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

A. 510(k) Number:

k112129

B. Purpose for Submission:

To obtain clearance for the addition of Clindamycin to the VITEK ® 2 and VITEK®2 Compact Systems Antimicrobial Susceptibility Test (AST) Systems

C. Measurand

Clindamycin concentrations (≤ 0.25- ≥ 1µg/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 Clindamycin (≤ 0.25- ≥ 1µg/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* Clindamycin is designed for antimicrobial susceptibility testing of Streptococcus species. VITEK® 2 *Streptococcus* Clindamycin is a qualitative 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. Clindamycin has been shown to be active *in vitro* against most strains of the microorganisms listed below, as describe in the FDA-approved package insert for this antimicrobial agent.

Active *in vitro* and in clinical infections against:
Streptococcus pneumoniae (penicillin-susceptible strains)
Streptococcus pyogenes

Active *in vitro* against:
Streptococcus agalactiae
Streptococcus anginosus
Streptococcus mitis
Streptococcus oralis

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* Clindamycin is designed for antimicrobial susceptibility testing of *Streptococcus* species. VITEK® 2 *Streptococcus* Clindamycin is a qualitative 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. Clindamycin has been shown to be active *in vitro* against most strains of the microorganisms listed below, as describe in the FDA-approved package insert for this antimicrobial agent.

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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 Clindamycin has the following concentrations in the card: 0.125, 0.25, 0.5 and 0.5/0.1 Clindamycin/Erythromycin µg/mL (equivalent standard method concentration by efficacy in µg/mL). The test provides only a clindamycin result; the clindamycin MIC result range for the VITEK® 2 card is ≤0.25 to ≥ 1µg/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	Clindamycin	Amoxicillin
Reading algorithm	Unique for Clindamycin	Unique for amoxicillin
Test organism	*S. pneumoniae* and other *Streptococcus* spp.	*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 Clindamycin has the following concentrations in the card: 0.125, 0.25, 0.5 and 0.5/0.1 Clindamycin/Erythromycin µg/mL (equivalent standard method concentration by efficacy in µg/mL). The test provides only a clindamycin result; the clindamycin MIC result range for the VITEK® 2 card is ≤0.25 to ≥ 1µg/mL.

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

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Reproducibility was demonstrated using 10 isolates at three sites on three separate days in triplicates. Results were >95% reproducible by Category Agreement only. Of the ten isolates tested, nine had off-scale results, preventing an evaluation of reproducibility in MIC.

The study included the Auto-dilution and the Manual dilution with the VITEK®2, and the Manual dilution with the VITEK®2 Compact.

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	5		6	
	0.06	160		160	
	0.12	4		1	
	0.25		168		169
	0.5		1		1

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	48	
	0.12	12	
	0.25		60
	0.5		

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 the 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* Clindamycin and broth microdilution panels containing Clindamycin. A total of 1318 clinical isolates were tested at four external sites by auto inoculation. The no growth rate was 0.08% (1/1318) in the VITEK®2 AST-ST Clindamycin Test. Two hundred and nine (15.9%: 209/1318) were from stock isolates.

Essential agreement was not calculated because the VITEK®2 AST-ST card contained <5 dilutions of Clindamycin. The table below is the comparison to the reference method.

Performance Summary Table (VITEK 2, Auto Dilution)

	CA total	**CA#**	**%CA**	**#R**	**min**	**maj**	**vmj**
Clinical	1317	1276	96.9	163	26	13	2
Challenge	192	190	99.0	24	0	2	0
Combined	1509	1466	97.2	187	26	15	2

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

Manual Dilution:
The challenge set of 192 organisms was also tested at one site using the manual method of inoculation for VITEK®2 and VITEK®2 Compact with the following performance.

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

	CA total	**CA#**	**%CA**	**#R**	**min**	**maj**	**vmj**
VITEK2	192	189	98.4	24	1	2	0
VITEK2 Compact	192	189	98.4	24	1	2	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

   S. pneumoniae and other *Streptococcus* spp.
   ≤ 0.25 (S), 0.5 (I), ≥ 1(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.