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

A. 510(k) Number:

k112075

B. Purpose for Submission:

The addition of Ampicillin to the VITEK ® 2 and VITEK®2 Compact Systems Antimicrobial Susceptibility Test (AST) Systems

C. Measurand

Ampicillin concentrations 0.5, 1, 4 and 8 µg/mL (the MIC range is ≤ 0.25- ≥ 16 µg/mL)

D. Type of Test:

Quantitative growth based detection algorithm using optics light detection

E. Applicant:

bioMérieux, Inc.

F. Proprietary and Established Names:

Vitek®2 Streptococcus Ampicillin (≤ 0.25- ≥ 16 µg/mL)

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):

   VITEK® 2 *Streptococcus* Ampicillin is designed for antimicrobial susceptibility testing of Streptococcus species. VITEK® 2 *Streptococcus* Ampicillin is a quantitative test intended for use with the VITEK® 2 and the VITEK® 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents. Ampicillin has been shown to be activity against the microorganisms listed below:
   Beta-hemolytic group *Streptococcus* species
   Viridans group *Streptococcus* species

   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 the most clinically significant aerobic gram-negative bacilli, *Staphylococcus spp*., *Enterococcus spp*., *Streptococcus* spp. and clinically significant yeast.

2. Indication(s) for use:

   VITEK® 2 *Streptococcus* Ampicillin is designed for antimicrobial susceptibility testing of Streptococcus species. VITEK® 2 *Streptococcus* Ampicillin is a quantitative test intended for use with the VITEK® 2 and the VITEK® 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents. Ampicillin has been shown to be activity against the microorganisms listed below:
   Beta-hemolytic group *Streptococcus* species
   Viridans group *Streptococcus* species

   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 the most clinically significant aerobic gram-negative bacilli, *Staphylococcus spp*., *Enterococcus spp*., *Streptococcus* spp. and clinically significant yeast.

3. Special condition for use statement(s):

   Prescription Use Only

4. Special instrument Requirements:

VITEK® 2 and the VITEK® 2 Compact Systems

I. Device Description:

Each VITEK® 2 test card contains 64 micro-wells. A control well which contains only microbiological culture media is resident on all cards. The remaining wells contain premeasured portions of a specific antibiotic combined with culture media. The bacterial or yeast isolate to be tested is diluted to a standardized concentration with 0.45 – 0.5% saline before being used to rehydrate the antimicrobial medium within the card. The VITEK 2 System automatically fills, seals and places the card into the incubator/reader. The VITEK 2 Compact has a manual filling, sealing and loading operation. The VITEK 2 Systems monitor the growth of each well in the card over a defined period of time. 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.

The VITEK 2 AST-ST Ampicillin has the following concentrations in the card: 0.5, 1, 4 and 8μg/mL (equivalent standard method concentration by efficacy in μg/mL). The MIC result range for the VITEK 2 card is ≤0.25 – ≥ 16μg/mL.

J. Substantial Equivalence Information:

1. Predicate device name(s)

VITEK® 2 Gram Positive Amoxicillin for *Streptococcus pneumoniae*

2. Predicate K number(s):

k063597

3. Comparison with predicate

Similarities		
Item	**Device**	**Predicate**
Intended Use	Determine antimicrobial susceptibility to antimicrobial agents	Same
Test Card	VITEK® 2 card format with base broth	same
Instrument	VITEK® 2 and VITEK ®2 Compact System	same

Differences		
Item	**Device**	**Predicate**
Antibiotic	Ampicillin	Amoxicillin
Reading algorithm	Unique for Ampicillin	Unique for amoxicillin
Test organism	Beta-hemolytic group *Streptococcus* species Viridans group *Streptococcus* species	*S. pneumoniae*

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-A8 "Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard"
CLSI M100-S19 "Performance Standards for Antimicrobial Susceptibility; Twenty-First Information Supplement"

L. Test Principle:

Each VITEK® 2 test card contains 64 micro-wells. A control well which contains only microbiological culture media is resident on all cards. The remaining wells contain premeasured portions of a specific antibiotic combined with culture media. The bacterial or yeast isolate to be tested is diluted to a standardized concentration with 0.45 – 0.5% saline before being used to rehydrate the antimicrobial medium within the card. The VITEK 2 System automatically fills, seals and places the card into the incubator/reader. The VITEK 2 Compact has a manual filling, sealing and loading operation. The VITEK 2 Systems monitor the growth of each well in the card over a defined period of time. 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.

The VITEK 2 AST-ST Ampicillin has the following concentrations in the card:, 0.5, 1, 4, and 8μg/mL (equivalent standard method concentration by efficacy in μg/mL). The MIC result range for the VITEK 2 card is ≤0.25 – ≥ 16μg/mL.

In addition to the automatic dilution, there is also a manual inoculation dilution procedure described in the package insert.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Reproducibility was demonstrated using 10 isolates at 3 sites on 3 separate days in triplicates. The study included the Auto-dilution and the Manual dilution with the VITEK®2, and the Manual dilution with the VITEK®2 Compact. All results were >95% reproducible.

b. Linearity/assay reportable range:

Not Applicable

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

The recommended QC isolates were tested on every test occasion with 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 the auto-dilution and the manual method of diluting the organisms. Results demonstrated that methods were comparable with the same mode.

Quality Control Summary (VITEK®2, Auto and Manual dilution)

Organism	Conc in µg/ml	Auto-dilution		Manual dilution	
S. pneumoniae ATCC 49619 Expected Range 0.06- 0.25 µg/ml		**Ref.**	**Test**	**Ref.**	**Test**
	≤0.03	2		2	
	0.06	114		111	
	0.12	66		66	
	0.25		182		179

An additional QC study was performed with the VITEK®2 Compact, the secondary option, at three sites, with the following results.

Quality Control Summary (VITEK®2 Compact, Manual dilution)

Organism	Conc in µg/ml	Manual-dilution	
S. pneumoniae ATCC 49619 Expected Range 0.06- 0.25 µg/ml		**Ref.**	**Test**
	≤0.03		
	0.06	61	
	0.12	13	
	0.25		74

Inoculum density control was monitored using the DensiChek2 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:

The reference method follows CLSI approved broth microdilution testing conditions:

- Medium: Mueller-Hinton broth supplemented with lysed blood
- Inoculum: Direct colony suspension
- Incubation : 35°C, ambient air, 20- 24 hours

a. Method comparison with predicate device:

Clinical study was performed at four external sites using the VITEK2 *Streptococcus* Ampicillin and broth microdilution panels containing Ampicillin. A total of 1124 clinical isolates were tested at four external sites by auto inoculation. The no growth rate was 0.8% (9/1124) in the VITEK®2 AST-ST Ampicillin Test. Three hundred and eight (27.4%: 308/1124) were from stock isolates.

Performance Summary Table (VITEK 2, Auto Dilution)

	total	**EA**	**%EA**	**Eval EA Total**	**Eval EA**	**Eval %EA**	**CA**	**%CA**	**#R**	**min**	**maj**	**vmj**
Clinical	1115	1104	99.0	60	54	90.0	1078	96.7	14	37	0	0
Challenge	157	157	100	6	6	100	156	99.4	10	1	0	0
Combined	1272	1261	99.1	66	60	90.9	1234	97.0	24	38	0	0

EA-Essential Agreement
CA-Category Agreement
R-resistant isolates
maj-major discrepancies
vmj-very major discrepancies
min- minor discrepancies

Manual Dilution:
The challenge set of 157 organisms was also tested at one site using the manual method of inoculation for VITEK2 and VITEK2 Compact with the following performance.

Comparison Challenge Data - VITEK 2, and VITEK2 Compact (Manual dilution)

	total	**EA**	**%EA**	**Eval EA Total**	**Eval EA**	**Eval %EA**	**CA**	**%CA**	**#R**	**min**	**maj**	**vmj**
VITEK2	157	156	99.4	6	6	100	156	99.4	10	1	0	0
VITEK2 Compact	157	155	98.7	6	6	100	155	98.7	10	2	0	0

The performance of the optional VITEK®2 Compact was evaluated in the QC, challenge, and reproducibility studies.

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):

4. Clinical cut-off:

Not Applicable

5. Expected values/Reference range

Beta *Streptococcus* ≤ 0.25 (S), 0.5- ≥ 16 (NS)

Viridans Group *Streptococcus* ≤ 0.25 (S), 0.5- 4(I), 8 - ≥16(R)

N. Proposed Labeling:

The labeling is sufficient and 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.