K123753

510(k) SUMMARY

JUL 17 2013

Date of Summary: July 10, 2013

Product Name IMDx VanR for Abbott *m*2000

Sponsor
Intelligent Medical Devices, Inc.
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Correspondent
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Device Identification

Trade or Proprietary Name:	IMDx VanR for Abbott *m*2000
Common or Usual Name:	Vancomycin-resistant enterococci detection assay
Product Code:	NIJ, OOI
Regulation Section:	21 CFR 866.1640 Antimicrobial susceptibility test powder
Device Class:	Class II
Panel:	83; Microbiology

Device Description

The IMDx VanR for Abbott *m*2000 assay is a PCR-based assay that targets regions unique to the *vanA* and *vanB* vancomycin resistance genes that may be associated with vancomycin resistant Enterococcus (VRE). Detection of the *vanA* and *vanB* genes is measured by the presence of fluorescently-labeled oligonucleotide probes that generate a fluorescent signal when specifically bound to amplified *vanA* and/or *vanB* PCR products. Differentiation of *vanA* from *vanB* is attained by labeling the oligonucleotide probes with different colored fluorescent dyes. The amplification cycle at which fluorescent signal is detected by the Abbott *m*2000*rt* is inversely proportional to the *vanA* and *vanB* DNA target level present in the sample.

The IMDx VanR for Abbott *m*2000 assay includes reagents for the detection of the assay process control, which contains inactivated bacteria, unrelated to enterococci, and is introduced into each specimen during sample preparation. The process control (also acting as an internal control (IC)) is co-extracted with the specimen and co-amplified in the same PCR reaction as the *vanA* and *vanB* targets. The IC demonstrates that the entire assay process has proceeded within specification.

Intended Use

The IMDx VanR for Abbott *m*2000 assay is an *in vitro* diagnostic assay that uses polymerase chain reaction (PCR) amplification for the qualitative detection of nucleic acids encoding the

vancomycin resistance genes *vanA* and/or *vanB*. The assay is performed directly on human peri-rectal swabs, rectal swabs, or stool specimens from patients at risk for Vancomycin Resistant *Enterococcus* (VRE) colonization. The IMDx VanR for Abbott *m*2000 assay detects the presence of *vanA* and *vanB* genes that can be associated with vancomycin-resistant enterococci. The IMDx VanR for Abbott *m*2000 assay can be used as an aid to identify, prevent and control vancomycin-resistant colonization in healthcare settings. The IMDx VanR for Abbott *m*2000 assay is not intended to diagnose VRE infection nor to guide or monitor treatment of infection. Culture methods are necessary to recover organisms for epidemiology typing and confirmation testing.

Substantial Equivalency

The IMDx VanR for Abbott *m*2000 assay is substantially equivalent to the BD GeneOhm™ VanR Assay (K102416). Table 1 compares the characteristics of the IMDx VanR for *m*2000 assay (New Device) and the GeneOhm assay (Predicate Device).

Table 1: Substantial Equivalence.

Similarities		
Characteristic	**Predicate Device** BD GeneOhm VanR Assay (K102416)	**New Device** IMDx VanR for Abbott *m*2000
Intended Use	The BD GeneOhm VanR Assay is a qualitative *in vitro* test for the rapid detection of vancomycin-resistant (*vanA* and *vanB*) genes directly from perianal or rectal swabs. The BD GeneOhm VanR Assay detects the presence of the *vanA* and *vanB* genes that can be associated with vancomycin-resistant enterococci (VRE). The assay is performed on an automated real-time PCR instrument with perianal or rectal swabs from individuals at risk for VRE colonization. The BD GeneOhm VanR Assay can be used as an aid to identify, prevent and control vancomycin-resistant colonization in healthcare settings. The BD GeneOhm VanR Assay is not intended to diagnose VRE infections nor to guide or monitor treatment for VRE infections. Concomitant cultures are necessary to recover organisms for epidemiological, susceptibility testing and for further confirmatory identification.	The IMDx VanR for Abbott *m*2000 assay is an in vitro diagnostic assay that uses polymerase chain reaction (PCR) amplification for the qualitative detection of nucleic acids encoding the vancomycin resistance genes *vanA* and/or *vanB*. The assay is performed directly on human peri-rectal swabs, rectal swabs, or stool specimens from patients at risk for Vancomycin Resistant Enterococcus (VRE) colonization. The IMDx VanR for Abbott *m*2000 assay detects the presence of vanA and vanB genes that can be associated with vancomycin-resistant enterococci. The IMDx VanR for Abbott *m*2000 assay can be used as an aid to identify, prevent and control vancomycin-resistant colonization in healthcare settings. The IMDx VanR for Abbott *m*2000 assay is not intended to diagnose VRE infection nor to guide or monitor treatment of infection. Culture methods are necessary to recover organisms for epidemiology typing and confirmation testing.
Sample Type	Perianal or rectal swab specimens	Rectal and peri-rectal swabs or stool specimens
Test Principle	Real-time PCR DNA amplification	Real-time PCR DNA amplification

Similarities		
Characteristic	**Predicate Device** BD GeneOhm VanR Assay (K102416)	**New Device** IMDx VanR for Abbott *m*2000
Targets Detected	*vanA* and *vanB*	*vanA* and *vanB*
Controls	Positive Control Negative Control Process Control	Positive Control Negative Control Process Control
Differences		
Characteristic	**Predicate Device** BD GeneOhm VanR Assay (K102416)	**New Device** IMDx VanR for Abbott *m*2000
Instrument	Cepheid SmartCycler System	Abbott *m*2000 System
Sample Preparation	Manual	Automated

The differences between the IMDx VanR for Abbott *m*2000 assay and the BD GeneOhm VanR Assay do not impact substantial equivalence. Both assays detect *vanA* and *vanB* nucleic acids from similar specimen types and have comparable intended uses. The differences noted above do not change the intended use of the IMDx VanR for Abbott *m*2000 and do not raise questions regarding the safety and effectiveness of the device.

Performance Characteristics

Analytical Performance

Precision (Repeatability/Reproducibility)

Assay precision was measured in four independent studies: within laboratory repeatability, user-to-user reproducibility, lot-to-lot reproducibility and instrument-to-instrument reproducibility using a seven-member panel consisting of one *vanA* and one *vanB* VRE strain at varying concentrations: Positive (2-3X LoD), Low Positive (LoD) and High Negative (<1X LoD). The final panel member was a true negative sample (negative specimen matrix alone).

Table 2 lists %CV values for precision studies. Table 3 lists % agreement values for precision studies.

Table 2. Precision (%CV) for *vanA/vanB* based on CN values.

Precision Panel Member	Reproducibility	Repeatability	Lot to Lot	Instrument to Instrument	
				m*2000*sp	***m*2000*rt***
vanA Positive	3.3%	3.6%	0.7%	1.0%	0.8%
vanA Low Positive	3.9%	4.7%	2.8%	1.5%	1.7%

Precision	Reproducibility	Repeatability	Lot to Lot	Instrument to Instrument	
vanA High Negative	3.4%	3.3%	3.6%	3.5%	2.8%
vanB Positive	2.0%	2.3%	0.6%	1.1%	0.8%
vanB Low Positive	2.6%	2.1%	1.5%	1.3%	1.5%
vanB High Negative	3.2%	2.1%	1.7%	2.4%	2.6%
Negative	N/A	N/A	N/A	N/A	N/A

Table 3. Precision (% Agreement).

Precision Panel Member	Expected Positivity	Reproducibility	Repeatability	Lot to Lot	Instrument to Instrument	
					m2000sp	*m2000rt*
vanA Positive	100%	100.0%	97.2%	100.0%	100.0%	100.0%
vanA Low Positive	95%	96.7%	95.8%	100.0%	100.0%	100.0%
vanA High Negative	20 - 80%	66.7%	55.6%	44.4%	55.6%	55.6%
vanB Positive	100%	100.0%	100.0%	100.0%	100.0%	100.0%
vanB Low Positive	95%	100.0%	100.0%	100.0%	100.0%	100.0%
vanB High Negative	20 - 80%	35.6%	27.8%	55.6%	16.7%	27.8%
Negative	0%	0.0%	0.0%	0.0%	0.0%	0.0%

Analytical Sensitivity (Limit of Detection)

Limit of Detection (LoD) studies were conducted to determine the lowest concentration of each target analyte that could be detected ≥ 95% of the time. Six strains of vancomycin-resistant *Enterococcus*, four VanA-type and two VanB-type, were tested. Dilutions of quantified bacterial stocks were tested in replicates of sixty (60). The LoD of the assay was estimated using probit analysis for each target (*vanA* and *vanB)*. The observed LoD for VRE strains tested is provided in Table 4.

Table 4. Limit of Detection

Strain	Genotype	Limit of Detection (95% CI)
E. faecium ATCC 51559	*vanA*	1010.7 CFU/swab (975.1 - 1047.5)
E. faecium ATCC 700221	*vanA*	4300.6 CFU/swab (3862.6 – 4788.2)
E. faecium ATCC BAA-2318	*vanA*	889.0 CFU/swab (777.1 – 1017.0)
E. faecium ATCC BAA-2320	*vanA*	2435.4 CFU/swab (2043.9 – 2901.7)
E. faecalis ATCC 51575	*vanB*	810.1 CFU/swab (571.7 – 1147.8)
E. faecalis ATCC 700802	*vanB*	1610.0 CFU/swab (1569.1 – 1652.0)

Analytical Reactivity

Eighty-eight (88) well-characterized vancomycin-resistant *Enterococcus* strains and/or clinical isolates (43 VanA-type and 45 VanB-type) were evaluated with the IMDx VanR for Abbott *m*2000 assay. All strains were detected by the assay.

Challenge Study

A challenge study was conducted using a panel of 72 well-characterized strains of *Enterococcus*: 23 *vanA* strains, 25 *vanB* strains, 2 strains with both *vanA* and *vanB* genes, 1 strain with both *vanA* and *vanC* genes, 5 *vanC* strains, 3 *vanD* strains, 2 *vanE* strains, 1 *vanG* strain, and 10 vancomycin-susceptible strains. All *Enterococcus* strains harboring *vanA* or *vanB* resistance genes were detected. All *Enterococcus* strains harboring *vanC, vanD, vanE*, or *vanG* resistance genes and all vancomycin-sensitive *Enterococcus* strains were not detected by the IMDx VanR for Abbott *m*2000 assay.

Cross-Reactivity/Microbial Interference

The IMDx VanR for Abbott *m*2000 assay was evaluated for potential cross-reactivity and/or interference using a panel of 96 organisms that may be present in rectal, peri-rectal and stool samples. Included in the panel were 13 vancomycin-sensitive *Enterococcus* strains and 10 vancomycin-resistant (non-*vanA*/*vanB*) *Enterococcus* strains. Bacteria were tested at a concentration of $\geq 1 \times 10^6$ CFU/mL, and viruses at a concentration of $\geq 1 \times 10^5$ $TCID_{50}$/mL. None of the organisms tested were found to cross-react or interfere with the IMDx VanR for Abbott *m*2000 assay.

Vancomycin-Resistant Staphylococcus aureus (VRSA) strains

Twelve (12) VRSA (VanA-type) isolates from the Network on Antimicrobial Resistance in *Staphylococcus aureus* (NARSA) were tested with the IMDx VanR for Abbott *m*2000 assay. The *vanA* gene was detected in all strains. The *vanB* gene was not detected in any of the strains. Since *S. aureus* may harbor *vanA* and *vanB* vancomycin resistance genes, the IMDx VanR for Abbott *m*2000 assay may produce detected results if *S. aureus* organisms harboring these genes are present in the clinical specimen.

Interfering Substances

The IMDx VanR for Abbott *m*2000 assay was challenged with twenty-three (23) substances that may be present in rectal, peri-rectal or stool specimens. The substances included: anti-fungal/ anti-itch vaginal cream, suppositories, anti-hemorrhoid creams/ointments, antacids, enemas, condoms with spermicidal lubricant, anti-diarrheal medication, laxatives, antibiotics (oral and topical), non-steroidal anti-inflammatory medications, moist towelettes, fecal components (e.g. blood, mucus, fecal lipid), and MRI contrast agent. No assay interference was observed for any of the substances.

Clinical Performance Characteristics

The performance of the IMDx VanR for Abbott *m*2000 assay was assessed by comparison to enriched culture combined with confirmation of the molecular basis of vancomycin resistance of isolates using an alternate PCR method. Samples were collected from five geographically diverse test sites within the United States. The patient distribution, by age, is shown in Figure 1. Samples enrolled for this study included a total of 587 peri-rectal swabs. 444 rectal swabs, and 469 stool specimens. Assay performance, by specimen type, is listed in Tables 5-10. Tables 11-12 presents Assay performance by genotype detected.

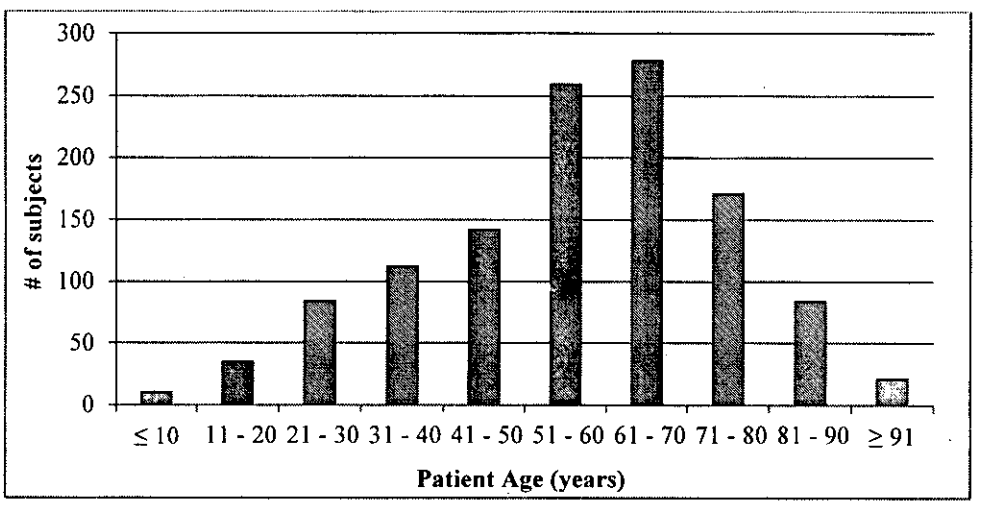

Figure 1. Patient Population. Subjects ranged in age from <1 to 98 years old.

Table 5. Peri-rectal Swab Specimens: IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR				
		VanA-type *Enterococcus*	*VanB*-type *Enterococcus*	*VanA*-type and *VanB*-type *Enterococcus*	Negative	Total
IMDx VanR for Abbott *m*2000	*vanA*	38	0	0	14	52
	vanB	0	0	0	15	15
	vanA and *vanB*	9	0	0	4	13
	Not Detected	3	0	0	504	507
	Total	50	0	0	537	587

Table 6. Resulting Truth Table for Peri-rectal Swab Specimens: IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR		
		POS	NEG	Total
IMDx VanR for Abbott *m*2000	POS	47	33	80
	NEG	3	504	507
	Total	50	537	587

		95% CI
Sensitivity	94.0%	(83.8% – 97.9%)
Specificity	93.9%	(91.5% - 95.6%)
Positive Predictive Value	58.8%	(47.8% - 68.9%)
Negative Predictive Value	99.4%	(98.3% - 99.8%)
Prevalence	8.5%	

Table 7. Rectal Swab Specimens (Prospective Collection): IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR				
		VanA-type *Enterococcus*	*VanB*-type *Enterococcus*	*VanA*-type and *VanB*-type *Enterococcus*	Negative	Total
IMDx VanR for Abbott *m*2000	*vanA*	51	0	0	11	62
	vanB	0	0	0	16	16
	vanA and *vanB*	9	1	0	1	11
	Not Detected	2	0	0	309	311
	Total	62	1	0	337	400

Table 8. Resulting Truth Table from Rectal Swab Specimens (Prospective Collection): IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR		
		POS	NEG	Total
IMDx VanR for Abbott *m*2000	POS	61	28	89
	NEG	2	309	311
	Total	63	337	400

		95% CI
Sensitivity	96.8%	(89.1% - 99.1%)
Specificity	91.7%	(88.3% - 94.2%)
Positive Predictive Value	68.5%	(58.3% - 77.2%)
Negative Predictive Value	99.4%	(97.7% - 99.8%)
Prevalence	15.8%	

Table 9. Rectal Swab Specimens (Retrospective Collection): IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR				
		VanA-type *Enterococcus*	*VanB*-type *Enterococcus*	*VanA*-type and *VanB*-type *Enterococcus*	Negative	Total
IMDx VanR for Abbott *m*2000	*vanA*	30	0	0	2	32
	vanB	0	0	0	0	0
	vanA and *vanB*	12	0	0	0	12
	Not Detected	0	0	0	0	0
	Total	42	0	0	2	44

Table 10. Resulting Truth Table from Rectal Swab Specimens (Retrospective Collection): IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR		
		POS	NEG	Total
IMDx VanR for Abbott *m*2000	POS	42	2	44
	NEG	0	0	0
	Total	42	2	44

		95% CI
Positive Percent Agreement	100.0%	(91.6% - 100.0%)
Negative Percent Agreement	0.0%	(0.0% - 65.8%)

Table 11. Stool Specimens: IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR				
		VanA-type *Enterococcus*	*VanB*-type *Enterococcus*	*VanA*-type and *VanB*-type *Enterococcus*	Negative	Total
IMDx VanR for Abbott *m*2000	*vanA*	50	0	0	7	57
	vanB	2*	0	0	45	47
	vanA and *vanB*	9	0	1	5	15
	Not Detected	7	0	0	343	350
	Total	68	0	1	400	469

* Considered as a false negative result for the 2x2 table below

Table 12. Resulting Truth Table from Stool Specimens: IMDx vs. Enriched Culture and Alternative PCR.

		Enriched Culture + Alternative PCR		
		POS	NEG	Total
IMDx VanR for Abbott *m*2000	POS	60	57	117
	NEG	9	343	352
	Total	69	400	469

		95% CI
Sensitivity	87.0%	(77.0% - 93.0%)
Specificity	85.8%	(82.0% - 88.8%)
Positive Predictive Value	51.3%	(42.3% - 60.2%)
Negative Predictive Value	97.4%	(95.2% - 98.6%)
Prevalence	14.7%	

Conclusions

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

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center – WO66-G609
Silver Spring, MD 20993-0002

INTELLIGENT MEDICAL DEVICES, INC.
C/O FRAN WHITE
REGULATORY CONSULTANT
MDC ASSOCIATES
180 CABOT STREET
BEVERLY MA 01915

July 17, 2013

Re: K123753
Trade/Device Name: IMDx VanR for Abbott *m*2000 Assay
Regulation Number: 21 CFR 866.1640
Regulation Name: Antimicrobial susceptibility test powder
Regulatory Class: II
Product Code: NIJ, OOI
Dated: June 13, 2013
Received: June 14, 2013

Dear Ms. White:

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 Parts 801 and 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.

If you desire specific advice for your device on our labeling regulations (21 CFR Parts 801 and 809), please contact 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/MedicalDevices/ResourcesforYou/Industry/default.htm. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21CFR 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/MedicalDevices/ResourcesforYou/Industry/default.htm.

Sincerely yours,

Uwe Scherf -S for

Sally A. Hojvat, M.Sc., Ph.D.
Director, Division of Microbiology Devices
Office of In Vitro Diagnostics
and Radiological Health
Center for Devices and Radiological Health

Enclosure

Indications for Use

510(k) Number: K123753

Device Name: IMDx VanR for Abbott *m*2000

Indications for Use:

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

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

Concurrence of CDRH, Office of In Vitro Diagnostics and Radiological Health (OIR)

John Hobson -S
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