-CoV-2 infections and should not be used as the sole basis for treatment or other management decisions.
7. Results from the UCSD EXCITE COVID-19 RT-PCR test should be used as an adjunct to clinical observations and other information available to the physician. The result is only for clinical reference, and the clinical management of patients should be considered in combination with their symptoms/signs, history, other laboratory tests and treatment responses.
8. This test cannot rule out diseases caused by other bacterial or viral pathogens.
9. The impacts of vaccines, antiviral therapeutics, antibiotics, chemotherapeutics, or immunosuppressant drugs have not been evaluated.
10. Laboratories are required to report all negatives and positive results to the appropriate public health authorities.
11. The performance of this test was established based on the evaluation of a limited number of clinical specimens. Clinical performance has not been established with 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.