

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

A. 510(k) Number:

K091899

B. Purpose for Submission:

To obtain an SE determination for the Addition of Meropenem test to the already cleared VITEK®2 and VITEK®2 Compact Systems Antimicrobial Susceptibility Test (AST) System.

C. Measurand:

Meropenem (≤ 0.25 - ≥ 16 µg/mL)

D. Type of Test:

Quantitative or qualitative growth based detection algorithm using predetermined growth Thresholds.

E. Applicant:

bioMerieux, Inc.

F. Proprietary and Established Names:

VITEK®2 Gram Negative Meropenem

G. Regulatory Information

Product Code	Classification	Regulation Section	Panel
<u>LON System,</u> <u>Test,Automated,</u> <u>Antimicrobial</u> <u>Susceptibility,Short</u> <u>Incubation</u>	<u>Classification II</u>	<u>866.1645</u> <u>Short-Term</u> <u>Antimicrobial</u> <u>Susceptibility Test</u> <u>System</u>	<u>83 Microbiology</u>

H. Intended Use:

1. 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*, and *S. pneumoniae*.

2. Indication(s) for use:

This application is indicated for the addition of Meropenem 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 - ≥8µg/mL.

3. Special conditions 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.

4. Special instrument requirements:

Not applicable

I. Device Description:

The VITEK® 2 AST card 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:

Predicate Device names:

VITEK® 2 Gram Negative Doripenem.

Predicate K number(s):

K082346

SIMILARITIES

ITEMS	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 bacilli	Same
Items	VITEK® Gram Negative Meropenem	VITEK® Gram Negative Doripenem (K082346)

DIFFERENCES

ITEMS	DEVICE	PREDICATE
Antibiotic	Meropenem at specific concentration	Doripenem at specific concentration
Reading algorithm	Unique for Meropenem	Unique for Doripenem

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

Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test 2 (AST) Systems; Guidance for Industry and FDA"; CLSI M7 (M100-S 18) "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):

1. 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, Stability, Expected values (controls, calibrators, or methods):

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 autodilution 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 ATCC 25922</i> <i>Exp Res 0.008-0.06</i> <i>ug/mL</i>	<=0.03125				122	71
	0.0625				1	1
	0.125					
	< 0.25	123	72			
	0.5					
<i>P. aeruginosa</i>	<=0.03125					
<i>ATCC 27853 Exp</i> <i>Res:0.25-1ug/mL</i>	0.0625					
	0.125				3	2
	0.25	116	72		79	46
	0.5	4			33	22
	1				6	2
	2					
	4					
	8					
	16	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

2. Comparison studies:

a. *Method comparison with predicate device:*

A clinical study was conducted at three external sites. bioMerieux, Inc served as a fourth trial site using the VITEK®2 gram negative meropenem and the broth microdilution method as recommended by CLSI. Inoculum was prepared with direct colony suspension and incubated in ambient air at $35 \pm 2^{\circ}\text{C}$ 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.

One very major discrepancy is indicated for Enterobacteriaceae and two for *P. aeruginosa* which is within the specified limits for acceptance according to the Guidance Document criteria.

Summary Table

	<i>EA Tot</i>	<i>EA N</i>	<i>EA %</i>	<i>EVAL EA Tot</i>	<i>EVAL EA N</i>	<i>EVAL EA %</i>	<i>CA N</i>	<i>CA %</i>	<i># resistant</i>	<i>min</i>	<i>maj</i>	<i>vmaj</i>
<i>A. baumannii</i>	190	188	98.9	27	26	96.3	186	97.9	156	4	0	0
<i>P. aeruginosa</i>	147	142	96.6	62	59	95.2	129	87.8	37	16	0	2
<i>Enterobacteriaceae</i>	360	356	98.9	7	6	85.7	360	100	22	0	0	1

EA = Essential Agreement

CA = Category Agreement

R = Resistant Isolates

min = minor discrepancies

maj = major discrepancies

vmj = very major discrepancies

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.

One very major discrepancy is indicated for Enterobacteriaceae, and two for *P. aeruginosa*, which is within the specified limits for acceptance according to the Guidance Document criteria.

Summary Table

	<i>EA Tot</i>	<i>EA N</i>	<i>EA %</i>	<i>Eval EA Tot</i>	<i>Eval EA N</i>	<i>Eval Ea %</i>	<i>CA N</i>	<i>CA %</i>	<i># resistant</i>	<i>min</i>	<i>maj</i>	<i>vmaj</i>
<i>Combined</i>	785	766	97.6	122	111	91	760	96.8	220	22	0	3

EA = Essential Agreement
CA = Category Agreement
R = Resistant Isolates

min = minor discrepancies
maj = major discrepancies
vmj = very major discrepancies

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/Reference range:

FDA Interpretive criteria MIC in µg/ml:	<u>S</u>	<u>I</u>	<u>R</u>
Enterobacteriaceae	≤ 4	8	>16
<i>Pseudomonas aeruginosa</i>	≤ 4	8	>16
<i>Acinetobacter baumannii</i>	≤ 4	8	>16

N. Proposed Labeling:

The labeling is sufficient and it 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.