QIAGEN GmbH
Melissa Mahall
Sr. Director Regulatory Affairs
19300 Germantown Road
Germantown, Maryland 20874

May 18, 2019

Re: K183597
Trade/Device Name: QIAstat-Dx Respiratory Panel
Regulation Number: 21 CFR 866.3980
Regulation Name: Respiratory Viral Panel Multiplex Nucleic Acid Assay
Regulatory Class: Class II
Product Code: OCC, OEM, OOU, OEP, OOI, OTG, OZX, OZY, OQW, OZZ
Dated: April 9, 2019
Received: April 9, 2019

Dear Melissa Mahall:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's

requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801 and Part 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see https://www.fda.gov/CombinationProducts/GuidanceRegulatoryInformation/ucm597488.htm); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/) and CDRH Learn (http://www.fda.gov/Training/CDRHLearn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (http://www.fda.gov/DICE) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Uwe Scherf, Ph.D.
Director
Division of Microbiology Devices
OHT7: Office of In Vitro Diagnostics
and Radiological Health
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: January 31, 2017
See PRA Statement below.

510(k) Number *(if known)*
K183597

Device Name
QIAstat-Dx Respiratory Panel

Indications for Use *(Describe)*
The QIAstat-Dx Respiratory Panel is a multiplexed nucleic acid test intended for use with QIAstat-Dx system for the simultaneous qualitative detection and identification of multiple respiratory viral and bacterial nucleic acids in nasopharyngeal swabs (NPS) eluted in Universal Transport Media (UTM) obtained from individuals suspected of respiratory tract infections. The following organism types and subtypes are identified using the QIAstat-Dx Respiratory Panel: Adenovirus, Coronavirus 229E, Coronavirus HKU1, Coronavirus NL63, Coronavirus OC43, Human Metapneumovirus A+B, Influenza A, Influenza A H1, Influenza A H3, Influenza A H1N1/pdm09, Influenza B, Parainfluenza Virus 1, Parainfluenza Virus 2, Parainfluenza Virus 3, Parainfluenza Virus 4, Rhinovirus/Enterovirus, Respiratory Syncytial Virus A+B, *Bordetella pertussis, Chlamydophila pneumoniae and Mycoplasma pneumoniae.*

The detection and identification of specific viral and bacterial nucleic acids from individuals presenting with signs and symptoms of a respiratory infection aids in the diagnosis of respiratory infection if used in conjunction with other clinical and epidemiological information. The results of this test should not be used as the sole basis for diagnosis, treatment or other management decisions. Negative results in the setting of a respiratory illness may be due to infection with pathogens that are not detected by the test or lower respiratory tract infection that is not detected by a nasopharyngeal swab specimen. Positive results do not rule out co-infection with other organisms: the agent(s) detected by the QIAstat-Dx Respiratory Panel may not be the definite cause of disease. Additional laboratory testing (e.g., bacterial and viral culture, immunofluorescence and radiography) may be necessary when evaluating a patient with possible respiratory tract infection.

Due to the small number of positive specimens collected for certain organisms during the prospective clinical study, performance characteristics for *Bordetella pertussis* and Parainfluenza Virus 1 were established primarily with retrospective clinical specimens. Performance characteristics for *Chlamydophila pneumoniae,* Parainfluenza Virus 2, Parainfluenza Virus 4, Influenza A subtype H1 and Coronavirus 229E were established primarily using contrived clinical specimens.

Due to the genetic similarity between Human Rhinovirus and Enterovirus, the QIAstat-Dx Respiratory Panel cannot reliably differentiate them. A positive QIAstat-Dx Respiratory Panel Rhinovirus/Enterovirus result should be followed-up using an alternate method (e.g., cell culture or sequence analysis).

Performance characteristics for Influenza A were established when Influenza A H1N1-2009 and A H3 were the predominant Influenza A viruses in circulation. Performance of detecting Influenza A may vary if other Influenza A strains are circulating or a novel Influenza A virus emerges. If infection with a novel Influenza A virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel virulent Influenza viruses and sent to state or local health departments for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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510(k) SUMMARY

General Information

Submitted by: QIAGEN GmbH
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Date Prepared: April 9, 2019

Device Name: QIAstat-Dx® Respiratory Panel

Trade Name: QIAstat-Dx® Respiratory Panel

Common Name: QIAstat-Dx® Respiratory Panel

Classification: 866.3980 - Respiratory viral panel multiplex nucleic acid assay

Product Code: OCC, OEM, OOU, OEP, OTG, OQW, OOI, OZZ, OZY, OZX

Predicate Device

Manufacturer	Product Name	510(k) No.
BioFire Diagnostics, Inc.	FilmArray® Respiratory Panel (RP)	K123620

Device Description

QIAstat-Dx® is based on single-test cartridges with pre-packaged reagents including both wet and dry chemistry to handle the sample preparation and detection steps for the presence of a range of selected analytes by PCR technology. After insertion of the sample, the QIAstat-Dx assay cartridge is processed by the QIAstat-Dx® Analyzer 1.0.

Principle of Operation

The QIAstat-Dx® Respiratory Panel is part of the QIAstat-Dx® system and works with the QIAstat-Dx® Analyzer 1.0.

The QIAstat-Dx® Respiratory Panel is intended to be used with liquid sample nasopharyngeal swabs (NPS).

Once the cartridge has been inserted into the instrument, the test starts automatically and runs for approximately 74 minutes. When the test is finished, the cartridge is removed by the user and discarded. The QIAstat-Dx® Analyzer 1.0 automatically interprets test results and displays a summary on the analyzer display screen. The results can be printed using a connected printer if needed. The detected analytes are displayed in red. All other tested but not detected analytes are listed in green. The analyzer will report if an error occurs during processing, in which case the test will fail and no results will be provided (screen will show "FAIL").

Resuspension of IC and Prot K

Following insertion of the cartridge, the IC and Prot K are resuspended with the buffer located in Reservoir 1 (resuspension buffer). The buffer from R1 is added to the interconnected IC cavity and Prot K cavity and transferred repeatedly between the Transfer Chamber and the cavities to ensure resuspension. The resuspended IC and Prot K are transferred to the sample cavity.

Cell Lysis

Primary lysis of the cells and analytes present in a NPS sample and IC occurs by a combination of chemical and mechanical processes using a rotor inside the lysis chamber in the presence of a buffer that acts as a chemical agent in aiding the mechanical process. The fast movement of the rotor results in sample agitation, which creates turbulence and shear forces that favor the lysis of the cell wall.

After mechanical lysis is completed, the primary lysate is transferred to the purification chamber through a frit with 80 µm pore size. The second lysis buffer (from Reservoir 2) is added to the primary lysate to complete chemical lysis.

Purification

Binding reagent (from Reservoir 4) is added to the lysate in the purification cavity, and the mix is passed through the silica membrane. In this process, the DNA/RNA molecules stick to the membrane, and the remaining components of the lysate are delivered to the waste chamber. Then the membrane is washed with a first washing buffer (from Reservoir 5) to wash away proteins. This is followed by a second washing step with a second washing buffer (from Reservoir 6) to remove any remaining substances other than the nucleic acids. A subsequent drying step eliminates volatile substances from the silica membrane. Prior to the elution step, the Transfer Chamber is rinsed with the rinsing buffer (from Reservoir 7) in order to remove any potential inhibitors from previous processing steps. At the end of the process, the nucleic acids are released from the membrane using an elution buffer (from Reservoir 8). The eluate is collected in the Transfer Chamber.

Rehydration of Master Mix

A defined volume (approximately 135µL) of the eluate is delivered to the dry chemistry reservoir (DCC) to rehydrate the Master Mix. Any remaining eluate is transferred to the waste chamber. The eluate/Master Mix solution is mixed by repeated transfer between the Transfer Chamber and the DCC.

Aliquotting and PCR

Defined aliquots (approximately 15 µL) of mixed eluate/Master Mix are sequentially transferred from the Transfer Chamber to each of seven Reaction Chambers containing the specified, air dried primers and probes.

Within each Reaction Chamber, multiplex rtPCR testing is performed. Increase in fluorescence (indicative of detection of each target analyte) is detected directly within each Reaction Chamber.

The rtPCR process is conducted by two submodules of the QIAstat-Dx® Analyzer 1.0: the Thermal Cycler and the qPCR Sensor.

Components Description

QIAstat-Dx® Respiratory Panel Cartridge:

The QIAstat-Dx® Respiratory Panel cartridge is a disposable plastic device that allows performing fully automated molecular assays. The main features of the QIAstat-Dx® Respiratory Panel cartridge for the RP assay include the ability to test liquid samples as well as direct swabs and the capacity to store all necessary reagents within the cartridge needed for such testing. The cartridge is also designed to allow future expansion to incorporate additional sample types, such as swabs. All sample preparation and assay steps will be performed within the cartridge.

All the reagents required for the complete execution of the test are pre-loaded and self-contained in the QIAstat-Dx® Respiratory Panel. The user does not need to manipulate

any reagents. During the test, reagents are handled by pneumatically-operated microfluidics without any direct contact with the user or the analyzer actuators. This eliminates any possibility of exposure of the user or the analyzer to chemicals contained in the cartridge during the test and up to the disposal of used cartridges.

Reagents may be found in three different physical forms: liquid, air-dried on surfaces or lyophilized powder cake.

Within the cartridge, multiple steps are automatically performed in sequence by using pneumatic pressure and a multiport valve to transfer sample and fluids via the Transfer Chamber to their intended destinations.

QIAstat-Dx Analyzer 1.0

The QIAstat-Dx® Analyzer 1.0 is the unit that hosts a cartridge and, on command from the user, is able to run predefined assay protocols. The software specific to this test is pre-loaded on the QIAstat-Dx® Analyzer 1.0.

Other Materials

Each QIAstat-Dx® Respiratory Panel cartridge will be used with a transfer pipette. The NPS sample from the patient will be collected in a sample tube using a swab in transport medium (not provided with device).

QIAstat-Dx® Analyzer – the QIAstat-Dx® Respiratory Panel cartridge can only be run on the QIAstat-Dx® Analyzer.

Calibrators and/or Controls

Blank controls are not applicable to the device because it is a single test disposable cartridge. Negative and positive external controls are recommended by the company but not provided with the QIAstat-Dx® Respiratory Panel.

QIAGEN provides an Internal Control within the QIAstat-Dx® Respiratory Panel cartridge. The IC is an MS2 phage. The IC is located in the IC cavity and is mixed with the sample during sample preparation and the eluate is mixed with the Master Mix, then aliquoted in all Reaction Chambers. The primers and probes necessary to detect the IC are present in Reaction Chamber 1. The IC is a process control that will go through all nucleic acid extraction and amplification steps, similar to patient samples.

The Analyzer 1.0 is provided factory calibrated and does not require user calibration. The Analyzer 1.0 includes self-check controls to verify the performance of all sensors and actuators and will alert the user in case of failure.

The RCA will provide the results to the Application Software. The Application SW will store all the information related to a given result in the database and will display a summary of detected and equivocal analytes and the result for the IC. All POSITIVE or EQUIVOCAL analytes will be listed as “DETECTED PATHOGENS”. The screen will

also display the complete list of all "TESTED PATHOGENS", including positive, negative, equivocal or invalid analytes.

Specimen collection and transport materials
Samples are collected using a single-use Nasopharyngeal swab and a tube filled with transport medium.

NPS swab specimens are to be collected and eluted using one of the following compatible collection kits: Universal Transport Medium (UTM™) (Copan Diagnostics (Brescia, Italy and CA, USA)), MicroTest™ M4, M4RT, M5, M6 (ThermoFisher Scientific, MA, USA), BD Universal Viral Transport (UVT) System (Becton Dickinson, NJ, USA), Universal Transport Medium (UTM) System (HealthLink Inc., FL, USA), Universal Transport Medium (Diagnostic Hybrids, OH, USA), V-C-M Medium (Quest Diagnostics, NJ, USA) or UniTranz-RT® Universal Transport Media (Puritan Diagnostics, ME , USA) collection kits.

Accessories and requirements
To be used in combination with the QIAstat-Dx Analyzer.

Transfer pipette (MS-253003) used with each QIAstat-Dx® Respiratory Panel cartridge.

Intended Use

The QIAstat-Dx® Respiratory Panel is a multiplexed nucleic acid test intended for use with QIAstat-Dx® system for the simultaneous qualitative detection and identification of multiple respiratory viral and bacterial nucleic acids in nasopharyngeal swabs (NPS) eluted in Universal Transport Media (UTM) obtained from individuals suspected of respiratory tract infections. The following organism types and subtypes are identified using the QIAstat-Dx Respiratory Panel: Adenovirus, Coronavirus 229E, Coronavirus HKU1, Coronavirus NL63, Coronavirus OC43, Human Metapneumovirus A+B, Influenza A, Influenza A H1, Influenza A H3, Influenza A H1N1/pdm09, Influenza B, Parainfluenza Virus 1, Parainfluenza Virus 2, Parainfluenza Virus 3, Parainfluenza Virus 4, Rhinovirus/Enterovirus, Respiratory Syncytial Virus A+B, Bordetella pertussis, Chlamydophila pneumoniae, and Mycoplasma pneumoniae.

The detection and identification of specific viral and bacterial nucleic acids from individuals presenting with signs and symptoms of a respiratory infection aids in the diagnosis of respiratory infection if used in conjunction with other clinical and epidemiological information. The results of this test should not be used as the sole basis for diagnosis, treatment, or other management decisions. Negative results in the setting of a respiratory illness may be due to infection with pathogens that are not detected by the test or lower respiratory tract infection that is not detected by a nasopharyngeal swab specimen. Positive results do not rule out co-infection with other organisms: the agent(s) detected by the QIAstat-Dx Respiratory Panel may not be the definite cause of disease. Additional laboratory testing (e.g. bacterial and viral culture, immunofluorescence, and

radiography) may be necessary when evaluating a patient with possible respiratory tract infection.

Due to the small number of positive specimens collected for certain organisms during the prospective clinical study, performance characteristics for Bordetella pertussis and Parainfluenza Virus 1 were established primarily with retrospective clinical specimens. Performance characteristics for Chlamydophila pneumoniae, Parainfluenza Virus 2, Parainfluenza Virus 4, Influenza A subtype H1 and Coronavirus 229E were established primarily using contrived clinical specimens.

Due to the genetic similarity between Human Rhinovirus and Enterovirus, the QIAstat-Dx Respiratory Panel cannot reliably differentiate them. A positive QIAstat-Dx Respiratory Panel Rhinovirus/Enterovirus result should be followed-up using an alternate method (e.g., cell culture or sequence analysis).

Performance characteristics for Influenza A were established when Influenza A H1N1-2009 and A H3 were the predominant Influenza A viruses in circulation. Performance of detecting Influenza A may vary if other Influenza A strains are circulating or a novel Influenza A virus emerges. If infection with a novel Influenza A virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel virulent Influenza viruses and sent to state or local health departments for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.

Comparison of the QIAstat-Dx® Respiratory Panel and the Predicate Device

The QIAstat-Dx® Respiratory Panel is substantially equivalent to the predicate device:

- K123620: FilmArray® Respiratory Panel

Similarities and differences between the QIAstat-Dx® Respiratory Panel and the predicate device are shown in Table 5.1.

Table 5.1: Comparison of the QIAstat-Dx® Respiratory Panel with the predicate device

Characteristic	Device	Predicate
Name	QIAstat-Dx® Respiratory Panel	BioFire Diagnostics, Inc.'s FilmArray® Respiratory Panel (RP)
510(k) No.	K183597	K123620
Regulation	21 CFR 866.3980	21 CFR 866.3980
Product Code	OCC	OCC
Device Class	Class II	Class II

Characteristic	Device	Predicate
Similarities		
Intended Use	The QIAstat-Dx Respiratory Panel is a multiplexed nucleic acid test intended for use with QIAstat-Dx system for the simultaneous qualitative detection and identification of multiple respiratory viral and bacterial nucleic acids in nasopharyngeal swabs (NPS) eluted in universal transport media (UTM) obtained from individuals suspected of respiratory tract infections. The following organism types and subtypes are identified using the QIAstat-Dx Respiratory Panel: Adenovirus, Coronavirus 229E, Coronavirus HKU1, Coronavirus NL63, Coronavirus OC43, Human Metapneumovirus A+B, Influenza A, Influenza A H1, Influenza A H3, Influenza A H1N1/pdm09, Influenza B, Parainfluenza Virus 1, Parainfluenza Virus 2, Parainfluenza Virus 3, Parainfluenza Virus 4, Rhinovirus/Enterovirus, Respiratory Syncytial Virus A+B, Bordetella pertussis, Chlamydophila pneumoniae, and Mycoplasma pneumoniae. The detection and identification of specific viral and bacterial nucleic acids from individuals presenting with signs and symptoms of a respiratory infection aids in the diagnosis of respiratory infection if used in conjunction with other clinical and epidemiological information. The results of this test should not be used as the sole basis for diagnosis, treatment, or other management decisions.	FilmArray® Respiratory Panel (RP) is a multiplexed nucleic acid test intended for use with the FilmArray Instrument for the simultaneous qualitative detection and identification of multiple respiratory viral and bacterial nucleic acids in nasopharyngeal swabs (NPS) obtained from individuals suspected of respiratory tract infections. The following organism types and subtypes are identified using the FilmArray RP: Adenovirus, Coronavirus 229E, Coronavirus HKU1, Coronavirus NL63, Coronavirus OC43, Human Metapneumovirus, Influenza A, Influenza A subtype H1, Influenza A subtype H3, Influenza A subtype H1-2009, Influenza B, Parainfluenza Virus 1, Parainfluenza Virus 2, Parainfluenza Virus 3, Parainfluenza Virus 4, Human Rhinovirus/Enterovirus, Respiratory Syncytial Virus, Bordetella pertussis, Chlamydophila pneumoniae, and Mycoplasma pneumoniae. The detection and identification of specific viral and bacterial nucleic acids from individuals exhibiting signs and symptoms of a respiratory infection aids in the diagnosis of respiratory infection if used in conjunction with other clinical and epidemiological information. The results of this test should not be used as the sole basis for diagnosis, treatment, or other management decisions. Negative results in the setting of a

Characteristic	Device	Predicate
	Negative results in the setting of a respiratory illness may be due to infection with pathogens that are not detected by the test or lower respiratory tract infection that is not detected by a nasopharyngeal swab specimen. Positive results do not rule out co-infection with other organisms: the agent(s) detected by the QIAstat-Dx Respiratory Panel may not be the definite cause of disease. Additional laboratory testing (e.g. bacterial and viral culture, immunofluorescence, and radiography) may be necessary when evaluating a patient with possible respiratory tract infection. Due to the small number of positive specimens collected for certain organisms during the prospective clinical study, performance characteristics for Bordetella pertussis and Parainfluenza Virus 1 were established primarily with retrospective clinical specimens. Performance characteristics for Chlamydophila pneumoniae, Parainfluenza Virus 2, Parainfluenza Virus 4, Influenza A subtype H1 and Coronavirus 229E were established primarily using contrived clinical specimens. Due to the genetic similarity between Human Rhinovirus and Enterovirus, the QIAstat-Dx Respiratory Panel cannot reliably differentiate them. A positive QIAstat-Dx Respiratory Panel Rhinovirus/Enterovirus result should be followed-up using an	respiratory illness may be due to infection with pathogens that are not detected by this test or, lower respiratory tract infection that is not detected by a nasopharyngeal swab specimen. Positive results do not rule out coinfection with other organisms: the agent(s) detected by the Film Array RP may not be the definite cause of disease. Additional laboratory testing (e.g. bacterial and viral culture, immunofluorescence, and radiography) may be necessary when evaluating a patient with possible respiratory tract infection. Due to the small number of positive specimens collected for certain organisms during the prospective clinical study, performance characteristics for Bordetella pertussis, Coronavirus 229E, Coronavirus OC43, Influenza A H1, Influenza A H3, Influenza A H1-2009, Influenza B, Mycoplasma pneumoniae, Parainfluenza Virus 1, Parainfluenza Virus 2, and Parainfluenza Virus 4 were established primarily with retrospective clinical specimens. Performance characteristics for Chlamydophila pneumoniae were established primarily using contrived clinical specimens. Due to the genetic similarity between Human Rhinovirus and Enterovirus, the FilmArray RP cannot reliably differentiate them. A positive FilmArray RP Rhinovirus/Enterovirus result should be followed-up using an alternate method (e.g., cell culture

Characteristic	Device	Predicate
	alternate method (e.g., cell culture or sequence analysis). Performance characteristics for Influenza A were established when Influenza A H1N1-2009 and A H3 were the predominant Influenza A viruses in circulation. Performance of detecting Influenza A may vary if other Influenza A strains are circulating or a novel Influenza A virus emerges. If infection with a novel Influenza A virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel virulent Influenza viruses and sent to state or local health departments for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.	or sequence analysis). The FilmArray RP assay for Coronavirus OC43 may cross-react with some isolates of Coronavirus HKU1. A dual positive result may be due to cross-reactivity or may indicate a co-infection. Performance characteristics for Influenza A were established when Influenza A H1-2009, A H1, and A H3 were the predominant Influenza A viruses in circulation. Performance of detecting Influenza A may vary if other Influenza A strains are circulating or a novel Influenza A virus emerges. If infection with a novel Influenza A virus is suspected based on current clinical and epidemiological screening criteria recommended by public health authorities, specimens should be collected with appropriate infection control precautions for novel virulent Influenza viruses and sent to state or local health departments for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.
Specimen Type	Nasopharyngeal swabs (NPS) eluted in UTM	Nasopharyngeal swabs (NPS)
Assay Targets	See analyte list above, RNA/ DNA	See analyte list above, RNA/DNA
Amplification and Detection Technology	PCR	PCR
Assay Controls	One internal control in each cartridge to control for sample processing that is subjected to all nucleic acid extraction and	Two controls are included in each reagent pouch to control for sample processing and both stages of PCR and melt analysis.

Characteristic	Device	Predicate
	amplification steps similar to patient samples. Labeling will recommend use of negative and positive external controls regularly. Use transport medium as the external Negative Control, and previously characterized positive samples or negative sample spiked with well characterized target organisms as external Positive Controls.	Labeling recommends the use of external positive and negative controls regularly. Use viral transport medium as the external negative control, and previously characterized positive samples or negative samples spiked with well characterized organisms as external positive controls.
Differences		
Nucleic Acid Extraction	Extraction of nucleic acids using spin columns	Extraction of nucleic acids using magnetic beads
Amplification and Detection Instrument System	QIAstat-Dx Analyzer	FilmArray Instrument

Performance Characteristics - Non-clinical Studies

Limit of Detection

The Limit of Detection (LoD) is defined as the lowest concentration at which ≥95% of the tested samples generate a positive call. The LoD for each QIAstat-Dx Respiratory Panel pathogen was assessed by analyzing serial dilutions of analytical samples prepared from high-titer stocks obtained from commercial suppliers (ZeptoMetrix and ATCC) or artificial samples for commercially unavailable target analytes.

The LoD concentration was determined for a total of 51 pathogen strains. The LoD of the QIAstat-Dx Respiratory Panel was determined per analyte using selected strains representing individual pathogens that are possible to detect with the QIAstat-Dx Respiratory Panel. To confirm the established LoD concentration, the detection rate of all replicates must be ≥95% (at least 19/20 replicates must generate a positive signal).

At least three different cartridge lots and at least three different QIAstat-Dx Analyzers were used for LoD determination for every pathogen.

Individual LoD values for each QIAstat-Dx Respiratory Panel target is shown in Table 5.2.

Table 5.2: LoD values obtained for the different respiratory target strains tested with the QIAstat-Dx Respiratory Panel

Pathogen	Strain	Source	Concentration	Detection rate
Influenza A H1N1	A/New Jersey/8/76	ATCC® VR-897	341 $CEID_{50}$/ml	Flu A: 20/20 H1: 20/20
	A/Brisbane/59/07	ZeptoMetrix® 0810244CFHI	4 $TCID_{50}$/ml	Flu A: 20/20 H1: 20/20
	A/New Caledonia/20/99	ZeptoMetrix 0810036CFHI	15 $TCID_{50}$/ml	Flu A: 20/20 H1: 19/20
Influenza A H3N2	A/Virginia/ATCC6/2012 *	ATCC VR-1811	0.1 PFU/ml	Flu A: 20/20 H3: 20/20
	A/Wisconsin/67/2005 *	ZeptoMetrix 0810252CFHI	3.8 $TCID_{50}$/ml	Flu A: 20/20 H3: 20/20
	A/Port Chalmers/1/73	ATCC VR-810	499.3 $CEID_{50}$/ml	Flu A: 20/20 H3: 20/20
Influenza A, subtype H1N1/2009	A/Virginia/ATCC1/2009	ATCC VR-1736	67 PFU/ml	Flu A: 20/20 H1N1: 20/20
	A/SwineNY/03/2009	ZeptoMetrix 0810249CFHI	56 $TCID_{50}$/ml	Flu A: 20/20 H1N1: 20/20
Influenza B	B/Virginia/ATCC5/2012 *	ATCC VR-1807	0.03 PFU/ml	20/20
	B/FL/04/06	ATCC VR-1804	1080 $CEID_{50}$/ml	20/20
	B/Taiwan/2/62	ATCC VR-295	5000 $CEID_{50}$/ml	19/20
Coronavirus 229E	–	ATCC VR-740	0.2 $TCID_{50}$/ml	20/20
	– *	ZeptoMetrix 0810229CFHI	3.6 $TCID_{50}$/ml	20/20
Coronavirus OC43	–	ATCC VR-1558	0.1 $TCID_{50}$/ml	20/20
	– *	ZeptoMetrix 0810024CFHI	0.1 $TCID_{50}$/ml	20/20
Coronavirus NL63	–	ZeptoMetrix 0810228CFHI	0.01 $TCID_{50}$/ml	20/20
Coronavirus HKU1	– *	Clinical Sample S510	40,000 copies/ml	20/20
Parainfluenza Virus 1 (PIV 1)	C35 *	ATCC VR-94	0.2 $TCID_{50}$/ml	19/20
	–	ZeptoMetrix 0810014CFHI	0.2 $TCID_{50}$/ml	19/20

Pathogen	Strain	Source	Concentration	Detection rate
Parainfluenza Virus 2 (PIV 2)	Greer	ATCC VR-92	7.3 $TCID_{50}$/ml	20/20
	– *	ZeptoMetrix 0810015CFHI	1.3 $TCID_{50}$/ml	19/20
Parainfluenza Virus 3 (PIV 3)	C 243	ATCC VR-93	2.3 $TCID_{50}$/ml	20/20
	– *	ZeptoMetrix 0810016CFHI	11.5 $TCID_{50}$/ml	20/20
Parainfluenza Virus 4a (PIV 4a)	M-25	ATCC VR-1378	0.5 $TCID_{50}$/ml	20/20
Parainfluenza Virus 4b (PIV 4b)	– *	ZeptoMetrix 0810060BCFHI	9.5 $TCID_{50}$/ml	20/20
Respiratory Syncytial Virus A	A2 *	ATCC VR-1540	12.0 PFU/ml	20/20
	Long *	ATCC VR-26	33.0 PFU/ml	20/20
Respiratory Syncytial Virus B	18537 *	ATCC VR-1580	0.03 PFU/ml	20/20
	CH93(18)-18	ZeptoMetrix 0810040CFHI	0.4 $TCID_{50}$/ml	20/20
Human Metapneumovirus	Peru6-2003 (type B2) *	ZeptoMetrix 0810159CFHI	0.01 $TCID_{50}$/ml	19/20
	hMPV-16, IA10-2003 (A1)	ZeptoMetrix 0810161CFHI	0.5 $TCID_{50}$/ml	20/20
	hMPV-20, IA14-2003 (A2) *	ZeptoMetrix, 0810163CFHI	0.4 $TCID_{50}$/ml	19/20
	hMPV-3, Peru2-2002 (B1) *	ZeptoMetrix, 0810156CFHI	1479.9 $TCID_{50}$/ml	19/20
Adenovirus	GB (Adenovirus B3)	ATCC VR-3	4993.0 $TCID_{50}$/ml	20/20
	RI-67 (Adenovirus E4) *	ATCC VR-1572	15.8 $TCID_{50}$/ml	20/20
	Adenoid 75 (Adenovirus C5) *	ATCC VR-5	7331.0 $TCID_{50}$/ml	20/20
	Adenoid 71 (Adenovirus C1) *	ATCC VR-1	69.5 $TCID_{50}$/ml	20/20
	Adenoid 6 (Adenovirus C2) *	ATCC VR-846	28.1 $TCID_{50}$/ml	20/20
	Tonsil 99 (Adenovirus C6) *	ATCC VR-6	88.8 $TCID_{50}$/ml	20/20

Pathogen	Strain	Source	Concentration	Detection rate
Enterovirus	/US/IL/14-18952 (Enterovirus D68)	ATCC VR-1824	8.9 $TCID_{50}$/ml	19/20
	Echovirus 6 *	ATCC VR-241	0.9 $TCID_{50}$/ml	19/20
Rhinovirus	1059 (Rhinovirus B14) *	ATCC VR-284	8.9 $TCID_{50}$/ml	20/20
	HGP (Rhinovirus A2)	ATCC VR-482	8.9 $TCID_{50}$/ml	19/20
	11757 (Rhinovirus C16) *	ATCC VR-283	50.0 $TCID_{50}$/ml	20/20
	Type 1A *	ATCC VR-1559	8.9 $TCID_{50}$/ml	20/20
Mycoplasma pneumoniae	M129-B7 (type 1) *	ATCC 29342	0.1 CCU/ml	20/20
	PI 1428	ATCC 29085	1.0 CCU/ml	20/20
Chlamydia pneumoniae	TW183	ATCC VR-2282	14.2 IFU/ml	20/20
	CWL-029 *	ATCC VR-1310	120.0 IFU/ml	19/20
Bordetella pertussis	I028	ATCC BAA-2707	0.3 CFU/ml	20/20
	18323 *	ATCC 9797	2.6 CFU/ml	19/20

NOTE: For pathogen strains with (*), the LoD has been obtained in simulated matrix.

Analytical Reactivity

Analytical reactivity (Inclusivity) was evaluated with a collection of 127 respiratory pathogen isolates/strains that were selected based on clinical relevance and temporal/geographical diversity. Based on wet testing and in silico analysis, the QIAstat-Dx® Respiratory Panel primers and probes are specific and inclusive for clinically prevalent and relevant strains for each pathogen. Wet testing has been done with the strains listed in Table 5.3. Every strain has been tested in triplicates with a 100% detection rate for concentrations listed.

Table 5.3: In vitro Analytical Reactivity details for all the pathogens tested with the QIAstat-Dx® Respiratory Panel

Pathogen	Strain	Supplier	Catalogue ID	Concentration tested	x-fold LoD
Influenza H1N1	A/Brisbane/59/07 [a]	Zeptometrix	0810244CF HI	0.4 $TCID_{50}$/mL	1x LoD
	A/New Caledonia/20/99	Zeptometrix	0810036CF HI	1.5 $TCID_{50}$/mL	0.3x LoD
	A/New Jersey/8/76	ATCC	VR-897	34.1 $CEID_{50}$/mL	1x LoD
	A/Denver/1/57	ATCC	VR-546	340 $CEID_{50}$/mL	0.1x LoD
	A/Mal/302/54	ATCC	VR-98	15.8 $CEID_{50}$/mL	1x LoD
	A/Weiss/43	ATCC	VR-96	28117.1 $CEID_{50}$/mL	0.1x LoD
	A/PR/8/34	ATCC	VR-1469	390 PFU/mL	3x LoD
	A/Fort Monmouth/1/1947	ATCC	VR-1754	28.1 $CEID_{50}$/mL	0.1x LoD
	A/WS/33	ATCC	VR-1520	15.8 $TCID_{50}$/mL	0.1x LoD
	A/Swine/Iowa/15/1930	ATCC	VR-333	889.1 $CEID_{50}$/mL	1x LoD
Influenza H3N2	A/Port Chalmers/1/73 [a]	ATCC	VR-810	499.3 $CEID_{50}$/mL	1x LoD
	A/Virginia/ATCC6/2012	ATCC	AV-VR-1811	0.1 PFU/mL	1x LoD
	A/Wisconsin/67/2005	Zeptometrix	0810252CF HI	3.8 $TCID_{50}$/mL	1x LoD
	A/Wisconsin/15/2009	ATCC	VR-1882	5.8 $CEID_{50}$/mL	1x LoD
	A/Victoria/3/75	ATCC	VR-822	16 $CEID_{50}$/mL	1x LoD
	A/Aichi/2/68	ATCC	VR-1680	31 PFU/mL	10x LoD
	A/Hong Kong/8/68	ATCC	VR-1679	1581.1 $TCID_{50}$/mL	10x LoD
	A/Alice (recombinant, carries A/England/42/72)	ATCC	VR-776	500 $TCID_{50}$/mL	10x LoD

Pathogen	Strain	Supplier	Catalogue ID	Concentration tested	x-fold LoD
	MRC-2 (recombinant A/England/42/72 and A/PR/8/34 strains)	ATCC	VR-777	8891.4 $CEID_{50}$/mL	100x LoD
	A/Switzerland/9715293/2013	ATCC	VR-1837	1000 $CEID_{50}$/mL	1x LoD
Influenza A H1N1 pan	A/Virginia/ATCC1/2009 [a]	ATCC	VR-1736	6.7 PFU/mL	1x LoD
	A/SwineNY/03/2009	Zeptometrix	0810249CFHI	5.6 $TCID_{50}$/mL	1x LoD
	A/Virginia/ATCC2/2009	ATCC	VR-1737	61 PFU/mL	0.1x LoD
	A/Virginia/ATCC3/2009	ATCC	VR-1738	1800 PFU/mL	100x LoD
	Swine NY/01/2009	Zeptometrix	0810248CFHI	138 $TCID_{50}$/mL	0.3x LoD
	Swine NY/02/2009	Zeptometrix	0810109CFNHI	1.4 $TCID_{50}$/mL	10x LoD
	A/California/07/2009 NYMC X-179A	ATCC	VR-1884	1400 $CEID_{50}$/mL	0.1x LoD
	Canada/6294/09	Zeptometrix	0810109CFJHI	1.7 $TCID_{50}$/mL	3x LoD
	Mexico/4108/09	Zeptometrix	0810166CFHI	14.1 $TCID_{50}$/mL	0.1x LoD
	Netherlands/2629/2009	BEI Resources	NR-19823	16 TCID50/mL	0.3x LoD
Influenza A H2N2	Japan/305/1957 (nucleic acid) [b]	BEI	NR-2775	0.00326 RNA ng/µL	1x LoD
	Korea/426/1968xPuerto Rico/8/1934 (nucleic acid) [b]	BEI	NR-9679	0.0000625 RNA ng/µL	0.3x LoD
Influenza A H5N3	A/Duck/Singapore/645/1997 (nucleic acid) [b]	BEI	NR-9682	0.002475 RNA ng/µL	1x LoD
Influenza A H10N7	Chicken/Germany/N/49 (nucleic acid) [b]	BEI	NR-2765	0.068 RNA ng/µL	10x LoD

Pathogen	Strain	Supplier	Catalogue ID	Concentration tested	x-fold LoD
Influenza A H1N2	Recombinant Kilbourne F63, A/NWS/1934 (HA) x A/Rockefeller Institute/5/1957 (nucleic acids) [b]	BEI	NR-9677	0.0148 RNA ng/µL	100x LoD
Influenza B	B/Virginia/ATCC5/2012 [a]	ATCC	VR-1807	0.03 PFU/mL	1x LoD
	B/FL/04/06	ATCC	VR-1804	108 $CEID_{50}$/mL	1x LoD
	B/Taiwan/2/62	ATCC	VR-295	49.9 $CEID_{50}$/mL	0.3x LoD
	B/Allen/45 [c]	ATCC	VR-102	n/a	Not detected
	B/Hong Kong/5/72 [c]	ATCC	VR-823	n/a	Not detected
	B/Maryland/1/59	ATCC	VR-296	338 $CEID_{50}$/mL	0.1x LoD
	B/GL/1739/54	ATCC	VR-103	50 $CEID_{50}$/mL	1x LoD
	B/Wisconsin/1/2010	ATCC	VR-1883	0.3 $CEID_{50}$/mL	0.1x LoD
	B/Massachusetts/2/2012	ATCC	VR-1813	2300 $CEID_{50}$/mL	3x LoD
	B/Florida/02/06 [d]	Zeptometrix	0810037CFHI	n/a	n/a
	B/Brisbane/60/2008	BEI Resources	NR-42005	1.8 $CEID_{50}$/mL	0.1x LoD
	B/Malaysia/2506/2004	BEI Resources	NR-9723	1.58 $CEID_{50}$/mL	0.3x LoD
Coronavirus 229E	n/a [a]	Zeptometrix	0810229CFHI	3.6 $TCID_{50}$/mL	1x LoD
	n/a	ATCC	VR-740	0.2 $TCID_{50}$/mL	0.3x LoD
Coronavirus OC43	n/a [a]	ATCC	VR-1558	0.1 $TCID_{50}$/mL	1x LoD
	n/a	Zeptometrix	0810024CFHI	0.1 $TCID_{50}$/mL	1x LoD
Coronavirus NL63	n/a [a]	Zeptometrix	0810228CFHI	0.01 $TCID_{50}$/mL	1x LoD
	n/a	BEI Resources	NR-470	1.6 $TCID_{50}$/mL	1x LoD

Pathogen	Strain	Supplier	Catalogue ID	Concentration tested	x-fold LoD
Coronavirus HKU1	n/a [a, e]	Zeptometrix	NATRVP-IDI	3E+03 copies/mL	1x LoD
	n/a [e]	QIAGEN Barcelona (STAT-Dx)	Clinical sample S510	1.2E+04 copies/mL	0.3x LoD
	n/a [e]	QIAGEN Barcelona (STAT-Dx)	Clinical sample S501	7E+03 copies/mL	1x LoD
	n/a [e]	QIAGEN Barcelona (STAT-Dx)	Clinical sample S496	7E+03 copies/mL	1x LoD
Parainfluenza Virus 1	n/a [a]	Zeptometrix	0810014CFHI	0.02 $TCID_{50}$/mL	1x LoD
	C35	ATCC	VR-94	0.2 $TCID_{50}$/mL	1x LoD
	n/a	Zeptometrix	NATRVP-IDI	1.0E-2 [f]	10x LoD
Parainfluenza Virus 2	Greer [a]	ATCC	VR-92	2.3 $TCID_{50}$/mL	1x LoD
	n/a	Zeptometrix	0810015CFHI	1.3 $TCID_{50}$/mL	0.3x LoD
	n/a	Zeptometrix	0810504CFHI	1.3 $TCID_{50}$/mL	0.1x LoD
Parainfluenza Virus 3	n/a [a]	Zeptometrix	0810016CFHI	11.5 $TCID_{50}$/mL	1x LoD
	C 243	ATCC	VR-93	2.3 $TCID_{50}$/mL	1x LoD
	n/a	Zeptometrix	NATRVP-IDI	1.0E-3 [f]	0.1x LoD
Parainfluenza Virus 4	M-25 [a]	ATCC	VR-1378	0.5 $TCID_{50}$/mL	1x LoD
	n/a	Zeptometrix	0810060BCFHI	9.6 $TCID_{50}$/mL	0.3x LoD
	n/a	Zeptometrix	0810060CFHI	28.2 $TCID_{50}$/mL	0.1x LoD
	CH 19503	ATCC	VR-1377	1 $TCID_{50}$/mL	0.3x LoD
Respiratory Syncytial Virus A+B	18537 [a]	ATCC	VR-1580	0.03 PFU/mL	1x LoD
	A2	ATCC	VR-1540	12 PFU/mL	0.3x LoD
	Long	ATCC	VR-26	33 PFU/mL	1x LoD
	CH93(18)-18	Zeptometrix	0810040CFHI	0.4 $TCID_{50}$/mL	1x LoD
	n/a	Zeptometrix	0810040ACFHI	0.3 $TCID_{50}$/mL	0.1x LoD
	B WV/14617/85	ATCC	VR-1400	15.8 $TCID_{50}$/mL	1x LoD
Human Metapneumovirus	IA10-2003 [a]	Zeptometrix	0810161CFHI	0.5 $TCID_{50}$/mL	1x LoD
	IA14-2003	Zeptometrix	0810163CFHI	0.4 $TCID_{50}$/mL	1x LoD

Pathogen	Strain	Supplier	Catalogue ID	Concentration tested	x-fold LoD
	Peru2-2002	Zeptometrix	0810156CF HI	1478.9 $TCID_{50}$/mL	1x LoD
	Peru6-2003	Zeptometrix	0810159CF HI	0.01 $TCID_{50}$/mL	1x LoD
	IA3-2002	Zeptometrix	0810160CF HI	66 $TCID_{50}$/mL	3x LoD
	IA27-2004	Zeptometrix	0810164CF HI	1.3 $TCID_{50}$/mL	1x LoD
	Peru3-2003	Zeptometrix	0810158CF HI	31.6 $TCID_{50}$/mL	1x LoD
	IA18-2003	Zeptometrix	0810162CF HI	0.4 $TCID_{50}$/mL	1x LoD
	Peru1-2002	Zeptometrix	0810157CF HI	2187.8 $TCID_{50}$/mL	10x LoD
Adenovirus	Tonsil 99 [a]	ATCC	VR-6	88.8 $TCID_{50}$/mL	1x LoD
	GB	ATCC	VR-3	4992.8 $TCID_{50}$/mL	0.3x LoD
	Adenoid 71	ATCC	VR-1	69.5 $TCID_{50}$/mL	1x LoD
	Adenoid 6	ATCC	VR-846	28.1 $TCID_{50}$/mL	0.3x LoD
	Adenoid 75	ATCC	VR-5	7331.2 $TCID_{50}$/mL	0.3x LoD
	RI-67	ATCC	VR-1572	15.8 $TCID_{50}$/mL	0.3x LoD
	Huie	ATCC	VR-863	88.9 $TCID_{50}$/mL	0.3x LoD
	Gomen	ATCC	VR-7	0.3 $TCID_{50}$/mL	0.1x LoD
	Slobitski	ATCC	VR-12	16 $TCID_{50}$/mL	10x LoD
	AV-1645 [128]	ATCC	VR-256	2.8 $TCID_{50}$/mL	0.3x LoD
	Compton	ATCC	VR-716	0.28 $TCID_{50}$/mL	0.3x LoD
	Holden	ATCC	VR-718	8.9 $TCID_{50}$/mL	0.3x LoD
	Trim	ATCC	VR-1815	160 $TCID_{50}$/mL	0.3x LoD
	Dugan	ATCC	VR-931	0.2 $TCID_{50}$/mL	0.1x LoD
	Tak (73-3544)	ATCC	VR-930	28117 $TCID_{50}$/mL	3x LoD
Enterovirus	/US/IL/14-18952 [a]	ATCC	VR-1824	8.9 $TCID_{50}$/mL	1x LoD
	D-1 (Cox)	ATCC	VR-241	0.9 $TCID_{50}$/mL	0.3x LoD
	H	ATCC	VR-1432	8.9 $TCID_{50}$/mL	1x LoD
	M.K. (Kowalik)	ATCC	VR-168	1.0E-6 [f]	10x LoD
	Gregory	ATCC	VR-41	889.1 $TCID_{50}$/mL	10x LoD

Pathogen	Strain	Supplier	Catalogue ID	Concentration tested	x-fold LoD
	Bastianni	ATCC	VR-1660	281.2 $TCID_{50}$/mL	1x LoD
	Griggs	ATCC	VR-1311	1.6 $TCID_{50}$/mL	0.3x LoD
	Conn-5	ATCC	VR-28	158.1 $TCID_{50}$/mL	0.3x LoD
	Ohio-1	ATCC	VR-29	2811.7 $TCID_{50}$/mL	3x LoD
	Nancy	ATCC	VR-30	0.9 $TCID_{50}$/mL	0.3x LoD
	CHHE-29	ATCC	VR-47	0.03 $TCID_{50}$/mL	10x LoD
	Kuykendall [V-024-001-012]	ATCC	VR-850	28.1 $TCID_{50}$/mL	10x LoD
Rhinovirus	1059 [a]	ATCC	VR-284	8.9 $TCID_{50}$/mL	1x LoD
	2060	ATCC	VR-1559	8.9 $TCID_{50}$/mL	0.1x LoD
	HGP	ATCC	VR-482	8.9 $TCID_{50}$/mL	1x LoD
	11757	ATCC	VR-283	49.9 $TCID_{50}$/mL	0.3x LoD
	FEB	ATCC	VR-483	281.2 $TCID_{50}$/mL	1x LoD
	33342	ATCC	VR-1663	200 PFU/mL	3x LoD
M. pneumoniae	PI 1428 [a]	ATCC	29085	1 CCU/mL	1x LoD
	M129-B7	ATCC	29342	0.1 CCU/mL	1x LoD
	FH strain of Eaton Agent [NCTC 10119]	ATCC	15531	0.2 CFU/mL	0.1x LoD
B. pertussis	I028 [a]	ATCC	BAA-2707	0.3 CFU/mL	1x LoD
	19323	ATCC	9797	2.6 CFU/mL	1x LoD
	10-536	ATCC	10380	1.0E-2 [f]	0.3x LoD
C. pneumoniae	TW183 [a]	ATCC	VR-2282	14.2 IFU/mL	1x LoD
	CWL-029	ATCC	VR-1310	120 IFU/mL	1x LoD
	AR-39	ATCC	53592	29 IFU/mL	0.3x LoD

[a] LoD reference strain used to calculate the x-fold LoD.
[b] Influenza A/Brisbane/59/07 (Zeptometrix, 0810244CFHI) used as reference strain to calculate the x-fold LoD.
[c] In silico analysis showed that this strain should be detected by QIAstat-Dx Respiratory Panel V1. In in vitro testing, the strain was not detected. It is identified as a derivative from B/Lee/40 ancestral lineage which is not in circulation since the 1980s (Nogales A., Martínez-Sobrido L. (2017). Reverse Genetics Approaches for the Development of Influenza Vaccines (Review). Int. J. Mol. Sci. 2017, 18, 20.).
[d] In silico analysis showed that this strain should be detected by QIAstat-Dx Respiratory Panel V1. In in vitro testing, the strain (Victoria lineage) was randomly detected, therefore x-fold LoD could not be determined.
[e] Coronavirus HKU1 was quantified by a real-time PCR assay against a standard curve of synthetic Coronavirus HKU1 RNA transcript to obtain quantification of the viral nucleic acid in the clinical specimen (RNA copies/mL).
[f] Relative dilution from stock. Stock titer not available according to manufacturer.

Analytical Specificity (Cross-Reactivity and Exclusivity)

The analytical specificity study was carried out by *in silico* analysis and *in vitro* testing to assess the cross-reactivity and exclusivity of the QIAstat-Dx Respiratory Panel. On-panel organisms were tested to assess the potential for intra-panel cross-reactivity and off-panel organisms were tested to evaluate panel exclusivity. The off-panel organisms selected were clinically relevant organisms (colonizing the upper respiratory tract or causing respiratory symptoms), common skin flora or laboratory contaminants, or microorganisms for which much of the population may have been infected. The on-panel organisms tested are shown in Table 5.4.

Samples were prepared by spiking potential cross-reactive organisms into simulated nasopharyngeal swab sample matrix at the highest concentration possible based on the organism stock – at least 10^5 $TCID_{50}$/ml for viral targets and 10^6 CFU/ml for bacterial and fungal targets. These concentrations represent levels approximately 800–1,000,000-fold higher than the LoD of the QIAstat-Dx Respiratory Panel.

A certain level of cross-reactivity with off-panel *Bordetella* species and *Bordetella pertussis* was predicted by *in silico* sequence analysis and was observed when *Bordetella holmesii* and *Bordetella bronchiseptica* were tested *in vitro*.

Table 5.4: List of Analytical Specificity Pathogens

Pathogen Type	Pathogen
On-panel bacteria	*Mycoplasma. pneumoniae*
	Bordetella pertussis
	Chlamydia pneumoniae
Off-panel bacteria	*Acinetobacter calcoaceticus*
	Bordetella avium
	Bordetella bronchiseptica
	Bordetella hinzii
	Bordetella holmesii
	Bordetella parapertussis
	Chlamydia trachomatis
	Corynebacterium diphteriae
	Enterobacter aerogenes
	Escherichia coli (O157)
	Haemophilus influenzae
	Klebsiella oxytoca
	Klebsiella pneumoniae
	Lactobacillus acidophilus
	Lactobacillus plantarum
	Legionella bozemanii
	Legionella dumofii
	Legionella feeleii
	Legionella longbeacheae
	Legionella micdadei
	Legionella pneumophila
	Moraxella catarrhalis
	*Mycobacterium tuberculosis**
	Mycoplasma genitalium
	Mycoplasma hominis
	Mycoplasma orale
	Neisseria elongata
	Neisseria gonorrhoeae
	Neisseria meningitidis
	Proteus mirabilis
	Pseudomonas aeruginosa
	Serratia marcescens
	Staphylococcus aureus
	Staphylococcus epidermidis
	Stenotrophomonas maltophilia
	Streptococcus agalactiae
	Streptococcus pneumoniae
	Streptococcus pyogenes
	Streptococcus salivarus
	Ureaplasma urealyticum

On-panel viruses	Influenza A H1N1
	Influenza A H3N2
	Influenza A H1N1/pdm09
	Influenza B
	Cor 229E
	Cor OC43
	Cor NL63
	Cor HKU1†
	Parainfluenza Virus 1
	Parainfluenza Virus 2
	Parainfluenza Virus 3
	Parainfluenza Virus 4a
	RSV A
	hMPV A
	Adenovirus C
	Adenovirus B
	Enterovirus
	Rhinovirus
Off-panel viruses	Bocavirus‡
	Cytomegalovirus
	Epstein-Barr Virus
	Herpes Simplex Virus 1
	Herpes Simplex Virus 2
	Measles Virus
	Middle East Respiratory Syndrome Coronavirus§
	Mumps
Off-panel fungi	*Aspergillus flavus*
	Aspergillus fumigatus
	Candida albicans
	Cryptococcus neoformans

* *Mycobacterium tuberculosis* genomic DNA tested
† Coronavirus HKU1 clinical specimen tested
‡ Bocavirus Type 1 clinical specimens tested
§ Middle East Respiratory Syndrome Coronavirus synthetic RNA tested

Interference

The effect of potentially interfering substances on the detectability of the QIAstat-Dx® Respiratory Panel organisms was evaluated. Thirty (30) potentially interfering substances were added to contrived samples at a level predicted to be above the concentration of the substance likely to be found in an authentic NPS specimen. The contrived samples (also referred to as combined samples) were each comprised of a mix of organisms tested at a concentration of 5xLoD.

Endogenous substances such as whole blood, human genomic DNA, and several pathogens were tested alongside exogenous substances like antibiotics, nasal sprays and different workflow contaminants.

The combined samples were tested with and without addition of an inhibitory substance allowing direct sample-to-sample comparison. Combined samples not spiked with any test substance served as a positive control. Additionally, for substances that may contain genetic material (such as blood, mucin, DNA and microorganisms), negative specimens (blank sNPS sample matrix with no organism mix) were spiked with only the test substance to evaluate the potential for false positive results due to the test substance itself.

Combined samples not spiked with any test substance served as a positive control and blank sNPS sample matrix with no organism mix as negative controls.

All pathogen-containing samples without spiked interferent generated positive signals for all pathogens present in the respective combined sample. Negative signals were obtained for all pathogens not present in the same sample but detected by the QIAstat-Dx® Respiratory Panel.

None of the substances tested showed inhibition, except for the nasal influenza vaccines (Table 5.5). This was due to the fact that the selection of substances concentration was higher than the concentrations expected to be present in a sample. In addition, nasal influenza vaccines (Fluenz Tetra and FluMist) were predicted to be reactive with the QIAstat-Dx® Respiratory Panel Influenza A (subtype) and Influenza B assays. Final dilution without observable interfering effect was 0,000001% v/v for both vaccines.

No impact on performance is expected when clinical liquid samples are examined in the presence of the substances tested.

Clinically relevant co-infections testing demonstrated that when at least two QIAstat-Dx® Respiratory Panel pathogens of different concentrations are simultaneously present in one sample all targets can be detected by the assay.

Table 5.5: Final highest concentration without observable inhibitory effect.

Substance Tested	Concentration Tested	Results
Endogenous Substances		
Human genomic DNA 200 ng/µL	20 ng/µL	No Interference
Human Blood (+NaCitrate)	1% v/v	No Interference
Mucin from bovine submaxillary	1% v/v	No Interference
Competitive Microorganisms		
Staphylococcus aureus	1.00E+06 CFU/mL	No Interference
Neisseria meningitidis	5.00E+04 CFU/mL	No Interference
Corynebacterium diphtheriae	5.00E+03 CFU/mL	No Interference

Substance Tested	Concentration Tested	Results
Human Cytomegalovirus	1.00E+05 TCID50/mL	No Interference
Exogenous Substances		
Tobramycin	0.6 mg/mL	No Interference
Mupirocin	2% w/v	No Interference
Saline Nasal Spray with Preservatives	1% v/v	No Interference
Afrin, Severe Congestion Nasal Spray (Oxymetazoline HCl)	1% v/v	No Interference
Analgesic ointment (Vicks®VapoRub®)	1% w/v	No Interference
Petroleum Jelly (Vaseline®)	1% w/v	No Interference
FluMist nasal influenza vaccine	0,00001% v/v	Interference
FluMist nasal influenza vaccine	0,000001% v/v	No Interference
Fluenz Tetra nasal influenza vaccine	0,00001% v/v	Interference
7	0,000001% v/v	No Interference
Disinfecting/Cleaning Substances		
Disinfecting wipes	½ $inches^2$/1ml UTM	No Interference
DNAZap	1% v/v	No Interference
RNaseOUT	1% v/v	No Interference
Bleach	5% v/v	No Interference
Ethanol	5% v/v	No Interference
Specimen Collection Materials		
Swab Copan 168C	1 swab/1mL UTM	No Interference
Swab Copan FloQ	1 swab/1mL UTM	No Interference
Swab Copan 175KS01	1 swab/1mL UTM	No Interference
Swab Puritan 25-801 A 50	1 swab/1mL UTM	No Interference
VTM Sigma Virocult	100%	No Interference
VTM Remel M4-RT	100%	No Interference
VTM Remel M4	100%	No Interference
VTM Remel M5	100%	No Interference
VTM Remel M6	100%	No Interference
BD Universal Viral Transport	100%	No Interference

Specimen Stability

Verification that storage of NPS samples at the specified conditions do not impact the performance when tested with the QIAstat-Dx® Respiratory Panel compared to freshly tested samples was evaluated. The detailed list of pathogens and strains for the 10 sample mixes used in the study is described in Table 5.6 with the respective 5x or 1xLoD concentration. Each pathogen was spiked into HeLa in UTM combined samples in a final concentration of 5x LoD or 1x LoD based on the 1x LoD concentration. During the study execution a total of 10 replicates per storage condition and target were tested.

Table 5.6: Pathogens tested in Specimen Stability Study

Mix	Pathogen	Strain	Source	Times LoD	Final Concentration Stock titer (re-titrated)
Mix 1	Influenza A H1	A/New Caledonia/20/99	Zeptometrix	5x	7.55E+6 TCID50/mL
	Cor HKU1*	n/a	Zeptometrix	5x	n/a
	PIV2	Greer	ATCC	5x	1.16E+7 TCID50/mL
	RSVB	CH93(18)-18	Zeptometrix	5x	6.30E+06 TCID50/mL
	C. pneumoniae	TW183	ATCC	5x	2.25E+06 IFU/mL
Mix 2	Influenza B	B/Florida/4/2006	ATCC	5x	5.40E+09 CEID50/mL
	Cor 229E	n/a	ATCC	5x	7.90E+04 TCID50/mL
	PIV4a**	M-25	ATCC	5x	8.00E+04 TCID50/mL
	Enterovirus D68	/US/IL/14-18952 (enterovirus D68)	ATCC	5x	4.45E+07 TCID50/mL
	hMPV A1	hMPV-16, IA10-2003 (A1)	Zeptometrix	5x	7.55E+06 TCID50/mL
	B. pertussis	I028	ATCC	5x	1.35E+07 CFU/mL
Mix 3	Influenza H1N1 (pdm)	A/Virginia/ATCC1/2009	ATCC	5x	3.35E+06 PFU/mL
	Cor OC43	n/a	ATCC	5x	1.41E+06 TCID50/mL
	PIV3	C 243	ATCC	5x	1.16E+07 TCID50/mL
	Rhinovirus A2	HGP (rhinovirus A2)	ATCC	5x	1.41E+08 TCID50/mL
	RSVA	A2	ATCC	5x	1.90E+08 PFU/mL
	M. pneumoniae	PI 1428	ATCC	5x	5.00E+06 CU/mL

Mix	Pathogen	Strain	Source	Times LoD	Final Concentration Stock titer (re-titrated)
Mix 4	Influenza A H3	A/Port Chalmers/1/73	ATCC	5x	7.90E+09 CEID50/mL
	Cor NL63***	n/a	Zeptometrix	5x	5.85E+05 TCID50/mL
	PIV1	C35	ATCC	5x	2.50E+06 TCID50/mL
	Adenovirus B3	GB (adenovirus B3)	ATCC	5x	7.90E+10 TCID50/mL
Mix 5	Influenza A H1	A/New Caledonia/20/99	Zeptometrix	1x	1.51E+6 TCID50/mL
	Cor HKU1*	n/a	Zeptometrix	1x	n/a
	PIV2	Greer	ATCC	1x	2.32E+06 TCID50/mL
	RSVB	CH93(18)-18	Zeptometrix	1x	1.26E+06 TCID50/mL
	C. pneumoniae	TW183	ATCC	1x	4.50E+05 IFU/mL
Mix 6	Influenza B	B/Florida/4/2006	ATCC	1x	1.08E+09 CEID50/mL
	Cor 229E	n/a	ATCC	1x	1.58E+04 TCID50/mL
	PIV4a**	M-25	ATCC	1x	1.60E+04 TCID50/mL
	Enterovirus D68	/US/IL/14-18952 (enterovirus D68)	ATCC	1x	8.89E+06 TCID50/mL
	hMPV A1	hMPV-16, IA10-2003 (A1)	Zeptometrix	1x	1.51E+06 TCID50/mL
	B. pertussis	I028	ATCC	1x	2.70E+06 CFU/mL
Mix 7	Influenza H1N1 (pdm)	A/Virginia/ATCC1/2009	ATCC	1x	6.70E+05 PFU/mL
	Cor OC43	n/a	ATCC	1x	2.81E+05 TCID50/mL
	PIV3	C 243	ATCC	1x	2.32E+06 TCID50/mL
	Rhinovirus A2	HGP (rhinovirus A2)	ATCC	1x	2.81E+07 TCID50/mL
	RSVA	A2	ATCC	1x	3.80E+07 PFU/mL
	M. pneumoniae	PI 1428	ATCC	1x	1.00E+06 CCU/mL

Mix	Pathogen	Strain	Source	Times LoD	Final Concentration Stock titer (re-titrated)
Mix 8	Influenza A H3	A/Port Chalmers/1/73	ATCC	1x	1.58E+09 CEID50/mL
	Cor NL63***	n/a	Zeptometrix	1x	1.17E+05 TCID50/mL
	PIV1	C35	ATCC	1x	5.00E+05 TCID50/mL
	Adenovirus B3	GB (adenovirus B3)	ATCC	1x	1.58E+10 TCID50/mL
Mix 9	Influenza A H1	A/New Caledonia/20/99	Zeptometrix	1x	1.51E+6 TCID50/mL
	Adenovirus B3	GB (adenovirus B3)	ATCC	1x	1.58E+10 TCID50/mL
Mix 10	Enterovirus D68	/US/IL/14-18952 (enterovirus D68)	ATCC	1x	8.89E+06 TCID50/mL
	hMPV A1	hMPV-16, IA10-2003 (A1)	Zeptometrix	1x	1.51E+06 TCID50/mL
	C. pneumoniae	TW183	ATCC	1x	4.50E+05 IFU/mL
Mix 9	Influenza A H1	A/New Caledonia/20/99	Zeptometrix	1x	1.51E+6 TCID50/mL
	Adenovirus B3	GB (adenovirus B3)	ATCC	1x	1.58E+10 TCID50/mL
Mix 10	Enterovirus D68	/US/IL/14-18952 (enterovirus D68)	ATCC	1x	8.89E+06 TCID50/mL
	hMPV A1	hMPV-16, IA10-2003 (A1)	Zeptometrix	1x	1.51E+06 TCID50/mL
	C. pneumoniae	TW183	ATCC	1x	4.50E+05 IFU/mL

The storage conditions are provided in Table 5.7.

Table 5.7: Storage conditions and samples tested per time point

Storage Condition	Time	Temperature	Samples tested with QIAstat-Dx® Respiratory Panel
Fresh	0 h	15 to 25 ˚C	Mix 1 to 8
Condition 1	4 h	15 to 25˚C	Mix 1 to 8
Condition 2	72 h	2-8˚C	Mix 1 to 8
Condition 3	30 days	-15 to-25 ˚C	Mix 1 to 8

Sample stability testing demonstrated that the QIAstat-Dx® Respiratory Panel Assay is capable of processing samples which are stored prior to the analysis under conditions typically utilized for NPS specimens according to the intended use.

The results of this study support the following recommendations for storage of NPS resuspended in UTM before testing:

- Up to 4h at RT (15 to 25 ˚C).
- Up to 3 days in the fridge (2 to 8 ˚C).
- Up to 30 days frozen (-15 to -25 ˚C).

Matrix Equivalency

A comparison of the performance of analytical samples prepared in NPS simulated matrix to negative clinical NPS sample matrix, and combined samples versus single-spiked samples was conducted. A total of 4 combined sample mixes were prepared by spiking individual pathogens in true-negative clinical NPS sample matrix for testing with QIAstat-Dx® Respiratory Panel. Every sample combination was established to detect not more than one positive pathogen per Reaction Chamber (RC). In order to assess comparable performance for the NPS clinical matrix, a concentration of 1x LoD for at least one strain per pathogen covering the QIAstat-Dx® Respiratory Panel was prepared in a true-negative clinical NPS sample matrix and tested in 20 replicates (using one or more lots of QIAstat-Dx® Respiratory Panel cartridges executed on one or more QIAstat-Dx® Analyzers). In addition, up to 6 pathogens were spiked per sample in order to demonstrate comparable performance to single-spiked samples (one analyte per sample). The LoD in clinical NPS sample matrix using combined samples was not shown to be equivalent to LoD in simulated matrix for all analytes (established with single-spiked samples). While claimed LoD concentrations represent the highest (most concentrated) titer of analyte confirmed in clinical matrix, analytical studies were performed in simulated matrix using the LoD determined in simulated matrix (the more challenging condition).

Reproducibility

Reproducibility testing of contrived samples was performed at three test sites. The study incorporated a range of potential variation factors introduced by sites, days, replicates, cartridge lots, operators, and QIAstat-Dx analyzers. For each site, testing was performed across 5 days with 4 replicates per day (leading to a total of 20 replicates per target, concentration and site), a minimum of 2 different QIAstat-Dx Analyzers per site, and at least 2 operators on each testing day.

A total of 12 sample mixes were prepared with at least 3 replicates tested per sample mix. Each pathogen was spiked into HeLa in UTM combined samples in a final concentration of 0.1x LoD, 1x LoD or 3x LoD, respectively. A summary of results for each analyte is provided in Table 5.8.

Table 5.8 summarizes the results for 0.1x LoD concentration where it is observed that the detection rate for 24 of the 24 targets was <95% and therefore the acceptance criteria is met.

Table 5.8: Detection rate per target at 0.1x LoD concentration for each site of reproducibility study and 2-sided 95% Confidence Interval by target

Target (0.1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Adenovirus (ATCC VR-3)	**STAT**	10 / 20	50.00%	29.9-70.1%
	LACNY	9 / 19	47.37%	27.3-68.2%
	INDIANA	10 / 19	52.63%	31.7-72.7%
	All Sites (Overall)	**29 / 58**	**50.00%**	**37.5-62.5%**
B. pertussis (BAA-2707)	**STAT**	9 / 20	45.00%	25.8-65.8%
	LACNY	7 / 19	36.84%	19.2-59.0%
	INDIANA	9 / 20	45.00%	25.8-65.8%
	All Sites (Overall)	**25 / 59**	**42.37%**	**30.6-55.1%**
***C. pneumoniae* (ATCC VR-2282)**	**STAT**	11 / 20	55.00%	34.2-74.2%
	LACNY	11 / 19	57.89%	36.3-76.9%
	INDIANA	14 / 20	70.00%	48.1-85.5%
	All Sites (Overall)	**36 / 59**	**61.02%**	**48.3-72.4%**
Coronavirus 229E (ATCC VR-740)	**STAT**	9 / 20	45.00%	25.8-65.8%
	LACNY	12 / 19	63.16%	41.0-80.9%
	INDIANA	5 / 20	25.00%	11.2-46.9%
	All Sites (Overall)	**26 / 59**	**44.07%**	**32.2-56.7%**
Coronavirus HKU1 (NATRVP-IDI)	**STAT**	17 / 20	85.00%	64.0-94.8%
	LACNY	10 / 19	52.63%	31.7-72.7%
	INDIANA	9 / 20	45.00%	25.8-65.8%
	All Sites (Overall)	**36 / 59**	**61.02%**	**48.3-72.4%**
Coronavirus NL63 (0810228CFHI)	**STAT**	13 / 20	65.00%	43.3-81.9%
	LACNY	12 / 19	63.16%	41.0-80.9%
	INDIANA	14 / 19	73.68%	51.2-88.2%
	All Sites (Overall)	**39 / 58**	**67.24%**	**54.4-77.9%**

Target (0.1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Coronavirus OC43 (ATCC VR-1558)	**STAT**	13 / 20	65.00%	43.3-81.9%
	LACNY	15 / 20	75.00%	53.1-88.8%
	INDIANA	15 / 20	75.00%	53.1-88.8%
	All Sites (Overall)	**43 / 60**	**71.67%**	**59.2-81.5%**
Enterovirus (ATCC VR-1824)	**STAT**	8 / 20	40.00%	21.9-61.3%
	LACNY	6 / 19	31.58%	15.4-54.0%
	INDIANA	7 / 20	35.00%	18.1-56.7%
	All Sites (Overall)	**21 / 59**	**35.59%**	**24.6-48.3%**
Human Metapneumovirus (0810161CF)	**STAT**	6 / 20	30.00%	14.6-51.9%
	LACNY	9 / 19	47.37%	27.3-68.2%
	INDIANA	9 / 20	45.00%	25.8-65.8%
	All Sites (Overall)	**24 / 59**	**40.68%**	**29.1-53.4%**
Influenza A (0810249CFHI)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	18 / 20	90.00%	69.9-97.2%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**57 / 60**	**95.00%**	**86.3-98.3%**
Influenza A (ATCC VR-810)	**STAT**	10 / 20	50.00%	29.9-70.1%
	LACNY	9 / 19	47.37%	27.3-68.3%
	INDIANA	16 / 19	84.21%	62.4-94.5%
	All Sites (Overall)	**35 / 58**	**60.34%**	**47.5-71.9%**
Influenza A (ATCC VR-897)	**STAT**	14 / 20	70.00%	48.1-85.5%
	LACNY	9 / 19	47.37%	27.3-68.3%
	INDIANA	12 / 20	60.00%	38.7-78.1%
	All Sites (Overall)	**35 / 59**	**59.32%**	**46.6-70.9%**
Influenza A H1(ATCC VR-897)	**STAT**	13 / 20	65.00%	43.3-81.9%
	LACNY	13 / 19	68.42%	46.0-84.6%
	INDIANA	15 / 20	75.00%	53.1-88.8%
	All Sites (Overall)	**41 / 59**	**69.49%**	**56.9-79.8%**

Target (0.1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Influenza B (ATCC VR-295)	**STAT**	7 / 20	35.00%	18.1-56.7%
	LACNY	9 / 19	47.37%	27.3-68.3%
	INDIANA	8 / 20	40.00%	21.9-61.3%
	All Sites (Overall)	**24 / 59**	**40.68%**	**29.1-53.4%**
Influenza H1N1 (pdm09) (0810249CFHI)	**STAT**	14 / 20	70.00%	48.1-85.5%
	LACNY	16 / 20	80.00%	58.4-91.9%
	INDIANA	15 / 20	75.00%	53.1-88.8%
	All Sites (Overall)	**45 / 60**	**75.00%**	**62.8-84.2%**
Influenza H3 (ATCC VR-810)	**STAT**	13 / 20	65.00%	43.3-81.9%
	LACNY	16 / 19	84.21%	62.4-94.5%
	INDIANA	17 / 19	89.47%	68.6-97.1%
	All Sites (Overall)	**46 / 58**	**79.31%**	**67.2-87.8%**
Mycoplasma pneumoniae (29085)	**STAT**	13 / 20	65.00%	43.3-81.9%
	LACNY	14 / 20	70.00%	48.1-85.5%
	INDIANA	14 / 20	70.00%	48.1-85.5%
	All Sites (Overall)	**41 / 60**	**68.33%**	**55.8-78.7%**
Parainfluenza virus 1 (0810014CFHI)	**STAT**	14 / 20	70.00%	48.1-85.5%
	LACNY	12 / 19	63.16%	41.0-80.9%
	INDIANA	9 / 19	47.37%	27.3-68.3%
	All Sites (Overall)	**35 / 58**	**60.34%**	**47.5-71.9%**
Parainfluenza virus 2 (ATCC VR-92)	**STAT**	9 / 20	45.00%	25.8-65.8%
	LACNY	11 / 19	57.89%	36.3-76.9%
	INDIANA	12 / 20	60.00%	38.7-78.1%
	All Sites (Overall)	**32 / 59**	**54.24%**	**41.7-66.3%**
Parainfluenza virus 3 (ATCC VR-93)	**STAT**	13 / 20	65.00%	43.3-81.9%
	LACNY	17 / 20	85.00%	64.0-94.8%
	INDIANA	17 / 20	85.00%	64.0-94.8%
	All Sites (Overall)	**47 / 60**	**78.33%**	**66.4-86.9%**

Target (0.1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Parainfluenza virus 4 (ATCC VR-1378)	**STAT**	10 / 20	50.00%	29.9-70.1%
	LACNY	11 / 19	57.89%	36.3-76.9%
	INDIANA	9 / 20	45.00%	25.8-65.8%
	All Sites (Overall)	**30 / 59**	**50.85%**	**38.4-63.2%**
RSVA (ATCC VR-1540)	**STAT**	6 / 20	30.00%	14.6-51.9%
	LACNY	7 / 20	35.00%	18.1-56.7%
	INDIANA	9 / 20	45.00%	25.8-65.8%
	All Sites (Overall)	**22 / 60**	**36.67%**	**25.6-49.3%**
Respiratory Syncytial Virus B (0810040CF)	**STAT**	14 / 20	70.00%	48.1-85.5%
	LACNY	15 / 19	78.95%	56.7-91.5%
	INDIANA	10 / 20	50.00%	29.9-70.1%
	All Sites (Overall)	**39 / 59**	**66.10%**	**53.4-76.9%**
Rhinovirus (ATCC VR-482)	**STAT**	15 / 20	75.00%	53.1-88.8%
	LACNY	15 / 20	75.00%	53.1-88.8%
	INDIANA	18 / 20	90.00%	69.9-97.2%
	All Sites (Overall)	**48 / 60**	**80.00%**	**68.2-88.2%**

Table 5.9 summarizes the results for 1x LoD concentration where it is observed that the detection rate for 24 of the 24 targets was ≥95% and therefore the acceptance criteria is met.

Table 5.9: Detection rate per target at 1x LoD concentration for each site of reproducibility study and 2-sided 95% Confidence Interval by target

Target (1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Adenovirus (ATCC VR-3)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	18 / 18	100.00%	82.4-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**

Target (1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
B. pertussis (ATCC BAA-2707)	**STAT**	18 / 20	90.00%	69.9-97.2%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**58 / 60**	**96.67%**	**88.6-99.1%**
***C. pneumoniae* (ATCC VR-2282)**	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**60 / 60**	**100.00%**	**94.0-100%**
Coronavirus 229E (ATCC VR-740)	**STAT**	18 / 20	90.00%	69.9-97.2%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**58 / 60**	**96.67%**	**88.6-99.1%**
Coronavirus HKU1 (NATRVP-IDI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**60 / 60**	**100.00%**	**94.0-100%**
Coronavirus NL63 (0810228CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	18 / 18	100.00%	82.4-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Coronavirus OC43 (ATCC VR-1558)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Enterovirus (ATCC VR-1824)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	19 / 20	95.00%	76.4-99.1%
	All Sites (Overall)	**58 / 60**	**96.67%**	**88.6-99.1%**
Human Metapneumovirus (0810161CF)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 60**	**98.33%**	**91.1-99.7%**

Target (1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Influenza A (0810249CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Influenza A (ATCC VR-810)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	18 / 18	100.00%	82.4-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**57 / 58**	**98.28%**	**90.9-99.7%**
Influenza A (ATCC VR-897)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 60**	**98.33%**	**91.1-99.7%**
Influenza A H1(ATCC VR-897)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	19 / 20	95.00%	76.4-99.1%
	All Sites (Overall)	**59 / 60**	**98.33%**	**91.1-99.7%**
Influenza B (ATCC VR-295)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 60**	**98.33%**	**91.1-99.7%**
Influenza H1N1 (pdm09) (0810249CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Influenza H3 (ATCC VR-810)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	18 / 18	100.00%	82.4-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
***Mycoplasma pneumoniae* (ATCC 29085)**	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**

Target (1xLoD)	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Parainfluenza virus 1 (0810014CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	18 / 18	100.00%	82.4-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Parainfluenza virus 2 (ATCC VR-92)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	19 / 20	95.00%	76.4-99.1%
	All Sites (Overall)	**58 / 60**	**96.67%**	**88.6-99.1%**
Parainfluenza virus 3 (ATCC VR-93)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Parainfluenza virus 4 (ATCC VR-1378)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**60 / 60**	**100.00%**	**94.0-100%**
RSVA (ATCC VR-1540)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Respiratory Syncytial Virus B (0810040CF)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**60 / 60**	**100.00%**	**94.0-100%**
Rhinovirus (ATCC VR-482)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**

Table 5.10 summarizes the results for 3x LoD concentration where it is observed that the detection rate for 24 of the 24 targets was ≥95% and therefore the acceptance criteria has been met.

Table 5.10: Detection rate per target at 3x LoD concentration for each site of reproducibility study and 2-sided 95% Confidence Interval by target.

Target	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Adenovirus (ATCC VR-3)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
***B. pertussis* (ATCC BAA-2707)**	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
***C. pneumoniae* (ATCC VR-2282)**	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 20	95.00%	76.4-99.1%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 60**	**98.33%**	**91.1-99.7%**
Coronavirus 229E (ATCC VR-740)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Coronavirus HKU1 (NATRVP-IDI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**60 / 60**	**100.00%**	**94.0-100%**
Coronavirus NL63 (0810228CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**

Target	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Coronavirus OC43 (ATCC VR-1558)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	19 / 19	100.00%	83.2-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Enterovirus (ATCC VR-1824)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Human Metapneumovirus (0810161CF)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19/19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Influenza A (0810249CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	19 / 19	100.00%	83.2-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Influenza A (ATCC VR-810)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Influenza A (ATCC VR-897)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**60 / 60**	**100.00%**	**94.0-100%**
Influenza A H1(ATCC VR-897)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 60**	**98.33%**	**91.1-99.7%**
Influenza B (ATCC VR-295)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**58 / 59**	**98.31%**	**91.0-99.7%**

Target	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
Influenza H1N1 (pdm09) (0810249CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	19 / 19	100.00%	83.2-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Influenza H3 (ATCC VR-810)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
***Mycoplasma pneumoniae* (ATCC 29085)**	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	19 / 19	100.00%	83.2-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Parainfluenza virus 1 (0810014CFHI)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**
Parainfluenza virus 2 (ATCC VR-92)	**STAT**	19 / 20	95.00%	76.4-99.1%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 60**	**98.33%**	**91.1-99.7%**
Parainfluenza virus 3 (ATCC VR-93)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	19 / 19	100.00%	83.2-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Parainfluenza virus 4 (ATCC VR-1378)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**59 / 59**	**100.00%**	**93.9-100%**

Target	Site	Detection Rate (#Positive)	% Detection rate (#Positive)	95% Confidence Interval
RSVA (ATCC VR-1540)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	19 / 19	100.00%	83.2-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**
Respiratory Syncytial Virus B (0810040CF)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	20 / 20	100.00%	83.9-100%
	INDIANA	20 / 20	100.00%	83.9-100%
	All Sites (Overall)	**60 / 60**	**100.00%**	**94.0-100%**
Rhinovirus (ATCC VR-482)	**STAT**	20 / 20	100.00%	83.9-100%
	LACNY	19 / 19	100.00%	83.2-100%
	INDIANA	19 / 19	100.00%	83.2-100%
	All Sites (Overall)	**58 / 58**	**100.00%**	**93.8-100%**

Performance Characteristics - Clinical Studies

The clinical performance of the QIAstat-Dx Respiratory Panel was established during a multi-center study conducted at six (6) geographically diverse study sites: five (5) U.S. sites and one (1) international site. Each study location was representative of the intended use setting (clinical laboratories) and testing was performed by trained clinical laboratory personnel. Residual nasopharyngeal swab (NPS) samples were collected from subjects with signs and symptoms of respiratory infection for QIAstat-Dx Respiratory Panel and comparator testing.

A residual NPS specimens in UTM from each study subject was tested with the QIAstat-Dx Respiratory Panel and the comparator FDA cleared multiplexed respiratory pathogen panel, that matched all panel members, in accordance with product instructions for use. Specimens tested in the clinical study were collected using the Universal Transport Medium (UTM™) (Copan Diagnostics (Brescia, Italy and CA, USA)), MicroTest™ M4, M4RT, M5, M6 (ThermoFisher Scientific, MA, USA), BD Universal Viral Transport (UVT) System (Becton Dickinson, NJ, USA), Universal Transport Medium (UTM) System (HealthLink Inc., FL, USA), Universal Transport Medium (Diagnostic Hybrids, OH, USA), V-C-M Medium (Quest Diagnostics, NJ, USA) and UniTranz-RT® Universal Transport Media (Puritan Diagnostics, ME , USA) collection kits.

A total of 2,304 residual NPS specimens (1994 prospective and 310 archived) were tested in this comparison study. Between December 2017 to April 2019, specimens were prospectively collected from all comers meeting the study inclusion criteria and immediately frozen for later testing by the study site as frozen prospective specimens

(N=1,093). No frozen samples were distributed amongst sites. At time of testing, specimens were thawed and tested on both the QIAstat-Dx Respiratory Panel and comparator method.

Between February and August 2018, specimens were prospectively collected from all comers meeting the study eligibility criteria and tested fresh (N=901) on both the QIAstat-Dx Respiratory Panel and comparator method in accordance with product instructions as fresh prospective specimens. One specimen was withdrawn from the study due to an incorrect specimen type.

A total of 1994 specimens were evaluated for all panel members in the prospective study. The performance of the QIAstat-Dx Respiratory Panel was evaluated by comparing the QIAstat-Dx Respiratory Panel test results with those from an FDA-cleared multiplexed respiratory pathogen panel.

Positive Percent Agreement (PPA) for each analyte was calculated as 100% x (TP/[TP+FN]). True Positive (TP) indicates that both the QIAstat-Dx Respiratory Panel and the comparator method yielded a "Detected" result of that specific analyte. A False Negative (FN) indicates that the QIAstat-Dx Respiratory Panel was "Not Detected" while the comparator method was "Detected" for the analyte in question. Negative Percent Agreement (NPA) was calculated as 100% x (TN/[TN+FP]). True Negative (TN) indicates that both the QIAstat-Dx Respiratory Panel and the comparator method resulted in "Not Detected" for that specific analyte. A False Positive (FP) indicates that the QIAstat-Dx Respiratory Panel was "Detected" while the comparator method was "Not Detected" for the specific pathogen.

Binomial two-sided 95% Confidence Intervals were calculated using the Wilson Score Method.

The QIAstat-Dx Respiratory Panel prospective performance data in positive percent and negative percent agreements against the comparator methods are presented by analyte in Table 5.11.

Table 5.11: QIAstat-Dx Respiratory Panel prospective clinical performance summary

Analyte		TP/(TP+FN)	Sensitivity / PPA	95% CI	TN/(TN+FP)	Specificity /NPA	95% CI
Viruses							
Adenovirus[a]	Fresh	55/58	94.8%	85.9 – 98.2	833/839	99.3%	98.4 – 99.7
	Frozen	31/32	96.9%	84.3 – 99.4	1047/1057	99.1%	98.3 – 99.5
	Overall	86/90	95.6%	89.1 -98.3	1880/1896	99.2%	98.6 – 99.5

Analyte		TP/(TP+FN)	Sensitivity / PPA	95% CI	TN/(TN+FP)	Specificity /NPA	95% CI
Coronavirus 229E	Fresh	8/9	88.9%	56.5-98.0	886/886	100.0%	99.6 – 100.0
	Frozen	0/0	N/A	N/A	1089/1089	100.0%	99.6 – 100.0
	Overall	8/9	88.9%	56.5-98.0	1975/1975	100.0%	99.8 – 100.0
Coronavirus HKU1[b]	Fresh	3/3	100.0%	43.8 – 100.0	890/892	99.8%	99.2 – 99.9
	Frozen	48/49	98.0%	89.3 – 99.6	1035/1040	99.5%	98.9 – 99.8
	Overall	51/52	98.1%	89.9 – 99.7	1925/1932	99.6%	99.3 – 99.8
Coronavirus NL63[c]	Fresh	4/5	80.0%	37.6 – 96.4	890/890	100.0%	99.6 – 100.0
	Frozen	36/42	85.7%	72.2 – 93.3	1046/1048	99.8%	99.3 – 99.9
	Overall	40/47	85.1%	72.3 – 92.6	1936/1938	99.9%	99.6 – 100.0
Coronavirus OC43[d]	Fresh	3/3	100.0%	43.8 – 100.0	892/892	100.0%	99.6 – 100.0
	Frozen	23/26	88.5%	71.0 – 96.0	1059/1063	99.6%	99.0 – 99.9
	Overall	26/29	89.7%	73.6 – 96.4	1951/1955	99.8%	99.5 – 99.9
Human Metapneumovirus[e]	Fresh	62/67	92.5%	83.7 – 96.8	828/829	99.9%	99.3 – 100.0
	Frozen	53/55	96.4%	87.7 – 99.0	1030/1034	99.6%	99.0 – 99.8
	Overall	115/122	94.3%	88.6 – 97.2	1858/1863	99.7%	99.4 – 99.9
Rhinovirus/ Enterovirus[f]	Fresh	144/157	91.7%	86.3 – 95.1	715/739	96.7%	95.2 – 97.8
	Frozen	124/137	90.5%	84.4 – 94.4	941/953	98.7%	97.8 – 99.3
	Overall	268/294	91.2%	87.4 – 93.9	1656/1692	97.9%	97.1 – 98.5
Influenza A[g]	Fresh	132/133	99.2%	95.8 – 99.9	753/757	99.5%	98.6 – 99.8
	Frozen	110/111	99.1%	95.1 – 99.8	972/977	99.5%	98.8 – 99.8
	Overall	242/244	99.2%	97.0 – 99.8	1725/1734	99.5%	99.0 – 99.7
Influenza A H1[h]	Fresh	0/1	0.0%	0.0 – 79.3	894/894	100.0%	99.6 – 100.0
	Frozen	0/0	N/A	N/A	1089/1089	100.0%	99.6 – 100.0
	Overall	0/1	0.0%	0.0 – 79.3	1983/1983	100.0%	99.8 – 100.0
Influenza A H1N1/pdm09[i]	Fresh	62/63	98.4%	91.5 – 99.78	826/831	99.4%	98.6 – 99.7
	Frozen	18/18	100.0%	82.4 – 100.0	1071/1071	100.0%	99.6 – 100.0
	Overall	80/81	98.8%	93.3 – 99.8	1897/1902	99.7%	99.4 – 99.9
Influenza A H3[j]	Fresh	67/67	100.0%	94.5 -100.0	825/826	99.9%	99.3 – 100.0
	Frozen	89/90	98.9%	94.0 – 99.8	992/998	99.4%	98.7 – 99.7
	Overall	156/157	99.4%	96.5 – 99.9	1817/1824	99.6%	99.2 – 99.8

Analyte		TP/(TP+FN)	Sensitivity / PPA	95% CI	TN/(TN+FP)	Specificity /NPA	95% CI
Influenza B[k]	Fresh	64/67	95.5%	87.6 – 98.5	827/828	99.9%	99.3 – 100.0
	Frozen	58/62	93.5%	84.6 – 97.5	1026/1026	100.0%	99.6 – 100.0
	Overall	122/129	94.6%	89.2 – 97.3	1853/1854	99.9%	99.7 – 100.0
Parainfluenza 1[l]	Fresh	3/3	100.0%	43.8 – 100.0	892/892	100.0%	99.6 – 100.0
	Frozen	13/14	92.9%	68.5 – 98.7	1072/1075	99.7%	99.2 – 99.9
	Overall	16/17	94.1%	73.0 – 99.0	1964/1967	99.8%	99.6 – 99.9
Parainfluenza 2	Fresh	2/2	100.0%	34.2 – 100.0	893/893	100.0%	99.6 – 100.0
	Frozen	0/0	N/A	N/A	1089/1089	100.0%	99.6 – 100.0
	Overall	2/2	100.0%	34.2 – 100.0	1982/1982	100.0%	99.8 – 100.0
Parainfluenza 3[m]	Fresh	102/104	98.1%	93.3 – 99.5	788/793	99.4%	98.5 – 99.7
	Frozen	9/9	100.0%	70.1 – 100.0	1081/1081	100.0%	99.6 – 100.0
	Overall	111/113	98.2%	93.8 – 99.5	1869/1874	99.7%	99.4 – 99.9
Parainfluenza 4[n]	Fresh	3/3	100.0%	43.8 -100.0	892/892	100.0%	99.6 – 100.0
	Frozen	0/0	N/A	N/A	1087/1089	99.8%	99.3 – 99.9
	Overall	3/3	100.0%	43.8 – 100.0	1979/1981	99.9%	99.6 – 100.0
Respiratory Syncytial Virus (RSV)[o]	Fresh	73/76	96.0%	88.9 – 98.6	819/820	99.9%	99.3 – 100.0
	Frozen	139/144	96.5%	92.1 – 98.5	941/945	99.6%	98.9 – 99.8
	Overall	212/220	96.3%	93.0 – 98.1	1760/1765	99.7%	99.3 – 99.9
Bacteria							
Bordetella pertussis[p]	Fresh	2/2	100.0%	34.2 – 100.0	893/893	100.0%	99.6 – 100.0
	Frozen	1/1	100.0%	20.7 – 100.0	1082/1088	99.4%	98.8 – 99.7
	Overall	3/3	100.0%	43.8 – 100.0	1975/1981	99.7%	99.3 – 99.9
Chlamydophila pneumoniae[q]	Fresh	4/4	100.0%	51.0 – 100.0	891/891	100.0%	99.6 – 100.0
	Frozen	1/1	100.0%	20.7 – 100.0	1087/1088	99.9%	99.5 – 100.0
	Overall	5/5	100.0%	56.6 – 100.0	1978/1979	99.9%	99.7 – 100.0
Mycoplasma pneumoniae[r]	Fresh	18/18	100.0%	82.4 – 100.0	875/877	99.8%	99.2 – 100.0
	Frozen	1/1	100.0%	20.7 – 100.0	1085/1088	99.7%	99.2 – 99.9
	Overall	19/19	100.0%	83.2- 100.0	1960/1965	99.7%	99.4 – 99.9

The QIAstat-Dx Respiratory Panel detected a total of 191 specimens with distinctive multiple organism detections (9.6% of all specimens) in the prospective study.

A total of 1994 prospective clinical specimens were tested and analyzed during the prospective clinical evaluation. Of these, 95.88% (1912/1994) yielded valid results on the first attempt (i.e., first loaded cartridge). Invalid or no result were obtained for the

remaining 82 specimens (4.11%). Forty-two (42) specimens were invalid due to cartridge internal control failure (2.11%). Of these, 20 (1.00%) provided a result for positively detected targets and 22 (1.10%) had no detections. For 40 (2.00%) specimens no results were obtained due to incomplete runs. Of these, 1 specimen was aborted by users (0.05%), 21 were due to instrument errors (1.05%) and 18 were due to cartridge related errors (0.90%). Seventy-two (72) of the 82 initially failed (no results or invalid) specimens yielded valid results after a single retesting using a new cartridge/sample. The remaining 10 specimens failed on the second attempt (2 due to cartridge failures, 1 due to instrument errors and 7 due to internal control failures). Of these internal control failures, detected pathogens were reported for 4 specimens.

Conclusions

The QIAstat-Dx Respiratory Panel is substantially equivalent to the legally marketed FilmArray® Respiratory Panel.