

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

A. 510(k) Number:

k082346

B. Purpose of Submission:

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

C. Measurand

Doripenem ≤ 0.12 - ≥ 8 µg/mL

D. Type of Test:

Quantitative or qualitative growth based detection algorithm using predetermined growth thresholds

E. Applicant:

bioMérieux, Inc.

F. Proprietary and Established Names:

VITEK®2 Gram Negative Doripenem

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:

5. Intended use(s):
The VITEK®2 Antimicrobial Susceptibility Test is intended for use with the VITEK®2 Systems 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.
6. Indication(s) for use:
This application is indicated for the addition of Doripenem to the VITEK®2 and VITEK®2 Compact Systems Antimicrobial Susceptibility Test (AST) System for testing *Acinetobacter baumannii*, *Escherichia coli*, *Klebsiella*

pneumoniae, *Proteus mirabilis*, and *Pseudomonas aeruginosa* at a concentration of 0.25, 0.5, 1, 4 µg/mL, and a calling range of ≤0.12 - ≥8.

7. Special condition for use statement(s):
Prescription use only

The current absence of resistant isolates precludes defining results other than Susceptible. Isolates yielding MIC results suggestive of Nonsusceptible category should be submitted to a reference laboratory for further testing.

8. 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:

9. Predicate device name(s):
VITEK® 2 Gram Negative Levofloxacin
10. Predicate K number(s):
k072038
3. Comparison with predicate

Similarities		
Item	Device	Predicate
Intended Use	Determine antimicrobial susceptibility to antimicrobial agents	Same
Instrument	VITEK®2 and VITEK®2 Compact Systems	Same
Test Card	VITEK®2 card, including the base broth	Same
Test organism	Colonies of Gram-Negative cocci	Same
Differences		
Item	Device	Predicate
Antibiotic	Doripenem at specific concentrations	Levofloxacin at specific concentrations
Reading algorithm	Unique for Doripenem	Unique for levofloxacin

K. 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-S18) “Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard”.

L. 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.

M. Performance Characteristics (if/when applicable):

4. Analytical performance:

a. *Precision/Reproducibility:*

Ten gram negative isolates were tested at three sites in triplicate for three days using both the manual dilution and the automatic dilution method. These same organisms were tested at one site three times to determine within site reproducibility of >95% also. This testing was performed using both the manual dilution of the inoculum and also the automatic dilution method.

b. *Linearity/assay reportable range:*

Not applicable

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

The FDA recommended quality control (QC) isolates, *P. aeruginosa* ATCC 27853, and *E. coli* ATCC 25922 were tested at each study site by 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 auto-dilution and the manual dilution method.

Quality Control Summary

ORGANISM	VITEK®2 Conc. (ug/mL)	VITEK®2 AUTO-DIL	VITEK®2 MAN-DIL	Reference Conc. (ug/mL)	Reference AUTO-DIL	Reference MAN-DIL
<i>E. coli</i> ATCC 25922 Exp Res: 0.015 – 0.06 µg/mL	≤0.125	101	80	≤0.0625	101	81
	0.25					
	0.5					
	1					
	2					
	4					
	8		1			
	≤0.125			0.125	23	22
<i>P. aeruginosa</i>	0.25	54	55	0.25	74	57
ATCC 27853	0.5	46	26	0.5	3	3
Exp Res: 0.12 – 0.5 µg/mL	1					
	2					
	4					
	8		1			

Inoculum density control was monitored using the DensiChek instrument. This was calibrated daily 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

5. Comparison studies:

a. Method comparison with predicate device:

A clinical study was conducted at three external sites using the VITEK®2 gram negative doripenem and the broth microdilution method as recommended by CLSI. Inoculum was prepared with direct colony suspension and incubated in ambient air at 35 ±2 °C for 16 – 20 hours. 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>A. baumannii</i>	79	78	98.7	20	19	95	78	98.7	64
<i>P. aeruginosa</i>	162	157	96.9	64	59	92.2	154	95.1	69
<i>Enterobacteriaceae</i>	330	327	99.1	22	20	90.9	328	99.4	1

EA - Essential Agreement

NS – Not Susceptible

CA - Category Agreement

EA is when there is agreement between the reference method and the new method is within plus or minus one serial two-fold dilution of antibiotic. Category agreement (CA) is when the new method result interpretation agrees exactly with the reference panel result interpretation. Evaluable EA is when the MIC result is on scale for both the new method and the reference method and have on-scale EA.

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 a 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>Combined</i>	84	81	96.4	36	33	94.3	80	95.2	9

EA - Essential Agreement

NS – Not Susceptible

CA - Category Agreement

EA is when there is agreement between the reference method and the new method is within plus or minus one serial two-fold dilution of antibiotic. Category agreement (CA) is when the new method result interpretation agrees exactly with the reference panel result interpretation. Evaluable EA is when the MIC result is on scale for both the new method and the reference method and have on-scale EA.

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:

Enterobacteriaceae ≤ 0.5

Pseudomonas aeruginosa ≤ 2

Acinetobacter baumannii ≤ 1

The current absence of resistant isolates precludes defining results other than Susceptible. Isolates yielding MIC results suggestive of Nonsusceptible category should be submitted to a reference laboratory for further testing.

N. 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.

O. Conclusion:

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