

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

A. 510(k) Number:

k032738

B. Analyte:

Quinupristin/dalfopristin 0.25-2 ug/mL by equivalency-AST

C. Type of Test:

Quantitative growth based detection algorithm using optics light detection

D. Applicant:

bioMerieux, Inc.

E. Proprietary and Established Names:

VITEK®2 AST GP Quinupristin/dalfopristin

F. 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

G. Intended Use:

1. Intended use(s):
The VITEK® 2 Antimicrobial Susceptibility Test (AST) 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*, and *S. pneumoniae*.

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.
2. Indication(s) for use:
This will include the testing of quinupristin/dalfopristin at concentrations of 0.25, 0.5, and 2 ug/mL for reporting of results between 0.25-16 ug/mL for the intended organisms using Vitek® 2 AST GP card.

3. Special condition for use statement(s):
Report results for *Enterococcus* “For reporting against vancomycin-resistant *E. faecium*” and for *Staphylococcus* “For reporting against methicillin-susceptible *S. aureus*.”
4. Special instrument Requirements:
Not applicable

H. Device Description:

Each VITEK® 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 0.45-0.5% sterile saline from a pure culture and standardized to a McFarland 0.5 standard using the DensiChek. The desired card (s) are placed in the cassette along with an empty tube for the susceptibility card. The cassette is placed into the VITEK® 2 instrument where a susceptibility test will be automatically diluted from the ID suspension by the VITEK® 2. The cards are then automatically vacuum filled; the tubes are cut and the cards sealed prior to proceeding to the Incubator Loading Station. Cards are then transferred from the cassette into the carousel for incubation (35.5° C) and optical scanning during testing. Readings are performed every 15 minutes.

There is also a manual method of inoculation of the specimen in the procedure.

I. Substantial Equivalence Information:

1. Predicate device name(s):
Vitek®2 Gram Positive Susceptibility Test for Norfloxacin
2. Predicate K number(s):
N50510/S110
3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	Same	Same
Test organism	Colonies of <i>Staphylococcus spp.</i> , <i>Enterococcus spp.</i> , and <i>Streptococcus agalactiae</i>	Colonies of <i>Staphylococcus spp.</i> , <i>Enterococcus spp.</i> , and <i>Streptococcus agalactiae</i>
Test Card	VITEK® 2 card format with base broth	same
Instrument	VITEK® 2 System	VITEK® 2 System
Differences		
Item	Device	Predicate
Antibiotic	Specific concentrations of Quinupristin/dalfopristin	Specific concentrations of norfloxacin
Reading algorithm	Unique for quinupristin/dalfopristin	Unique for norfloxacin

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

Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA”; NCCLS M7 (M100-S13)
 “Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard”

K. 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 an organism identification in order to determine a category interpretation. A category interpretation will be reported along with a MIC.

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

Reproducibility testing was performed on 25 on-scale isolates using both the manual and the auto-dilution methods of inoculation. The testing demonstrated >95% reproducibility for both dilution methods. Within site reproducibility was also demonstrated to be 95% by testing 25 isolates 3 times at one site.

b. *Linearity/assay reportable range:*

Not applicable

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

NCCLS recommended Quality Control strains were tested (see table below). The Vitek® results demonstrate that the system can produce QC results in the recommended range.

ORGANISM	Reference conc.	Reference	VITEK® Conc.	auto	man
S. aureus ATCC 29213	≤ 0.125				
Range 0.25-1 ug/mL	0.25	26	≤ 0.25	51	60
	0.5	44		19	7
	1				
E. faecalis ATCC	≤ 0.125				

29212 Range 2-8 ug/mL	.25		≤ 0.25		
	.5		0.5		
	1		1		
	2	41	2	65	60
	4	28	4	5	6
	8	1	8		

Quality Control was performed during the studies using both the auto-dilution and the manual method of diluting the organisms. As demonstrated in the chart the modes for both methods are the same indicating no difference in the two methods of inoculation. The mode of the reference method trended to one well more resistant than the Vitek® 2 result.

Inoculum density control: The DensiChek instrument was used for the preparation of the inocula for the Vitek®2 and the agar dilution test. Standardization of the instrument was performed weekly. Internal verification was also performed prior to the study.

- 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:*

The NCCLS recommended agar dilution reference method was performed according to the NCCLS recommendation and was used to compare to the Vitek®2 results. Clinical testing was performed at three sites using the autodilution. The testing included both fresh clinical isolates and stock isolates along with a challenge set with known results. There was a <1% no growth rate in the study. A comparison was provided to the reference method with the following agreement. During this study >99.9% of the isolates provided results in <16 hours.

	total	EA	%EA	Total evaluable	EA of evaluable	%EA	CA	%CA	#R	min	maj	vmj
Clinical	726	698	96.1	506	499	98.6	693	95.5	152	31	0	2
Challenge	107	107	100	53	53	100	97	90.7	18	10	0	0
Combined	833	805	96.6	559	552	98.7	790	94.8	170	51	0	2

EA-Essential Agreement
CA-Category Agreement
R-resistant isolates

maj-major discrepancies
vmj-very major discrepancies
min- minor discrepancies

Evaluable results are those that fall within the test range of the reference method and could also be on-scale with the new device if within the plus/minus one well variability. EA is when there is agreement between

the reference method and the VITEK® 2 within plus or minus one serial two-fold dilution of antibiotic. CA is when the interpretation of the reference method agrees exactly with the interpretation of the VITEK® 2 result.

The two vmj were due to *E. faecalis*. There was also an obvious trending of the Vitek® 2 result that was one well more susceptible than the reference method result.

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 was little or no difference between the two inoculation methods.

Manual testing

	total	EA	%EA	Total evaluable	EA of evaluable	%EA	CA	%CA	#R	min	maj	vmj
challenge	107	106	99.1	50	50	100	100	93.5	18	7	0	0

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:

≤ 1 (S), 2 (I), ≥ 4 (R)

The expected QC value ranges and interpretative criteria are the same as recommended in NCCLS. All values will be included in the package insert.

M. Conclusion:

The reproducibility, quality control results and overall performance is acceptable as described in the “Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA” which was used in the design and evaluation of the study. The appropriate control organisms are included in the labeling and are the same as those recommended in the NCCLS M7- (M100-S13) document. This performance as compared to a standard method demonstrates substantial equivalency to the predicate.