June 26, 2023

bioMerieux, Inc.
Esther Hernandez
Regulatory Affairs Specialist
595 Anglum Road
Hazelwood, Missouri 63042

Re: K222378
Trade/Device Name: VITEK 2 AST-Gram Negative Levofloxacin (≤0.125 - ≥8 ug/mL)
Regulation Number: 21 CFR 866.1645
Regulation Name: Fully Automated Short-Term Incubation Cycle Antimicrobial Susceptibility System
Regulatory Class: Class II
Product Code: LON, LTT, LTW
Dated: August 4, 2022
Received: August 5, 2022

Dear Esther Hernandez:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database located at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801 and Part 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR

803) for devices or postmarketing safety reporting (21 CFR 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

Ribhi Shawar -S

Ribhi Shawar, Ph.D. (ABMM)
Branch Chief
General Bacteriology and Antimicrobial Susceptibility Branch
Division of Microbiology Devices
OHT7: Office of In Vitro Diagnostics
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 06/30/2023
See PRA Statement below.

510(k) Number *(if known)*
K222378

Device Name
VITEK® 2 AST-Gram Negative Levofloxacin (≤0.125 - ≥8 µg/mL)

Indications for Use *(Describe)*

VITEK® 2 AST-Gram Negative Levofloxacin is designed for antimicrobial susceptibility testing of Gram-negative bacilli and is intended for use with the VITEK® 2 and VITEK® 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents. VITEK® 2 AST-Gram Negative Levofloxacin is a quantitative test. Levofloxacin has been shown to be active against most strains of the microorganisms listed below, according to the FDA label for this antimicrobial.

Active *in vitro* and in clinical infections: *Enterobacter cloacae, Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Pseudomonas aeruginosa, Serratia marcescens*

Active *in vitro* but clinical significance unknown: *Citrobacter koseri, Citrobacter freundii, Enterobacter aerogenes, Klebsiella oxytoca, Morganella morganii, Pantoea agglomerans, Proteus vulgaris, Providencia rettgeri, Providencia stuartii*

VITEK® 2 AST-Gram Negative Levofloxacin also reports the susceptibility for the following additional organism as listed on the FDA Susceptibility Test Interpretive Criteria website: *Salmonella* spp.

The VITEK® 2 Gram-Negative Susceptibility Card is intended for use with the VITEK® 2 Systems in clinical laboratories as an *in vitro* test to determine the susceptibility of clinically significant aerobic Gram-negative bacilli to antimicrobial agents when used as instructed.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

510(k) SUMMARY

VITEK® 2 AST-GN Levofloxacin

A. 510(k) Submission Information:

Submitter's Name:	bioMérieux, Inc.
Address:	595 Anglum Road Hazelwood, MO 63042
Contact Person:	Esther Hernandez Regulatory Affairs Specialist
Phone Number:	314 -731-8841
Fax Number:	314-731-8689
Date of Preparation:	August 4, 2022

B. Device Name:

Formal/Trade Name:	VITEK® 2 AST-Gram Negative Levofloxacin (≤ 0.125 – ≥8 µg/mL)
Classification Name:	21 CFR 866.1645 Fully Automated Short-Term Incubation Cycle Antimicrobial Susceptibility System Product Code LON, LTT, LTW.
Common Name:	VITEK® 2 AST-GN Levofloxacin

C. Predicate Device: VITEK® 2 AST-Gram Negative Levofloxacin (K072038)

D. Device Description:

The principle of the VITEK® 2 AST cards is based on the microdilution minimum inhibitory concentration (MIC) technique reported by MacLowry and Marsh [(1)] and Gerlach [(2)]. The VITEK® 2 AST card is essentially a miniaturized, abbreviated and automated version of the doubling dilution technique [(3)].

Each VITEK® 2 AST card contains 64 wells. A control well which only contains 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.

VITEK® 2 AST-GN Levofloxacin has the following concentrations in the card: 0.25, 0.5, 2, and 8 (equivalent standard method concentration by efficacy in µg/mL).

E. Substantial Equivalence Information

The similarities and differences of the VITEK 2 AST-GN Levofloxacin when compared to the predicate device, VITEK 2 AST-GN Levofloxacin (K072038), are described in the following table. The only difference between both devices are the Indications for Use and the breakpoints used to analyze the data performance. The below table provides the similarities and differences:

Item	Device: VITEK® 2 AST-GN Levofloxacin	Predicate: VITEK® 2 AST-GN Levofloxacin (K072038)
Similarities		
Intended Use	VITEK® 2 AST-Gram Negative Levofloxacin is designed for antimicrobial susceptibility testing of Gram-negative bacilli and is intended for use with the VITEK® 2 and VITEK® 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents. VITEK® 2 AST-Gram Negative Levofloxacin is a quantitative test. Levofloxacin has been shown to be active against most strains of the microorganisms listed below, according to the FDA label for this antimicrobial. Active *in vitro* and in clinical infections: *Enterobacter cloacae* *Escherichia coli* *Klebsiella pneumoniae* *Proteus mirabilis* *Pseudomonas aeruginosa* *Serratia marcescens* Active *in vitro* but clinical significance unknown	VITEK® 2 AST-Gram Negative Levofloxacin is designed for antimicrobial susceptibility testing of Gram-negative bacilli and is intended for use with the VITEK® 2 and VITEK® 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents. VITEK® 2 AST-Gram Negative Levofloxacin is a quantitative test. Levofloxacin has been shown to be active against most strains of the microorganisms listed below, according to the FDA label for this antimicrobial. Active *in vitro* and in clinical infections: *Enterobacter cloacae* *Escherichia coli* *Klebsiella pneumonia* *Proteus mirabilis* *Pseudomonas aeruginosa* *Serratia marcescens* *Citrobacter koseri* *Citrobacter freundii* *Enterobacter aerogenes*

	Citrobacter koseri *Citrobacter freundii* *Enterobacter aerogenes* *Klebsiella oxytoca* *Morganella morganii* *Pantoea agglomerans* *Proteus vulgaris* *Providencia rettgeri* *Providencia stuartii* The VITEK® 2 Gram-Negative Susceptibility Card is intended for use with the VITEK® 2 Systems in clinical laboratories as an *in vitro* test to determine the susceptibility of clinically significant aerobic Gram-negative bacilli to antimicrobial agents when used as instructed.	*Klebsiella oxytoca* *Morganella morganii* *Pantoea agglomerans* *Proteus vulgaris* *Providencia rettgeri* *Providencia stuartii* The VITEK® 2 Antimicrobial Susceptibility Test (AST) is intended to for use with the VITEK® 2 and VITEK ® 2 Compact Systems 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*.
Test Methodology	Automated quantitative antimicrobial susceptibility test for use with the VITEK® 2 and VITEK® 2 Compact Systems to determine the *in vitro* susceptibility of Gram-negative bacilli.	Same
Antimicrobial Agent	Levofloxacin	Same
Inoculum	Saline suspension of organism	Same
Test Card	VITEK®2 Gram-negative Susceptibility Test Card	Same
Analysis Algorithms	Discriminant Analysis	Same
Instrument	VITEK® 2 and VITEK® 2 Compact Systems	Same
Concentrations	0.25, 0.5, 2, 8	Same
Differences		
Indications for Use	VITEK® 2 AST-Gram Negative Levofloxacin also reports the susceptibility for the following additional organism as listed on the FDA Susceptibility Test Interpretive Criteria website: *Salmonella* spp.	*Acinetobacter baumannii* *Acinetobacter lwoffii* *Enterobacter sakazakii* *Pseudomonas fluorescens*
Breakpoints	*Enterobacterales:* ≤0.5 (S), 1 (I), ≥2 (R) *Pseudomonas aeruginosa:* ≤1 (S), 2 (I), ≥4 (R) *Salmonella* spp.: ≤0.125 (S), 0.25-1 (I), ≥2 (R)	*Acinetobacter*: ≤2 (S), 4 (I), 8 (R) *Enterobacteriaceae:* ≤2 (S), 4 (I), 8 (R) *Pseudomonas*: ≤2 (S), 4 (I), 8 (R)

F. Intended Use:

VITEK® 2 AST-Gram Negative Levofloxacin is designed for antimicrobial susceptibility testing of Gram-negative bacilli and is intended for use with the VITEK® 2 and VITEK® 2 Compact Systems as a laboratory aid in the determination of *in vitro* susceptibility to antimicrobial agents. VITEK® 2 AST-Gram Negative Levofloxacin is a quantitative test. Levofloxacin has been shown to be active against most strains of the microorganisms listed below, according to the FDA label for this antimicrobial.

Active *in vitro* and in clinical infections:

Enterobacter cloacae
Escherichia coli
Klebsiella pneumoniae
Proteus mirabilis
Pseudomonas aeruginosa
Serratia marcescens

Active *in vitro* but clinical significance unknown:

Citrobacter koseri
Citrobacter freundii
Enterobacter aerogenes
Klebsiella oxytoca
Morganella morganii
Pantoea agglomerans
Proteus vulgaris
Providencia rettgeri
Providencia stuartii

VITEK® 2 AST-Gram Negative Levofloxacin also reports the susceptibility for the following additional organism as listed on the FDA Susceptibility Test Interpretive Criteria website:

Salmonella spp.

The VITEK® 2 Gram-Negative Susceptibility Card is intended for use with the VITEK® 2 Systems in clinical laboratories as an *in vitro* test to determine the susceptibility of clinically significant aerobic Gram-negative bacilli to antimicrobial agents when used as instructed.

G. Performance Overview:

VITEK® 2 AST-GN Levofloxacin demonstrated substantially equivalent performance when compared with the CLSI agar dilution reference method, as defined in the FDA Class II

Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA (Issued August 28, 2009).

The Premarket Notification (Traditional 510[k]) presents data in support of VITEK® 2 AST-GN Levofloxacin. An external evaluation was conducted with fresh and stock clinical isolates, as well as a set of challenge strains. The external evaluations were designed to confirm the acceptability of VITEK® 2 AST-GN Levofloxacin by comparing its performance with the CLSI agar dilution reference method incubated between 16-20 hours. The data is representative of performance on both the VITEK® 2 and VITEK® 2 Compact instrument platforms.

VITEK® 2 AST-GN Levofloxacin demonstrated acceptable performance as presented in the table below.

Antimicrobial	Antimicrobial Code	Antibiotic Version	Bp[1]	Comment	Essential Agreement				Category Agreement				% Reproducibility
					% Error				% Error				
					% EA	VME	ME	mE	% CA	VME	ME	mE	
Levofloxacin	LEV	lev02n	CLSI (FDA)	#, E Enterobacterales	(345/346) 99.7	N/A	N/A	N/A	(339/346) 98.0	(0/76) 0.0	(0/262) 0.0	(7/346) 2.0	100
				#, E *Pseudomonas aeruginosa*	(218/225) 96.9	N/A	N/A	N/A	(210/225) 93.3	(0/76) 0.0	(2/127) 1.6	(13/225) 5.8	
				#, E *Salmonella* spp.	(47/48) 97.9	N/A	N/A	N/A	(47/48) 97.9	(0/4) 0.0	(0/40) 0.0	(1/48) 2.1	
				VITEK 2 Levofloxacin MIC values for *Escherichia coli, Klebsiella pneumoniae pneumoniae,* and *Pseudomonas aeruginosa* tended to be in exact agreement or at least one doubling dilution higher when compared to the reference agar dilution method. VITEK 2 Levofloxacin MIC values for *Serratia marcescens* tended to be in exact agreement or at least one doubling dilution lower when compared to the reference agar dilution method.								

[1]Abbreviations – Bp = breakpoint committee; EA = essential agreement; CA = category agreement; VME = Very Major Error (susceptible result with resistant reference result); ME Major Error (resistant result with susceptible reference result); mE = minor Error (susceptible or resistant result with an intermediate reference result, or an intermediate result with a susceptible or resistant reference result)
# = US Food and Drug Administration 510(k) cleared
CLSI = Clinical and Laboratory Standards Institute
E = External performance data
N/A = Not applicable

Reproducibility and Quality Control demonstrated acceptable results.

H. Conclusion:

The performance data presented in this submission support a substantial equivalence decision. VITEK® 2 AST-Gram Negative Levofloxacin (≤ 0.125 – ≥8 µg/mL) is substantially equivalent to VITEK® 2 AST-Gram Negative Levofloxacin (K072038).

References:

1. MacLowry, J.D. and Marsh, H.H., Semi-automatic Microtechnique for Serial Dilution Antibiotic Sensitivity Testing in the Clinical laboratory, Journal of Laboratory Clinical Medicine, 72:685-687, 1968.
2. Gerlach, E.H., Microdilution 1: A Comparative Study, p. 63-76. Current Techniques for Antibiotic Susceptibility Testing. A. Balows (ed.), Charles C. Thomas, Springfield, IL, 1974.
3. Barry, A.L., The Antimicrobic Susceptibility Test, Principles and Practices, Lea and Febiger, Philadelphia, PA, 1976.