

K120911

510(k) Summary

As required by 21 CFR Section 807.92(c).

MAY 18 2012

Submitted by: Cepheid
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Contact: Russel K. Enns, Ph.D.

Date of Preparation: May 7, 2012

Device:

Trade name: Xpert® Flu

Common name:: Xpert Flu Assay

Type of Test: Automated, multiplex real-time reverse transcription-polymerase chain reaction (rRT-PCR) assay intended for the *in vitro* qualitative detection and differentiation of influenza A, influenza B and 2009 H1N1 influenza viral RNA.

Classification: Class II

Classification name: Respiratory viral panel multiplex nucleic acid assay

Regulation number: 866.3980/Respiratory viral panel multiplex nucleic acid assay and 866.3332/Reagents for detection of specific novel influenza A viruses

Product code: OQW, OCC, OOI

Panel: Microbiology (83)

Predicate Device: Xpert® Flu Assay, 510(k) #K103766

Device Description:

The Cepheid Xpert® Flu Assay is a rapid, automated *in vitro* diagnostic test for qualitative detection and differentiation of influenza A, influenza B, and influenza A, subtype 2009 H1N1 from nasal aspirates/washes (NA/W) and nasopharyngeal (NP) swab specimens from patients with signs and symptoms of respiratory infection. The assay is performed on the Cepheid GeneXpert Instrument Systems, which consist of the GeneXpert Dx System and the GeneXpert Infinity-48 System. The Device is being modified with this 510(k), to add the GeneXpert Infinity-80 System as an additional instrument system for use with the Xpert Flu Assay.

As a result of this modification, the Intended Use of the modified Xpert Flu Assay has not changed. Further, the fundamental scientific technology has not changed as a result of the modification to use the GeneXpert Infinity-80 System with the Xpert Flu Assay.

The GeneXpert Instrument Systems automate and integrate sample purification, nucleic acid amplification, and detection of the target sequence in simple or complex samples using real-time PCR and rRT-PCR assays. The GeneXpert Instrument System family comprises a GeneXpert (GX) instrument, GX-I, GX-IV, GX-XVI; a GeneXpert XVI, available with 4, 8, 12 or 16 modules, a GeneXpert Infinity-48 available with 16, 24, 32 or 48 modules, or a GeneXpert Infinity-80 available with 16, 24, 32, 40, 48, 56, 64, 72, or 80 modules. The instrument systems also contain a computer, and preloaded software for running tests and viewing the results. The GeneXpert Infinity Systems contain robotic features for cartridge handling. Each module contains a syringe drive for dispensing fluids, an ultrasonic horn for lysing cells or spores, a valve drive for sample movement, and I-CORE® thermocycler for performing real-time PCR and detection.

All systems require the use of the assay-specific single-use disposable cartridges that hold the PCR reagents and host the PCR process. The patented single-use cartridges contain: (1) eleven chambers for holding sample, reagents, or other materials, (2) a valve body composed of a plunger and syringe barrel, (3) a rotary valve system for controlling the movement of fluids between chambers, (4) an area for capturing, concentrating, washing, and lysing cells, (5) dry real-time PCR reagents, (6) an integrated PCR reaction tube that can be automatically filled by the instrument, and (7) liquid reagents. To eliminate test-to-test contamination, all fluids including amplicons, are contained within the disposable cartridge. The instrument never comes into contact with any fluids within the cartridge. Each disposable cartridge is intended to test one sample. Cartridges are not re-usable.

A sample processing control (SPC) and a system control (Probe Check Control) are controls utilized by the GeneXpert Instrument System platform. The SPC is pre-loaded into the GeneXpert cartridge provided with the assay. The SPC is an encapsidated RNA made up of recombinant fragments developed so that there is no homology to the influenza genome. The SPC is present to control for adequate processing of the target viruses and to monitor the presence of inhibitors in the PCR reaction to reduce the possibility of false negative results. The SPC also ensures the PCR reaction conditions (temperature and time) are appropriate for the amplification reaction and that the PCR reagents are functional. The Probe Check Control verifies reagent rehydration, PCR tube filling in the cartridge, probe integrity and dye stability.

Commercially-available external controls may also be run in accordance with local, state, and federal accrediting organizations, as applicable.

The Xpert Flu Assay includes reagents for the simultaneous detection and differentiation of the target viruses. The primers and probes in the Xpert Flu Assay detect the presence of nucleic acid sequences for influenza A (Flu A), influenza B (Flu B) and influenza A sub-type 2009 H1N1 (2009 H1N1) directly from nasal aspirates/washes (NA/W) and nasopharyngeal (NP) swab specimens collected from patients suspected of having

influenza. The specimens are collected in Universal Transport Medium (UTM) and transported to the GeneXpert area.

The specimen is prepared according to package insert instructions and transferred to the sample chamber (large opening) of the Xpert Flu Assay Cartridge. Reagent 1 (Binding Reagent) is dispensed into the chamber with the small opening of the Xpert Flu Assay Cartridge. The GeneXpert Cartridge is loaded onto the GeneXpert® Instrument System platform, which performs hands-off automated sample processing and real-time PCR for detection of Flu RNA. Summary and detailed test results are obtained in 75 minutes.

The results are interpolated by the GeneXpert Instrument Systems software from measured fluorescent signals and embedded calculation algorithms and are shown in the "View Results" window in tabular and graphic formats. The Xpert Flu Assay provides test results for influenza A, influenza B and influenza A, subtype 2009 H1N1. It also reports if the test is "Invalid," "Error" or "No Result," and instructs the user to repeat the test.

Device Intended Use:

The Cepheid Xpert® Flu Assay is an automated, multiplex real-time RT-PCR assay intended for the *in vitro* qualitative detection and differentiation of influenza A, influenza B and 2009 H1N1 influenza viral RNA. The Xpert Flu Assay uses nasal aspirates/washes and nasopharyngeal swab specimens collected from patients with signs and symptoms of respiratory infection in conjunction with clinical and epidemiological risk factors. The Xpert Flu Assay is intended as an aid in the diagnosis of influenza.

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 2009-2010 influenza season when 2009 H1N1 influenza was the predominant influenza A virus in circulation. When other 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 department for testing. Viral culture should not be attempted in these cases unless a BSL 3+ facility is available to receive and culture specimens.

Substantial Equivalence:

The Xpert Flu Assay with the GeneXpert Infinity-80 Instrument System option is substantially equivalent to the predicate device, the Xpert Flu Assay; 510(k) #K103766, which was cleared on April 21, 2011. The two devices have the same material composition and technological characteristics. The 510(k) supports the addition of the option of performing the assay on the GeneXpert Infinity-80 System. The Intended Use

of the Xpert Flu Assay remains the same. There are no changes to the fundamental scientific technology of the device as a result of the modification.

Analytical Performance Evaluation:

A reproducibility/precision study was conducted using the Xpert Flu Assay to compare the performance of the GeneXpert Dx and the GeneXpert Infinity-80 Instrument Systems. A panel of 10 specimens with varying concentrations of influenza A, influenza B, and influenza A subtype 2009 H1N1 were tested on 12 different days by two operators. Each operator conducted four runs of each panel specimen per day on each of the two instrument systems (10 specimens x 4 times/day x 12 days x 2 operators x 2 instrument systems). One lot of Xpert Flu Assay was used for the study. Xpert Flu Assays were performed according to the Xpert Flu Assay procedure. The two Instrument Systems were shown to provide comparable results. Results are summarized in Table 7.1.

Table 7.1: Summary of Instrument System Reproducibility Results

Sample ID	GeneXpert Dx	Infinity - 80	% Total Agreement by Sample
Negative	100.0% (96/96)	100.0% (96/96)	100.0% (192/192)
Flu A moderate positive	100.0% (96/96)	100.0% (96/96)	100.0% (192/192)
Flu A low positive	97.9% (94/96)	99.0% (95/96)	98.4% (189/192)
Flu A high negative	93.8% (90/96)	87.5% (84/96)	90.6% (174/192)
2009 H1N1 moderate positive	100.0% (96/96)	100.0% (96/96)	100.0% (192/192)
2009 H1N1 low positive	97.9% (94/96)	99.0% (95/96)	98.4% (189/192)
2009 H1N1 high negative	54.2% (52/96)	38.7% (36/93) ^a	46.6% (88/189)
Flu B moderate positive	97.9% (94/96)	100.0% (96/96)	99.0% (190/192)
Flu B low positive	81.3% (78/96)	88.5% (85/96)	84.9% (163/192)
Flu B high negative	85.4% (82/96)	83.3% (80/96)	84.4% (162/192)
% Total Agreement	90.8% (872/960)	89.8% (859/957)	90.3% (1731/1917)

^a n=93 because 3/96 Samples yielded indeterminate results on both the first and second attempt.

Clinical Performance Evaluation:

There were no clinical studies conducted as a result of the modification to the predicate device.

Conclusion:

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.



Cepheid
c/o Kerry J. Flom, Ph.D.
Senior Vice President
904 Caribbean Drive
Sunnyvale, CA 94089-1189

MAY 18 2012

Re: k120911

Trade/Device Name: Xpert® Flu Assay
Regulation Number: 21 CFR 866.3980
Regulation Name: Respiratory viral panel multiplex nucleic acid assay
Regulatory Class: Class II
Product Code: OQW, OCC, OOI
Dated: March 23, 2012
Received: March 26, 2012

Dear Dr. Flom:

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.

If your device is classified (see above) into class II (Special Controls), it may be subject to such additional controls. Existing major regulations affecting your device can be found in Title 21, Code of Federal Regulations (CFR), Parts 800 to 895. In addition, FDA may publish further announcements concerning your device in the Federal Register.

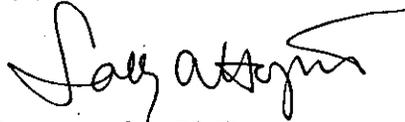
Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); and good manufacturing practice

requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820). This letter will allow you to begin marketing your device as described in your Section 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Parts 801 and 809), please contact the Office of *In Vitro* Diagnostic Device Evaluation and Safety at (301) 796-5450. 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.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address <http://www.fda.gov/cdrh/industry/support/index.html>.

Sincerely yours,



Sally Hojvat, M.Sc., Ph.D.
Director
Division of Microbiology Devices
Office of *In Vitro* Diagnostic Device
Evaluation and Safety
Center for Devices and Radiological Health

Enclosure

6.0 Statement of Indications for Use

Indications for Use Form

510(k) Number (if known): 5120911

Device Name: Xpert® Flu

Indications for Use:

The Cepheid Xpert® Flu Assay is an automated, multiplex real-time RT-PCR assay intended for the *in vitro* qualitative detection and differentiation of influenza A, influenza B and 2009 H1N1 influenza viral RNA. The Xpert Flu Assay uses nasal aspirates/washes and nasopharyngeal swab specimens collected from patients with signs and symptoms of respiratory infection in conjunction with clinical and epidemiological risk factors. The Xpert Flu Assay is intended as an aid in the diagnosis of influenza.

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Prescription Use X AND/OR Over-The-Counter Use _____
(Part 21 CFR 801 Subpart D) (21 CFR 801 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Device Evaluation and Safety



Division Sign-Off
Office of In Vitro Diagnostic Device
Evaluation and Safety

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