

**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
DEVICE ONLY TEMPLATE**

A. 510(k) Number:

k091126

B. Purpose of Submission:

Addition of daptomycin to the VITEK®2 and VITEK®2 Compact Systems
Antimicrobial Susceptibility Test (AST) System

C. Measurand

Daptomycin ≤ 0.12 - ≥ 8 µg/mL

D. Type of Test:

Quantitative growth based detection algorithm using predetermined growth thresholds

E. Applicant:

bioMerieux, Inc.

F. Proprietary and Established Names:

VITEK®2 Gram Positive Daptomycin

G. Regulatory Information:

1. Regulation section:
866.1645 Short-Term Antimicrobial Susceptibility Test System
2. Classification:
II
3. Product Code:
LON System, Test, Automated, Antimicrobial Susceptibility, Short Incubation
4. Panel:
83 Microbiology

H. Intended Use:

1. Intended use(s):
The VITEK®2 Antimicrobial Susceptibility Test is intended to be used with the VITEK®2 System for the automated quantitative or qualitative susceptibility testing of isolated colonies for most clinically significant aerobic gram-negative bacilli, *Staphylococcus spp.*, *Enterococcus spp.*, *Streptococcus agalactiae*, *S. pneumoniae* and yeast.

The VITEK®2 Gram Positive Susceptibility Card is intended for use with the VITEK®2 system in clinical laboratories as an *in vitro* test to determine the susceptibility of *Staphylococcus spp.*, *Enterococcus spp.*, and *Streptococcus agalactiae* to antimicrobial agents when used as instructed in the Online Product Information.

2. Indication(s) for use:

VITEK® 2 Gram Positive Daptomycin is designed for antimicrobial susceptibility testing of gram positive microorganisms and is intended for use with the VITEK® 2 and the VITEK® 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents.

VITEK® 2 Gram Positive Daptomycin is a quantitative test. Daptomycin has been shown to be active against the microorganisms listed below according to the FDA label for the antimicrobial.

Active *in vitro* and in clinical infections:

Enterococcus faecalis (vancomycin-susceptible strains only)

Staphylococcus aureus (including methicillin-resistant strains)

3. Special condition for use statement(s):

Prescription use only

Perform an alternative method of testing prior to reporting of results for the following antibiotic/organism combination:

Daptomycin: *Streptococcus agalactiae*

4. Special instrument Requirements:

Not applicable

I. Device Description:

The VITEK® 2 AST card containing the test is inoculated with a standardized organism suspension. The card is incubated within the instrument and optically monitored throughout the incubation cycle. Results are automatically calculated once a predetermined growth threshold is reached and a report is generated that contains the final result.

J. Substantial Equivalence Information:

1. Predicate device name(s):

VITEK® 2 Gram Positive Vancomycin

2. Predicate K number(s):

k072668

3. Comparison with predicate

Similarities		
Item	Device	Predicate
Intended Use	Determine antimicrobial susceptibility to antimicrobial agents	Same
Instrument	VITEK®2 System	Same
Test Card	VITEK®2 card, including the base broth	Same
Test organism	Colonies of Gram-Positive cocci	Same
Differences		
Item	Device	Predicate
Antibiotic	Daptomycin at specific concentrations	Vancomycin at specific concentrations
Reading algorithm	Unique for daptomycin	Unique for vancomycin

K.

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

Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA”; CLSI M7 (M100-S19) “Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard”.

M. Test Principle:

Optics systems use visible light to directly measure organism growth. These transmittance optics are based on an initial light reading of a well before significant growth has begun. Periodic light transmittance samplings of the same well measure organism growth by how much light is prevented from going through the well. An interpretive call is made between 4 and 16 hours for a “rapid” read but may be extended to 18 hours in some instances. The VITEK®2 Susceptibility Card test is based on the microdilution minimum inhibitory concentration technique with concentrations equivalent to standard method concentrations. Several parameters based on the growth characteristics observed are used to provide appropriate input for the MIC calculations. Discriminate analysis is used to develop the algorithm that determines the susceptibility result for all antimicrobials on the VITEK®2 system. The MIC result must be linked to organism identification in order to determine a category interpretation. A category interpretation (SIR) will be reported along with a MIC.

N. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. *Precision/Reproducibility:*

Ten gram-positive on-scale organisms were evaluated for site to site and inter site reproducibility demonstrating >95%

reproducibility. The ten isolates study described in the guidance document was used (10 organisms tested 3 times on 3 days at 3 sites).

b. Linearity/assay reportable range:

Not applicable

c. Traceability (controls, calibrators, or method):

The recommended QC isolates were tested on every test occasion with the reference method and the VITEK®2. The reference method QC results were in range for every day tested. The VITEK®2 was tested a sufficient number of times to demonstrate that the system can produce QC results in the recommended range.

Quality Control was performed during the studies using both the auto-dilution and the manual method of diluting the organisms. Results demonstrated that methods were comparable with the same mode.

ORGANISM	MIC Conc. (ug/mL)	VITEK®2 AUTO-DIL	VITEK®2 MAN-DIL	Reference
<i>E. faecalis</i>	2			1
ATCC 29212	4	99	98	90
Expected Range: 1 - 4 µg/mL	8			8
<i>S. aureus</i>	0.25	51	52	73
ATCC 29213	0.5	36	36	25
Expected Range: 0.25 – 1 µg/mL	1	10	10	
	2	1		

Inoculum density control was monitored using the DensiChek2 instrument. This was standardized weekly with all results recorded and in the expected range. Verification was performed during internal testing.

d. Detection limit:

Not applicable

e. Analytical specificity:

Not applicable

f. Assay cut-off:

Not applicable

2. Comparison studies:

a. *Method comparison with predicate device:*

A clinical study was conducted at three sites using the VITEK®2 gram positive cards with daptomycin and the broth microdilution method using Mueller Hinton (MH) broth (cation adjusted) supplemented with 50 µg/mL calcium. The MH broth was incubated at 35°C in ambient air at 16 – 20h. The Inoculum was prepared with direct colony suspension. The testing included both fresh clinical isolates and stock isolates along with a challenge set with known results. Two methods of inoculation (manual and automated) were evaluated. Clinical testing was performed using the automated method of inoculation and the challenge set was tested using both the manual and the automated method. The test device had a growth rate of >90%. A comparison was provided to the reference method with the following agreement.

Summary Table

	EA Tot	EA N	EA %	Eval EA Tot	Eval EA N	Eval EA %	CA N	CA %	#NS
<i>Enterococcus faecalis</i>	196	192	98	192	188	97.9	191	97.4	8
<i>Staphylococcus aureus</i>	195	187	95.9	189	181	95.8	193	99	9

EA-Essential Agreement

CA-Category Agreement

NS-not susceptible

Essential agreement (EA) is when the VITEK®2 panels agree with the reference test panel results exactly or within one doubling dilution of the reference method. Category agreement (CA) is when the VITEK®2 panel result interpretation agrees exactly with the reference panel result interpretation. Evaluable EA is when the MIC result is on scale for both the VITEK®2 and the reference and have on-scale EA.

There appears to be a trend where the test device is slightly more resistant than the reference method as demonstrated in the Accuracy studies however results are still within essential agreement.

Manual Dilution:

The challenge set of organisms was also tested at one site using the manual method of inoculation with the following performance that demonstrated that there is minimal difference between the two inoculation methods.

Summary Table

	EA Tot	EA N	EA %	Eval EA Tot	Eval EA N	Eval EA %	CA N	CA %	#NS
<i>Enterococcus faecalis</i>	30	30	100	29	29	100	29	96.7	2
<i>Staphylococcus aureus</i>	45	45	100	41	41	100	45	100	9

EA-Essential Agreement

CA-Category Agreement

NS-not susceptible

b. Matrix comparison:
Not applicable

3. Clinical studies:

a. Clinical sensitivity:
Not applicable

b. Clinical specificity:
Not applicable

c. Other clinical supportive data (when a and b are not applicable):
Not Applicable

4. Clinical cut-off:
Not applicable

5. Expected values:
Staphylococcus aureus (including methicillin-resistant strains) ≤ 1
Enterococcus faecalis (vancomycin-susceptible strains only) ≤ 4

The current absence of data for resistant strains precludes defining any results other than “Susceptible”. Strains yielding MIC results suggestive of a “non-susceptible” category should be submitted to a reference laboratory for further testing.

O. Labeling

The expected value range, interpretive criteria and QC are included in the package insert. The labeling is sufficient and satisfies the requirements of 21 CFR Part 809.10.

P. Conclusion:

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