



**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY**

I Background Information:

A 510(k) Number

K201403

B Applicant

Zeptomatrix

C Proprietary and Established Names

NATtrol Vaginal Panel External Run Controls

D Regulatory Information

Product Code(s)	Classification	Regulation Section	Panel
PMN	Class II	21 CFR 866.3920 - Assayed Quality Control Material For Clinical Microbiology Assays	MI - Microbiology

II Submission/Device Overview:

A Purpose for Submission:

To obtain a substantial equivalence determination for the NATtrol BD MAX Vaginal Panel External Controls

B Measurand:

DNA sequences from the following eight (8) microorganisms:

- *Lactobacillus jensenii*
- *Gardnerella vaginalis*
- *Atopobium vaginae*
- *Saccharomyces cerevisiae* containing BVAB2 (Bacterial Vaginosis-Associated Bacterium 2) sequence
- *Candida albicans*

- *Candida krusei*
- *Candida glabrata*
- *Trichomonas vaginalis*

C Type of Test:

The NATtrol BD MAX Vaginal Panel External Controls are intended for *in vitro* diagnostic use as external assayed quality control materials to monitor the qualitative amplification, detection and identification steps of the laboratory nucleic acid test, the BD MAX Vaginal Panel.

III Intended Use/Indications for Use:

A Intended Use(s):

See Indications for Use below.

B Indication(s) for Use:

NATtrol BV Negative Control (NATBVNEG-BD) is intended for use as an assayed quality control material to monitor the performance of in vitro diagnostic laboratory nucleic acid testing procedures for the qualitative detection of targets on the BD Vaginal Panel for BD MAX System. NATtrol BV Negative Control is a qualitative control containing intact and inactivated *Lactobacillus crispatus* and intended to be used solely with the BD Vaginal Panel for BD MAX System. This product is not intended to replace manufacturer controls provided in the package insert.

NATtrol BV Positive Control (NATBVPOS-BD) is intended for use as an assayed quality control material to monitor the performance of in vitro diagnostic laboratory nucleic acid testing procedures for the qualitative detection of targets on the BD Vaginal Panel for BD MAX System. NATtrol BV Positive Control is a qualitative control containing intact and inactivated *Lactobacillus jensenii*, *Gardnerella vaginalis*, *Atopobium vaginae*, and *Saccharomyces cerevisiae* containing BVAB2 (Bacterial Vaginosis-Associated Bacterium 2) sequence and intended to be used solely with the BD Vaginal Panel for BD MAX System. This product is not intended to replace manufacturer controls provided in the package insert.

NATtrol Candida/TV Positive Control (NATCTVPOS-BD) is intended for use as an assayed quality control material to monitor the performance of in vitro diagnostic laboratory nucleic acid testing procedures for the qualitative detection of targets on the BD Vaginal Panel for BD MAX System. NATtrol Candida/TV Positive Control is a qualitative control containing intact and inactivated *Candida albicans*, *Candida krusei*, *Candida glabrata*, and *Trichomonas vaginalis* and intended to be used solely with the BD Vaginal Panel for the BD MAX System. This product is not intended to replace manufacturer controls provided in the package insert.

C Special Conditions for Use Statement(s):

Rx - For Prescription Use Only

D Special Instrument Requirements:

NATtrol BD MAX Vaginal Panel External Controls are intended for use on the BD MAX System.

IV Device/System Characteristics:

A Device Description:

NATtrol BD MAX Vaginal Panel External Controls are formulated with purified, intact microorganisms that have been chemically modified to render them non-infectious and refrigerator stable. The controls are formulated in a proprietary matrix that contains Fetal Bovine Serum, Human Serum Albumin, and sodium azide.

NATtrol BV Positive Control contains intact and inactivated *Lactobacillus jensenii*, *Gardnerella vaginalis*, *Atopobium vaginae*, and *Saccharomyces cerevisiae* containing BVAB2 (Bacterial Vaginosis-Associated Bacterium 2) sequence.

NATtrol Candida/TV Positive Control contains intact and inactivated *Candida albicans*, *Candida krusei*, *Candida glabrata*, and *Trichomonas vaginalis*.

NATtrol BV Negative Control contains intact and inactivated *Lactobacillus crispatus*.

B Principle of Operation:

Contains organism targets for the BD Vaginal Panel Assay to monitor the performance of the assay over time, as performed on the BD MAX System.

V Substantial Equivalence Information:

A Predicate Device Name(s):

BD MAX CT/GC/TV 20-Day QC Panel

B Predicate 510(k) Number(s):

K181683

C Comparison with Predicate(s):

Device & Predicate Device(s):	<u>K201403</u>	<u>K181683</u>
Device Trade Name	NATtrol BD MAX Vaginal Panel External Run Controls	BD MAX CT/GC/TV 20-Day QC Panel
General Device Characteristic Similarities		
Intended Use/Indications For Use	NATtrol BV Negative Control (NATBVNEG-BD) is intended for use as an assayed quality control material to monitor the performance of in vitro	The BD MAX CT/GC/TV 20-Day QC Panel is intended for use as an external assayed positive quality control material to monitor the

	diagnostic laboratory nucleic acid testing procedures for the qualitative detection of targets on the BD Vaginal Panel for BD MAX System. NATtrol BV Negative Control is a qualitative control containing intact and inactivated <i>Lactobacillus crispatus</i> and intended to be used solely with the BD Vaginal Panel for BD MAX System. This product is not intended to replace manufacturer controls provided in the package insert. NATtrol BV Positive Control (NATBVPOS-BD) is intended for use as an assayed quality control material to monitor the performance of in vitro diagnostic laboratory nucleic acid testing procedures for the qualitative detection of targets on the BD Vaginal Panel for BD MAX System. NATtrol™ BV Positive Control is a qualitative control containing intact and inactivated <i>Lactobacillus jensenii</i>, <i>Gardnerella vaginalis</i>, <i>Atopobium vaginae</i>, and <i>Saccharomyces cerevisiae</i> containing BVAB2 (Bacterial Vaginosis-Associated Bacterium 2) sequence and intended to be used	performance of in vitro laboratory nucleic acid testing procedures for the qualitative detection of <i>Chlamydia trachomatis</i>, <i>Neisseria gonorrhoeae</i> and <i>Trichomonas vaginalis</i> with the BD MAX CT/GC/TV Assay on the BD MAX System. The controls comprise cultured and inactivated <i>C. trachomatis</i>, <i>N. gonorrhoeae</i> and <i>T. vaginalis</i>. The BD MAX CT/GC/TV 20-Day QC Panel is not intended to replace manufacturer controls provided with the device.
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	solely with the BD Vaginal Panel for BD MAX System. This product is not intended to replace manufacturer controls provided in the package insert. NATtrol Candida/TV Positive Control (NATCTVPOS-BD) is intended for use as an assayed quality control material to monitor the performance of in vitro diagnostic laboratory nucleic acid testing procedures for the qualitative detection of targets on the BD Vaginal Panel for BD MAX System. NATtrol Candida/TV Positive Control is a qualitative control containing intact and inactivated <i>Candida albicans</i>, <i>Candida krusei</i>, <i>Candida glabrata</i>, and <i>Trichomonas vaginalis</i> and intended to be used solely with the BD Vaginal Panel for the BD MAX System. This product is not intended to replace manufacturer controls provided in the package insert.	
Composition	Inactivated microorganisms	Same
Test System	BD MAX System	Same
Assay Steps Monitored	Extraction, amplification, and detection	Same
Analytes	Inactivated	Same

	microorganisms	
General Device Characteristic Differences		
Physical Format	Read-to-use liquid	Lyophilized
Number of Targets Monitored	Eight (8): <i>Lactobacillus jensenii</i> , <i>Gardnerella vaginalis</i> , <i>Atopobium vaginae</i> , <i>Saccharomyces cerevisiae</i> , <i>Candida albicans</i> , <i>Candida krusei</i> , <i>Candida glabrata</i> , and <i>Trichomonas vaginalis</i>	Three (3): <i>Chlamydia trachomatis</i> , <i>Neisseria gonorrhoeae</i> and <i>Trichomonas vaginalis</i>

VI Standards/Guidance Documents Referenced:

Special Controls under 21 CFR 866.3920

VII Performance Characteristics (if/when applicable):

A Analytical Performance:

1. Precision/Reproducibility:

An external site precision study was performed with the NATtrol BD MAX Vaginal Panel External Run Controls on the BD Max system. The performance of the controls was evaluated by observing the data collected during multiple studies performed by six (6) operators using two (2) lots of BV Positive (NATBVPOS-BD), two (2) lots of BV Negative (NATBVNEG-BD), and one (1) lot of CTV Positive (NATCTVPOS-BD) controls. All controls were added to the BD Molecular Swab Sample Buffer Tube and processed according to the BD Vaginal Panel Assay package insert. A total of 381 external controls were tested (86 BV Positive Controls, 104 CTV Positive Controls, and 191 BV Negatives). The results are shown in the Tables below:

Table 1: BV Positive Control Precision Study Summary

BV Positive Control		
Target	BD MAX Result (Observed/Total)	% Agreement with expected Results (95% CI)
BV	Positive (84/86)	97.7% (91.9%-99.4%)
C group	Negative (86/86)	100% (95.7%-100%)

<i>C. krusei</i>	Negative (86/86)	100% (95.7%-100%)
<i>C. glabrata</i>	Negative (86/86)	100% (95.7%-100%)
TV	Negative (86/86)	100% (95.7%-100%)

Table 2: BV Negative Control Precision Study Summary

BV Negative Control		
Target	BD MAX Result (Observed/Total)	% Agreement with expected Results (95% CI)
BV	Negative (191/191)	100% (98.0%-100%)
C group	Negative (189/191)	99.0% (96.3%-99.7%)
<i>C. krusei</i>	Negative (191/191)	100% (98.0%-100%)
<i>C. glabrata</i>	Negative (191/191)	100% (98.0%-100%)
TV	Negative (191/191)	100% (98.0%-100%)

Table 3: *Candida*/TV Positive Control Precision Study Summary

<i>Candida</i>/TV Positive Control		
Target	BD MAX Result (Observed/Total)	% Agreement with expected Results (95% CI)
BV	Negative (102/104)	98.1% (93.3%-99.5%)
C group	Positive (103/104)	99.0% (94.8%-99.8%)
<i>C. krusei</i>	Positive (103/104)	99.0% (94.8%-99.8%)
<i>C. glabrata</i>	Positive (103/104)	99.0% (94.8%-99.8%)
TV	Positive (103/104)	99.0% (94.8%-99.8%)

Table 4: BV Positive Control Precision Study Stratified by Operator and Lot

	Lot Number		
Operator	320306	322104	Total
1	0/0	5/5 (100%)	5/5 (100%)
2	12/12 (100%)	3/3 (100%)	15/15 (100%)
3	0/0	3/3 (100%)	3/3 (100%)
4	3/3 (100%)	12/12 (100%)	15/15 (100%)
5	3/3 (100%)	43/45 (95.55%)	46/48 (95.8%)
Total	18/18 (100%)	66/68 (97.05%)	84/86 (97.7%)

Table 5: *Candida*/TV Positive Control Precision Study Stratified by Operator

	Lot Number	
Operator	322106	Total
1	5/5 (100%)	5/5 (100%)
2	9/9 (100%)	9/9 (100%)
3	3/4 (75%)	3/4 (75%)
4	15/15 (100%)	15/15 (100%)
5	67/68 (98.5%)	67/68 (98.5%)
6	3/3 (100%)	3/3 (100%)
Total	102/104 (98.1%)	102/104 (98.1%)

Table 6: BV Negative Control Precision Study Stratified by Operator and Lot

	Lot Number		
Operator	322123	321575	Total
1	10/10 (100%)	0/0	10/10 (100%)
2	12/12 (100%)	12/12 (100%)	24/24 (100%)
3	7/7 (100%)	0/0	7/7 (100%)
4	27/27 (100%)	3/3 (100%)	30/30 (100%)
5	112/114 (98.2%)	3/3 (100%)	115/117 (98.3%)
6	3/3 (100%)	0/0	3/3 (100%)
Total	171/173 (98.8%)	18/18 (100%)	189/191 (99.0%)

The precision study results establish there is no significant difference in control performance among different operators and between lots.

Table 7: NATrol BD MAX Vaginal Panel External Run Controls Precision Study Stratified By Lot

Target (Lot)	External Run Control	N	Mean Ct	Ct SD	Ct %CV
BV-GV (320306)	NATBVPOS-BD	18	21.1	0.30	1.4%
BV-GV (322104)		66	21.0	0.42	2.0%
BV-GV (All)		84	21.0	0.40	1.9%

BV- <i>Atopobium vaginae</i> (320306)	NATBVPOS-BD	18	19.7	0.35	1.8%
BV- <i>Atopobium vaginae</i> (322104)		66	21.4	0.47	2.2%
BV-<i>Atopobium vaginae</i> (All)		84	21.0	0.82	3.9%
<i>Lactobacillus</i> spp. (320306)	NATBVPOS-BD	17	30.7	1.38	4.5%
<i>Lactobacillus</i> spp. (322104)		66	25.7	0.76	2.9%
<i>Lactobacillus</i> spp. (All)		83	26.7	2.21	8.3%
BVAB-2 (320306)	NATBVPOS-BD	18	22.5	0.19	0.9%
BVAB-2 (322104)		66	22.2	0.24	1.1%
BVAB-2 (All)		84	22.3	0.25	1.1%
TV (322106)	NATCVPOS-BD	102	26.1	0.26	1.0%
C group (322106)		102	25.2	0.40	1.6%
<i>C. krusei</i> (322106)		102	25.2	0.34	1.3%
<i>C. glabrata</i> (322106)		102	30.1	2.11	7.0%
<i>Lactobacillus</i> spp. (321575)	NATBVNEG-BD	18	23.7	0.22	0.9%
<i>Lactobacillus</i> spp. (322123)		171	22.5	0.44	1.9%
<i>Lactobacillus</i> spp. (All)		189	22.6	0.56	2.5%

The results confirm there is no significant difference in Ct values for controls between different lots of BV Positive Controls and BV Negative Controls.

Overall, the precision study results are acceptable.

2. Linearity:

Not applicable.

3. Analytical Specificity/Interference:

Not applicable.

4. Assay Reportable Range:

Not applicable.

5. Traceability, Stability, Expected Values (Controls, Calibrators, or Methods):

Real-Time Stability Program:

The NATtrol BD MAX Vaginal Panel External Controls stability study is an ongoing study designed to support a 12-month shelf-life claim at 2-8°C. Testing is performed at multiple timepoints within the anticipated shelf-life with an additional test performed at least four (4) months after the proposed expiration date. The BD MAX Vaginal Panel will be used to test each control three times at each time point according to the package insert instructions for use. Acceptance criteria for each test is a positive or negative result for the appropriate targets at all time points.

The controls were tested using the BD MAX Vaginal Panel with the UVE Sample Buffer Tube for initial stability testing. Release testing (post dispense and assembly) of each lot served as the initial time point of the study (T0). For Real-Time Stability, controls in their

final packaging were placed at 2-8°C, and three replicates (n = 3) from three separate tubes were tested at each time point per the testing methods. All three replicates for each control produced the same expected result, which is summarized in Table 8.

Table 8: Summary of Initial Real Time Stability Testing

NATrol BD MAX Vaginal Panel External Controls	Lot	Final time point (months)	Summary of Results at Each Time Point
NATBVPOS-BD	316984	12	BV POS
	318513	25	
	319891	25	
	320306	25	
	321997	18	
	322104	18	
NATBVNEG-BD	320307	25	Cgroup POS, Ckru POS, Cgla POS, TV POS
	321575	24	
	322123	18	
NATCTVPOS-BD	318697	13	BV NEG
	319920	13	
	320966	13	
	322106	18	

Real-time stability study protocols, acceptance criteria, and initial results were reviewed and found to be acceptable.

6. Detection Limit:

Not applicable.

7. Assay Cut-Off:

Not applicable.

B Comparison Studies:

1. Method Comparison with Predicate Device:

Not applicable.

2. Matrix Comparison:

Not applicable.

C Clinical Studies:

1. Clinical Sensitivity:

Not applicable.

2. Clinical Specificity:

Not applicable.

3. Other Clinical Supportive Data (When 1. and 2. Are Not Applicable):

Not applicable.

D Clinical Cut-Off:

Not applicable.

E Expected Values/Reference Range:

NATrol BD MAX Vaginal Panel External Run Controls are qualitative controls, and the expected results are listed in Table 9.

Table 9: Expected Results for Each NATrol BD MAX Vaginal Panel External Control

Target	BV Positive Control	BV Negative Control	CTV Positive Control
BV	Positive	Negative	Negative
C. group	Negative	Negative	Positive
<i>C. krusei</i>	Negative	Negative	Positive
<i>C. glabrata</i>	Negative	Negative	Positive
TV	Negative	Negative	Positive

VIII Proposed Labeling:

The labeling supports the finding of substantial equivalence for this device.

IX Conclusion:

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