

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

A. 510(k) Number:

K052323

B. Purpose for Submission:

Susceptibility testing of *Mycobacterium tuberculosis* to pyrazinamide (PZA)

C. Measurand:

Pyrazinamide at 300 µg/mL

D. Type of Test:

Qualitative growth based detection based on pressure changes

E. Applicant:

TREK Diagnostic Systems, Inc.

F. Proprietary and Established Names:

VersaTREK® MYCO PZA Kit

G. Regulatory Information:

1. Regulation section:

866.1640

2. Classification:

Class II

3. Product code:

MJA

4. Panel:

83

H. Intended Use:

1. Intended use(s):

The VersaTREK® MYCO PZA Kit is a rapid qualitative procedure for susceptibility testing of *Mycobacterium tuberculosis*, from culture, to pyrazinamide (PZA). The VersaTREK® MYCO PZA Kit is used with the VersaTREK® Automated Microbial Detection System (VTI) and the ESP® Culture System II (ESP).

2. Indication(s) for use:

For testing *M. tuberculosis* with 300 µg/mL PZA

3. Special conditions for use statement(s):

Prescription use only

Inoculum prepared from liquid VersaTREK® Myco seed bottle of confirmed *M. tuberculosis*.

Confirm all resistant results with an alternate method.

4. Special instrument requirements:

Not Applicable

I. Device Description:

ESP/VTI Systems(ESP/VTI) are fully automated, computer-controlled instruments with self-contained 35° incubator. The Myco broth bottle contains pieces of cellulose sponge and 12.5 ml of mycobacterial medium (Middlebrook 7H10 broth base).

Each PZA test consists of two Myco broth bottles, one is the growth control and the other is the single PZA concentration of 300 µg/mL. Both bottles are supplemented with a MYCO GS (growth supplement), a buffer to adjust the pH (5.9-6.0) and the adjusted concentration of test organism. After inoculation of the bottles, a disposable connector is attached to each bottle to connect the bottle head space to the instrument sensor. The connector contains a recessed needle that penetrates the bottle stopper, an O-ring to seal the bottle to the instrument and a 0.22 micron hydrophobic membrane to prevent contamination of the sample and to protect users from aerosols. Bottles are continuously monitored until the test is complete. A conversion from the pressure reading in the headspace is converted into a curve for analysis of growth if it is present. If there is no growth then the curve is represented by a flat line indicating the organism is inhibited by the drug (is susceptible). As the organism grows the pressure change is measured; curves due to gas production will show an upward curve whereas curves due to gas consumption will show a downward curve. Mycobacteria consume oxygen in

the ESP/VTI System and growth is demonstrated by a gas consumption curve with a downward curve. A positive curve for mycobacterial testing is indicative of contamination. If growth in a PZA containing bottle is detected within three days of the detection of the control bottle, the organism is considered resistant. If there is no growth detected or if growth is detected >3 days after detection of the control bottle, the organism is considered susceptible. Growth detected prior to 2.5 days would indicate contamination, growth detected >12 days in the control would indicate too low of an inoculum or lack of proper supplementation.

J. Substantial Equivalence Information:

1. Predicate device name(s):

BACTEC® 460TB

2. Predicate 510(k) number(s):

k895362

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	Qualitative susceptibility testing of <i>M. tuberculosis</i> to pyrazinamide	Same
Growth based	Compare growth from a drug free medium to growth in the presence of PZA	Same
Results	Qualitative	Qualitative
pH	5.9-6.0 final pH	same

Differences		
Item	Device	Predicate
Medium additives	Oleic acid, catalase, dextrose, albumin	Albumin, catalase
PZA concentration	300 µg/mL	100 µg/mL
Incubation and readings	Incubation in VersaTREK® or ESP® culture system until instrument detection of growth with manual interpretations	Incubation off line and manually placed in BACTEC® 460 instrument periodically to obtain readings for manual interpretation
Detection technology	Change in headspace	Radioactive labeled

Differences		
Item	Device	Predicate
	pressure measured by a sensor	carbon dioxide measured in the head space
Inoculum	Pure cultures of <i>M. tuberculosis</i> grown in a seed bottle	Pure cultures of <i>M. tuberculosis</i> grown in BACTEC® 12B medium to the active phase
Growth monitoring time	Continuous monitoring	Once daily
Incubation temperature	35°	37°

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

Clinical and Laboratory Standards Institute (CLSI) standard M24-A “Susceptibility Testing of Mycobacteria, Nocardiae, and Other Aerobic Actinomycetes”; Approved Standard.

L. Test Principle:

ESP/VTI Systems (ESP/VTI) are fully automated, computer-controlled instruments with a self-contained 35° incubator. The detection technology is based upon the measurement of pressure changes in the head space of a sealed bottle. The growth and metabolism of organisms in culture medium result in the consumption of oxygen or the production of gases, such as CO₂, N₂, and H₂. Individual sensors continuously monitor changes in gas pressure in the head space of each bottle. When a positive culture is detected, a red light is illuminated at the bottle location. The computer continuously monitors each location, generates patient reports, assigns locations and bottle entry or removal.

M. Performance Characteristics (if/when applicable):

1. Analytical performance:

a. Precision/Reproducibility:

Reproducibility was determined to be $\geq 95\%$ with the data sets that included thirty challenge strains tested one time at three sites, two strains tested at three sites on three days in triplicate, with three lots from four strains at one site.

b. Linearity/assay reportable range:

Not Applicable

c. Traceability, Stability, Expected values (controls, calibrators, or methods):

Quality Control was performed at the time of testing using a susceptible strain

(ATCC 25618) and a resistant strain (ATCC 35828) with adequate test results. Since the original studies a more consistent QC isolate (ATCC 27294) was tested and demonstrated to be a better QC isolate. ATCC 27294 is the Quality Control recommended in CLSI Standard M24A and also in this assay with the expected result of susceptible.

Periodic colony counts were performed to demonstrate that the final inoculum was within the recommended range of 10^6 .

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 VersaTREK®PZA susceptibility test was evaluated at five geographically diverse sites composed of regional reference centers, public health laboratories, and university hospital-based laboratories. The VersaTREK® PZA KIT was compared to the BACTEC® 460TB PZA susceptibility test method. Susceptibility tests of *Mycobacterium tuberculosis* were performed on 96 isolates from a liquid inoculum source. The ESP Myco PZA is tested at a concentration of 300 µg/mL and a pH of 5.9-6.0 while the BACTEC® 460 uses a concentration of PZA at 100 µg/mL and a pH of 5.9-6.0. There was a $\leq 10\%$ no growth rate or repeats due to no growth or contamination. The results are demonstrated in the table below:

		BACTEC® 460TB		ESP/VTI System			
		Expected Results		Susceptible		Resistant	
Source/source	# Tests	S	R	# Agree	CA % (95%CI)	# Agree	CA % (95%CI)
Seeded bottle	96	83	13	73	88 (79-94.1)	12	92.3 (64-99.8)

All resistant results are recommended to be confirmed with an alternate method which would improve the % agreement of susceptible organisms and remove the

false resistance that may occur.

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:

Susceptible

Resistant

Quality Control is the same as recommended in the CLSI standard and will be included in the package insert.

N. Proposed Labeling:

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

O. Conclusion:

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

