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WHAT IS MOST IMPORTANT: PERHAPS: Abbott's system detects low levels of RNA, using upper-respiratory samples from nasopharyngeal or oropharyngeal swabs, many microorganisms don't make it past the upper respiratory tract, same kind of “amplification” methodology LabCorp and Quest are using, ............ Amplification of the three targets (SARS-CoV-2 RdRp, SARS-CoV-2 N, and IC) takes place simultaneously in the same reaction. They did tests for false positives and false negatives for a whole array of viruses, including 4 basic coronaviruses, SARS, MERS, 3 influenza viruses and 4 parainfluenza viruses, 3 types of Streptococcus, a number of other viruses that can cause the common cold or pneumonia, and even Candida albicans. I don't know what the significance of this means but does it mean there can be that much cross-reactions in tests?

The Abbott RealTime SARS-CoV-2 assay is real-time reverse transcription polymerase chain reaction (rRT-PCR) test on the Abbott m2000 System. The SARS-CoV-2 primer and probe sets are designed to detect RNA from SARS-CoV-2 in nasopharyngeal and oropharyngeal swabs from patients with signs and symptoms of infection who are suspected of COVID-19. ............ PubMed: The reverse transcription - polymerase chain reaction (RT-PCR) is a sensitive technique for the quantification of steady-state mRNA levels, particularly in samples with limited quantities of extracted RNA, or for analysis of low level transcripts. The procedure amplifies defined mRNA transcripts by taking advantage of retroviral enzymes with reverse transcriptase (RT) activity, coupled to PCR. The resultant PCR product concentration is directly proportional to the initial starting quantity of mRNA, therefore allowing quantification of gene expression by incorporation of a fluorescence detector for the appropriate amplicons ............ A primary transcript is the single-stranded ribonucleic acid (RNA) product synthesized by transcription of DNA, and processed to yield various mature RNA products such as mRNAs, tRNAs, and rRNAs. The primary transcripts designated to be mRNAs are modified in preparation for translation. ...... Transcription is the process by which the information in a strand of DNA is copied into a new molecule of messenger RNA (mRNA), [however, that's a natural process; the tests do this chemically] The Abbott RealTime SARS-CoV-2 assay consists of 2 reagent kits:

• Abbott RealTime SARS-CoV-2 Amplification Reagent Kit

Instructions for Use
INTRODUCTION
This Emergency Use Authorization (EUA) package insert must be read carefully prior to use. EUA package insert instructions must be followed accordingly. Reliability of EUA assay results cannot be guaranteed if there are any deviations from the instructions in this package insert.

NAME
Abbott RealTime SARS-CoV-2

INTENDED USE
The Abbott RealTime SARS-CoV-2 assay is a real-time (rt) reverse transcriptase (RT) polymerase chain reaction (PCR) test intended for the qualitative detection of nucleic acid from the SARS-CoV-2 in nasopharyngeal (NP) and oropharyngeal (OP) swabs from patients suspected of COVID-19 by their health care provider. Testing is limited to laboratories certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, to perform high complexity tests.

Results are for the identification of SARS-CoV-2 RNA. The SARS-CoV-2 RNA is generally detectable in nasopharyngeal and oropharyngeal swabs 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. Laboratories within the United States and its territories are required to report all positive 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 Abbott RealTime SARS-CoV-2 assay is intended for use by qualified and trained clinical laboratory personnel specifically instructed and trained in the techniques of real-time PCR and in vitro diagnostic procedures. The Abbott RealTime SARS-CoV-2 assay is only for use under the Food and Drug Administration’s Emergency Use Authorization.

SUMMARY AND EXPLANATION OF THE TEST
The Abbott RealTime SARS-CoV-2 assay is a real-time reverse transcription polymerase chain reaction (rRT-PCR) test on the Abbott m2000 System. The SARS-CoV-2 primer and probe sets are designed to detect RNA from SARS-CoV-2 in nasopharyngeal and oropharyngeal swabs from patients with signs and symptoms of infection who are suspected of COVID-19.

BIOLICAL PRINCIPLES OF THE PROCEDURE
The Abbott RealTime SARS-CoV-2 assay consists of 2 reagent kits:
- • Abbott RealTime SARS-CoV-2 Amplification Reagent Kit
- • Abbott RealTime SARS-CoV-2 Control Kit

The Abbott RealTime SARS-CoV-2 assay is a dual target assay for the RdRp and N genes. An RNA sequence that is unrelated to the SARS-CoV-2 target sequence is introduced into each specimen at the beginning of sample preparation. This unrelated RNA sequence is simultaneously amplified by RT-PCR and serves as an internal control (IC) to demonstrate that the process has proceeded correctly for each sample.

The Abbott RealTime SARS-CoV-2 assay detects the SARS-CoV-2 virus and IC target sequences through the use of target-specific fluorescent-labeled oligonucleotide probes. The probes do not generate a signal unless they are specifically bound to the amplified product. The two SARS-CoV-2-specific probes are labeled with the same fluorophore and the IC-specific probe is labeled with a different fluorophore, thus allowing for simultaneous detection of both SARS-CoV-2 and IC amplified products in the same reaction well.

The Abbott RealTime SARS-CoV-2 assay is performed on the Abbott m2000 System consisting of a sample preparation unit, the Abbott m2000sp, and an amplification and detection unit, the Abbott m2000rt. Application parameters specific to the Abbott RealTime SARS-CoV-2 assay are contained on an assay-specific application specification file, distributed electronically, stored on portable media and loaded onto the Abbott m2000sp and Abbott m2000rt instruments.

Sample Preparation
The Abbott m2000sp provides automated sample preparation using a magnetic microparticle-based protocol and reagents (Abbott mSample Preparation Systemsp) to process 0.5 mL samples from nasopharyngeal and oropharyngeal swabs.

During the sample preparation protocol, SARS-CoV-2 virions are disrupted by guanidine isothiocyanate, nucleic acids are captured on the magnetic microparticles, and inhibitors and unbound sample components are removed by washing steps. The bound nucleic acids are eluted off the microparticles with buffer and transferred to a 96 deep-well plate. The nucleic acids are then ready for amplification. The Internal Control (IC) is introduced into each specimen at the beginning of the sample preparation process to demonstrate that the process was completed correctly for each specimen and control. A positive control and a negative control are processed from the start of sample preparation for each test order to evaluate run validity.

The purpose of sample preparation is to extract and concentrate the target nucleic acids (DNA and RNA) molecules to make the target accessible for amplification, and to remove potential inhibitors of amplification from the extract.

The Abbott mSample Preparation Systemm uses magnetic particle technology to capture nucleic acids and washes the particles to remove unbound sample components. The bound nucleic acids are eluted and transferred to output tubes or a 96 deep-well plate. The nucleic acids are then ready for amplification. The IC is taken through the entire sample preparation procedure along with the controls and specimens.

The Abbott m2000sp automated instrument system is used to prepare samples for the Abbott RealTime SARS-CoV-2 assay. The Abbott m2000sp provides automated sample eluate transfer and reaction assembly in the Abbott 96-Well Optical Reaction Plate.

Reagent Preparation and Reaction Plate Assembly
The Abbott m2000sp combines the Abbott RealTime SARS-CoV-2 assay amplification reagent components (SARS-CoV-2 Oligonucleotide Reagent, Thermstable rTh Polymerase Enzyme, and Activation Reagent). The Abbott m2000sp dispenses the resulting master mix to the Abbott 96-Well Optical Reaction Plate along with aliquots of the nucleic acid samples prepared by the Abbott m2000sp. The plate is ready, after manual application of the optical seal, for transfer to the Abbott m2000rt.

Amplification
During the amplification reaction on the Abbott m2000rt, the target RNA is converted to cDNA by the reverse transcriptase activity of the thermostable rTh DNA polymerase. First, the SARS-CoV-2 and IC reverse primers anneal to their respective targets and are extended during a prolonged incubation period. After a denaturation step, in which the temperature of the reaction is raised above the melting point of the double-stranded cDNA:RNA product, a second primer anneals to the cDNA strand and is extended by the DNA polymerase activity of the rTh enzyme to create a double-stranded DNA product.

During each round of thermal cycling, amplification products dissociate to single strands at high temperature allowing primer annealing and extension as the temperature is lowered. Exponential amplification of the product is achieved through repeated cycling between high and low temperatures, resulting in a billion-fold or greater amplification of target sequences. Amplification of the three targets (SARS-CoV-2 RdRp, SARS-CoV-2 N, and IC) takes place simultaneously in the same reaction.
The target sequences for the Abbott RealTime SARS-CoV-2 assay are in the SARS-CoV-2 RdRp and N genes of the SARS-CoV-2 genome. The selected target sequences are highly conserved and also specific to this strain of coronavirus.

The IC target sequence is derived from the hydroxyprolyl reductase gene from the pumpkin plant, Cucurbita pepo, and is delivered in an Armored RNA® particle that has been diluted in negative human plasma.

Detection

During the read cycles of amplification on the Abbott m2000rt, the temperature is lowered further to allow fluorescent detection of amplification products as the SARS-CoV-2 and IC probes anneal to their targets (real-time fluorescence detection). The SARS-CoV-2 probes have a fluorescent moiety that is covalently linked to the 5’ end and has a quencher molecule at its 3’ end. In the absence of target sequences, the probes adopt a conformation that brings the quencher close enough to the excited fluorophore to absorb its energy before it can be fluorescently emitted. When the probe binds to its complementary sequence in the target, the fluorophore and the quencher are held apart, allowing fluorescent emission and detection. The IC probe is a single-stranded DNA oligonucleotide with a fluorophore at the 5’ end and a quencher at the 3’ end. In the absence of IC target sequences, probe fluorescence is quenched. In the presence of IC target sequences, probe hybridization to complementary sequences separates the fluorophore and the quencher and allows fluorescent emission and detection. The SARS-CoV-2 and IC specific probes are each labeled with a different fluorophore, thus allowing for simultaneous detection of both amplified products.

PREVENTION OF NUCLEIC ACID CONTAMINATION

The possibility of nucleic acid contamination is minimized because:

- Reverse transcription, PCR amplification, and oligonucleotide hybridization occur in a sealed Abbott 96-Well Optical Reaction Plate.
- Detection is carried out automatically without the need to open the Abbott 96-Well Optical Reaction Plate.
- Pipettes with aerosol barrier tips or disposable transfer pipettes are used for all pipetting. The disposable pipettes or pipette tips are discarded after use.
- Separate, dedicated areas are used to perform the Abbott RealTime SARS-CoV-2 assay. Refer to the SPECIAL PRECAUTIONS section of this package insert.

REAGENTS

Abbott RealTime SARS-CoV-2 Amplification Reagent Kit (List No. 09N77-095)

1. Abbott RealTime SARS-CoV-2 Internal Control
   (4 vials, 1.2 mL per vial)
   - < 0.01% noninfectious Armored RNA with internal control sequences in negative human plasma. Negative human plasma tested and found to be non-reactive by appropriate FDA-licensed, approved, or cleared tests for antibody to HCV, antibody to HIV-1, antibody to HIV-2, HIV-1 Ag, HBsAg, and Syphilis. The material is also tested and found to be negative by appropriate FDA-licensed, approved, or cleared PCR methods for HIV RNA, HCV RNA, and HBV DNA. Preservatives: 0.1% ProClin® 300 and 0.15% ProClin 950.

2. Abbott RealTime SARS-CoV-2 Amplification Reagent Pack (List No. 9N77)
   (4 packs, 24 tests/pack)
   - 1 bottle (0.141 mL) Thermostable rTth Polymerase Enzyme (2.9 to 3.5 Units/µL) in buffered solution.
   - 1 bottle (1.0 mL) SARS-CoV-2 Amplification Reagent containing synthetic oligonucleotides (6 primers and 3 probes), and dNTPs in a buffered solution with a reference dye. Preservative: 0.10% ProClin 300 and 0.15% ProClin 950.
   - 1 bottle (0.400 mL) Activation Reagent. 50 mM manganese chloride solution. Preservatives: 0.10% ProClin 300 and 0.15% ProClin 950.

Abbott RealTime SARS-CoV-2 Control Kit (List No. 09N77-085)

1. Abbott RealTime SARS-CoV-2 Negative Control
   (8 vials, 1.3 mL per vial) Contains 1.0% ammonium sulfate and 7.9% detergent in a buffer solution.

2. Abbott RealTime SARS-CoV-2 Positive Control
   (8 vials, 1.3 mL per vial) Contains non-infectious, recombinant Sindbis virus containing SARS-CoV-2 RNA sequences, 1.0% ammonium sulfate, and 7.9% detergent in a buffer solution.

WARNINGS AND PRECAUTIONS

For Use Under An Emergency Use Authorization Only. This assay is only for in vitro diagnostic use under the FDA Emergency Use Authorization. For Prescription Use Only.

Safety Precautions

Refer to the Abbott m2000sp and Abbott m2000rt Operations Manuals, Hazard Section, for instructions on safety precautions. Important information regarding the safe handling, transport and disposal of this product is contained in the Safety Data Sheet.

**CAUTION:** This preparation contains human sourced and/or potentially infectious components. Components sourced from human blood have been tested and found to be nonreactive by appropriate FDA-licensed, approved, or cleared tests for antibody to HCV, antibody to HIV-1, antibody to HIV-2, HIV-1 Ag, HBsAg, and Syphilis. The material is also tested and found to be negative by appropriate FDA-licensed, approved, or cleared PCR methods for HIV RNA, HCV RNA, and HBV DNA. No known test method can offer complete assurance that products derived from human sources or inactivated microorganisms will not transmit infection. These reagents and human specimens should be handled as if infectious using laboratory safety procedures, such as those outlined in Biosafety in Microbiological and Biomedical Laboratories,1 OSHA Standards on Bloodborne Pathogens,2 CLSI Document M29-A4, and other appropriate biosafety practices. Therefore all human sourced materials should be considered infectious. These precautions include, but are not limited to, the following:

- Wear gloves when handling specimens or reagents.
- Do not pipette by mouth.
- Do not eat, drink, smoke, apply cosmetics, or handle contact lenses in areas where these materials are handled.
- Clean and disinfect spills of specimens by including the use of a tuberculocidal disinfectant such as 1.0% sodium hypochlorite or other suitable disinfectant.1
- Decontaminate and dispose of all potentially infectious materials in accordance with local, state, and federal regulations.4

Components of the Abbott RealTime SARS-CoV-2 Internal Control, Oligonucleotide Reagent, and Activation Reagent contain the following components:
2-Methyl-4-isothiazol-3-one:
- Reaction mass of: 5-chloro-2-methyl-4-isothiazolin-3-one (EC no. 247-500-7) and 2-methyl-2H-isothiazol-3-one (EC no. 220-239-6)(3:1)
- Reaction mass of: 5-chloro-2-methyl-4-isothiazolin-3-one (EC no. 247-500-7) and 2-methyl-4-isothiazolin-3-one (EC no. 220-239-6)(3:1)

Potassium Hydroxide

The following warning applies:

<table>
<thead>
<tr>
<th>Warning</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H315</td>
<td>Causes skin irritation.</td>
</tr>
<tr>
<td>H319</td>
<td>Causes serious eye irritation.</td>
</tr>
<tr>
<td>H37</td>
<td>May cause an allergic skin reaction.</td>
</tr>
<tr>
<td>H402</td>
<td>Harmful to aquatic life.*</td>
</tr>
<tr>
<td>P261</td>
<td>Avoid breathing mist/vapors/spray.</td>
</tr>
<tr>
<td>P264</td>
<td>Wash hands thoroughly after handling.</td>
</tr>
<tr>
<td>P272</td>
<td>Contaminated work clothing should not be allowed out of the workplace.</td>
</tr>
<tr>
<td>P280</td>
<td>Wear protective gloves/protective clothing/eye protection.</td>
</tr>
<tr>
<td>P273</td>
<td>Avoid release to the environment.</td>
</tr>
<tr>
<td>P302</td>
<td>IF ON SKIN: Wash with plenty of water.</td>
</tr>
<tr>
<td>P333</td>
<td>If skin irritation or rash occurs: Get medical advice/attention.</td>
</tr>
<tr>
<td>P362</td>
<td>Take off contaminated clothing and wash before reuse.</td>
</tr>
<tr>
<td>P305</td>
<td>IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</td>
</tr>
<tr>
<td>P337</td>
<td>If eye irritation persists: Get medical advice/attention.</td>
</tr>
<tr>
<td>P501</td>
<td>Dispose of contents/container in accordance with local regulations.</td>
</tr>
</tbody>
</table>

* Not applicable where regulation EC 1272/2008 (CLP) has been implemented.

Important information regarding the safe handling, transport, and disposal of this product is contained in the Safety Data Sheet. Safety Data Sheets are available from your Abbott Representative.

**SPECIAL PRECAUTIONS**

As with any test procedure, good laboratory practice is essential to the proper performance of this assay. Due to the high sensitivity of this test, care should be taken to keep reagents and amplification mixtures free of contamination.

- For in vitro diagnostic use under Emergency Use Authorization only.
- Positive results are indicative of the presence of SARS-CoV-2 RNA.
- Laboratories within the United States and its territories are required to report all positive results to the appropriate public health authorities.
- All patient samples should be handled as if infectious, using good laboratory procedures as outlined in Biosafety in Microbiological and Biomedical Laboratories1 and in the CLSI Document M29-A4.  Only personnel proficient in handling infectious materials and the use of the Abbott RealTime SARS-CoV-2 assay and the Abbott m2000 System should perform this procedure.

**Handling Precautions for Specimens**

- The Abbott RealTime SARS-CoV-2 assay is only for use with nasopharyngeal and oropharyngeal swabs that have been handled and stored as described in the SPECIMEN COLLECTION, STORAGE, AND TRANSPORT TO THE TEST SITE section.
- Inadequate or inappropriate specimen collection, storage, and transport are likely to yield false test results. Training in specimen collection is highly recommended due to the importance of specimen quality. Refer to CLSI MM13-A5 as an appropriate resource.
- During preparation of samples, compliance with good laboratory practices is essential to minimize the risk of cross-contamination between samples and the inadvertent introduction of ribonucleases (RNases) into samples during and after the extraction procedure.
- Proper aseptic technique should always be used when working with RNA.
- Amplification technologies such as PCR are sensitive to accidental introduction of product from previous amplification reactions. Incorrect results could occur if either the clinical specimen or the reagents used become contaminated by accidental introduction of even a few molecules of amplification product. Measures to reduce the risk of contamination in the laboratory include physically separating the activities involved in performing PCR in compliance with good laboratory practices.

**Work Areas**

The m2000sp and the m2000rt instruments may be operated in the same location. The use of 2 dedicated areas (Sample Preparation Area and Amplification Area) within the laboratory is recommended when performing the Abbott RealTime SARS-CoV-2 assay. The Sample Preparation Area is dedicated to processing samples (specimens and Abbott RealTime SARS-CoV-2 Controls) and to adding processed samples and controls to the 96-Well Optical Reaction Plate. All reagents used in the Sample Preparation Area should remain in this dedicated area at all times. Laboratory coats, pipettes, pipette tips, and vortexers used in the Sample Preparation Area must remain in this area and not be moved to the Amplification Area. Do not bring amplification product into the Sample Preparation Area.

The Amplification Area is dedicated to the amplification and detection of amplified product. Laboratory coats and equipment used in the Amplification Area must remain in this area and not be moved to the Sample Preparation Area.

- Components contained within a kit are intended to be used together. Do not mix components from different kit lots. For example, do not use the negative control from control kit lot X with the positive controls from control kit lot Y.
- Do not use kits or reagents after the expiration dates shown on kit labels.
- Work area and instrument platforms must be considered potential sources of contamination. Change gloves after contact with potential contaminants (specimens, eluates, and/or amplified product) before handling unopened reagents, negative control, positive controls, or specimens. Refer to the Abbott m2000sp and Abbott m2000rt Operations Manuals for instrument cleaning procedures.
- If the Abbott m2000sp instrument run is aborted, dispose of all commodities and reagents according to the Abbott m2000sp Operations Manual.
- If the Abbott m2000sp master mix addition protocol is aborted, seal the Abbott 96-Well Optical Reaction Plate in a sealable plastic bag and dispose according to the Abbott m2000sp Operations Manual, Hazards section, along with the gloves used to handle the plate.

Refer to the Abbott m2000sp and Abbott m2000rt Operations Manuals for instrument cleaning procedures.
• If the Abbott m2000rt instrument run is interrupted or aborted, seal the Abbott 96-Well Optical Reaction Plate in a sealable plastic bag and dispose according to the Abbott m2000rt Operations Manual along with the gloves used to handle the plate.
• Decontaminate and dispose of all potentially biohazardous materials in accordance with local, state, and federal regulations.4 All materials should be handled in a manner that minimizes the chance of potential contamination of the work area.

NOTE: Autoclaving the sealed Reaction Plate will not degrade the amplified product and may contribute to the release of the amplified product by opening the sealed plate. The laboratory area can become contaminated with amplified product if the waste materials are not carefully handled and contained.

Aerosol Containment
To reduce the risk of nucleic acid contamination due to aerosols formed during manual pipetting, aerosol barrier pipette tips must be used for all manual pipetting. The pipette tips must be used only 1 time. Clean and disinfect spills of specimens and reagents as stated in the Abbott m2000sp and Abbott m2000rt Operations Manuals.

Contamination and Inhibition
The following precautions should be observed to minimize the risks of RNase contamination, cross-contamination between samples, and inhibition:
• Wear appropriate personal protective equipment at all times.
• Use powder-free gloves.
• Change gloves after having contact with potential contaminants (such as specimens, eluates, and/or amplified product).
• To reduce the risk of nucleic acid contamination due to aerosols formed during pipetting, pipettes with aerosol barrier tips must be used for all pipetting. The length of the tip should be sufficient to prevent contamination of the pipette barrel. While pipetting, care should be taken to avoid touching the pipette barrel to the inside of the sample tube or container. The use of extended aerosol barrier pipette tips is recommended.
• Change aerosol barrier pipette tips between ALL manual liquid transfers.
• The Abbott mSample Preparation SystemDNA reagents are single use only. Use new reagent troughs or vessels, reaction vessels, and newly opened reagents for every new Abbott RealTime SARS-CoV-2 assay run. At the end of each run, discard all remaining reagents from the worktable as stated in the Abbott m2000sp Operations Manual and the Abbott mSample Preparation SystemDNA product information sheet.

STORAGE INSTRUCTIONS
Abbott RealTime SARS-CoV-2 Amplification Reagent Kit (List No. 09N77-095)
-25°C 

Abbott RealTime SARS-CoV-2 Control Kit (List No. 09N77-085)

-25°C 

SHIPPING CONDITIONS
• Abbott RealTime SARS-CoV-2 Amplification Reagent Kit: Ship on dry ice.
• Abbott RealTime SARS-CoV-2 Control Kit: Ship on dry ice.

If you receive reagents that are in a condition contrary to label recommendation, or that are damaged, contact your Abbott Representative.

INDICATION OF INSTABILITY OR DETERIORATION OF REAGENTS
When a positive or negative control value is out of the expected range, it may indicate deterioration of the reagents. Associated test results are invalid and samples must be retested.

SPECIMEN COLLECTION, STORAGE, AND TRANSPORT TO THE TEST SITE
Specimen Collection and Storage
Human nasopharyngeal and oropharyngeal swab specimens may be used with the Abbott RealTime SARS-CoV-2 assay. Refer to the CDC Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons Under Investigation (PUIs) for Coronavirus Disease 2019 (COVID-19)4 https://www.cdc.gov/coronavirus/2019-ncov/lab/guidelines-clinical-specimens.html

Specimen Transport
For domestic and international shipments, specimens must be packaged, shipped, and transported according to the current edition of the International Air Transport Association (IATA) Dangerous Goods Regulation. Follow shipping regulations for UN 3373 Biological Substance, Category B when sending potential SARS-CoV-2 specimens.

INSTRUMENT PROCEDURE
The Abbott RealTime SARS-CoV-2 application specification files must be installed on the Abbott m2000sp and Abbott m2000rt instruments from the Abbott RealTime SARS-CoV-2 Application Specification (List No. 09N77-010) prior to performing the assay. For a detailed description of how to perform an Abbott m2000sp instrument and Abbott m2000rt instrument protocol, refer to the Abbott m2000sp and Abbott m2000rt Operations Manuals, Operating Instructions sections.

ABBOTT REALTIME SARS-COV-2 ASSAY PROCEDURE
This package insert contains instructions for running the Abbott RealTime SARS-CoV-2 assay.

Materials Provided
• Abbott RealTime SARS-CoV-2 Amplification Reagent Kit (List No. 09N77-095)
• Abbott RealTime SARS-CoV-2 Control Kit (List No. 09N77-085)

Materials Required But Not Provided
• Abbott mSample Preparation SystemDNA (List No. 06K12-24)
• Abbott RealTime SARS-CoV-2 Application Specification (List No. 09N77-010)

Sample Preparation Area
• Abbott m2000sp Instrument (m2000sp software version 8.1 or higher)
• Abbott m2000sp Operations Manual (List No. 09K20-009 or higher)
• Abbott mSample Preparation SystemDNA (List No. 06K12-24)
• Abbott RealTime SARS-CoV-2 Application Specification (List No. 09N77-010)
• 5 mL Reaction Vessels (12 x 75 mm) (List No. 4J71-20)
• Master Mix Tubes (List No. 04J71-80)
• Amplification Reagent Pack Caps (List No. 3N20-01) (Optional)
• Transport Tubes (List No. 04J71-90)
• 200 mL Reagent Vessels (List No. 4J71-60)
• Abbott 96-Well Optical Reaction Plate (List No. 04J71-70)
• Abbott 96-Deep-Well Plate (List No. 04J71-30)
• Abbott Splash-Free Support Base (List No. 09K31-01)
• 200 μL and 1000 μL Disposable Tips for Abbott m2000sp (List No. 4J71-17 and 4J71-10)
• Abbott Optical Adhesive Cover (List No. 04J71-75)
• Abbott Adhesive Cover Applicator (List No. 9K32-01)
• Waste bags (List No. 3N17-01)
• Biohazard bags (List No. 4J71-45)
• Sample racks
• Vortex mixer
• USP Grade 190 to 200 Proof Ethanol (95 to 100% Ethanol). Do not use ethanol that contains denaturants.
• Calibrated precision pipettes capable of delivering 20 μL to 1000 μL
• 20 μL to 1000 μL aerosol barrier pipette tips for precision pipettes.

Other Materials
• Biological safety cabinet approved for working with infectious materials
• Sealable plastic bags
• RNase-free water (Eppendorf or equivalent)
• 1.7 mL molecular biology grade microcentrifuge tubes (Dot Scientific, Inc. or equivalent)
• Cotton Tip Applicators (Puritan or equivalent)

† Note: These 3 items are used in the procedure for Monitoring the Laboratory for the Presence of Contamination. Refer to the QUALITY CONTROL PROCEDURES section of this package insert.

Amplification Area
• Abbott m2000rt Instrument (m2000rt software version 8.1 or higher)
• Abbott m2000rt Operations Manual (List No. 09N03-009 or higher)
• Abbott RealTime SARS-CoV-2 Application Specification (List No. 09N77-010)
• Abbott m2000rt Optical Calibration Kit (List No. 4J71-93)

Other Materials
• Sealable plastic bags

Procedural Precautions
• Read the instructions in this package insert carefully before processing samples.
• The Abbott RealTime SARS-CoV-2 Negative Control and Positive Control vials are intended for single-use only and should be discarded after use.
• Use aerosol barrier pipette tips or disposable pipettes only one time when pipetting specimens, IC, or amplification reagents. To prevent contamination to the pipette barrel while pipetting, care should be taken to avoid touching the pipette barrel to the inside of the sample tube or container. The use of extended aerosol barrier pipette tips is recommended.
• Monitoring procedures for the presence of amplification product can be found in the QUALITY CONTROL PROCEDURES section in this package insert.
• To reduce the risk of nucleic acid contamination, clean and disinfect spills of specimens by including the use of a tuberculocidal disinfectant such as 1.0% sodium hypochlorite or other suitable disinfectant.
• The Abbott RealTime SARS-CoV-2 Controls must be prepared in conjunction with the specimens to be tested. The use of the Abbott RealTime SARS-CoV-2 Controls is integral to the performance of the Abbott RealTime SARS-CoV-2 assay. Refer to the QUALITY CONTROL PROCEDURES section of this package insert for details.

ASSAY PROTOCOL
For a detailed description of how to perform an Abbott m2000sp instrument and Abbott m2000rt instrument protocol, refer to the Abbott m2000sp and Abbott m2000rt Operations Manuals, Operating Instructions sections. Laboratory personnel must be trained to operate the Abbott m2000sp and Abbott m2000rt instruments. The operator must have a thorough knowledge of the applications run on the instruments and must follow good laboratory practices.

Sample Preparation Area
1. Thaw assay controls and IC at 15 to 30°C or at 2 to 8°C.
   • Once thawed, assay controls and IC can be stored at 2 to 8°C for up to 24 hours before use.
   • Vortex each assay control 3 times for 2 to 3 seconds before use. Ensure that the contents of each vial are at the bottom after vortexing by tapping the vials on the bench to bring liquid to the bottom of the vial. NOTE: Avoid excessive foaming.
2. Select amplification reagent packs to be used in the run. Refer to the Abbott m2000sp Operations Manual (List No. 09K20 version 9 or higher), Operating Instructions section, for instructions pertaining to amplification reagent pack inventory management. All amplification reagent packs used in runs of greater than 24 reactions must have the same lot number. Thaw amplification reagents at 15 to 30°C or at 2 to 8°C and store at 2 to 8°C until required for the amplification master mix procedure. Once thawed, the amplification reagents can be stored at 2 to 8°C for up to 24 hours if not used immediately.
The following table shows the number of sample preparation reagents and internal control vials needed based on the number of reactions.

<table>
<thead>
<tr>
<th>Sample Preparation Reagents and Internal Control Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reagent</strong></td>
</tr>
<tr>
<td>mMicroparticles</td>
</tr>
<tr>
<td>mLysis</td>
</tr>
<tr>
<td>mWash 1</td>
</tr>
<tr>
<td>mWash 2</td>
</tr>
<tr>
<td>mElution Buffer</td>
</tr>
<tr>
<td>Internal Control</td>
</tr>
</tbody>
</table>

**Abbott m2000sp Procedure**

3. Gently invert the Abbott mSample Preparation bottles to ensure a homogeneous solution. If crystals are observed in any of the reagent bottles upon opening, allow the reagent to equilibrate at room temperature until the crystals disappear. Do not use the reagents until the crystals have dissolved. Add USP Grade 190 to 200 Proof Ethanol (95 to 100% Ethanol) to the mLysisDNA, mWash1DNA, and mWash2DNA bottles as indicated below. Do not use ethanol that contains denaturants.

- **Add 35 mL ethanol to each bottle of mLysisDNA being used.**
- **Add 23 mL ethanol to each bottle of mWash1DNA being used.**
- **Add 70 mL ethanol to each bottle of mWash2DNA being used.**

4. Vortex each IC 3 times for 2 to 3 seconds before use.

5. Use a calibrated precision **PIPETTE DEDICATED FOR INTERNAL CONTROL USE ONLY** to add 750 µL of IC to each bottle of mLysis Buffer. Mix by gently inverting the container 5 to 10 times to minimize foaming and pour the contents into the appropriate reagent vessels per the table above. When pouring in 2 bottles of the mLysisDNA with the Ethanol and IC, fill reagent vessel no higher than the fill line where the top of the reagent label is placed. Ensure bubbles or foam are not generated in the reagent vessels; if present, remove with a sterile pipette tip, using a new tip for each reagent vessel.

6. Gently pour in remaining Abbott mSample Preparation bottles into the reagent vessels per the table above except for mMicroparticlesDNA which will be loaded later.

**A total of 96 samples can be processed in each run.** A negative control and a positive control are included in each run, therefore allowing a maximum of 94 specimens to be processed per run.

- The Abbott RealTime SARS-CoV-2 assay minimum sample volume and associated rack requirements on the Abbott m2000sp are:

<table>
<thead>
<tr>
<th>Rack</th>
<th>Tube Diameter⁴</th>
<th>Minimum Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 mm</td>
<td>11.5 - 14.0 mm</td>
<td>1.3 mL</td>
</tr>
<tr>
<td>16 mm</td>
<td>14.5 - 16.0 mm</td>
<td>1.3 mL</td>
</tr>
</tbody>
</table>

⁴Refers to sample tube outer diameter. Minimum sample volume varies with tube geometry and size. Refer to the Abbott m2000sp Operations Manual and QUICK REFERENCE GUIDE FOR SAMPLE TUBE SIZES AND VOLUMES for recommended sample input volume.

- If frozen, thaw specimens at 15 to 30°C or at 2 to 8°C. Once thawed, specimens can be stored at 2 to 8°C for up to 6 hours if not processed immediately.

**NOTE:** For every stored specimen, if centrifugation is needed, the following actions must be done in the order described: vortex the specimen first and follow with centrifugation of nasopharyngeal and oropharyngeal swab specimens. If these actions are not performed in this order, then invalid results may occur.

- Vortex each specimen 3 times for 2 to 3 seconds.
- If needed, centrifuge nasopharyngeal and oropharyngeal swab specimens only at 2000g for 5 minutes before loading onto the Abbott m2000sp worktable. Aliquot each specimen into clean tubes or vials if necessary. Refer to the Abbott m2000sp Operations Manual for tube sizes. Avoid touching the inside of the cap when opening tubes.

Refer to the Abbott m2000sp Operations Manual for tube sizes.

7. Remove cap. Avoid touching the inside of the cap when opening tubes. Remove swab if present.

8. Place the positive and negative controls, if applicable, and the patient specimens into the Abbott m2000sp sample rack. If used, bar codes on tube labels must face right for scanning.

9. Place the 5 mL Reaction Vessels into the Abbott m2000sp 1 mL subsystem carrier.

10. Immediately prior to initiation of the sample extraction protocol, vigorously mix or vortex the mMicroparticlesDNA until they are fully resuspended and pour the mMicroparticlesDNA into the appropriate 200 mL reagent vessel.

11. Load the Abbott mSample Preparation SystemDNA reagents and the Abbott 96 Deep-Well Plate on the Abbott m2000sp worktable as described in the Abbott m2000sp Operations Manual, Operating Instructions section.

12. From the Protocol screen, select the appropriate application file and initiate the sample extraction protocol as described in the Abbott m2000sp Operations Manual, Operating Instruction section.

- **The application specification file m2000 SARS_CoV-2 is required for nasopharyngeal and oropharyngeal swab specimens.**
- **The Abbott m2000sp Master Mix Addition protocol (step 14) must be initiated within 1 hour after completion of Sample Preparation.**

**NOTE:** Change gloves before handling the amplification reagents.

13. Load the amplification reagents and the master mix tube (if needed) on the Abbott m2000sp worktable after sample preparation is completed.

The following table shows the number of amplification reagent packs needed based on the number of reactions.

<table>
<thead>
<tr>
<th>Amplification Reagent Pack Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 to 24 Reactions</strong></td>
</tr>
<tr>
<td>1 pack</td>
</tr>
</tbody>
</table>
• All amplification reagent packs used in runs of greater than 24 reactions must have the same lot number.
• Ensure that the contents of amplification reagent packs are at the bottom of the vials prior to opening the amplification reagents by tapping the vials in an upright position on the bench 5 to 10 times.
• Ensure that amplification reagent packs are firmly seated on the instrument.

14. Select the appropriate deep-well plate that matches the corresponding sample preparation extraction. Initiate the Abbott m2000sp Master Mix Addition protocol. Follow the instructions as described in the Abbott m2000sp Operations Manual, Operating Instructions section.

NOTE: The operator should not manually fill any empty/unfilled wells in the Abbott 96-Well Optical Reaction Plate.
• The Abbott m2000rt protocol (step 18) must be started within 50 minutes of the initiation of the Master Mix Addition protocol (step 14).

NOTE: If the run is aborted for any reason subsequent to step 14, a new 96-well PCR plate must be used if the Abbott m2000sp Master Mix Addition Protocol (step 14) will be repeated.

Amplification Area
15. Switch on and initialize the Abbott m2000rt instrument in the Amplification Area.

NOTE: The Abbott m2000rt requires 15 minutes to warm-up.
NOTE: Remove gloves before returning to the sample preparation area.


17. Place the sealed optical reaction plate into the Abbott Splash-Free Support Base for transfer to the Abbott m2000rt instrument. Export the completed PCR plate results to a CD (or directly to a mapped Abbott m2000rt via a network connection).

Abbott m2000rt Procedures
For a detailed description of how to perform the Abbott m2000rt SARS-CoV-2 assay protocol, refer to the Operating Instructions section in the Abbott m2000rt Operations Manual.


NOTE: Test order transfer through the use of CD-ROM or network connection with export and import features of the m2000sp and m2000rt software is recommended. If creating the Abbott m2000rt test order manually, enter sample IDs in the corresponding PCR tray locations according to the “Wells for Selected Plate” grid, found on the detail screen of the “PCR Plate Results” on the Abbott m2000sp. See Section 5 of the Abbott m2000sp Operations Manual.

POST PROCESSING PROCEDURES
1. Remove the Abbott 96 Deep-Well Plate from the worktable and dispose of according to the Abbott m2000sp Operations Manual.
2. Place the Abbott 96-Well Optical Reaction Plate in a sealable plastic bag and dispose according to the Abbott m2000rt Operations Manual along with the gloves used to handle the plate.

QUALITY CONTROL PROCEDURES
Abbott m2000rt Optical Calibration
Refer to the Calibration Procedures section in the Abbott m2000rt Operations Manual for a detailed description of when and how to perform an Abbott m2000rt Optical Calibration.

Optical calibration of the Abbott m2000rt instrument is required for the accurate measurement and discrimination of dye fluorescence during the Abbott RealTime SARS-CoV-2 assay.

The following Abbott m2000rt Optical Calibration Plates are used to calibrate the Abbott m2000rt instrument for the Abbott RealTime SARS-CoV-2 assay:
• FAM™ Plate (Carboxyfluorescein)
• ROX™ Plate (Carboxy-X-rhodamine)
• VIC® Plate (Proprietary dye)

Detection of Inhibition
A defined, consistent quantity of IC nucleic acid is introduced into each specimen and control at the beginning of sample preparation and measured on the Abbott m2000rt to demonstrate proper specimen processing and assay validity. The IC is comprised of a RNA sequence unrelated to the SARS-CoV-2 virus target sequences. An IC CN validity range is defined within the Abbott RealTime SARS-CoV-2 Assay Application File.

An error code or flag is displayed when a specimen or control fails to meet the IC specification. Refer to INTERPRETATION OF RESULTS section of this package insert and the Abbott m2000rt System Operations Manual for a list of error codes and flags.

Negative and Positive Controls
A negative control and a positive control are included in each test order to evaluate run validity in order to generate a valid result.

The Abbott m2000rt instrument automatically reports the control results on the Abbott m2000rt workstation. An error control flag is displayed when a control result is out of range. Refer to the Abbott m2000rt Operations Manual for an explanation of the corrective actions for the error control flag. If negative or positive controls are out of range, all of the specimens and controls from that run must be reprocessed, beginning with sample preparation.

The presence of the SARS-CoV-2 virus must not be detected in the negative control. SARS-CoV-2 virus detected in the negative control is indicative of contamination by other samples or by amplified product introduced during sample preparation or during preparation of the Abbott 96-Well Optical Reaction Plate. To avoid contamination, clean the Abbott m2000sp instrument and the Abbott m2000rt instrument and repeat sample processing for controls and specimens following the Procedural Precautions. If negative controls are persistently reactive, contact your Abbott representative.

Monitoring the Laboratory for the Presence of Contamination
It is recommended that this test be done at least once a month to monitor laboratory surfaces and equipment for contamination by amplification product. It is very important to test all areas that may have been exposed to processed specimens, controls, and/or amplification product. This includes routinely handled objects such as pipettes, the Abbott m2000sp and Abbott m2000rt function keys, laboratory bench surfaces, microcentrifuges, and centrifuge adaptors.

1. Add 0.8 mL RNase-free water to a 1.7 mL molecular biology grade microcentrifuge tube.
2. Saturate the cotton tip of an applicator (Puritan or equivalent) in the RNase-free water from the microcentrifuge tube.
3. Using the saturated cotton tip of the applicator, wipe the area to be monitored using a sweeping motion. Place the applicator into the microcentrifuge tube.
4. Swirl the cotton tip in RNase-free water 10 times, and then press the applicator along the inside of the tube so that the liquid drains back into the solution at the bottom of the microcentrifuge tube. Discard the applicator.
5. Pipette 0.5 mL of mWash 1 buffer to a clean tube using the pipette dedicated for Internal Control use.
6. Add 20 µL of the mWash 1 buffer to each microcentrifuge tube.
7. Cap the microcentrifuge tube.
8. Test this sample according to the assay procedure section of this study brochure.
   • Transfer liquid from the microcentrifuge tube to a 5 mL Reaction Vessel.
   • Bring the volume to 1.5 mL with RNase-free water.
9. The presence of contamination is indicated by the detection of SARS-CoV-2 nucleic acid in the swab samples.
10. If SARS-CoV-2 nucleic acid is detected on equipment, follow the cleaning and decontaminating guidelines given in that equipment’s operations manual.
   If SARS-CoV-2 nucleic acid is detected on surfaces, clean the contaminated areas with 1.0% (v/v) sodium hypochlorite solution, followed by 70% ethanol or water.

NOTE: Chlorine solutions may pit equipment and metal. Use sufficient amounts or repeated applications of 70% ethanol or water until chlorine residue is no longer visible.
11. Repeat testing of the contaminated area by following steps 1 through 10.

**INTERPRETATION OF RESULTS**

The Abbott m2000rt instrument automatically reports the results and interpretations on the Abbott m2000rt workstation. An error is displayed when a result is invalid. Assay results and interpretations will look similar to the following examples:

<table>
<thead>
<tr>
<th>Location</th>
<th>Sample ID</th>
<th>Sample Type</th>
<th>Assay</th>
<th>Result</th>
<th>Interpret</th>
<th>Flags</th>
<th>Error Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>SARS-CoV-2_NEG</td>
<td>Control</td>
<td>SARS-CoV-2</td>
<td>Not Detected</td>
<td>XXXX1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>SARS-CoV-2_POS</td>
<td>Control</td>
<td>SARS-CoV-2</td>
<td>XX.XX CN</td>
<td>XXXX2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Sample 1</td>
<td>Control</td>
<td>SARS-CoV-2</td>
<td>XX.XX CN</td>
<td>Positive</td>
<td>IC3</td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>Sample 2</td>
<td>Control</td>
<td>SARS-CoV-2</td>
<td>Not Detected</td>
<td>Negative</td>
<td>XXXX4</td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>Sample 3</td>
<td>Control</td>
<td>SARS-CoV-2</td>
<td>XX.XX CN</td>
<td>Positive</td>
<td>XXXX5</td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>Sample 4</td>
<td>SARS-CoV-2</td>
<td>Not Detected</td>
<td>XXXX1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>Sample 5</td>
<td>SARS-CoV-2</td>
<td>XX.XX CN</td>
<td>Positive</td>
<td>XXXX5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>Sample 6</td>
<td>SARS-CoV-2</td>
<td>XXXX2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Error code generated due to negative control failure.
2 Error code generated due to positive control failure
3 Patient sample with positive amplification of target but failed internal control will produce valid result with a flag for internal control failure.
4 Error code generated due to no amplification of target and internal control failure.
5 Indicates a failed control, invalidating all results in the run. Users are instructed to rerun the samples starting at sample preparation.

For more information about error codes and flags, refer to the Abbott m2000rt Operations Manual.

**LIMITATIONS OF THE PROCEDURE**

For use under an Emergency Use Authorization only.

• This assay is for in vitro diagnostic use under FDA Emergency Use Authorization only.
• Use of the Abbott RealTime SARS-CoV-2 assay is limited to personnel who have been trained in the procedures of a molecular diagnostic assay and the Abbott m2000 System.
• Laboratories are required to report all positive results to the appropriate public health authorities.
• The instruments and assay procedures reduce the risk of contamination by amplification product. However, nucleic acid contamination from the positive controls or specimens must be controlled by good laboratory practices and careful adherence to the procedures specified in this package insert.
• Optimal performance of this test requires appropriate specimen collection, storage, and transport to the test site (refer to the SPECIMEN COLLECTION, STORAGE, AND TRANSPORT TO THE TEST SITE section of this package insert).
• Detection of SARS-CoV-2 RNA may be affected by sample collection methods, patient factors (eg, presence of symptoms), and/or stage of infection.
• False-negative results may arise from degradation of the viral RNA during shipping/storage.
• The impacts of vaccines, antiviral therapeutics, antibiotics, chemotherapeutic or immunosuppressant drugs have not been evaluated.
• As with any molecular test, mutations within the target regions of Abbott RealTime SARS-CoV-2 assay could affect primer and/or probe binding resulting in failure to detect the presence of virus.
• Due to inherent differences between technologies, it is recommended that, prior to switching from one technology to the next, users perform method correlation studies in their laboratory to qualify technology differences. One hundred percent agreement between the results should not be expected due to aforementioned differences between technologies. Users should follow their own specific policies/procedures.
• 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.
• Results should be interpreted by a trained professional in conjunction with the patient’s history and clinical signs and symptoms, and epidemiological risk factors.
• Negative results do not preclude infection with the SARS-CoV-2 virus and should not be the sole basis of a patient treatment/management or public health decision. Follow up testing should be performed according to the current CDC recommendations.

**CONDITIONS OF AUTHORIZATION FOR LABORATORIES**

The Abbott RealTime SARS-CoV-2 assay Letter of Authorization, along with the authorized Fact Sheet for Healthcare Providers, the authorized Fact Sheet for Patients, and authorized labeling are available on the FDA website: https://www.fda.gov/MedicalDevices/Safety/ EmergencySituations/ucm161496.htm.

However, to assist clinical laboratories using the Abbott RealTime SARS-CoV-2 assay ("your product" in the conditions below), the relevant Conditions of Authorization are listed below:
A. Authorized laboratories\(^1\) using your product will include with result reports of your product, all authorized Fact Sheets. Under exigent circumstances, other appropriate methods for disseminating these Fact Sheets may be used, which may include mass media.

B. Authorized laboratories using your product will use your product as outlined in the Instructions for Use. Deviations from the authorized procedures, including the authorized instruments, authorized extraction methods, authorized clinical specimen types, authorized control materials, authorized other ancillary reagents and authorized materials required to use your product are not permitted.

C. Authorized laboratories that receive your product will notify the relevant public health authorities of their intent to run your product prior to initiating testing.

D. 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.

E. Authorized laboratories will collect information on the performance of your product and report to DMD/OHT7-OIR/OPC/O/CDRH (via email: CDRH-EUA-Reporting@fda.hhs.gov) and Abbott Molecular (email: molecularsupport@abbott.com; 1-800-553-7042) any suspected occurrence of false positive or false negative results and significant deviations from the established performance characteristics of your product of which they become aware.

F. All laboratory personnel using your product must be appropriately trained in RT-PCR techniques and use appropriate laboratory and personal protective equipment when handling this kit, and use your product in accordance with the authorized labeling.

\(^1\) The letter of authorization refers to, "United States (U. S.) laboratories certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. §263a, to perform high complexity tests" as “authorized laboratories.”

### SPECIFIC PERFORMANCE CHARACTERISTICS

#### Limit of Detection (Analytical Sensitivity)

Limit of Detection (LOD) studies determine the lowest detectable concentration of SARS-CoV-2 at which greater than or equal to 95% of all (true positive) replicates test positive.

To determine the LoD, a recombinant virus containing SARS-CoV-2 RNA (Seracare, AccuPlex COVID-19, 1.3E+07 copies/mL as determined by digital PCR) was serially diluted in simulated nasal matrix (SNM). The initial LOD was determined by testing 4 levels at target concentrations of 900, 300, 100, and 33 copies/mL. Each panel member was tested in replicates of 3. The final LoD was confirmed by testing 4 panel members with target concentrations at 400, 300, 200, and 100 copies/mL tested in replicates of 21.

The results are summarized in **Table 1.** The lowest concentration level with observed positive rates ≥ 95% was 100 virus copies/mL.

<table>
<thead>
<tr>
<th>Virus Copies/mL</th>
<th>GE/Reaction(^a)</th>
<th>Total Valid Replicates</th>
<th>Positive Replicates</th>
<th>Positive Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>12.5</td>
<td>21</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>300</td>
<td>9.4</td>
<td>21</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>200</td>
<td>6.2</td>
<td>21</td>
<td>21</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>3.1</td>
<td>21</td>
<td>20</td>
<td>95.2</td>
</tr>
</tbody>
</table>

\(^a\) Genome equivalent per reaction (GE/reaction) was determined from calibration curve established using genomic RNA from SARS-Related Coronavirus 2, Isolate USA-WA1/2020 (BEI Resources, Catalog No. NR-52285).

#### Inclusivity

Inclusivity was demonstrated by comparing the Abbott RealTime SARS-CoV-2 assay primers and probes to an alignment of all SARS-CoV-2 sequences available in Genbank as of March 5, 2020. The MUSCLE alignment was generated by NCBI ([https://www.ncbi.nlm.nih.gov/labs/virus/vski/#/?virus?SeqType_s=Nucleotide&VirusLineage_ss=SARS-CoV-2,%20taxid:2697049](https://www.ncbi.nlm.nih.gov/labs/virus/vski/#/?virus?SeqType_s=Nucleotide&VirusLineage_ss=SARS-CoV-2,%20taxid:2697049)) and viewed in Bioedit. The regions of the test’s primers and probes were identified in silico analysis to verify sequence homology with circulating SARS-CoV-2 strains. A total of 78 sequences from 10 countries (Australia, Belgium, Brazil, China, Finland, Nepal, South Korea, Sweden, Taiwan, and USA) had sequence coverage of at least one of the test’s primers or probes for the comparison. Amongst the 78 sequences, there were also 6 strains without any country information listed in Genbank. All of the primers and probes in the test had 100% homology to all of the available circulating SARS-CoV-2 sequences.

#### Cross-reactivity

**In Silico Analysis**

Related pathogens, high prevalence disease agents and normal or pathogenic flora that are reasonably likely to be encountered in the clinical specimen have been evaluated in silico to identify the % homology between the selected probe/primer sequences and the sequence present in the microorganism.

The conclusion of this analysis is that there is limited opportunity for cross-reactivity to allow for false-positive reporting or affect performance of SARS-CoV-2 virus detection based upon the following:

- For many organisms, only one primer (forward or reverse) has >80% homology, making an amplified product unlikely.
- The probe is unlikely to bind for any of the hits (< 80% homology).
- Mismatches in the 3’ end of primers makes extension unlikely.
- For the N amplicon, two organisms with forward and reverse primers having >80% homology (LS483366.1, CP040804.1) have both primer binding sites on the same plus-sense strand and will not result in amplification.
- For the N amplicon, the remaining two organisms that may potentially give rise to amplicons due to both forward and reverse primers having >80% homology on opposite strands (CP000262.1, CP002888.1) have primer binding sites separated by >100,000 nucleotides in the bacterial chromosome, making amplification unlikely.

Overall, the results of this analysis predict no significant cross-reactivity or microbial interference.

**Laboratory Testing**

Cross reactivity performance of Abbott RealTime SARS-CoV-2 assay was evaluated by testing whole organisms or appropriate representative samples listed below in **Table 2.** No cross-reactivity of the Abbott RealTime SARS-CoV-2 assay with the selected microorganisms was observed at the concentrations tested. The results are summarized in **Table 2.**
Table 2. Abbott RealTime SARS-CoV-2 Cross-reactivity Summary

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Concentration</th>
<th>Result (No. Positive/No. Tested)</th>
<th>Final Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human coronavirus 229E</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Human coronavirus OC43</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Human coronavirus HKU1</td>
<td>Clinical Isolates</td>
<td>0/2</td>
<td>Negative</td>
</tr>
<tr>
<td>Human coronavirus NL63</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>SARS-coronavirus</td>
<td>25-28 (Ct range)</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>MERS-coronavirus</td>
<td>25-28 (Ct range)</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Adenovirus (Ad. 71)</td>
<td>$1.00 \times 10^5$ TCID50/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Human Metapneumovirus (hMPV)</td>
<td>Clinical Isolates</td>
<td>0/3</td>
<td>Negative</td>
</tr>
<tr>
<td>Parainfluenza virus 1</td>
<td>$1.00 \times 10^5$ TCID50/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Parainfluenza virus 2</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Parainfluenza virus 3</td>
<td>$5.00 \times 10^5$ TCID50/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Parainfluenza virus 4</td>
<td>Clinical Isolates</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Influenza A (H1N1)</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Influenza A (H3N2)</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Influenza B</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Enterovirus Type 71</td>
<td>$1.00 \times 10^5$ TCID50/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Respiratory syncytial virus</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Rhinovirus</td>
<td>$1.00 \times 10^5$ Copies/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Chlamydia pneumoniae</td>
<td>$1.00 \times 10^6$ IFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Haemophilus influenzae</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Legionella pneumophila</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/3</td>
<td>Negative</td>
</tr>
<tr>
<td>Mycobacterium tuberculosis</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Streptococcus pneumoniae</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Streptococcus pyogenes</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Bordetella pertussis</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/3</td>
<td>Negative</td>
</tr>
<tr>
<td>Mycoplasma pneumoniae</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Pneumocystis jirovecii (PJP)</td>
<td>23-25 (Ct range)</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Candida albicans</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>Staphylococcus epidermis</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
<tr>
<td>S. salivarius</td>
<td>$1.00 \times 10^6$ CFU/mL</td>
<td>0/4</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Clinical Performance Evaluation

A clinical evaluation study was performed to evaluate the performance of the Abbott RealTime SARS-CoV-2 Assay using nasopharyngeal swab specimens. A total of 61 contrived positive specimens at approximately 1X to 2X LOD and 20x LOD were tested. Samples were contrived by spiking known concentrations of recombinant virus containing SARS-CoV-2 RNA sequences into negative patient specimens. In addition to the contrived positive specimens, 34 negative specimens were tested. There were 21 total samples tested at the 1X to 2X LOD level with 20 results valid and included in the analysis. One result was invalid and excluded from the analysis. There were 40 total samples tested at 20x LOD with 40 results valid and included in the analysis. There were 34 total samples tested for the negative level with 31 results valid and included in the analysis and 3 results invalid and excluded from the analysis.

Table 3. Clinical Evaluation of the Abbott RealTime SARS-CoV-2 Assay

<table>
<thead>
<tr>
<th>SARS-CoV-2 Concentration</th>
<th>Number Tested</th>
<th>Number Detected</th>
<th>% Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1X to 2X LOD(^a)</td>
<td>20</td>
<td>20</td>
<td>100 (N=20/20)</td>
</tr>
<tr>
<td>20X LOD</td>
<td>40</td>
<td>40</td>
<td>100 (N=40/40)</td>
</tr>
<tr>
<td>Negative(^b)</td>
<td>31</td>
<td>0</td>
<td>0 (N=0/31)</td>
</tr>
</tbody>
</table>

\(^a\) One replicate was invalid and excluded from the analysis.
\(^b\) Three replicates were invalid and excluded from the analysis.

N - Agreement
PPA – Positive Percent Agreement
NPA – Negative Percent Agreement

PPA – Positive Percent Agreement
NPA – Negative Percent Agreement

These coronaviruses don’t have single genomes, so one can’t know what virus was used or from what year, or whether the samples are still circulating. They are all common coronaviruses and novel genotypes emerge over time through natural recombination.

Human coronavirus 229E: at least as far back as 2008

Human coronavirus OC43 common cold: Molecular Epidemiology of Human Coronavirus OC43 Reveals Evolution of Different Genotypes over Time and Recent Emergence of a Novel Genotype due to Natural Recombination

Human coronavirus NL63 new in 2006

Human coronavirus HKU1: 2005
BIBLIOGRAPHY

Key to Symbols Used

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>RX</td>
<td>For Prescription Use Only.</td>
</tr>
<tr>
<td>!</td>
<td>Caution</td>
</tr>
<tr>
<td>!</td>
<td>Warning</td>
</tr>
<tr>
<td>🟢</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>🟢</td>
<td>Temperature Limitation</td>
</tr>
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<td>🟢</td>
<td>Consult Instructions For Use</td>
</tr>
<tr>
<td>🟢</td>
<td>In Vitro Diagnostic Medical Device</td>
</tr>
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<td>LOT</td>
<td>Lot Number</td>
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<tr>
<td>⏰</td>
<td>Use By</td>
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<tr>
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<td>🟢</td>
<td>For In Vitro Diagnostic Use</td>
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<td>In Vitro Test</td>
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<tr>
<td>🟢</td>
<td>In Vitro Test</td>
</tr>
<tr>
<td>🔴</td>
<td>Corrosive</td>
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</table>

IN VITRO DIAGNOSTIC MEDICAL DEVICE

TECHNICAL ASSISTANCE
For technical assistance, call Abbott Molecular Technical Services at 1-800-553-7042, email molecularsupport@abbott.com, or visit the Abbott Molecular website at http://www.abbottmolecular.com.

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Abbott RealTime SARS-CoV-2 Control Kit (List No. 09N77-085)

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