

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY AND INSTRUMENT COMBINATION TEMPLATE**

A. 510(k) Number:

K123998

B. Purpose for Submission:

Substantial equivalence determination for the Quidel Molecular Direct *C. difficile* Assay on: (i) the Applied Biosystems 7500 Fast Dx instrument; (b) the Cepheid SmartCycler II instrument, and (c) the Life Technologies QuantStudio[®] Dx Real-Time PCR system.

C. Measurand:

Targets DNA sequences of the toxin A (*tcdA*), and toxin B (*tcdB*) genes within the PaLoc of toxigenic strains of *Clostridium difficile*.

D. Type of Test:

Nucleic acid amplification test based on multiplex, real-time.

E. Applicant:

Quidel Corporation

F. Proprietary and Established Names:

Quidel Molecular Direct *C. difficile* Assay

G. Regulatory Information:

1. Regulation section:

21 CFR §866.3130 - *C. difficile* Nucleic Acid Amplification Test Assay

2. Classification:

II

3. Product codes:

OZN - Amplification assay for the detection of *Clostridium difficile* toxin genes from stool specimens of symptomatic patients

OOI - Real-Time Nucleic Acid Amplification System

4. Panel:

Microbiology (83)

H. Intended Use:

1. Intended use(s):

The Quidel Molecular Direct *C. difficile* Assay is a qualitative, multiplexed *in vitro* diagnostic test for the direct rapid detection of toxin A gene (*tcdA*) or toxin B gene (*tcdB*) sequences of toxigenic strains of *Clostridium difficile* from unformed (liquid or soft) stool specimens collected from patients suspected of having *Clostridium difficile*-Associated Disease (CDAD).

The Quidel Molecular Direct *C. difficile* Assay is a real-time PCR test and utilizes proprietary sample preparation with fluorescently labeled primers and probes. The assay can be performed using either the Life Technologies QuantStudio[®] Dx; the Applied Biosystems 7500 Fast Dx, or the Cepheid SmartCycler II, to detect the toxin gene sequences associated with toxin-producing *C. difficile* strains.

The assay is intended to be performed directly on CDAD-suspected stool specimens, and is indicated for use as an aid in the diagnosis of CDAD.

2. Indication(s) for use:

The Quidel Molecular Direct *C. difficile* Assay is a qualitative, multiplexed *in vitro* diagnostic test for the direct rapid detection of toxin A gene (*tcdA*) or toxin B gene (*tcdB*) sequences of toxigenic strains of *Clostridium difficile* from unformed (liquid or soft) stool specimens collected from patients suspected of having *Clostridium difficile*-Associated Disease (CDAD).

The Quidel Molecular Direct *C. difficile* Assay is a real-time PCR test and utilizes proprietary sample preparation with fluorescently labeled primers and probes. The assay can be performed using either the Life Technologies QuantStudio[®] Dx; the Applied Biosystems 7500 Fast Dx, or the Cepheid SmartCycler II, to detect the toxin gene sequences associated with toxin-producing *C. difficile* strains.

The assay is intended to be performed directly on CDAD-suspected stool specimens, and is indicated for use as an aid in the diagnosis of CDAD.

3. Special conditions for use statement(s):

For prescription use only.

4. Special instrument requirements:

Life Technologies QuantStudio[®] Dx with software version 1

Applied Biosystems 7500 Fast Dx with software version 1.4

Cepheid SmartCycler II with software version 3.0b

I. Device Description:

The Quidel Molecular Direct *C. difficile* Assay is a qualitative *in vitro* diagnostic test for the direct rapid detection of toxigenic *Clostridium difficile* toxin A gene (*tcdA*) or toxin B gene (*tcdB*) from stool samples of patients suspected of having *Clostridium difficile*-Associated Diarrhea (CDAD). The Quidel Molecular Direct *C. difficile* Assay utilizes proprietary sample preparation and Real-time PCR to detect the amplified DNA from patient specimens. A multiplex, real-time PCR reaction is performed under optimized conditions in a single tube/well generating amplicons for each of the targets present in the specimen. Identification occurs by the use of oligonucleotide primers and probes that are complementary to conserved regions in the *tcdA* and *tcdB* genes of the pathogenicity locus (PaLoc).

A swab is used to transfer a small amount of specimen into a process buffer tube (PB1). The diluted sample is then transferred into a second process buffer tube (PB2) which contains the assay's process control (PRC). The processed specimen is then combined with rehydrated master mix in either a reaction tube or plate well. The Master Mix contains oligonucleotide primers, fluorophore and quencher-labeled probes targeting conserved regions of the *tcdA* and *tcdB* as well as the process control sequence. The reaction tubes or plate is then placed into either the Applied Biosystems[®] 7500 Fast Dx instrument, the Life Technologies QuantStudio[™] Dx Real-Time PCR system, or the Cepheid SmartCycler[®] II instrument.

Once the reaction tube or plate is added to the instrument, the Quidel Molecular Direct *C. difficile* Assay protocol is initiated. This assay is based on Taqman[®] chemistry, and uses an enzyme with DNA polymerase, and 5'-3' exonuclease activities. During DNA amplification, this enzyme cleaves the probe bound to the complementary DNA sequence, separating the quencher dye from the reporter dye. This step generates an increase in fluorescent signal upon excitation by a light source of the appropriate wavelength. With each cycle, additional dye molecules are separated from their quenchers resulting in an increase in the fluorescent signal. If sufficient fluorescence is achieved, the sample is reported as positive for the detected nucleic acid.

The Quidel Molecular Direct C. difficile Assay contains sufficient reagents to process 96 specimens or quality control samples. The kit contains the following:

Assay Kit (96 Reactions)

	Component	Quantity
1	Rehydration Solution	1 vial/kit 1.9 mL
2	Quidel Molecular C. difficile Master Mix	12 vials/kit 8 reactions/vial

Rapid DNA Stool Sample Prep Kit (96 Specimens)

	Component	Quantity
1	Process Buffer 1	96 tubes/kit 500 µL
2	Process Buffer 2 Contains Process Control	96 tubes/kit 570 µL
3	Neonatal flocced Swabs	96 swabs

J. Substantial Equivalence Information:

- Predicate device name(s):
Great Basin Scientific Portrait Toxigenic C. difficile Assay
- Predicate 510(k) number(s):
K113358
- Comparison with predicate:

Similarities		
Item	Device	Predicate (Great Basin Scientific Portrait Toxigenic C. difficile Assay)
Intended Use	The Quidel Molecular Direct C. difficile Assay is a qualitative, multiplexed in vitro diagnostic test for the direct rapid detection of toxin A gene (tcdA) or toxin B gene (tcdB) sequences of toxigenic strains of Clostridium	Portrait Toxigenic C. difficile Assay, a prescription device under 21 CFR Part 801.109 that is indicated for the detection of toxigenic <i>Clostridium difficile</i> in human fecal samples collected from patients suspected of

Similarities		
Item	Device	Predicate (Great Basin Scientific Portrait Toxigenic <i>C. difficile</i> Assay)
	<p>difficile from unformed (liquid or soft) stool specimens collected from patients suspected of having Clostridium difficile-Associated Disease (CDAD).</p> <p>The Quidel Molecular Direct <i>C. difficile</i> Assay is a real-time PCR test and utilizes proprietary sample preparation with fluorescently labeled primers and probes. The assay can be performed using either the Life Technologies QuantStudio® Dx; the Applied Biosystems 7500 Fast Dx, or the Cepheid SmartCycler II, to detect the toxin gene sequences associated with toxin-producing <i>C. difficile</i> strains.</p> <p>The assay is intended to be performed directly on CDAD-suspected stool specimens, and is indicated for use as an aid in the diagnosis of CDAD.</p>	<p>having <i>Clostridium difficile</i> infection (CDI). The test utilizes automated blocked primer enabled helicase-dependent amplification (bpHDA) to detect toxin gene sequences associated with toxin producing <i>C. difficile</i>. The Portrait Toxigenic <i>C. difficile</i> Assay is intended as an aid in the diagnosis of CDI.</p>
Specimen	Unformed stool	Same
Assay time	75 to 90 min	Same
Detection method	Automated	Same
Technological principle	Fully automated nucleic acid amplification	Same

Differences		
Item	Device	Predicate
Assay technique	Multiplex real-time PCR reaction	Isothermal, helicase-dependent nucleic acid amplification
Test Container	Manual amplification set-up in PCR microfuge tubes or plates with wells.	Disposable single-use, multi-chambered fluidic test cartridge.
Analyte	Toxin A gene (<i>tcdA</i>) and Toxin B gene (<i>tcdB</i>)	Toxin B gene (<i>tcdB</i>)
Instrument	QuantStudio [®] Dx; the Applied Biosystems 7500 Fast Dx, or the Cepheid SmartCycler II	Great Basin Portrait Analyzer
Detection technique	PCR with fluorescently labeled primers and probes; detection based on Taqman [®] chemistry: Amplification occurs with an enzyme that has both DNA polymerase and 5'-3' exonuclease activities. During DNA amplification this enzyme cleaves the probe bound to the complementary DNA sequence, separating the quencher dye from the reporter dye causing an increase in fluorescent signal with each cycle.	Amplification primers are biotin-labeled primers and hybridized to probes immobilized on a silicon chip. Incubation with anti-biotin antibody conjugated to the HRP with TMB allows visualization by the Portrait Analyzer

K. Standard/Guidance Document Referenced (if applicable):

Establishing the Performance Characteristics of *In Vitro* Diagnostic Devices for the Detection of *Clostridium difficile* – Draft Guidance for Industry and FDA Staff (issued on November 29, 2010)

L. Test Principle:

The Quidel Molecular Direct *C. difficile* Assay is a rapid, *in vitro* diagnostic test for the qualitative detection of *C. difficile* DNA directly from unformed (liquid or soft) stool specimens of patients suspected of having *Clostridium difficile*-Associated Disease (CDAD). The assay detects nucleic acids that have been prepared from a patient sample using proprietary sample preparation. A multiplex real-time PCR reaction is performed under optimized conditions in a single tube/well generating amplicons for each of the targets present in the sample. Identification occurs by the use of oligonucleotide primers and probes that are complementary to conserved regions in the *tcdA* and *tcdB* genes of the pathogenicity locus (PaLoc).

A neonatal flocked swab is dipped into a liquid or soft stool specimen from a pediatric or adult patient suspected of having CDAD. The swab is twirled in the first process buffer tube (PB1); 30 µL of the processed sample is then added to the second process buffer tube (PB2) which contains the process control (PRC). Separately, the lyophilized Master Mix is rehydrated using the Rehydration Solution; the Master Mix contains oligonucleotide primers, fluorophore and quencher-labeled probes targeting conserved regions of the *tcdA* and *tcdB* as well as the process control sequence. A 15 µL portion of the rehydrated Master Mix is then placed into each reaction tube or well. To each tube/well is added 5 µL of prepared specimen (i.e., the processed specimen in the PB2 tube with the PRC). The tube/plate is then placed into the Life Technologies QuantStudio® Dx Real-Time PCR system, the Applied Biosystems 7500 Fast Dx instrument, or Cepheid SmartCycler® II instrument. Once the reaction tube or plate is added to the instrument, the Quidel Molecular Direct *C. difficile* Assay protocol is initiated. This assay is based on Taqman® chemistry.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. *Precision/Reproducibility:*

For the Precision/Within Laboratory Repeatability study, a blinded four-member panel consisting of *C. difficile* positive and negative sample was tested by two operators, twice a day using a single assay lot of Quidel Molecular Direct *C. difficile* Assay reagents for 12 days on all three instruments.

Precision: Applied Biosystems 7500 Fast Dx				
<i>C. difficile</i>	5X LoD	2X LoD	0.3X LoD	Negative
% Detection	100%	100%	71%	0%
Average Ct	18.2	20.5	25.8	N/A
STDEV	1.0	1.3	2.4	N/A
%CV	5.2%	6.2%	9.4%	N/A

Precision: Life Technologies QuantStudio™ Dx				
<i>C. difficile</i>	5X LoD	2X LoD	0.3X LoD	Negative
% Detection	100%	100%	88%	0%
Average Ct	16.51	17.70	21.13	N/A
STDEV	0.42	0.76	1.37	N/A
%CV	2.6%	4.3%	6.5%	N/A

Precision: Cepheid SmartCycler II				
<i>C. difficile</i>	5X LoD	2X LoD	0.3X LoD	Negative
% Detection	100%	96%	27%	0%
Average Ct	18.3	20.6	23.6	N/A
STDEV	1.1	1.3	1.1	N/A
%CV	6.0%	6.4%	4.7%	N/A

Reproducibility: In order to confirm the reproducibility of the Quidel Molecular Direct C. difficile Assay a blinded and randomized study panel containing *Clostridium difficile* negative and positive samples was tested at three (3) test sites, two of which were clinical sites while the third site was internal. Each site tested a reproducibility panel and assay controls for five (5) days in triplicate on each instrument. The testing was done by two operators at each site. Each operator ran the panel once a day using one lot of Quidel Molecular Direct C. difficile Assay reagents.

Reproducibility: Applied Biosystems 7500 Fast Dx										
Panel Member ID	Site 1			Site 2			Site 3			Total Results
	Results	AVE Ct	%CV	Results	AVE Ct	%CV	Results	AVE Ct	%CV	
High Negative 0.3x LoD	5/29	28.8	15.0	11/30	27.1	9.0	16/30	27.6	2.8	32/89
Low Positive 2x LoD	29/30	23.2	8.4	30/30	22.7	7.5	29/30	23.1	6.5	88/90
Med Positive 5x LoD	30/30	20.5	5.7	30/30	20.2	5.0	30/30	20.4	5.0	90/90
Negative Specimen	0/29	N/A	N/A	0/30	N/A	N/A	0/30	N/A	N/A	0/89
Negative Control	0/30	N/A	N/A	0/30	N/A	N/A	0/30	N/A	N/A	0/90
Positive Control	30/30	15.8	2.9	30/30	16.2	2.6	30/30	15.7	2.9	90/90

Reproducibility: Life Technologies QuantStudio Dx										
Panel Member ID	Site 1			Site 2			Site 3			Total Results
	Results	AVE Ct	%CV	Results	AVE Ct	%CV	Results	AVE Ct	%CV	
High Negative 0.3x LoD	8/30	22.9	5.0	15/30	22.5	5.7	15/30	22.5	1.5	38/90
Low Positive 2x LoD	30/30	20.4	5.9	30/30	19.0	5.1	30/30	19.2	0.8	90/90
Med Positive 5x LoD	30/30	18.4	4.2	30/30	17.5	2.2	30/30	17.9	0.7	90/90
Negative Specimen	0/30	N/A	N/A	0/30	N/A	N/A	0/30	N/A	N/A	0/90
Negative Control	0/30	N/A	N/A	0/30	N/A	N/A	0/30	N/A	N/A	0/90
Positive Control	30/30	15.7	0.6	30/30	15.7	0.1	30/30	15.5	0.1	90/90

Reproducibility: Cepheid SmartCycler II										
Panel Member ID	Site 1			Site 2			Site 3			Total Results
	Results	AVE Ct	%CV	Results	AVE Ct	%CV	Results	AVE Ct	%CV	
High Negative 0.3x LoD	17/30	23.4	6.6	22/30	25.3	13.4	26/30	23.4	9.3	65/90
Low Positive 2x LoD	29/30	20.1	4.6	29/29	20.1	5.1	30/30	19.9	6.4	88/89
Med Positive 5x LoD	30/30	18.4	9.5	30/30	18.5	3.1	30/30	18.3	6.4	90/90
Negative Specimen	0/30	N/A	N/A	0/30	N/A	N/A	0/29	N/A	N/A	0/89
Negative Control	0/30	N/A	N/A	0/30	N/A	N/A	0/29	N/A	N/A	0/89
Positive Control	30/30	15.1	3.8	30/30	14.8	2.2	30/30	14.5	3.4	90/90

The reproducibility and repeatability study results are acceptable.

b. *Linearity/assay reportable range:*

Not applicable

c. *Traceability, Stability, Expected values (controls, calibrators, or methods):*

The Quidel Molecular Direct *C. difficile* Assay incorporates a process control which is included in the second process buffer tube (PB2) and is used to monitor sample processing and evaluate the presence of inhibitory substances. The process control confirms the integrity of assay reagents and detection. Additional controls are performed in accordance with end user laboratory guidelines and requirements.

d. *Detection limit:*

The analytical sensitivity (limit of detection or LoD) of the Quidel Molecular Direct *C. difficile* Assay was determined on each instrument using quantified (CFU/mL) cultures of two *C. difficile* strains (ATCC BAA-1870 and ATCC BAA-1872) and serially diluted in a negative fecal matrix. Analytical sensitivity (LoD) is defined as the lowest concentration at which 95% of all replicates tested positive. Serial dilutions of the strains were tested and the putative LoD confirmed with 60 replicates.

Instrument	Strain			
	ATCC BAA-1870		ATCC BAA-1872	
	Calculated CFU/mL at LoD	CFU per Assay at LoD	Calculated CFU/mL at LoD	CFU per Assay at LoD
Applied Biosystems 7500 Fast Dx	8.4E+04	4.2E-01	2.4E+04	1.2E-01
Life Technologies QuantStudio	8.4E+04	4.2E-01	8.0E+03	4.0E-02
Cepheid SmartCycler II	8.4E+04	4.2E-01	2.4E+04	1.2E-01

The final assay LoD is defined as the higher of the two strain concentrations where 95% positivity was observed. The final assay LoD is 4.2E-01 CFU/assay.

e. *Analytical Reactivity*

The inclusivity of the Quidel Molecular Direct *C. difficile* Assay was evaluated using twenty-four toxigenic strains for *C. difficile* (see table below). Strains were tested at 2 to 3X LoD in negative specimen matrix using three different lots; this experiment was conducted on the Applied Biosystems 7500 Fast Dx instrument. Strains were reported to originate from at least five states and four countries (USA, Belgium, France and Sweden). Seven (7) toxinotypes were represented: 0, IIIb, IIIc, IV, V, VIII and XXIII. The analytical reactivity testing conducted demonstrated that the Quidel Molecular Direct *C. difficile* Assay can detect a broad range of toxigenic *Clostridium difficile* strains at 2-3X LoD.

C. difficile Strains used in Inclusivity Study						
No.	Strain	aka	toxintype	ribotype	PFGE	Serogroup
1	43255	VPI 10463	0	087	n/a	n/a
2	8864	20309	X	n/a	n/a	A
3	37770	UCL 7701	IV	n/a	n/a	A5
4	BAA-1875	5325	V	n/a	NAP 7	n/a
5	43598	1470	VIII	017	n/a	F
6	37774	UCL 8785	XXIII	n/a	n/a	A9
7	9004	n/a	n/a	n/a	n/a	A
8	BAA-1874	4205	0	002	NAP 6	n/a
9	43600	2149	0	014	n/a	H
10	BAA-1871	4111	0	001	NAP 2	n/a
11	BAA-1803	n/a	IIIc	027	NAP 1	n/a
12	700792	14797-2	0	005	n/a	n/a
13	43599	2022	0	001	n/a	G
14	60276	LRA 0801058 & others	n/a	153	n/a	n/a
15	60275	LRA 0801040 & others	n/a	118	n/a	n/a
16	37778	UCL T218	n/a	n/a	n/a	S4
17	37777	UCL T215	n/a	n/a	n/a	S3
18	37776	UCL T048	n/a	n/a	n/a	S1
19	37773	UCL 8737	n/a	n/a	n/a	A8
20	17857	870	0	001	n/a	n/a
21	43594	W1194	0	005	n/a	A
22	43596	545	0	012	n/a	C
*	BAA-1872	4206	0	207	NAP 4	n/a
*	BAA-1870	4118	IIIb	027	n/a	n/a

*These strains were used for Limit of Detection, and therefore were not run in this study.

Analytical reactivity study results are acceptable.

f. Analytical Specificity

The analytical specificity of the Quidel Molecular Direct C. difficile Assay was evaluated by testing a panel consisting of 66 bacterial, viral and yeast microorganisms, and human DNA representing common enteric pathogens, flora, and/or nucleic acid commonly present in the intestine (see table below). Microorganisms or nucleic acid was mixed with pooled negative matrix and tested directly; this experiment was conducted on the Applied Biosystems 7500 Fast Dx instrument. Bacteria were tested at concentrations greater than 1.0E+06 CFU/mL and viruses at greater than 1.0E+05 PFU/mL. In addition, *in silico* analysis showed that the Quidel Molecular Direct C. difficile Assay had no predicted cross-reactivity for *C. botulinum*. The results of this study demonstrate that the Quidel Molecular Direct C. difficile Assay does not cross-react with medically relevant levels of viruses or bacteria found in stool specimens.

Analytical Specificity & Microbial Interference Panel		
Genera and Species	CFU/mL, PFU/mL, or copies/mL	Stock Type
<i>Abiotrophia defectiva</i>	4.30E+09 copies/mL	DNA
<i>Acinetobacter baumannii</i> (307-0294)	5.27E+08 CFU/mL	Bacteria
Adenovirus 1 VR-1	5.67E+05 PFU/mL	Virus
<i>Aeromonas hydrophila</i>	2.09E+10 CFU/mL	Bacteria
<i>Alcaligenes faecalis subsp. faecalis</i>	4.65E+09 CFU/mL	Bacteria
<i>Bacillus cereus</i>	1.00E+07 CFU/mL	Bacteria
<i>Bacteroides fragilis</i>	1.19E+09 copies/mL	DNA
<i>Campylobacter coli</i>	5.30E+09 copies/mL	DNA
<i>Campylobacter jejuni subsp. jejuni</i>	1.72E+07 CFU/mL	Bacteria
<i>Candida albicans</i>	3.00E+07 CFU/mL	Bacteria
<i>Citrobacter freundii</i>	2.38E+09 CFU/mL	Bacteria
<i>Clostridium bifermentans</i>	2.05E+07 CFU/mL	Bacteria
<i>Clostridium butyricum</i>	1.75E+07 CFU/mL	Bacteria
<i>Clostridium difficile</i> (non-toxigenic) strain 1	1.13E+06 CFU/mL	Bacteria
<i>Clostridium difficile</i> (non-toxigenic) strain 2	4.58E+06 CFU/mL	Bacteria
<i>Clostridium haemolyticum</i>	3.43E+09 copies/mL	DNA
<i>Clostridium novyi</i>	6.50E+06 CFU/mL	Bacteria
<i>Clostridium orbiscindens</i>	5.30E+06 CFU/mL	Bacteria
<i>Clostridium perfringens</i> (Type A)	3.37E+07 CFU/mL	Bacteria
<i>Clostridium scindens</i>	1.62E+07 CFU/mL	Bacteria
<i>Clostridium septicum</i>	2.03E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (ATCC 9714) strain 1	1.94E+06 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (Z077) strain 2	2.07E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (CCUG 6329) strain 3	9.85E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (CCUG 9284) strain 4	6.50E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (CCUG 33098) strain 5	2.00E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (CCUG 36938) strain 6	5.55E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (CCUG 43123) strain 7	2.50E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (CCUG 47545) strain 8	1.36E+07 CFU/mL	Bacteria
<i>Clostridium sordellii</i> (CCUG 59819) strain 9	7.00E+06 CFU/mL	Bacteria
<i>Clostridium sporogenes</i>	3.55E+07 CFU/mL	Bacteria
Coxsackievirus B4	2.43E+07 PFU/mL	Virus
Cytomegalovirus Towne VR-977	1.48E+06 PFU/mL	Virus
Echovirus 6	1.05E+09 PFU/mL	Virus
<i>Edwardsiella tarda</i>	2.03E+09 CFU/mL	Bacteria
<i>Enterobacter aerogenes</i>	1.31E+10 CFU/mL	Bacteria
<i>Enterobacter cloacae</i>	5.95E+08 CFU/mL	Bacteria
<i>Enterococcus faecalis vanB</i>	3.45E+09 CFU/mL	Bacteria
Enterovirus 71	4.82E+05 PFU/mL	Virus
<i>Escherichia coli</i>	1.92E+09 CFU/mL	Bacteria
<i>Escherichia coli</i> O157:H7 (EDL933)	2.20E+09 CFU/mL	Bacteria
<i>Helicobacter pylori</i> (Z040)	3.57E+06 CFU/mL	Bacteria
Human Genomic DNA	N/A	DNA
<i>Klebsiella oxytoca</i>	1.63E+09 CFU/mL	Bacteria
<i>Lactobacillus acidophilus</i>	6.82E+07 CFU/mL	Bacteria
<i>Listeria monocytogenes</i> (Serotype 1/2b)	1.18E+10 CFU/mL	Bacteria
Norovirus GII	3.92E+08 copies/mL	RNA
<i>Peptostreptococcus anaerobius</i>	4.00E+09 copies/mL	DNA
<i>Plesiomonas shigelloides</i>	1.40E+08 CFU/mL	Bacteria
<i>Porphyromonas asaccharolytica</i>	1.30E+07 CFU/mL	Bacteria
<i>Prevotella melaninogenica</i>	5.10E+08 CFU/mL	Bacteria

Analytical Specificity & Microbial Interference Panel		
Genera and Species	CFU/mL, PFU/mL, or copies/mL	Stock Type
<i>Proteus mirabilis</i>	1.06E+09 CFU/mL	Bacteria
<i>Providencia alcalifaciens</i>	9.60E+08 CFU/mL	Bacteria
<i>Pseudomonas aeruginosa</i>	2.60E+10 CFU/mL	Bacteria
Rotavirus (WA)	2.32E+08 copies/mL	RNA
<i>Salmonella choleraesuis (typhimurium)</i>	3.55E+10 CFU/mL	Bacteria
<i>Salmonella enterica subsp. enterica</i>	6.80E+09 CFU/mL	Bacteria
<i>Salmonella enterica subsp. Arizonae</i> (formerly <i>Choleraesuis arizonae</i>)	4.22E+09 CFU/mL	Bacteria
<i>Serratia liquefaciens</i>	3.79E+10 CFU/mL	Bacteria
<i>Serratia marcescens</i>	6.10E+08 CFU/mL	Bacteria
<i>Shigella boydii</i>	8.16E+08 CFU/mL	Bacteria
<i>Shigella dysenteriae</i>	1.26E+10 CFU/mL	Bacteria
<i>Shigella sonnei</i>	3.36E+08 CFU/mL	Bacteria
<i>Staphylococcus aureus</i>	6.00E+07 CFU/mL	Bacteria
<i>Staphylococcus epidermidis</i>	4.00E+08 CFU/mL	Bacteria
<i>Streptococcus agalactiae</i>	2.75E+08 CFU/mL	Bacteria
<i>Vibrio parahaemolyticus</i>	9.50E+06 CFU/mL	Bacteria

Analytical specificity study results are acceptable.

g. *Microbial Interference:*

Microbial interference of the Quidel Molecular Direct *C. difficile* Assay was evaluated by testing a panel consisting of 66 bacterial, viral and yeast microorganisms, and human DNA representing common enteric pathogens, flora, and/or nucleic acid commonly present in the intestine (see table above).

Microorganisms or nucleic acid was mixed with pooled negative matrix and tested in the presence of 2 to 3x LoD level of *C. difficile*; this experiment was conducted on the Applied Biosystems 7500 Fast Dx instrument. Two different strains of *C. difficile* were used in this study (see table below). Bacteria were tested at concentrations greater than 1.0E+06 CFU/mL and viruses at greater than 1.0E+05 PFU/mL. The results of this study demonstrate that medically relevant levels of viruses or bacteria found in stool specimens do not interfere with the Quidel Molecular Direct *C. difficile* Assay.

<i>C. difficile</i> Strains used in Microbial Interference Study			
Strain Number	Toxinotype	<i>C. difficile</i> Strain	CFU/PCR reaction
1	IIIb	BAA-1870	0.84
2	0	BAA-1872	0.30

h. *Interfering Substances*

Two toxigenic strains of *C. difficile* (ATCC BAA-1870 and ATCC BAA-1872) were evaluated against a test panel consisting of thirty-five substances found in stool specimens.

<i>C. difficile</i> Strains used in Interfering Substances Study			
Strain Number	Toxinotype	<i>C. difficile</i> Strain	CFU/PCR reaction
1	IIIb	BAA-1870	0.84
2	0	BAA-1872	0.30

Substances were introduced into the assay dilution tubes at concentrations which were medically relevant. Each of the strains was tested for each substance; this experiment was conducted on the Applied Biosystems 7500 Fast Dx instrument. None of the substances tested were found to interfere with the Quidel Molecular Direct *C. difficile* Assay.

Substance ID	Substance	Concentration Tested	Solvent
1	Palmitic Acid	1.3 mg/mL	100% Methanol
2	Triclosan	0.1% (w/v)	20% DMSO
3	Methicillin	13 mg/mL	Water
4	Phenylephrine HCl	2% w/v	Water
4b	Phenylephrine HCl	cream	Full swab
5	Stearic Acid	26 mg/mL	100% DMSO
6	Mineral Oil	2% v/v	10% DMSO
8	Naproxen Sodium	14 mg/mL	Water
9	Aluminum Hydroxide	0.1 mg/mL	Water
10	Magnesium Hydroxide	0.1 mg/mL	Water
11	Mucin	3 mg/mL	Water
12	Barium Sulfate	5 mg/mL	Water
13	Cimetidine	0.5 mg/mL	Water
14	Esomeprazole Magnesium Hydrate	0.5 mg/mL	Water
15	Nystatin	10000 USP U/mL	DPBS
16	Human Serum Albumin	10 mg/mL	Water
17	Bismuth Subsalicylate	0.87 mg/mL	100% DMSO
18	Ethanol	10% v/v	Water
19	Calcium Carbonate	0.5 mg/mL	Water
20	Glucose	1 mg/mL	Water
21	Loperamide HCl	1 mg/mL	Water
22	Human Hemoglobin	3.2 mg/mL	Water
23	Benzalkonium Cl	0.12%	Water
24	5-Aminosalicylic acid	2 mg/mL	100% DMSO
25	Petroleum Jelly	100%	Full swab
26	Cortisol	1% hydrocortisonecream	1/2 swab
27	Zinc Oxide	13%	Full swab
28	Sennosides	0.1 mg/mL	Water
29	Whole Blood	4%	Saline
30	Nonoxynol-9	7%	Full Swab
31	Miconazole Nitrate Salt	2% w/v	100% Methanol
32	Aluminum Hydroxide/Magnesium Carbonate	0.1 mg/mL	Water
33	Witch Hazel	100%	Alcohol
34	Vancomycin HCl	12.5 mg/mL	Water
35	Human IgA	1.6 mg/mL	Tris - saline

i. *Assay cut-off:*

Not applicable.

j. *Carry-Over & Cross-Contamination Study:*

The potential for carry-over and cross-contamination to occur with the Quidel Molecular Direct *C. difficile* Assay was evaluated on all three platforms. High positive specimens were manufactured by using pooled negative stool spiked with *C. difficile* bacterial stock at a concentration such that a Ct of 10.0 or lower was obtained. These specimens were prepared and frozen in aliquots; aliquots were defrosted prior to the experiment.

For all experiments an unused sterile neonatal flocked swab was used to transfer a positive sample into a PB1 tube; similarly an unused sterile neonatal flocked swab was used to transfer a negative sample into a PB1 tube. This process of manufacturing positive and negative samples was repeated, alternating the creation of mock positive and negative specimens. In each instance an aliquot was transferred from each PB1 tube into the appropriate PB2 prior to amplification.

The Applied Biosystems 7500 Fast Dx experiment and the Life Technologies QuantaStudio Real-Time PCR system experiment each utilized 96 wells per experiment; the Cepheid SmartCycler II experiment utilized 16 tubes per experiment. Each experiment was repeated 6 times, and each experiment was carried out on a different day.

No carry over was detected as all negative samples tested negative for *C. difficile*.

2. Comparison studies:

a. *Method comparison with predicate device:*

Clinical performance was determined by comparing the Quidel Molecular Direct *C. difficile* Assay results to reference culture (i.e., direct culture or enriched toxigenic culture) followed by cell cytotoxicity testing on the isolates.

b. *Matrix comparison:*

Not applicable

3. Clinical studies:

Clinical performance characteristics of the Quidel Molecular Direct *C. difficile* Assay were determined in a multi-site, prospective investigational study at four geographically diverse locations within the United States, as well as one internal site. Two clinical studies were conducted: one study evaluated the ABI 7500 Fast Dx and Cepheid SmartCycler II (665 specimens), and the second study evaluated the QuantStudio Dx Real-Time PCR System (792 specimens).

a. Sensitivity and specificity

i Applied Biosystems 7500 Fast Dx

Performance characteristics of the Quidel Molecular Direct C. difficile Assay on the Applied Biosystems 7500 Fast Dx instrument were established using 665 specimens collected from patients suspected of having *Clostridium difficile*-associated disease. This study was conducted at four distinct geographical sites across the United States. Specimens were tested with the Quidel Assay on the 7500 Fast Dx at three external facilities. The tissue culture cytotoxin assay and enhanced toxigenic culture were performed at a central reference laboratory.

Nine specimens (1.35%) were invalid in the Quidel Molecular Direct C. difficile Assay when initially tested. Eight specimens yielded a valid result when retested (7 were negative, 1 was positive). One specimen remained invalid upon repeat testing.

Direct Culture Cytotoxicity Assay Comparison

Six hundred sixty-five (665) specimens were tested by both the Quidel Molecular Direct C. difficile Assay and tissue culture followed by cell cytotoxicity testing on the isolates. Three specimens (0.5%) were indeterminate in the cytotoxin assay due to toxicity in the antitoxin well. Nine specimens (1.35%) were invalid in the Quidel Molecular Direct C. difficile Assay when initially tested on the Applied Biosystems 7500 Fast Dx instrument. Clinical performance was based on the initial test result obtained for each specimen (e.g., 665 specimens – 3 cytotoxin indeterminate – 9 Quidel invalid results = 653 evaluable specimens). Therefore, the data below summarizes the performance of the Quidel Molecular Direct C. difficile Assay relative to direct culture using the remaining 653 specimens on the Applied Biosystems 7500 Fast Dx instrument.

Performance of the Quidel Molecular Direct C difficile Assay					
vs					
Direct Culture					
Applied Biosystems 7500 Fast Dx Real-Time PCR Instrument, software version 1.4					
Combined Sites					
		Direct Culture			
		+	-		
Quidel Molecular Direct C difficile Assay	+	83	33 ^a	116	
	-	5 ^b	532	537	
		88	565	653	
				95% CI	
		Sensitivity =	94.3%	87.4%	97.6%
		Specificity =	94.2%	91.9%	95.8%
		PPV =	71.6%	64.3%	78.0%
		NPV =	99.1%	97.9%	99.6%

^aOf these 33 discordant specimens, 32 were tested with an FDA-cleared molecular device. All 32 of these specimens were positive for *C. difficile*. The remaining specimen was unavailable for testing.

^bOf these five discordant specimens, all were tested with an FDA-cleared molecular device. All five specimens were found to be negative for *C. difficile*.

Enriched Toxigenic Culture Comparison

Similarly, these 665 specimens were also subjected to enriched toxigenic culture. Clinical performance was based on the initial test result obtained on the Applied Biosystems 7500 Fast Dx for each specimen (e.g., 665 specimens – 9 Quidel invalid results = 656 evaluable specimens). Therefore, the data below summarizes the performance of the Quidel Molecular Direct C. difficile Assay relative to enriched toxigenic culture using the remaining 656 specimens on the Applied Biosystems 7500 Fast Dx instrument.

Performance of the Quidel Molecular Direct C difficile Assay				
vs				
Enriched Toxigenic Culture				
Applied Biosystems 7500 Fast Dx Real-Time PCR Instrument, software version 1.4				
Combined Sites				
Enriched Toxigenic Culture				
+				
-				
Quidel Molecular Direct C difficile Assay	+	112	6 ^a	118
	-	14 ^b	524	538
		126	530	656
			95% CI	
	Sensitivity =	88.9%	82.2%	93.3%
	Specificity =	98.9%	97.6%	99.5%
	PPV =	94.9%	89.6%	97.6%
	NPV =	97.4%	95.9%	98.4%

^aThese six discordant specimens were tested with an FDA-cleared molecular device; all were positive for *C. difficile*.

^bThese 12 discordant specimens were tested with an FDA-cleared molecular device. Two specimens were unavailable for testing; nine of these specimens were found negative for *C. difficile*, while the remaining three were positive.

ii Cepheid SmartCycler II

Performance characteristics of the Quidel Molecular Direct C. difficile Assay on the Cepheid SmartCycler II instrument were established using 665 specimens collected from patients suspected of having CDAD. This study was conducted at four distinct geographical sites across the United States. Specimens were tested with the Quidel Assay on the Cepheid SmartCycler II at three external facilities. The tissue culture cytotoxin assay and enhanced toxigenic culture were performed at a central reference laboratory.

Five specimens (0.75%) were invalid in the Quidel Molecular Direct C. difficile Assay when initially tested on the SmartCycler II. All five (5) specimens yielded a valid result when retested (3 were negative, 2 were positive).

Direct Culture Cytotoxicity Assay Comparison

Six hundred sixty-five (665) specimens were tested by both the Quidel Molecular Direct C. difficile Assay and tissue culture followed by cell cytotoxicity testing of

the isolates. Three specimens (0.5%) were indeterminate in the cytotoxin assay due to toxicity in the antitoxin well. Five specimens (0.75%) were invalid in the Quidel Molecular Direct *C. difficile* Assay when initially tested on the SmartCycler II. Clinical performance was based on the initial test result obtained for each specimen (e.g., 665 specimens – 3 cytotoxin indeterminate – 5 Quidel invalid results = 657 evaluable specimens). Therefore, the data below summarizes the performance of the Quidel Molecular Direct *C. difficile* Assay relative to direct culture using the remaining 657 specimens on the SmartCycler II instrument.

Performance of the Quidel Molecular Direct <i>C. difficile</i> Assay				
vs				
Direct Culture				
Cepheid SmartCycler II Instrument, software version 3.0b				
Combined Sites				
Direct Culture				
+				
Quidel Molecular Direct <i>C. difficile</i> Assay	+	78	38 ^a	116
	-	9 ^b	532	541
		87	570	657
95% CI				
	Sensitivity =	89.7%	81.5%	94.5%
	Specificity =	93.3%	91.0%	95.1%
	PPV =	67.2%	60.0%	73.8%
	NPV =	98.3%	97.0%	99.1%

^aThese 38 discordant specimens were tested with a FDA-cleared molecular device. Nine of these specimens were negative for *C. difficile*, while 29 were positive for *C. difficile*.

^bEight of the nine discordant specimens were tested with a FDA-cleared molecular device; one specimen was unavailable for testing. Five of these specimens were negative for *C. difficile*, while three were positive.

Enriched Toxigenic Culture Comparison

Similarly, these 665 specimens were also subjected to enriched toxigenic culture. Clinical performance was based on the initial test result obtained for each specimen on the SmartCycler II (e.g., 665 specimens – 5 Quidel invalid results = 660 evaluable specimens). Therefore, the data below is for the 660 initially evaluable specimens.

Performance of the Quidel Molecular Direct <i>C. difficile</i> Assay					
vs					
Enriched Toxigenic Culture					
Cepheid SmartCycler II Instrument, software version 3.0b					
Combined Sites					
Enriched Toxigenic Culture					
+					
-					
Quidel Molecular Direct C. difficile Assay	+	103	15 ^a		118
	-	22 ^b	520		542
		125	535		660
				95% CI	
	Sensitivity =	82.4%		74.8%	88.1%
	Specificity =	97.2%		95.4%	98.3%
	PPV =	87.3%		80.7%	91.9%
	NPV =	95.9%		94.3%	97.3%

^aThese 15 discordant specimens were tested with a FDA-cleared molecular device. Six of these specimens were positive for *C. difficile*, while nine were negative.

^bNineteen of these 22 discordant specimens were tested with a FDA-cleared molecular device. Three specimens were unavailable for testing. Ten of these specimens were found to be positive for *C. difficile*, and nine were found to be negative.

(iii) *Life Technologies QuantaStudio Real-Time PCR Instrument*

Performance characteristics of the Quidel Molecular Direct *C. difficile* Assay on the Life Technologies QuantaStudio Real-Time PCR system were established using 792 specimens collected from patients suspected of having *Clostridium difficile*-associated disease (CDAD). This study was conducted at two distinct geographical sites across the United States and one central reference laboratory. Specimens were tested with the Quidel Molecular Direct *C. difficile* Assay on the Life Technologies QuantaStudio Real-Time PCR Instrument at three facilities. The tissue culture cytotoxin assay and enhanced toxigenic culture were performed at a central reference laboratory.

One specimen (0.1%) was invalid in the Quidel Molecular Direct *C. difficile* Assay when initially tested on the QuantaStudio Real-Time PCR system. The specimen yielded a valid result when retested (it was negative).

Direct Culture Cytotoxicity Assay Comparison

Seven hundred ninety-two (792) specimens were tested by both the Quidel Molecular Direct *C. difficile* Assay and tissue culture followed by cell cytotoxicity testing on the isolates. Three specimens (0.4%) were indeterminate in the cytotoxin assay due to toxicity in the antitoxin well. One specimen (0.1%) was invalid in the Quidel Molecular Direct *C. difficile* Assay when initially tested on the QuantaStudio Real-Time PCR system. Clinical performance was based on the initial test result obtained for each specimen (e.g., 792 specimens – 3 cytotoxin indeterminate – 1 Quidel invalid result = 788 evaluable specimens). Therefore, the data below summarizes the performance of the Quidel Molecular Direct *C. difficile* Assay relative to direct culture using the remaining 788 specimens on the QuantaStudio Real-Time PCR system.

Performance of the Quidel Molecular Direct <i>C difficile</i> Assay				
vs				
Direct Culture				
Life Technologies QuantStudio Dx Real-Time PCR Instrument, software version 1.0				
Combined Sites				
Direct Culture				
+				
-				
Quidel Molecular Direct <i>C difficile</i> Assay	+	98	45 ^a	143
	-	7 ^b	638	645
		105	683	788
			95% CI	
	Sensitivity =	93.3%	86.9%	96.7%
	Specificity =	93.4%	91.3%	95.0%
	PPV =	68.5%	62.1%	74.4%
	NPV =	98.9%	97.9%	99.5%

^aOf these 45 discordant specimens, 44 were tested with an FDA-cleared molecular device; 35 specimens were positive for *C. difficile*, while nine were negative. The remaining specimen was unavailable for testing.

^bThese seven discordant specimens were tested with an FDA-cleared molecular device. Two specimens were positive for *C. difficile*, whereas five were negative.

Enriched Toxigenic Culture Comparison

Similarly, these 792 specimens were also subjected to enriched toxigenic culture. Clinical performance was based on the initial test result obtained for each specimen on the QuantaStudio Real-Time PCR system (e.g., 792 specimens – 1 Quidel invalid result = 791 evaluable specimens). Therefore, the data below is for the 791 initially evaluable specimens.

Performance of the Quidel Molecular Direct <i>C difficile</i> Assay				
vs				
Enriched Toxigenic Culture				
Life Technologies QuantStudio Dx Real-Time PCR Instrument, software version 1.0				
Combined Sites				
Enriched Toxigenic Culture				
+				
-				
Quidel Molecular Direct <i>C difficile</i> Assay	+	137	8 ^a	145
	-	20 ^b	626	646
		157	634	791
			95% CI	
	Sensitivity =	87.3%	81.1%	91.6%
	Specificity =	98.7%	97.5%	99.4%
	PPV =	94.5%	89.7%	97.2%
	NPV =	96.9%	95.4%	98.0%

^aThese eight discordant specimens were tested with an FDA-cleared molecular device; two were positive for *C. difficile*, and six were negative.

^bOf these 20 discordant specimens, 17 were tested with an FDA-cleared molecular device; three specimens were unavailable for testing. Eleven of these specimens were negative for *C. difficile*, while six were positive.

4. Clinical cut-off:

Not applicable.

5. Expected values/Reference ranges:

i Applied Biosystems 7500 Fast Dx

The age and gender distribution based on the Quidel Molecular Direct C. difficile Assay result obtained on the Applied Biosystems 7500 Fast Dx was calculated. The patient age and gender data below is for the 656 initially evaluable specimens.

Age and Gender Distribution of <i>C. difficile</i> Positive Results				
Applied Biosystems 7500 Fast Dx Real-Time PCR Instrument, software version 1.4				
Combined Sites				
	Male	Female	Total	Prevalence by age*
Unknown Gender			3	33.3% (1/3)
Infant (<2 yrs)	4	4	8	12.5% (1/8)
Child (≥2 to <12 yrs)	21	18	39	25.6% (10/39)
Adolescent (≥12 to <18 yrs)	8	11	19	21.1% (4/19)
Transitional Adolescent (>18 to <21 yrs)	5	8	13	15.4% (2/13)
Adult (>21 to 59 yrs)	132	146	278	19.1% (53/278)
Sr. Adult (> 60 yrs)	127	169	296	15.9% (47/296)
Total	297	356	656	18.0% (118/656)

*Prevalence based on *C. difficile* positives with the Quidel Molecular Direct C. difficile Assay on the Applied Biosystems 7500 Fast Dx instrument.

ii Cepheid SmartCycler II

The age and gender distribution based on the Quidel Molecular Direct C. difficile Assay result obtained on the SmartCycler II was calculated. The patient age and gender data below is for the 650 initially evaluable specimens.

Age and Gender Distribution of <i>C. difficile</i> Positive Results				
Cepheid SmartCycler II Instrument, software version 3.0b				
Combined Sites				
	Male	Female	Total	Prevalence by age*
Unknown Gender			3	33.3% (1/3)
Infant (<2 yrs)	4	4	8	12.5% (1/8)
Child (≥2 to <12 yrs)	21	18	39	23.1% (9/39)
Adolescent (≥12 to <18 yrs)	8	11	19	15.8% (3/19)
Transitional Adolescent (≥18 to <21 yrs)	5	8	13	7.7% (1/13)
Adult (>21 to 59 yrs)	133	147	280	18.6% (52/280)
Sr. Adult (> 60 yrs)	129	169	298	17.1% (51/298)
Total	300	357	660	17.9% (118/660)

*Prevalence based on *C. difficile* positives with the Quidel Molecular Direct *C. difficile* Assay on the Cepheid SmartCycler II Instrument.

iii Life Technologies QuantaStudio Real-Time PCR Instrument

The age and gender distribution based on the Quidel Molecular Direct *C. difficile* Assay result obtained on the QuantaStudio Real-Time PCR system was calculated. The patient age and gender data below is for the 791 initially evaluative specimens.

Age and Gender Distribution of <i>C. difficile</i> Positive Results				
Life Technologies QuantStudio Dx Real-Time PCR Instrument, software version 1.0				
Combined Sites				
	Male	Female	Total	Prevalence by age*
Unknown Gender			2	50.0% (1/2)
Infant (<2 yrs)	5	5	10	10.0% (1/10)
Child (≥2 to <12 yrs)	28	21	49	24.5% (12/49)
Adolescent (≥12 to <18 yrs)	10	14	24	20.8% (5/24)
Transitional Adolescent (≥18 to <21 yrs)	6	7	13	7.7% (1/13)
Adult (>21 to 59 yrs)	158	170	328	18.3% (60/328)
Sr. Adult (> 60 yrs)	163	202	365	17.8% (65/365)
Total	370	419	791	18.3% (145/791)

*Prevalence based on *C. difficile* positives with the Quidel Molecular Direct *C. difficile* Assay on the Life Technologies QuantStudio Dx Real-Time PCR system.

N. Instrument Name:

The Quidel Molecular Direct *C. difficile* Assay can be performed on the following platforms with the specified software:

Life Technologies QuantStudio® Dx with software version 1

Applied Biosystems 7500 Fast Dx with software version 1.4

Cepheid SmartCycler II with software version 3.0b

O. System Descriptions:

1. Modes of Operation:

Please see the respective Decision Summary for the platform of interest:

Life Technologies QuantStudio® Dx – K123955

Applied Biosystems 7500 Fast Dx – K082562

Cepheid SmartCycler II – K062948

2. Software:

FDA has reviewed applicant's Hazard Analysis and software development processes for this line of product types:

Yes or No

The results of the validation and verification testing results were provided for version 1.0 of the Life Technologies QuantStudio® Dx software; version 1.4 of the Applied Biosystems 7500 Fast Dx software, or version 3.0b of the Cepheid SmartCycler II software.

3. Specimen Identification:

Not applicable – specimen identification is manually entered.

4. Specimen Sampling and Handling:

Specimens are manually transferred to processing tubes prior to amplification.

5. Calibration:

Please see the respective manual for the platform of interest:

Life Technologies QuantStudio® Dx

Applied Biosystems 7500 Fast Dx

Cepheid SmartCycler II

6. Quality Control:

Users must implement their own quality control decision algorithms; such algorithms must be in compliance with local and state guidelines. The sponsor recommends use of the “Quidel Molecular *C. difficile* Control Set” (SKU # M108) for development of appropriate quality control procedures for this assay.

P. Other Supportive Instrument Performance Characteristics Data Not Covered In The “Performance Characteristics” Section above:

Not applicable

Q. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

R. Conclusion:

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