December 19, 2017

Cepheid
Jim Kelly, PhD
Executive Director, Regulatory Affairs
904 Caribbean Drive
Sunnyvale, California 94089-1189

Re: K171552
Trade/Device Name: Xpert Xpress Flu, Xpert Nasopharyngeal Sample Collection Kit, Xpert Nasal Sample Collection Kit
Regulation Number: 21 CFR 866.3980
Regulation Name: Respiratory viral panel multiplex nucleic acid assay
Regulatory Class: Class II
Product Code: OCC, OOI, JSM
Dated: May 24, 2017
Received: May 26, 2017

Dear Dr. Kelly:

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. 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); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR

Part 820); 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 the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

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,

Steven R. Gitterman -S for

Uwe Scherf, Ph.D.
Director
Division of Microbiology Devices
Office of In Vitro Diagnostics
and Radiological Health
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: 06/30/2020
*See PRA Statement below.*

510(k) Number *(if known)*
K171552

Device Name
Xpert Xpress Flu

Indications for Use *(Describe)*
The Cepheid Xpert Xpress Flu Assay, performed on the GeneXpert Xpress System, is an automated, multiplex real-time, reverse transcriptase polymerase chain reaction (RT- PCR) assay intended for the in vitro qualitative detection and differentiation of influenza A and influenza B viral RNA. The Xpert Xpress Flu Assay uses nasopharyngeal (NP) swab and nasal swab (NS) specimens collected from patients with signs and symptoms of respiratory infection. The Xpert Xpress Flu Assay is intended as an aid in the diagnosis of influenza infections in conjunction with clinical and epidemiological risk factors. Negative results do not preclude influenza virus infection and should not be used as the sole basis for treatment or other patient management decisions.

Performance characteristics for influenza A were established during the 2016-2017 influenza season. When other novel influenza A viruses are emerging, performance characteristics may vary.

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.

Ancillary Collection Kit for Nasopharyngeal Swabs Indications for Use:
The Xpert Nasopharyngeal Sample Collection Kit is designed to collect, preserve, and transport nasopharyngeal swab specimens and to preserve and transport nasal aspirate/wash specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Flu Assay or the Xpert Flu/RSV XC Assay. The Xpert Nasopharyngeal Sample Collection Kit is designed to collect, preserve, and transport nasopharyngeal swab specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Flu +RSV Xpress Assay, Xpert Xpress Flu/RSV Assay or the Xpert Xpress Flu Assay.

Ancillary Collection Kit for Nasal Swabs Indications for Use:
The Xpert Nasal Sample Collection Kit is designed to collect, preserve, and transport nasal swab specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Xpress Flu Assay.

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.**

This section applies only to requirements of the Paperwork Reduction Act of 1995.

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**510(k) Summary**

As required by 21 CFR Section 807.92(c).

| | |
|---|---|
| Submitted by: | Cepheid<br>904 Caribbean Drive<br>Sunnyvale, CA 90489<br>Phone number: (408) 400-6838 |
| Contact: | Yi-Ping Lin, PhD |
| Date of Preparation: | May 24, 2017 |
| Device: | |
| Trade name: | Xpert® Xpress Flu |
| Common name: | Xpert Xpress Flu Assay |
| Type of Test: | Automated, multiplex real-time reverse transcription-polymerase chain reaction (RT-PCR) assay intended for the *in vitro* qualitative detection and differentiation of influenza A and influenza B viral RNA. |
| Regulation number/ Classification name/ Product code: | 866.3980/Respiratory viral panel multiplex nucleic acid assay;<br>866.2570/Instrumentation for clinical multiplex test systems<br>OCC; OOI, JSM |
| Classification | Class II |
| Advisory Panel | Microbiology (83) |
| Prescription Use | Yes |
| Predicate Devices Assay: | 1) *For the detection and differentiation of influenza A, influenza B, and RSV A/B viral RNA in nasopharyngeal swab specimens:*<br>Xpert® Flu+RSV Xpress Assay [510(k) #K151226]<br><br>2) *For the Sample Collection Kits:*<br>Cepheid Xpert® Nasopharyngeal Sample Collection Kit for Viruses<br>[510(k) # K162456]<br><br>Copan Universal Transport Medium (UTM-RT) System,<br>[510(k) # K042970] |

Device Description:

The Xpert Xpress Flu Assay is a rapid, automated *in vitro* diagnostic test for the qualitative detection and differentiation of influenza A (Flu A) and influenza B (Flu B) viral RNA directly from nasopharyngeal (NP) swab and nasal swab (NS) specimens. The assay is performed on the Cepheid GeneXpert® Xpress System.

The Xpert Xpress Flu Assay includes reagents for the simultaneous detection and differentiation of the target viruses. The primers and probes in the Xpert Xpress Flu Assay detect the presence of nucleic acid sequences for Flu A and Flu B directly from NS and NP swab specimens collected from patients with signs and symptoms of respiratory infection. A Sample Processing Control (SPC) and a Probe Check Control (PCC) are internal controls utilized by the GeneXpert Xpress System platform. The SPC is present in every assay to control for adequate processing of the target viruses and to monitor for the presence of inhibitor(s) in the PCR assay to avoid false-negative results. The PCC verifies reagent rehydration, real-time PCR tube filling in the cartridge, probe integrity, and dye stability.

The specimens are collected in universal transport medium and transported to the GeneXpert Xpress area. The specimen is prepared according to package insert instructions and transferred to the sample chamber (large opening) of the Xpert Xpress Flu Assay cartridge. The GeneXpert cartridge is loaded onto the GeneXpert Xpress System platform, which performs hands-off automated sample processing and real-time RT-PCR for detection of Flu viral RNA. Summary and detailed test results are obtained in approximately 30 minutes or less. The results are automatically generated at the end of the process in a report that can be viewed and printed.

Device Intended Use:

The Cepheid Xpert® Xpress Flu Assay, performed on the GeneXpert® Xpress System, is an automated, multiplex real-time, reverse transcriptase polymerase chain reaction (RT-PCR) assay intended for the *in vitro* qualitative detection and differentiation of influenza A and influenza B viral RNA. The Xpert Xpress Flu Assay uses nasopharyngeal (NP) swab and nasal swab (NS) specimens collected from patients with signs and symptoms of respiratory infection. The Xpert Xpress Flu Assay is intended as an aid in the diagnosis of influenza infections in conjunction with clinical and epidemiological risk factors.

Negative results do not preclude influenza virus infection and should not be used as the sole basis for treatment or other patient management decisions.

Performance characteristics for influenza A were established during the 2016-2017 influenza season. When other novel influenza A viruses are emerging, performance characteristics may vary.

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.

Ancillary Collection Kit for Nasal Swabs Indications for Use:

The Xpert® Nasal Sample Collection Kit is designed to collect, preserve, and transport nasal swab specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Xpress Flu Assay.

Ancillary Collection Kit for Nasopharyngeal Swabs Indications for Use:

The Xpert® Nasopharyngeal Sample Collection Kit is designed to collect, preserve, and transport nasopharyngeal swab specimens and to preserve and transport nasal aspirate/wash specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Flu Assay or the Xpert Flu/RSV XC

Assay. The Xpert® Nasopharyngeal Sample Collection Kit is designed to collect, preserve, and transport nasopharyngeal swab specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Flu+RSV Xpress Assay, Xpert Xpress Flu/RSV Assay or the Xpert Xpress Flu Assay.

Substantial Equivalence**:**

The Xpert Xpress Flu Assay is substantially equivalent to the current Xpert® Flu+RSV Xpress Assay [510(k) #K151226]. The Xpert Xpress Flu Assay detects influenza A and influenza B from nasopharyngeal (NP) swab and nasal swab (NS) specimens and the Xpert® Flu+RSV Xpress Assay detects influenza A, influenza B, and RSV from NP swab specimens. Both assays utilize the same technology by determining the presence of the target organisms through real-time RT-PCR amplification and fluorogenic target-specific hybridization detection. A multi-center clinical study was conducted and data obtained using the Xpert Xpress Flu/RSV Assay was then reanalyzed with the Xpert Xpress Flu Assay Definition File (ADF). The reanalyzed data was used to determine the performance characteristics of the Xpert Xpress Flu Assay relative to the reference Flu test, which has been FDA cleared for NP swab and NS specimens. The study results showed that the Xpert Xpress Flu Assay is acceptable for its intended use and is substantially equivalent to the predicate device.

Table 8-1 shows the similarities and differences between the Xpert Xpress Flu Assay and the predicate device.

**Table 8-1: Comparison of Similarities and Differences of the Xpert Xpress Flu Assay with the Predicate Devices**

| Similarities | | |
|---|---|---|
| | **Device** | **Predicate** |
| **Item** | **Cepheid Xpert® Xpress Flu** | **Cepheid Xpert® Flu+RSV Xpress Assay 510(k)# K151226** |
| Regulation | 866.3980 | Same |
| Product Code | OCC, OOI | Same |
| Device Class | II | Same |
| Technology Principle of Operation | Multiplex real time RT-PCR | Same |
| Assay Results | Qualitative | Same |
| Instrument System | Cepheid GeneXpert Xpress System (instrument model GX-II and GX-IV); Cepheid I-core technology | Cepheid GeneXpert Xpress System (instrument model GX-I); Cepheid I-core technology |
| Primers and probes | Primers and probes to detect the presence of nucleic acid sequences of influenza A, influenza B, and RSV. Only results for influenza A and influenza B are reported. | Primers and probes to detect the presence of nucleic acid sequences of influenza A, influenza B, and RSV. Results for influenza A, influenza B and RSV analytes are reported. |
| Laboratory Users | Untrained operators with no clinical lab experience. | Same |
| Sample Preparation | Self-contained and automated after mixed specimen is added to cartridge. All other reagents are contained in the cartridge. | Same |

| | | |
|---|---|---|
| Primers and probes for influenza A, influenza B | Primers and probes to detect the presence of nucleic acid sequences of influenza A, influenza B, and RSV A/B. The Xpert Xpress Flu Assay contains primers and probes to detect additional RNA segments in order to protect the assay sensitivity and specificity from mutations in the influenza genome due to antigenic drifts and shifts.<br>Only results for influenza A and influenza B are reported. | Primers and probes to detect the presence of nucleic acid sequences of influenza A, influenza B, and RSV A/B. The Xpert Flu+RSV Xpress Assay contains primers and probes to detect additional RNA segments in order to protect the assay sensitivity and specificity from mutations in the influenza genome due to antigenic drifts and shifts.<br>Results for influenza A, influenza B and RSV analytes are reported. |
| Target Sequences | Influenza A: Matrix protein (MP), basic polymerase (PB2) and acidic protein (PA)<br>Influenza B: Matrix protein (MP) and Non-structural proteins (NS 1 and NS 2)<br>RSV A and RSV B: Nucleocapsid protein<br>Only results for influenza A and influenza B are reported. | Influenza A: Matrix protein (MP), basic polymerase (PB2) and acidic protein (PA)<br>Influenza B: Matrix protein (MP) and Non-structural proteins (NS 1 and NS 2)<br>RSV A and RSV B: Nucleocapsid protein Results for influenza A, influenza B and RSV analytes are reported. |
| Internal Controls | Sample processing control (SPC) and probe check control (PCC). | Same |
| Early Assay termination function | Yes | Yes |

| **Differences** | | |
|---|---|---|
| **Item** | **Device** | **Predicate** |
| | **Cepheid Xpert® Xpress Flu** | **Cepheid Xpert® Flu+RSV Xpress Assay K151226** |
| Assay Targets | Influenza A and Influenza B viral RNA | Influenza A, Influenza B, and RSV viral RNA |

| | | |
|---|---|---|
| Specimen Types | Nasopharyngeal (NP) swab and nasal swab (NS) specimens | Nasopharyngeal (NP) swab specimens |
| Assay Controls | Encapsulated (armored) RNA pseudovirus as a sample processing control.<br>Available but not provided are inactivated virus controls for influenza A/B as external positive controls, and Coxsackie virus as an external negative control. | Encapsulated (armored) RNA pseudovirus as a sample processing control.<br>Available but not provided are inactivated virus controls for influenza A/B and RSV as external positive controls, and Coxsackie virus as an external negative control. |
| Time to obtain test results | Approximately 30 minutes or less for sample preparation and RT-PCR | Approximately 60 minutes for sample preparation and real- time RT-PCR |
| Combinatorial Assay Selections | Not applicable | Yes, user may select combined assay with all targets or a Flu only assay or a RSV only assay. |

| | | |
|---|---|---|
| Intended Use | The Cepheid Xpert® Xpress Flu Assay, performed on the GeneXpert® Xpress System, is an automated, multiplex real-time, reverse transcriptase polymerase chain reaction (RT- PCR) assay intended for the in vitro qualitative detection and differentiation of influenza A and influenza B viral RNA. The Xpert Xpress Flu Assay uses nasopharyngeal (NP) swab and nasal swab (NS) specimens collected from patients with signs and symptoms of respiratory infection. The Xpert Xpress Flu Assay is intended as an aid in the diagnosis of influenza infections in conjunction with clinical and epidemiological risk factors.<br><br>Negative results do not preclude influenza virus infection and should not be used as the sole basis for treatment or other patient management decisions.<br><br>Performance characteristics for influenza A were established during the 2016-2017 influenza season. When other novel influenza A viruses are emerging, performance characteristics may vary.<br><br>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. | The Cepheid Xpert® Flu+RSV Xpress Assay, performed on the GeneXpert® Xpress System, is an automated, multiplex real-time, reverse transcriptase polymerase chain reaction (RT-PCR) assay intended for the in vitro qualitative detection and differentiation of influenza A, influenza B, and respiratory syncytial virus (RSV) viral RNA. The Xpert Flu+RSV Xpress Assay uses nasopharyngeal swab specimens collected from patients with signs and symptoms of respiratory infection. The Xpert Flu+RSV Xpress Assay is intended as an aid in the diagnosis of influenza and respiratory syncytial virus in conjunction with clinical and epidemiological risk factors.<br><br>Negative results do not preclude influenza virus or respiratory syncytial virus infection and should not be used as the sole basis for treatment or other patient management decisions.<br><br>Performance characteristics for influenza A were established during the 2014-2015 influenza season. When other novel influenza A viruses are emerging, performance characteristics may vary.<br><br>If infection with a novel influenza A virus is suspected based on current clinical and epidemiological screening |

The Xpert Xpress Flu Assay and the predicate device have the same general intended use and technological characteristics, and both detect influenza A and influenza B viral RNA from NP swab specimens. The clinical study demonstrates that the Xpert Xpress Flu

Assay is acceptable for its intended use and is substantially equivalent to the predicate device.

The predicate device for the ancillary specimen collection kit, the Xpert Nasopharyngeal Sample Collection Kit for Viruses is the Cepheid Nasopharyngeal Sample Collection Kit for Viruses, [510(k) # K162456]. The similarities are shown in Table 8-2. There is no difference between the Nasopharyngeal Sample Collection Kit for Viruses cleared in 510(k) # K162456 and this 510(k).

The predicate device for the ancillary specimen collection kit, the Xpert Nasal Sample Collection Kit for Viruses is the Copan Universal Transport Medium (UTM-RT) System, [510(k) # K042970]. The similarities and differences are shown in Table 8-3.

**Table 8-2: Comparison of Similarities of the Xpert Nasopharyngeal Sample Collection Kit with the Predicate Device**

| **Similarities** | | |
|---|---|---|
| **Item** | **Device** | **Predicate** |
| | **Xpert® Nasopharyngeal Sample Collection Kit for Viruses** | **Xpert® Nasopharyngeal Sample Collection Kit for Viruses 510(k)# K162456** |

| | | |
|---|---|---|
| Intended Use | The Xpert® Nasopharyngeal Sample Collection Kit is designed to collect, preserve, and transport nasopharyngeal swab specimens and to preserve and transport nasal aspirate/wash specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Flu Assay or the Xpert Flu/RSV XC Assay. The Xpert Nasopharyngeal Sample Collection Kit is designed to collect, preserve, and transport nasopharyngeal swab specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Flu+RSV Xpress Assay, Xpert Xpress Flu/RSV Assay or the Xpert Xpress Flu Assay. | Same |
| Single-use Device | Yes | Same |

| | **Similarities** | |
|---|---|---|
| | **Device** | **Predicate** |
| **Item** | **Xpert® Nasopharyngeal Sample Collection Kit for Viruses** | **Xpert® Nasopharyngeal Sample Collection Kit for Viruses 510(k)# K162456** |
| Transport Medium Formulation | Hank's Balanced Salt Solution<br>Bovine Serum Albumin<br>L-cysteine Gelatin Sucrose<br>L-glutamic acid HEPES buffer<br>Vancomycin Amphotericin B<br>Colistin<br>Phenol red | Same |
| pH | 7.3 ± 0.2 | Same |

| | | |
|---|---|---|
| Storage Temperature | 2 - 25°C (refrigerated and room temperature) | Same |
| Volume | 3 ml | Same |
| Glass Beads | 3 x 3 mm | Same |
| Container | Plastic (medical-grade polypropylene) | Same |
| Product Configuration | Medium Tube in Kit with individually-wrapped sterile swab. | Same |

**Table 8-3: Comparison of Similarities and Differences of the Xpert Nasal Sample Collection Kit for Viruses with the Predicate Device**

| **Similarities** | | |
|---|---|---|
| **Item** | **Device** | **Predicate** |
| | **Xpert® Nasal Sample Collection Kit for Viruses** | **Copan Universal Transport Medium (UTM-RT) System 510(k)# K042970** |
| Intended Use | The Xpert® Nasal Sample Collection Kit is designed to collect, preserve, and transport nasal swab specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Xpress Flu Assay. | Copan Universal Transport Medium (UTM-RT) System is intended for the collection and transport of clinical specimens containing viruses, chlamydiae, mycoplasma or ureaplasma from the collection site to the testing laboratory. UTM-RT can be processed using standard clinical laboratory operating procedures for viral, chlamydial, mycoplasma and ureaplasma culture. |
| Single-use Device | Yes | Same |

| | **Similarities** | |
|---|---|---|
| | **Device** | **Predicate** |
| **Item** | **Xpert® Nasal Sample Collection Kit for Viruses** | **Copan Universal Transport Medium (UTM-RT) System 510(k)# K042970** |

| | | |
|---|---|---|
| Transport Medium Formulation | Hank's Balanced Salt Solution<br>Bovine Serum Albumin<br>L-cysteine Gelatin Sucrose<br>L-glutamic acid HEPES buffer<br>Vancomycin Amphotericin B<br>Colistin<br>Phenol red | Same |
| pH | 7.3 ± 0.2 | Same |
| Storage Temperature | 2 - 25°C (refrigerated and room temperature) | Same |
| Volume | 3 ml | Same |
| Glass Beads | 3 x 3 mm | Same |
| Container | Plastic (medical-grade polypropylene) | Same |

| **Differences** | | |
|---|---|---|
| **Item** | **Device** | **Predicate** |
| | **Xpert Nasal Sample Collection Kit for Viruses** | **Copan Universal Transport Medium (UTM-RT) System 510(k)# K042970** |
| Intended Use | For collection, preservation and transport of nasal swab specimens containing viruses from patients with signs and symptoms of respiratory infection prior to analysis with the Xpert Xpress Flu Assay. | For collection, transport (and preservation of viability) of swab collected clinical specimens containing viruses, chlamydiae, mycoplasma or ureaplasma. UTM-RT can be processed using standard clinical laboratory operating procedures for viral, chlamydial, mycoplasma and ureaplasma culture. |
| Product Configuration | Medium Tube in Kit with individually-wrapped sterile swab. | Medium Tubes;<br>Kit with Medium Tubes and Swab Options |
| Swab | Nylon flocked | Polyester |

The proposed collection kits and predicate collection kits have the same general intended use and the same technology to collect, store and transport clinical specimens, including viruses, to the laboratory for further testing. The prospective component of the multi-

center clinical study of the Xpert Xpress Flu Assay was conducted using Xpert Nasopharyngeal Sample Collection Kit for Viruses [510(k) # K162456] and Xpert Nasal Sample Collection Kit for Viruses (Copan-manufactured UTM-RT and sterile nylon flocked swab) demonstrating that the Xpert Nasopharyngeal Sample Collection Kit for Viruses and Xpert Nasal Sample Collection Kit for Viruses are acceptable for their intended use and substantially equivalent to the predicate devices.

Non-Clinical Studies:

**Analytical Sensitivity (Limit of Detection)**

Studies were performed to determine the analytical limit of detection (LoD) of the Xpert Xpress Flu Assay with two lots of reagents across three testing days. The higher LoD observed per strain and per lot was selected for verification. Verification of the estimated LoD claim was performed on one reagent lot across a minimum of three testing days. LoD was established using two influenza A H3N2 strains, two influenza A 2009 H1N1 strains and two influenza B strains. Viruses were diluted into negative pooled NP swab and NS clinical matrices for testing. The LoD is defined as the lowest concentration (tissue culture infective dose, $TCID_{50}$/mL) per sample that can be reproducibly distinguished from negative samples with 95% confidence or the lowest concentration at which 19 of 20 replicates were positive. Each strain was tested in replicates of 20 per concentration of virus in each matrix in NP swab and NS clinical matrix. The LoD point values for each strain tested are summarized in Tables 8-4 – 8-6.

**Table 8-4 Confirmed LoD (TCID50/mL): Influenza A 2009 H1N1**

| Virus Strain | Confirmed LoD Probit ($TCID_{50}$/mL) | |
|---|---|---|
| | NP Swab Matrix | NS Matrix |
| Influenza A/California/7/2009 | 0.02 | 0.018 |
| Influenza A/Florida/27/2011 | 0.04 | 0.04 |

**Table 8-5 Confirmed LoD (TCID50/mL): Influenza A H3N2**

| Virus Strain | Confirmed LoD Probit (TCID50/mL) | |
|---|---|---|
| | NP Swab Matrix | NS Matrix |
| Influenza A/Perth/16/2009 | 0.01 | 0.006 |
| Influenza A/Victoria/361/2011 | 0.75 | 0.21 |

**Table 8-6 Confirmed LoD (TCID50/mL): Influenza B**

| Virus Strain | Confirmed LoD Probit (TCID50/mL) | |
|---|---|---|
| | NP Swab Matrix | NS Matrix |
| Influenza B/Mass/2/2012 | 0.40 | 0.07 |
| Influenza B/Wisconsin/01/2011 | 0.19 | 0.17 |

The analytical specificity of the Xpert Xpress Flu Assay was evaluated by testing a panel of 44 cultures consisting of 16 viral, 26 bacterial, and two yeast strains representing common respiratory pathogens or those potentially encountered in the nasal passage and nasopharynx. Three replicates of all bacterial and yeast strains were tested at concentrations of $\geq 1 \times 10^6$ CFU/mL with the exception of one strain that was tested at $1 \times 10^5$ CFU/mL (*Chlamydia pneumoniae*). Three replicates of all viruses were tested at concentrations of $\geq 1 \times 10^5$ TCID50/mL. The analytical specificity was 100%. Results are shown in Table 8-7.

**Table 8-7 Analytical Specificity of the Xpert Xpress Flu Assay**

| Organism | Concentration (per cartridge) | Result | |
|---|---|---|---|
| | | Influenza A | Influenza B |
| No Template Control | N/A | NEG | NEG |
| Adenovirus Type 1 | 1.12E+06 $TCID_{50}$/mL | NEG | NEG |
| Adenovirus Type 7 | 1.87E+05 $TCID_{50}$/mL | NEG | NEG |

| | | | |
|---|---|---|---|
| Human coronavirus OC43 | 2.85E+05 $TCID_{50}$/mL | NEG | NEG |
| Human coronavirus 229E | 1.00E+05 $TCID_{50}$/mL | NEG | NEG |
| Cytomegalovirus | 1.00E+05 $TCID_{50}$/mL | NEG | NEG |
| Echovirus | 3.31E+07 $TCID_{50}$/mL | NEG | NEG |
| Enterovirus | 3.55E+05 $TCID_{50}$/mL | NEG | NEG |
| Epstein Barr Virus | 7.16E+07 $TCID_{50}$/mL | NEG | NEG |
| HSV | 8.90E+05 $TCID_{50}$/mL | NEG | NEG |
| Measles | 6.31E+05 $TCID_{50}$/mL | NEG | NEG |
| Human metapneumovirus | 1.00E+05 $TCID_{50}$/mL | NEG | NEG |
| Mumps virus | 6.31E+06 $TCID_{50}$/mL | NEG | NEG |
| Human parainfluenza Type 1 | 1.15E+06 $TCID_{50}$/mL | NEG | NEG |
| Human parainfluenza Type 2 | 6.31E+05 $TCID_{50}$/mL | NEG | NEG |
| Human parainfluenza Type 3 | 3.55E+06 $TCID_{50}$/mL | NEG | NEG |
| Rhinovirus Type 1A | 1.26E+05 $TCID_{50}$/mL | NEG | NEG |
| *Acinetobacter baumannii* | 1.00E+06 CFU/mL | NEG | NEG |
| *Burkholderia cepacia* | 3.30E+06 CFU/mL | NEG | NEG |
| *Candida albicans* | 3.20E+06 CFU/mL | NEG | NEG |
| *Candida parapsilosis* | 3.00E+06 CFU/mL | NEG | NEG |
| *Bordetella pertussis* | 3.30E+06 CFU/mL | NEG | NEG |
| *Chlamydia pneumoniae* | 1.00E+05 CFU/mL | NEG | NEG |
| *Citrobacter freundii* | 3.30E+06 CFU/mL | NEG | NEG |
| *Corynebacterium sp.* | 3.30E+06 CFU/mL | NEG | NEG |
| *Escherichia coli* | 1.00E+07 CFU/mL | NEG | NEG |
| *Enterococcus faecalis* | 1.30E+06 CFU/mL | NEG | NEG |
| *Hemophilus influenzae* | 1.00E+06 CFU/mL | NEG | NEG |
| *Lactobacillus reuteri* | 1.00E+06 CFU/mL | NEG | NEG |
| *Legionella spp.* | 1.00E+06 CFU/mL | NEG | NEG |
| *Moraxella catarrhalis* | 1.00E+07 CFU/mL | NEG | NEG |
| *Mycobacterium tuberculosis (avirulent)* | 1.00E+06 CFU/mL | NEG | NEG |
| *Mycoplasma pneumoniae* | 1.00E+06 CFU/mL | NEG | NEG |
| *Neisseria meningitides* | 2.15E+06 CFU/mL | NEG | NEG |
| *Neisseria mucosa* | 1.00E+07 CFU/mL | NEG | NEG |
| *Propionibacterium acnes* | 2.40E+07 CFU/mL | NEG | NEG |
| *Pseudomonas aeruginosa* | 3.70E+06 CFU/mL | NEG | NEG |
| *Staphylococcus aureus (*protein A producer) | 2.20E+06 CFU/mL | NEG | NEG |
| *Staphylococcus epidermidis* | 3.40E+06 CFU/mL | NEG | NEG |
| *Staphyloccus haemolyticus* | 4.00E+06 CFU/mL | NEG | NEG |

| | | | |
|---|---|---|---|
| *Streptococcus agalactiae* | 3.50E+06 CFU/mL | NEG | NEG |
| *Streptococcus pneumoniae* | 1.00E+06 CFU/mL | NEG | NEG |
| *Streptococcus pyogenes* | 1.00E+07 CFU/mL | NEG | NEG |
| *Streptococcus salivarius* | 1.00E+07 CFU/mL | NEG | NEG |
| *Streptococcus sanguinis* | 3.10E+06 CFU/mL | NEG | NEG |

**Analytical Reactivity (Inclusivity)**

The analytical reactivity of the Xpert Xpress Flu Assay was evaluated against multiple strains of influenza A H1N1 (seasonal pre-2009), influenza A pH1N1 (pandemic 2009), influenza A H3N2 (seasonal), avian influenza A (H5N1, H5N2, H6N2, H7N2, H7N3, H2N2, H7N9, and H9N2) and influenza B (representing strains from both Victoria and Yamagata lineages) at levels near the analytical LoD. A total of 48 strains comprised of 35 influenza A and 13 Influenza B strains were tested in this study with the Xpert Xpress Flu Assay. Three replicates were tested for each strain. All Flu strains tested positive in all three replicates, except for one Flu A H1N1 strain (A/New Jersey/8/76), which tested positive in 2 of 3 replicates at 0.1 $TCID_{50}$/mL. Results are shown in Table 8-8.

Predicted cross reactivity from *in silico* analyses showed 100% sequence homology for additional pH1N1 strains.

**Table 8-8 Analytical Reactivity (Inclusivity) of the Xpert Xpress Flu Assay**

| Virus | Strain | Target Concentration | Result | |
|---|---|---|---|---|
| | | | Flu A | Flu B |
| No Template Control | | n/a | NEG | NEG |
| | A/swine/Iowa/15/30 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/WS/33 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/PR/8/34 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/Mal/302/54 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/Denver/1/57 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/New Jersey/8/76 | 0.1 $TCID_{50}$/mL | POS | NEG |

| | | | | |
|---|---|---|---|---|
| **Influenza A H1N1 (pre-2009)** | A/New Caledonia/20/1999 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/New York/55/2004 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/Soloman Island/3/2006 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/Taiwan/42/06 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/Brisbane/59/2007 | 0.1 $TCID_{50}$/mL | POS | NEG |
| **Influenza A H1N1 (pdm2009)** | A/swine/NY/02/2009 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/Colorado/14/2012 | 0.1 $TCID_{50}$/mL | POS | NEG |
| | A/Washington/24/2012 | 0.1 $TCID_{50}$/mL | POS | NEG |
| **Influenza A H3N2 (Seasonal)** | A/Aichi/2/68 | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/HongKong/8/68 | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/Port Chalmers/1/73 | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/Hawaii/15/2001 | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/Wisconsin/67/05 | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/Brisbane/10/2007 | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/Minnesota/11/2010 (H3N2)v | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/Indiana/08/2011 (H3N2)v | 2.0 $TCID_{50}$/mL | POS | NEG |
| | A/Texas/50/2012 | 2.0 $TCID_{50}$/mL | POS | NEG |
| **Avian influenza A** | A/duck/Hunan/795/2002 (H5N1) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/chicken/Hubei/327/2004 (H5N1) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/Anhui/01/2005 (H5N1) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/Japanese white eye/ Hong Kong/ 1038/2006 (H5N1) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/mallard/WI/34/75 (H5N2) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/chicken/CA431/00 (H6N2) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/duck/LTC-10-82743/1943 (H7N2) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/chicken/NJ/15086-3/94 (H7N3) | ≤ 1ρg/μL[a] | POS | NEG |
| | A/Anhui/1/2013 (H7N9) | N/A[b] | POS | NEG |
| | A/Shanghai/1/2013 (H7N9) | N/A[b] | POS | NEG |
| | A/chicken/Korea/38349-p96323/ 1996 (H9N2) | ≤ 1ρg/μL[a] | POS | NEG |

| | | | | |
|---|---|---|---|---|
| | A/Mallard/NY/6750/78 (H2N2) | ≤ 1pg/µL[a] | POS | NEG |
| **Influenza B** | B/Lee/40 | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Allen/45 | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/GL/1739/54 | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Maryland/1/59 | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Panama/45/90[c] | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Florida/07/2004[d] | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Florida/02/06[c] | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Florida/04/06[d] | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Hong Kong/5/72 | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Wisconsin/01/2010[d] | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Malaysia/2506/04[c] | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Taiwan/2/62 | 1.0 $TCID_{50}$/mL | NEG | POS |
| | B/Brisbane/60/2008[c] | 1.0 $TCID_{50}$/mL | NEG | POS |

a. Purified viral RNA in simulated background matrix was used for avian influenza A viruses due to biosafety regulations.
b. Inactivated avian influenza A (H7N9) viruses without viral titer was diluted 100,000 fold in simulated background matrix and tested due to biosafety regulations.
c. Known Victoria lineage.
d. Known Yamagata lineage.

**Potentially Interfering Substances**

In a non-clinical study, potentially interfering substances that may be present in the nasal passage and nasopharynx were evaluated directly relative to the performance of the Xpert Xpress Flu Assay. Potentially interfering substances in the nasal passage and nasopharynx may include, but are not limited to: blood, nasal secretions or mucus, and nasal and throat medications used to relieve congestion, nasal dryness, irritation, or asthma and allergy symptoms, as well as antibiotics and antivirals. Negative samples (n = 8) were tested per each substance to determine the effect on the performance of the sample processing control (SPC). Positive samples (n = 8) were tested per substance with six influenza (four influenza A and two influenza B) strains spiked at 3X the analytical LoD determined for each strain. All results were compared to positive and negative simulated background matrix controls. The simulated background matrix consisted of 2.5% (w/v) porcine mucin, 1% (v/v) human whole blood in 0.85% sodium

chloride (NaCl) formulated in 1x PBS solution with 15% glycerol, which was then diluted 1:5 in UTM.

The evaluated substances are listed in Table 8-9 with active ingredients and concentrations tested shown. None of the substances caused interference of the assay at the concentrations tested in this study. All positive and negative replicates were identified correctly using the Xpert Xpress Flu Assay.

**Table 8-9 Potentially Interfering Substances in the Xpert Xpress Flu Assay**

| Substance/Class | Description/Active Ingredient | Concentration Tested |
|---|---|---|
| Control | Simulated background matrix | 100% (v/v) |
| Beta-adrenergic bronchodilator | Albuterol Sulfate | 0.83 mg/mL (equivalent to 1 dose per day) |
| Blood | Blood (Human) | 2% (v/v) |
| BD™ Universal Viral Transport System | Transport Media | 100% (v/v) |
| Remel M4® | Transport Media | 100% (v/v) |
| Remel M4RT® | Transport Media | 100% (v/v) |
| Remel M5® | Transport Media | 100% (v/v) |
| Remel M6® | Transport Media | 100% (v/v) |
| Throat lozenges, oral anesthetic and analgesic | Benzocaine, Menthol | 1.7 mg/mL |
| Mucin | Purified Mucin protein (Bovine or porcine submaxillary gland) | 2.5% (w/v) |
| Antibiotic, nasal ointment | Mupirocin | 10 mg/mL |
| Saline Nasal Spray | Sodium Chloride (0.65%) | 15% (v/v) |
| Anefrin Nasal Spray | Oxymetazoline, 0.05% | 15% (v/v) |
| PHNY Nasal Drops | Phenylephrine, 0.5% | 15% (v/v) |
| Tamiflu Anti-viral drugs | Zanamivir | 7.5 mg/mL |
| Antibacterial, systemic | Tobramycin | 4 µg/mL |
| Zicam Nasal Gel | Luffa opperculata, Galphimia glauca, Histaminum hydrochloricum Sulfur | 15% (w/v) |
| Nasal corticosteroid | Fluticasone Propionate | 5 µg/mL |

**Carry-Over Contamination**

A study was conducted to demonstrate that single-use, self-contained GeneXpert cartridges prevent carry-over contamination of negative samples when followed by very high positive samples in the same GeneXpert module. The study consisted of a negative sample processed in the same GeneXpert module immediately followed by a very high influenza A sample (A/Victoria/361/2011, $2x10^7$ $TCID_{50}$/mL) spiked into a simulated background matrix. This testing scheme was repeated 20 times on two GeneXpert modules for a total of 41 runs resulting in 20 positive and 21 negative specimens for each virus type. All 20 positive samples were correctly reported as Flu A POSITIVE; Flu B NEGATIVE. All 21 negative samples were correctly reported as Flu A NEGATIVE; Flu B NEGATIVE.

**Competitive Interference Study**

Competitive interference of the assay caused by the presence of two targets in the Xpert Xpress Flu Assay was evaluated by testing individual influenza strains near the LoD in the presence of different influenza strains at a higher concentration in a simulated background matrix. Analytical competitive interference was assessed using one (1) seasonal Flu A H3 strain (H3/Victoria/361/2011) at 0.8 $TCID_{50}$/mL and one (1) Flu B strain (B/Mass/2/2012) at 0.45 $TCID_{50}$/mL; the strains were tested in the presence of competing strains at either 1 x $10^2$ $TCID_{50}$/mL or 1 x $10^3$ $TCID_{50}$/mL. Replicates of 20 were tested for each target strain and each competitive strain combination. The normal binomial distribution with 20 replicate samples at LoD is between 17 and 20 positive results based on the binomial distribution with N=20, p=0.95 (X~Bin(20,0.95)). Therefore, sets of 20 with 16 or less positives would be rare and an indication of a competitive inhibitory effect due to high levels of a competing analyte.

- With Flu A/Victoria/361/2011 at a concentration of 0.8 $TCID_{50}$/mL no competitive inhibitory effects were observed in the presence of $1x10^3$ $TCID_{50}$/mL of Flu B/Mass/2/2012.
- With Flu B/Mass/2/2012 at a concentration of 0.45 $TCID_{50}$/mL competitive inhibitory effects were observed in the presence of $1x10^3$ $TCID_{50}$/mL of Flu

A/Victoria/361/2011. No competitive inhibitory effects were observed in the presence of $1x10^2$ $TCID_{50}$/mL of Flu A/Victoria/361/2011.

Under the conditions of this study, internal competitive inhibitory effects were observed on the Flu B target in the presence of Flu A for the Xpert Xpress Flu Assay. The competitive inhibitory effect on the Xpert Xpress Flu targets is addressed in the Limitations section of the Package Insert.

## Clinical Studies

### Clinical Comparison Study

Performance characteristics of the Xpert Xpress Flu Assay were evaluated at fourteen institutions in the U.S. during the 2016-2017 influenza season.

Specimens were collected from the following:

- Individuals exhibiting signs and symptoms of respiratory infection who provided informed consent for the collection of a NS or NP swab specimen.

The Xpert Xpress Flu Assay performance was compared to FDA-cleared molecular comparator assay.

### Overall Results

A total of 3229 specimens (1582 NS and 1647 NP swab) were tested for influenza A and influenza B by the Xpert Xpress Flu Assay and the comparator assay.

For NS specimens, the Xpert Xpress Flu Assay demonstrated a positive percent agreement (PPA) and a negative percent agreement (NPA) relative to the comparator method of 98.9% and 97.3% for the detection of influenza A and 98.4% and 99.2% for influenza B, respectively (Table 8-10).

For NP swab specimens, the Xpert Xpress Flu Assay demonstrated a PPA and NPA relative to the comparator method of 97.5% and 98.0% for the detection of influenza A and 97.3% and 99.5% for influenza B, respectively (Table 8-10).

For the combined dataset, the Xpert Xpress Flu Assay demonstrated a PPA and NPA

relative to the comparator method of 98.2% and 97.7% for the detection of influenza A and 97.8% and 99.4% for influenza B, respectively (Table 8-10).

**Table 8-10 Xpert Xpress Flu Assay Performance**

| Specimen Type | Target | n | TP | FN | TN | FP | PPA (95% CI) | NPA (95% CI) |
|---|---|---|---|---|---|---|---|---|
| NS | Flu A | 1582 | 185 | 2 | 1358 | 37 | 98.9% (96.2-99.7) | 97.3% (96.4-98.1) |
| | Flu B | 1582 | 63 | 1 | 1506 | 12 | 98.4% (91.7-99.7) | 99.2% (98.6-99.5) |
| NP | Flu A | 1647 | 198 | 5 | 1415 | 29 | 97.5% (94.4-98.9) | 98.0% (97.1-98.6) |
| | Flu B | 1647 | 71 | 2 | 1566 | 8 | 97.3% (90.6-99.2) | 99.5% (99.0-99.7) |
| Combined[a] | Flu A | 3229 | 383 | 7 | 2773 | 66 | 98.2% (96.3-99.1) | 97.7% (97.1-98.2) |
| | Flu B | 3229 | 134 | 3 | 3072 | 20 | 97.8% (93.8-99.3) | 99.4% (99.0-99.6) |

a. Six specimens (5 Flu A & Flu B FP; 1 Flu A & Flu B TP) were positive for both targets.

Of the Xpert Xpress Flu Assay runs performed with eligible specimens, 98.1% (3175/3236) of these specimens were successful on the first attempt. The remaining 61 gave indeterminate results on the first attempt (33 NO RESULT-REPEAT TEST results and 28 INSTRUMENT ERROR). Fifty-nine of the 61 indeterminate cases were retested, of which 54 yielded valid results upon repeat testing; two specimens were not retested. The overall rate of assay success was 99.8% (3229/3236). The overall indeterminate rate was 0.2%.

**Reproducibility Study**

Reproducibility was established in a multi-center, blinded study using a 5-member specimen panel. Testing was performed at three sites using the GeneXpert Xpress System.

Testing was conducted for five (not necessarily consecutive) days, with one lot of Xpert Xpress Flu cartridges. Each site had three operators, who tested each panel twice each day. Results are summarized in Table 8-11.

**Table 8-11 Summary of Reproducibility Results**

| Sample | Site 1 | | | | Site 2 | | | | Site 3 | | | | % Total Agreement by Sample[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Op 1 | Op 2 | Op 3 | Site | Op 1 | Op 2 | Op 3 | Site | Op 1 | Op 2 | Op 3 | Site | |
| Neg | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (90/90) |
| Flu A Low Pos | 100% (10/10) | 100% (10/10) | 90.0% (9/10) | 96.7% (29/30) | 70.0% (7/10) | 100% (10/10) | 100% (10/10) | 90.0% (27/30) | 70.0% (7/10) | 100% (10/10) | 88.9% (8/9)[b] | 86.2% (25/29) | 91.0% (81/89) |
| Flu A Mod Pos | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (90/90) |
| Flu B Low Pos | 90.0% (9/10) | 100% (10/10) | 90.0% (9/10) | 93.3% (28/30) | 100% (10/10) | 100% (10/10) | 90.0% (9/10) | 96.7% (29/30) | 100% (10/10) | 70.0% (7/10) | 100% (10/10) | 90.0% (27/30) | 93.3% (84/90) |
| Flu B Mod Pos | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (10/10) | 100% (10/10) | 100% (10/10) | 100% (30/30) | 100% (90/90) |

a. Agreement calculated based on expected result: Negative for Negative (targeted positivity: 0%); Positive for Low Pos (targeted positivity: 95%) and Mod Pos (targeted positivity: 100%) samples.
b. One sample 2x indeterminate (Flu A Low Pos)

The reproducibility of the Xpert Xpress Flu Assay was also evaluated in terms of the fluorescence signal expressed in Ct values for each target detected. The mean, standard deviation (SD), and coefficient of variation (CV) between-sites, between- days, between-lots and between-operators for each panel member are presented in Table 8-12.

**Table 8-12 Summary of Reproducibility Data**

| Sample | Assay Channel (Analyte) | N[a] | Mean Ct | Between-Site | | Between-Day | | Between-Operator | | Within-Assay | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SD | CV (%) | SD | CV (%) | SD | CV (%) | SD | CV (%) | SD | CV (%) |
| Neg | SPC | 90 | 32.2 | 0.2 | 0.6 | 0.2 | 0.6 | 0.2 | 0.7 | 0.4 | 1.4 | 0.6 | 1.8 |
| Flu A Low Pos | A | 80 | 36.4 | 0.1 | 0.4 | 0 | 0 | 0 | 0 | 1.8 | 4.9 | 1.8 | 4.9 |
| Flu A Mod Pos | A | 90 | 33.7 | 0.1 | 0.2 | 0 | 0 | 0 | 0 | 0.6 | 1.7 | 0.6 | 1.8 |
| Flu B Low Pos | B | 84 | 35.8 | 0 | 0 | 0 | 0 | 0.6 | 1.8 | 1.5 | 4.1 | 1.6 | 4.5 |
| Flu B Mod Pos | B | 90 | 33.7 | 0 | 0.1 | 0.1 | 0.4 | 0 | 0 | 0.5 | 1.6 | 0.6 | 1.7 |

a. Results with non-zero Ct values of 90.

## Conclusions

The results of the nonclinical analytical and clinical performance studies

summarized above demonstrate that the Xpert Xpress Flu Assay is substantially equivalent to the predicate device.