

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

A. 510(k) Number:

k061347

B. Purpose of Submission:

For addition of a high-level VRSA Screen to the VITEK®2 Antimicrobial Susceptibility Test System for testing on *Staphylococcus aureus*

C. Analyte

Vancomycin will be included in the VITEK®2 VRSA Screen at a concentration of 16 µg/mL

D. Type of Test:

Qualitative growth based detection algorithm using predetermined growth thresholds

E. Applicant:

bioMerieux, Inc.

F. Proprietary and Established Names:

VITEK®2 Gram Positive VRSA Screen

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):

Vancomycin at a concentration of 16 µg/mL on 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 aureus* to antimicrobial agents when used as instructed in the Online Product Information.

The VITEK[®] 2 Antimicrobial Susceptibility Test (AST) is intended to be used with the VITEK[®] 2 and VITEK[®] 2 Compact 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*.

2. Indication(s) for use:

This submission is for the addition of the VITEK[®] 2 Gram Positive VRSA Screen for detecting high level resistance of vancomycin in *Staphylococcus aureus*.

3. Special condition for use statement(s):

Prescription use only

Positive VRSA screen results must be confirmed by performing an alternate method off line for vancomycin resistance.

The **VRSA Screen** is intended to detect high-level vancomycin resistance at $\geq 16 \mu\text{g/mL}$. It is not intended to be used to detect increased resistance below $16 \mu\text{g/mL}$. *Staphylococcus aureus* strains with vancomycin MIC results $< 16 \mu\text{g/mL}$ will not be detected.

The **VRSA Screen** detected high-level vancomycin resistance in the VRSA *S. aureus* strains available at the time of comparative testing. The ability to detect resistance in other *S. aureus* strains is unknown due to the limited number of resistant strains available for comparative testing.

4. Special instrument Requirements:

Not applicable

I. Device Description:

The VITEK[®] 2 AST Card contains 64 wells. A control well containing only microbiological culture media is resident on all cards. The remaining wells contain premeasured portions of a specific antibiotic combined with culture media which are then dried. The bacterial isolate to be tested is diluted to a standardized concentration with 0.45% saline before being used to rehydrate the antimicrobial medium within the card. The VITEK[®] 2 automatically fills, seals and places the card into the incubator/reader. The VITEK[®] 2 Compact has a manual filling and sealing operation. The card is incubated within the instrument and optically monitored throughout the incubation cycle. The VRSA screen test is based on two test wells, the vancomycin test well ($16 \mu\text{g/mL}$) and a control well. This additional control well is required since this test uses a different base broth.

VITEK® 2 VRSA screen results are reported as either negative (NEG) or positive (POS). All VRSA Screen positive results will carry the following on the lab report: “Possible increased vancomycin MIC, confirm using an alternate susceptibility method”.

J. Substantial Equivalence Information:

1. Predicate device name(s):
Vitek® 2 Gram Positive AST for High-Level Streptomycin
2. Predicate K number(s):
N50510/S113
3. Comparison with predicate

Similarities		
Item	Device	Predicate
Intended use	Predict resistance	Same
Instrument	VITEK®2 System	Same
Test Card	VITEK®2 card,	Same
Results	Provide qualitative, positive/negative test results	Same
Differences		
Item	Device	Predicate
Specific indications	Predict high-level vancomycin resistance in <i>Staphylococcus aureus</i>	Screen to determine if the enterococcal isolate will be affected synergistically by a combination of a penicillin or glycopeptide with an aminoglycoside
Test organism	Colonies of <i>S. aureus</i>	Colonies of Enterococcus
Antibiotic	Contains different antibiotic, vancomycin, and utilize different analysis algorithms	Contains different antibiotic, Streptomycin, and utilize different analysis algorithms
Media formulation	Specific for VRSA screen	Base broth for streptomycin

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-S16) “Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard”.

L. Test Principle:

The Vitek® 2 Cards after inoculation are placed into the VITEK® 2 systems where the growth of each well in the card is monitored over a defined period of time (up to 18 hours). The computer software evaluates when a well demonstrates growth based on the

attenuation of light measured by an optical scanner once a predetermined growth threshold has been reached. At the completion of the incubation cycle, a report is generated. For the VITEK®2 VRSA Screen, the report will list either a positive or negative result.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. *Precision/Reproducibility:*

Reproducibility was performed as described in the “Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA” using the 10 isolate study design. The selection of *S. aureus* included the ATCC 29213 QC isolate and the 4 identified VRSA which were set up in duplicate but the sample ID was masked to the user. These were tested at four sites with >95% reproducibility. 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 following table demonstrates the frequency of the quality control testing for both the reference method and the Vitek® 2.

ORGANISM	Test Results	VITEK®2 AUTO-DIL	VITEK®2 MAN-DIL
<i>S. aureus</i> ATCC 29213 Expected Result: Neg	Negative	72	69
	Positive		
<i>Enterococcus faecalis</i> ATCC 51299 Expected Result : Pos	Negative		
	Positive	75	69

Quality Control was performed during the studies using both the auto-dilution and the manual method of diluting the organisms.

Inoculum density control was monitored using the DensiChek 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:*

Clinical testing was performed at 3 sites on 310 *S. aureus* isolates using the VITEK®2 VRSA Screen test and compared to the CLSI reference broth microdilution method. A qualitative comparison only was performed. All MIC reference results were ≤ 1 $\mu\text{g/mL}$ except for one which was recorded as 2 $\mu\text{g/mL}$. The performance was in category agreement 100% of the time with no major errors. Very Major errors are not possible when no resistant isolates exist.

A challenge study was performed utilizing auto-dilution and manual dilution at one site with 50 isolates. The testing included 20 enterococci and 30 *S. aureus* with one known VRSA isolate. The enterococci were included to capture *vanA* resistance since it was anticipated that the clinical isolates of *S. aureus* would not include this gene. The *S. aureus* results had 16 isolates with broth MIC values between 2 and 8 $\mu\text{g/mL}$. All of these tested negative for the VITEK® VRSA Screen test. The high level resistant *S. aureus* (3 results) were all VITEK® VRSA Screen positive. One Enterococcus test results was falsely negative. There was no difference between the two types of dilutions.

Greater than 95% of the isolates grew in the VITEK®2 card in less than 16 hours.

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:

The incidence of VRSA is very low. Results will be reported out as: Negative or Positive.

N. Labeling:

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

Quality Control recommendations will be included in the package insert.

Limitation statements included: Positive VRSA screen results must be confirmed by performing an alternate method off line for vancomycin resistance.

The **VRSA Screen** is intended to detect high-level vancomycin resistance at $\geq 16 \mu\text{g/mL}$. It is not intended to be used to detect increased resistance below $16 \mu\text{g/mL}$. *Staphylococcus aureus* strains with vancomycin MIC results $< 16 \mu\text{g/mL}$ will not be detected.

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O. Conclusion:

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