

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

**A. 510(k) Number:**

k050816

**B. Purpose for Submission:**

To include Meropenem on the VITEK<sup>®</sup>2 gram positive AST panel for testing appropriate gram positive isolates.

**C. Measurand:**

Meropenem at  $\leq 0.5$  -  $\geq 16$   $\mu\text{g/ml}$

**D. Type of Test:**

Qualitative growth based detection algorithm using optics light detection

**E. Applicant:**

bioMerieux, Inc.

**F. Proprietary and Established Names:**

VITEK<sup>®</sup> 2 Gram Positive Meropenem

**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<sup>®</sup> 2 Antimicrobial Susceptibility Test (AST) is intended to be used with the VITEK<sup>®</sup> 2 Systems for the automated quantitative or qualitative susceptibility testing of isolated colonies for the most clinically significant aerobic gram-negative bacilli, *Staphylococcus spp.*, *Enterococcus spp.*, *Streptococcus agalactiae*, and *S. pneumoniae*.  
  
The VITEK<sup>®</sup> 2 Gram Positive susceptibility Card 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.
2. Indication(s) for use:  
This submission is for the addition of the antibiotic Meropenem at concentrations at 0.5, 1, and 4  $\mu\text{g/mL}$  for a calling range of  $\leq 0.5$ -  $\geq 16$   $\mu\text{g/mL}$  to the VITEK<sup>®</sup>2 gram positive susceptibility CARD for the testing of oxacillin susceptible *Staphylococcus aureus* and *Staphylococcus epidermidis* on the VITEK<sup>®</sup>2 Systems.

It is intended for use with the VITEK<sup>®</sup> 2 and VITEK<sup>®</sup> 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents.

3. Special condition for use statement(s):

Prescription Use only.

4. Special instrument Requirements:

Not applicable

**I. Device Description:**

Each VITEK<sup>®</sup> 2 test card contains 64 microwells. A control well, that contains only microbiological culture medium is resident on all cards, with the remaining wells containing premeasured amounts of a specific antibiotic combined with culture medium. A suspension of organism is made in 0.45 % sterile saline from a pure culture and standardized to a McFarland 0.5 standard using the DensiChek. The VITEK<sup>®</sup> 2 automatically fills, seals and places the card into the incubator/reader. The VITEK<sup>®</sup> 2 Compact has a manual filling and sealing operation. The VITEK<sup>®</sup> 2 monitors the growth by optical scanning of each well in the card over a defined period of time (up to 18 hours) of incubation at 35.5° C. Minimum Inhibitory Concentration (MIC) readings are performed every 15 minutes. At the completion of the incubation cycle, a report is generated that contains the MIC value along with the interpretive category result for each antibiotic contained on the card.

**J. Substantial Equivalence Information:**

1. Predicate device name(s):

VITEK<sup>®</sup> 2 Gram Positive AST Panel for sparfloxacin

2. Predicate K number(s):

N50510/S141

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	AST testing of gram positive isolates	Same
Test organism	Colonies of <i>Staphylococcus spp.</i> , <i>Enterococcus spp.</i>	Same
Test Card	VITEK <sup>®</sup> 2 card format with base broth	Same
Instrument	VITEK <sup>®</sup> 2 and VITEK <sup>®</sup> 2 Compact Systems	Same
Performance	Categorical interpretation	Categorical interpretation
Differences		
Item	Device	Predicate
Antibiotic	Meropenem	Sparfloxacin
Reading algorithm	Unique for Meropenem	Unique for Sparfloxacin

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

Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA”; Clinical and Laboratory Standards Institute (CLSI) M7 (M100-S15) “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 an early reading of results with an option to incubate up to 18 hours if necessary. 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 systems. The MIC result must be linked to an organism identification in order to determine a category interpretation. A category interpretation will be reported.

**M. Performance Characteristics (if/when applicable):**1. Analytical performance:a. ***Precision/Reproducibility:***

Ten on-scale gram positive organisms were tested in triplicate at each of three sites for three days for an overall inter and intra site reproducibility of >95%. 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):***

Quality Control was performed during the studies using both the auto-dilution and the manual method of diluting the organisms. This included the two recommended QC organisms with the following results. Although the reference testing included more dilutions than the VITEK as demonstrated in the table, all testing provided results with the same mode.

<b>ORGANISM</b>	<b>VITEK® Conc.</b>	<b>Auto-dilution</b>	<b>Manual dilution</b>	<b>Reference conc.</b>	<b>Reference</b>
<i>E. faecalis</i> ATCC 29212 Range 2-8 ug/mL	≤0.5			≤0.125	
	1			0.25	
	2	3	6	0.5	
	4	90	77	1	
	8	1		2	
	≥16	1		4	<b>157</b>
				8	<b>30</b>

				16	
				$\geq 32$	
<i>S. aureus</i> ATCC 29213 Range 0.03-0.12 ug/mL				<0.125	<b>176</b>
				0.25	<b>2</b>
	$\leq 0.5$	94	84	0.5	
	1			1	
	2			2	
	4			4	
	8			8	
	$\geq 16$			$\geq 16$	

Inoculum density control: Internal verification of the DensiChek was performed using 2 ATCC organisms and five instruments with 50 results available for each organism. The clinical sites also performed weekly standardization of the DensiChek used at that site. All recorded calibrated values were within acceptable parameters.

*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 comparison of the clinical data was performed to the agar dilution reference method as described in the CLSI M7. All of the test organisms that provided results did so in <16 hours in the VITEK<sup>®</sup> 2 systems. Testing was performed using the automatic and manual dilution features. In the Clinical testing both oxacillin susceptible and oxacillin resistant *Staphylococcus spp.* was tested at three sites that included both clinical and challenge isolates. A total of 382 *Staphylococci* were tested but only 160 were oxacillin susceptible. The VITEK system reports Meropenem as resistant for all methicillin/oxacillin resistant *Staphylococcus spp.* as recommended by CLSI and FDA. The performance is based on evaluating methicillin/oxacillin susceptible *Staphylococcus spp.* only.

The data in the table below reflects the testing performed on oxacillin-susceptible *Staphylococcus species*:

	total	CA	%CA	#R	min	maj	vmj
<b>Clinical</b>	<b>114</b>	<b>114</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Challenge</b>	<b>46</b>	<b>46</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Combined</b>	<b>160</b>	<b>160</b>	<b>100</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

CA-Category agreement

vmj-very major discrepancies

min-minor discrepancies

maj-major discrepancies

CA is when the interpretation of the VITEK<sup>®</sup> 2 results agrees exactly with the interpretation of the reference method. The CA is acceptable when compared to the reference method as described in the FDA guidance document, “Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA”.

Essential agreement can not be determined since the VITEK<sup>®</sup> 2 system tests less than five dilutions of meropenem.

The challenge set of organisms was also tested at one site using the manual and auto-dilution methods of inoculation with the following performance that demonstrated that there was little or no difference between the two inoculation methods. The table below contains the data from the two dilution methods of testing oxacillin susceptible *Staphylococcus species*:

Manual testing:

	total	#R	CA	%CA
<b>Challenge</b>	46	38	46	100

Autodilution testing:

	total	#R	CA	%CA
<b>Challenge</b>	46	38	46	100

The test device had a growth rate of >95%.

*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:

*Staphylococcus spp.* ≤4 (S), 8 (I), ≥16 (R)

The VITEK system reports Meropenem as resistant for all methicillin/oxacillin resistant *Staphylococcus spp.* as recommended by CLSI and FDA.

The expected value range, interpretive criteria and QC are the same as recommended in CLSI and FDA.

**N. Proposed Labeling**

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

**O. Conclusion:**

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