

September 22, 2008

Participant
Centers for Disease Control and Prevention (CDC)

Drug Susceptibility Testing of *Mycobacterium tuberculosis* and Nontuberculous Mycobacteria Performance Evaluation Program

Subject: Analyses of Participant Laboratory Results for the June 2008 Shipment

Dear Participant:

Enclosed are analyses of laboratory test results reported to the Centers for Disease Control and Prevention (CDC) by participant laboratories for strains of *Mycobacterium tuberculosis* complex and the nontuberculous mycobacteria (NTM), *M. fortuitum*, shipped in June 2008. Participant laboratories (137) received either four *M. tuberculosis* complex strains only or four *M. tuberculosis* strains and one NTM culture. Testing results were received and analyzed from 128 of 137 (93.4%) laboratories participating in this shipment. Of the laboratories submitting results, 94 (73.4%) reported them via the online data entry system.

The enclosed aggregate report is prepared in a format that will allow laboratories to compare their results with those obtained by other participants for the same strain using the same method, drug, and concentration. We encourage you to circulate this report to personnel who are involved with drug susceptibility testing, reporting, or interpreting for *M. tuberculosis* and NTM.

The NTM strain in this performance evaluation is intended to provide an assessment of the various methods, drugs, and interpretations that are reported by laboratories performing drug susceptibility testing for these different strains. The test results for the NTM strain also provide information on inter laboratory agreement with different test methods and will assist with efforts to develop standard methods for NTM drug susceptibility testing. By reporting these practices and test results, CDC is neither recommending nor endorsing these testing practices. Some of the test results reported by participants may, in fact, provide inappropriate or misleading information to the clinician. A consensus report by the American Thoracic Society and the Clinical and Laboratory Standards Institute (CLSI) approved standard are referenced to provide participants with recommendations for NTM test methods and drugs that have clinical relevance.

If you have any comments or suggestions on the results in this report or have questions regarding the changes in this program, you may call me at (404) 498-2295.

Sincerely yours,



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Enclosures

Analyses of June 2008 *M. tuberculosis* and Nontuberculous Mycobacteria Drug Susceptibility Test Results Reported by Participating Laboratories

This report analyzes the laboratory test results reported to the Centers for Disease Control and Prevention (CDC) by participant laboratories for the four *Mycobacterium tuberculosis* complex and one *Mycobacterium fortuitum* strains shipped in June 2008. Participant laboratories received either four *M. tuberculosis* complex strains only or four *M. tuberculosis* complex strains and one nontuberculous mycobacteria (NTM) strain. Testing results were received and analyzed from 128 of 137 (93.4%) laboratories participating in this shipment. Of the laboratories submitting results, 94 (73.4%) reported via the online data entry system.

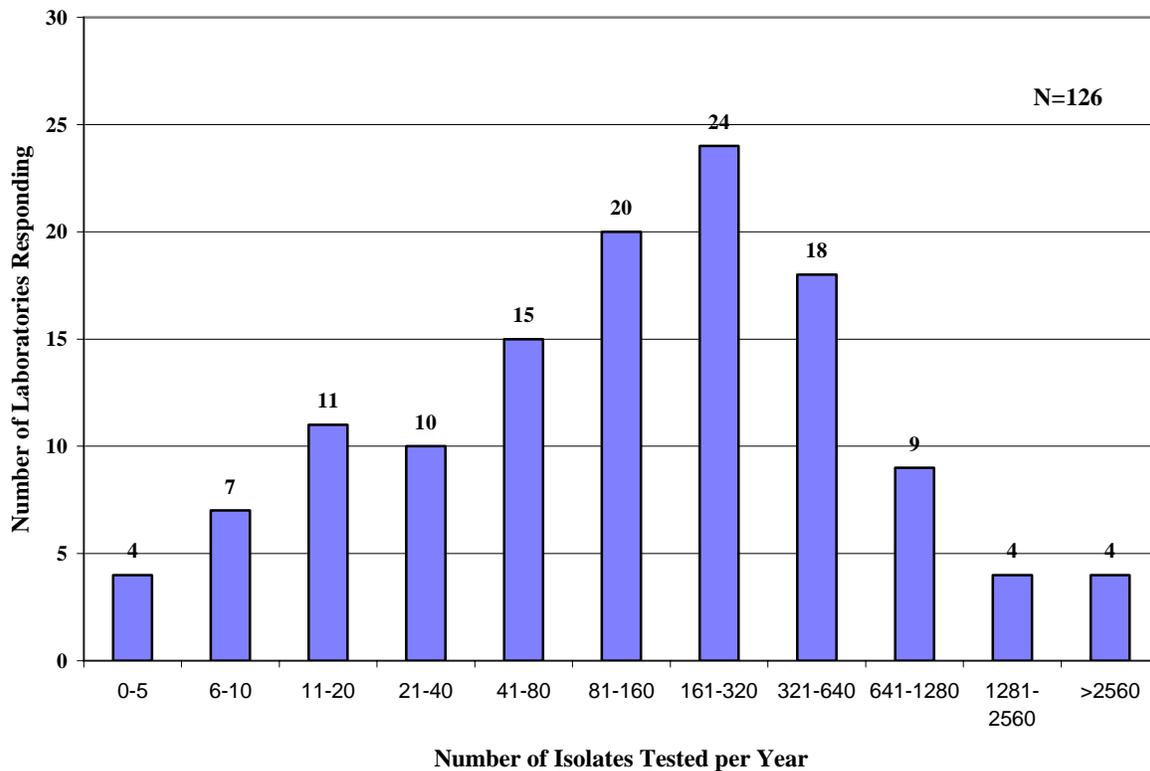
Descriptive Information on Participant Laboratories

Laboratory classifications reported by the 128 participants are:

- 80 (62.5%) health departments,
- 35 (27.3%) hospitals,
- 10 (7.8%) independent laboratories, and
- 3 (2.3%) other type of laboratories.

Figure 1 shows the distribution of the annual volume of *M. tuberculosis* susceptibility testing performed by participants. The numbers on top of the bars indicate the number of laboratories within each group.

Figure 1: Distribution of the Annual Volume of *M. tuberculosis* Isolates Tested for Drug Susceptibility by Participating Laboratories in Calendar Year 2007.



According to the annual volume of testing reported, some laboratories perform less than one drug susceptibility test per month. Laboratories performing these low testing volumes may want to consider referring drug susceptibility tests to other facilities.

Biosafety Levels of Participant Laboratories

The biosafety levels (BSL) reported by participant laboratories for handling *M. tuberculosis* were:

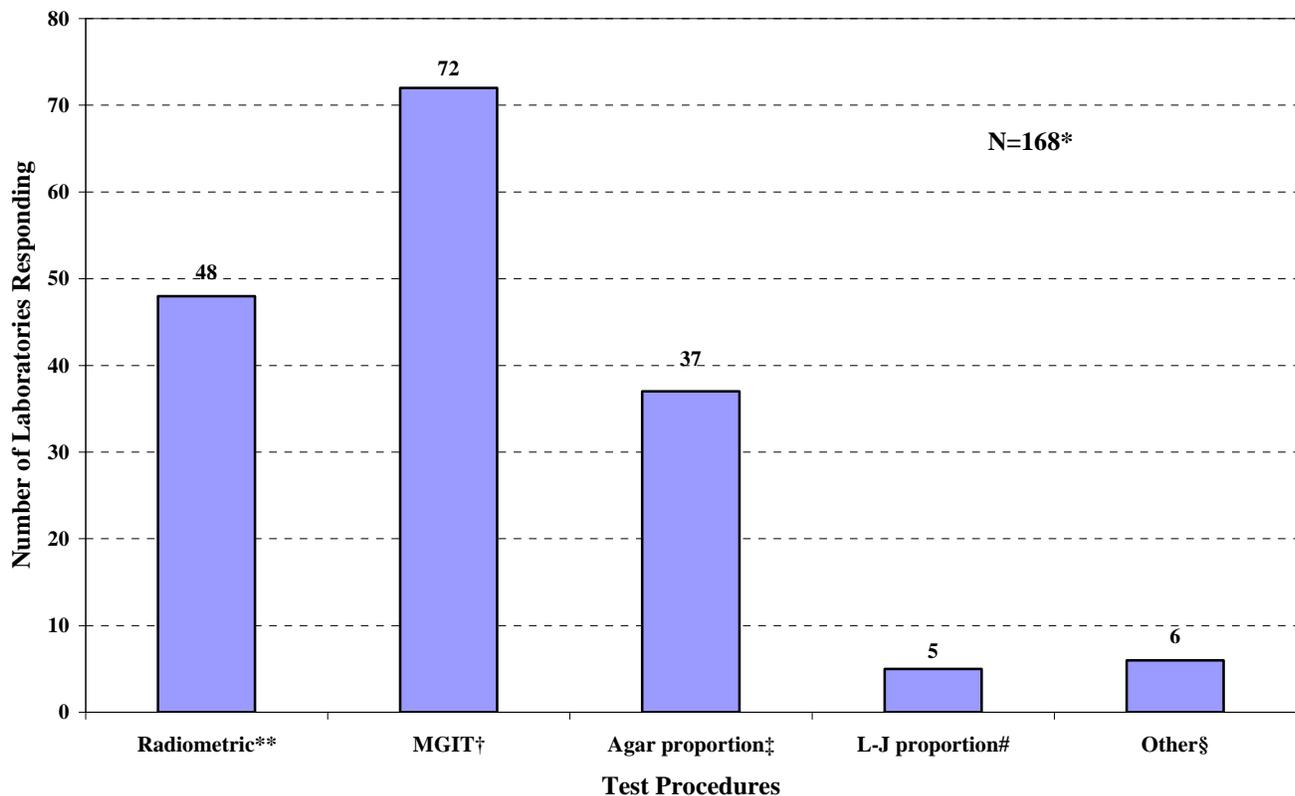
- BSL-3, 75 participants,
- BSL-2 facilities with level 3 containment practices, 42 participants,
- BSL-2, 11 participants.

All laboratories are strongly encouraged to consult the CDC/NIH manual, Biosafety in Microbiological and Biomedical Laboratories (5th Edition), which can be accessed on the web at <http://www.cdc.gov/od/ohs/biosfty/bmb15/bmb15toc.htm> for recommendations and to determine their correct biosafety level.

Laboratory Test Procedures

Figure 2 shows the number of laboratories by the type of procedure used for drug susceptibility testing.

Figure 2: Procedures Used by the Participating Laboratories for *M. tuberculosis* Drug Susceptibility Testing



* Some participants reported more than one test method.

** Radiometric is BACTEC 460TB

† MGIT, Mycobacteria Growth Indicator Tube (BACTEC MGIT 960)

‡ Agar proportion using Middlebrook 7H10 or 7H11 medium.

Lowenstein-Jensen proportion method

§ Other methods listed were microtiter, Bact/ALERT, VersaTREK ESP and Colorimetric method for determining MICs with Alamar Blue, Pyrazinamidase test, and resistance ratio method (RRM) on LJ genotype MTBDR HAIN Lifescience.

Thirty eight laboratories reported using 2 methods and 1 laboratories reported using 3 methods. Some methods, such as the RRM reflect procedures used by international participants only.

M. tuberculosis Complex Strains Test Results:

To facilitate comparison among laboratories, the aggregate test results are provided in Tables 1.0 through 1.3 at the end of this document, representing strains F, G, H, and I. The tables for the *M. tuberculosis* complex strains F, G, H, and I include the results for the radiometric (BACTEC), agar proportion (AP), Lowenstein-Jensen (L-J) proportion, MGIT, and other methods at each concentration of drug.

In the tables, the concentrations recommended by CDC and the Clinical and Laboratory Standards Institute (CLSI)¹ for the primary [isoniazid (INH), rifampin (RIF), pyrazinamide (PZA), and ethambutol (EMB)] and secondary [streptomycin (SM), ethionamide (THA), kanamycin (KM), capreomycin (CM), and p-amino-salicylic acid (PAS)] antituberculosis drugs are highlighted for the conventional and radiometric methods. Participants should note that these recommended combinations reflect the critical concentrations of antituberculosis drugs in 7H10 agar and those concentrations for the BACTEC method that directly correlate with the critical concentrations in the conventional method. When two concentrations are highlighted, such as for isoniazid and ethambutol, the lower concentration is the critical concentration that should always be included to determine whether the *M. tuberculosis* isolate is resistant.

Strains F and I were the same isolate sent in duplicate. Please see the result below for each strain separately.

Strain F, *M. tuberculosis* – INH resistant at 0.2 µg/ml and 1.0 µg/ml and streptomycin resistant at 2.0 µg/ml and 10.0 µg/ml by agar proportion method.

Isoniazid has two recommended concentrations for the AP method (0.2 µg/ml and 1.0 µg/ml) and equivalent concentrations for BACTEC 460TB and MGIT (0.1 µg/ml and 0.4 µg/ml, respectively). Among the participant laboratories INH resistance was reported by 100% (27/27) at 0.2µg/ml and 100% (29/29) at 1.0µg.ml by agar proportion method. For participants using BACTEC, 100% (39/39) at 0.1 µg/ml and 100% (14/14) at 0.4 µg/ml have reported resistance. For participants using MGIT method 97.1% (67/69) at 0.1 µg/ml and 100% (37/37) at 0.4 µg/ml reported resistance.

Among the participant laboratories streptomycin resistance was reported by 100% (30/30) at 2.0 µg/ml and (26/26) at 10 µg/ml by agar proportion method and 100% (36/36) at 2.0 µg/ml and (9/9) by BACTEC method.

Participant laboratories using MGIT method reported 96.4% (53/55) resistance at 1.0 µg/ml and 100% (15/15) resistance at 4.0 µg/ml.

Among the participant laboratories, ethambutol resistance was reported by 73.9% (17/23) at 5 µg/ml and no resistance was reported (0/10) at 10 µg/ml using agar proportion method. Among the laboratories using BACTEC, resistance was reported by 97.1% (33/34) at 2.5 µg/ml and 25% (2/8) at 7.5 µg/ml. Among the participant laboratories, 46.4% (32/69) reported resistance at 5.0 µg/ml using the MGIT method.

Strain G, *M. tuberculosis* – fully susceptible.

Strain G was reported as resistant to ethambutol at 2.5 µg/ml by 2.9% (1/35) of the laboratories using BACTEC and 1.4% (1/70) using MGIT at 5.0 µg/ml.

Streptomycin resistance was reported by 1.9% (1/54) laboratories at 1.0 µg/ml by the MGIT method.

Strain H, *M. tuberculosis*- Rifampin resistant at 1.0 µg/ml by agar proportion method.

Rifampin is a first line drug and has recommended concentration (1.0 µg/ml) for agar proportion method and equivalent concentrations for BACTEC, MGIT and BacT/ALERT MB methods (2.0 µg/ml, 1.0 µg/ml and 0.9 µg/ml respectively). Among the participant laboratories, resistance was reported by 70.4% (19/27) at 1.0 µg/ml using agar proportion method. Resistance was reported by 41.7% (15/36) of laboratories at 2.0 µg/ml by BACTEC and only 18.8% (13/69) of laboratories using MGIT at 1.0 µg/ml. Laboratories using LJ proportion method reported 100% (7/7) resistance at various concentrations.

Among the participant laboratories, 1.4% (1/69) reported INH resistance at 0.1 µg/ml by MGIT method.

Pyrazinamide resistance at 100.0 µg/ml was reported by 2.7% (1/37) laboratories using BACTEC and 1.7% (1/59) laboratories using MGIT method.

Ofloxacin resistance was reported at 2.0 µg/ml by 92.9% (13/14) laboratories using agar proportion method.

Strain I, *M. tuberculosis* – INH resistant at 0.2 µg/ml and 1.0 µg/ml and streptomycin resistant at 2.0 µg/ml and 10.0 µg/ml by agar proportion method.

Isoniazid has two recommended concentrations for the AP method (0.2 µg/ml and 1.0 µg/ml) and equivalent concentrations for BACTEC 460TB and MGIT (0.1 µg/ml and 0.4 µg/ml, respectively). Among the participant laboratories INH resistance was reported by 100% (28/28) at 0.2 µg/ml and 100% (30/30) at 1.0 µg/ml by agar proportion method. For participants using BACTEC, 97.4% (38/39) at 0.1 µg/ml and 100% (14/14) at 0.4 µg/ml have reported resistance. For participants using MGIT method 98.5% (67/68) at 0.1 µg/ml and 100% (37/37) at 0.4 µg/ml reported resistance.

Among the participant laboratories streptomycin resistance was reported 100% (31/31) at 2.0 µg/ml and 100% (27/27) at 10 µg/ml by agar proportion method and 97.2% (35/36) at 2.0 µg/ml and 100% (9/9) by BACTEC method. Participant laboratories using MGIT method reported 100.0% (53/53) resistance at 1.0 µg/ml and 100% (15/15) resistance at 0.4 µg/ml.

Among the participant laboratories, ethambutol resistance was reported by 83.3% (20/24) at 5 µg/ml and no resistance reported (0/10) at 10 µg/ml using agar proportion method. Among the laboratories using BACTEC, resistance was reported by 97.1% (33/34) at 2.5 µg/ml and 25% (2/8) at 7.5 µg/ml. Among the participant laboratories, 47.0% (31/66) reported resistance at 5.0 µg/ml using MGIT.

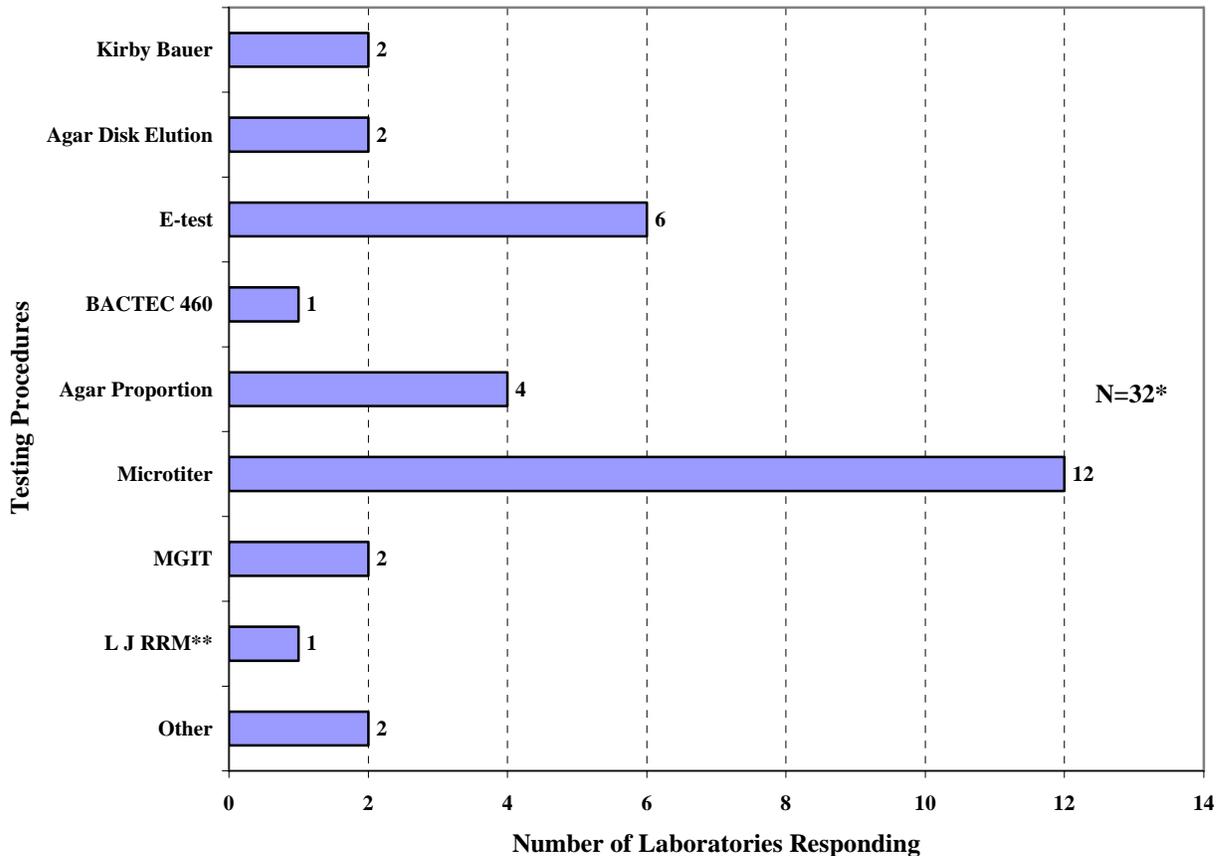
Pyrazinamide resistance was reported by 21.2% (7/33) of laboratories using BACTEC and by 5.2% (3/58) using MGIT.

Note: Our providing test results for all drugs that are reported to CDC by participant laboratories should not be construed as a recommendation or endorsement for testing particular drug concentrations with patient isolates of the *M. tuberculosis* complex. It is assumed that some of the drugs are being tested for research purposes or potential use in the few referral institutions that may treat patients with *M. tuberculosis* isolates resistant to almost all standard drugs. Laboratories should not add drugs to their testing regimen without consulting physicians having expertise in treating multi-drug resistant tuberculosis. Laboratories may contact their local TB control program for referrals of physicians with experience and expertise in treating multi-drug resistant tuberculosis.

Nontuberculous Mycobacteria-Strain J, *Mycobacterium fortuitum*

Thirty laboratories performed susceptibility testing on *M. fortuitum*. Figure 3 shows the procedures used.

Figure 3: Procedures Used by Participating Laboratories Testing Strain J, *M. fortuitum*.



*Some participants reported more than one test method. Therefore, the total is greater than the number of laboratories reporting results.

** L J RRM, resistance ratio method

***M. fortuitum* case history:**

Patient: A 22-year old female visited a day spa. Prior to her visit, she prepared by shaving her legs and shampooing her hair. At the day spa, she had a massage, mud wrap, sugar scrub, pedicure and manicure. Two (2) weeks post spa visit, the woman presented with large open sores on both legs. The wounds produced a small amount of pus.

Laboratory Findings: Examination of a smear made from the pus was stained by the Ziehl-Neelsen method and revealed a substantial number of acid fast bacilli. The Lowenstein-Jensen (L-J) slant showed growth within seven (7) days. The culture was submitted to a reference laboratory for identification and drug susceptibilities. The isolate was identified as *Mycobacterium fortuitum* and drug susceptibility testing was performed.

The infection required surgical resection, and one year later the patient was left with extensive scarring on her legs.

The current *Mycobacterium fortuitum* group has three species/taxa: *M. fortuitum*, *M. peregrinum*, and an unnamed third biovariant complex. Recently, additional species were also described in this group. *M. fortuitum* is a rapidly growing nontuberculous mycobacterium that can cause skin, bone and soft tissue infections. It can also cause lung disease clinically similar to *M. abscessus* in small groups of patients with gastro-esophageal disorders. Whirlpool footbaths at nail salons have been identified as a source of *M. fortuitum* furunculosis^{2,3}.

M. fortuitum isolates are usually susceptible to amikacin, ciprofloxacin, ofloxacin, sulfonamides, and imipenem. The use of clarithromycin and macrolides should be used with caution due to an inducible erythromycin methylase *erm* gene⁴.

Susceptibility results:

Among the participant laboratories 30 reported susceptibility testing for *M. fortuitum*.

Participants should note that the CLSI (M24-A, 2003) recommends broth microdilution method for rapidly growing mycobacteria (RGM) and NO first line anti-tuberculous agents be tested against the RGM.

See Tables 2 and 3 for complete susceptibility testing results reported for *M. fortuitum*.

The addition of NTM strains to this performance evaluation program should not be interpreted as a recommendation for laboratories to adopt NTM drug susceptibility testing, especially if the laboratory has limited experience with these tests and methods. We encourage laboratories that perform NTM drug susceptibility testing to consult recommendations, references, and physicians with expertise in infectious diseases when selecting test methods, drugs, and test interpretations.

Tables

The test results are listed in the appropriate (susceptible or resistant) columns with a corresponding total number of tests (Sum) column provided as a denominator for determining the level of consensus. This report contains all results reported by participating laboratories, including many drug concentrations with only one result.

The CDC and CLSI recommendations reflect the critical concentrations of anti-tuberculosis drugs in 7H10 agar and those concentrations for the BACTEC 460TB method that directly correlate with the critical concentrations in the conventional method⁵⁻⁹. These critical values are highlighted. When two concentrations are highlighted, such as for isoniazid and ethambutol, the lower value is the critical concentration which should always be included for determining whether the *M. tuberculosis* isolate is resistant.

Participants should note that the CLSI approved standard “Susceptibility Testing of Mycobacteria, Nocardiae, and Other Aerobic Actinomycetes,” M24-A (ISBN 1-56238-500-3) CLSI, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898, USA, 2003, recommends testing streptomycin as a secondary drug and also adds ofloxacin and rifabutin to the list of recommended secondary drugs for isolates of *M. tuberculosis* complex.

Concentrations are listed in micrograms per milliliter, µg/ml.

Acknowledgments

Special thanks to the following persons for reviewing this report: Nancy G. Warren, Ph.D., Pennsylvania Department of Health; Barbara Brown-Elliott, M.S., University of Texas at Tyler, TX; Beverly Metchock, Dr. PH; Pamela H. Robinson, CDC/Atlanta; Wendy Gross, M.S., TB Reference Laboratory, West Haven, CT; G. David Cross, M.S., CDC/Atlanta; and Bereneice Madison, Ph.D., CDC/Lusaka, Zambia.

Table 1.0: Participant Results for Culture F, *M. tuberculosis*, resistant to isoniazid at 0.2 and 1.0 µg/ml and to streptomycin at 2.0 and 10.0 µg/ml.

DRUG	Conc	Test Method															
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results			
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	
Isoniazid	0.01												1	1			
Isoniazid	0.05														1	1	
Isoniazid	0.10				39	39						2	67	69	4	4	
Isoniazid	0.20	27	27		3	3		5	5			1	1		1	1	
Isoniazid	0.40				14	14						37	37		3	3	
Isoniazid	1.00	29	29		2	2		1	2	3		2	2				
Isoniazid	2.00	1	1		2	2											
Isoniazid	3.00											1	1				
Isoniazid	5.00	4	4		1	1											
Isoniazid	10.00							1		1		1		1			
Isoniazid	100.00							1		1							
Rifampin	1.00	26		26	4		4		1	1		69	1	70	3		3
Rifampin	2.00				39		39					1		1			
Rifampin	5.00	4		4	1		1		1								
Rifampin	8.00														1		1
Rifampin	16.00														1		1
Rifampin	32.00														1		1
Rifampin	40.00							4		4							
Rifampin	50.00							1		1							
Pyrazinamide	64.00														1		1
Pyrazinamide	100.00				34	2	36		1		1	58	1	59	1		1
Pyrazinamide	300.00														3		3
Pyrazinamide	400.00								1		1						
Ethambutol	1.00								1		1						
Ethambutol	1.60														1		1
Ethambutol	2.00								5		5						
Ethambutol	2.50				1	33	34					1		1			
Ethambutol	3.20														1		1
Ethambutol	5.00	6	17	23	1	4	5		1		1	37	32	69	3		3
Ethambutol	6.40														1		1
Ethambutol	7.50	1	2	3	6	2	8					1		1			
Ethambutol	8.00														3		3
Ethambutol	10.00	10		10	1		1					1		1			
Streptomycin	1.00								1		1	2	53	55			
Streptomycin	2.00	30		30	36		36					1		1			
Streptomycin	4.00				1		1		4		4	15		15			
Streptomycin	5.00								1		1						
Streptomycin	6.00				9		9										
Streptomycin	7.50														1		1
Streptomycin	10.00	26		26	1		1		1		1						
Streptomycin	15.00														1		1
Streptomycin	20.00											1		1			
Streptomycin	30.00														1		1

Table 1.0: Participant Results for Culture F, *M. tuberculosis*, resistant to isoniazid at 0.2 and 1.0 µg/ml and to streptomycin at 2.0 and 10.0 µg/ml.

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Ethionamide	1.00	1		1												
Ethionamide	1.25				2	1	3									
Ethionamide	2.50				3	2	5				1		1			
Ethionamide	5.00	24		24	2		2				1		1			
Ethionamide	10.00	3		3											1	1
Ethionamide	20.00								1		1				1	1
Ethionamide	40.00							1		1					1	1
Kanamycin	2.50				1		1									
Kanamycin	4.00				1		1									
Kanamycin	5.00	10		10	6		6				1		1			
Kanamycin	6.00	13		13												
Kanamycin	10.00								1		1					
Kanamycin	20.00								1		1					
Kanamycin	40.00								1		1					
Capreomycin	0.50														1	1
Capreomycin	1.25				6		6									
Capreomycin	2.50				2		2									
Capreomycin	5.00				3		3									
Capreomycin	10.00	19		19												
Capreomycin	14.00														1	1
Capreomycin	28.00														1	1
Capreomycin	40.00								1		1					
Capreomycin	56.00														1	1
Cycloserine	12.00														1	1
Cycloserine	20.00								1		1					
Cycloserine	24.00														1	1
Cycloserine	25.00	1		1												
Cycloserine	30.00	9		9					1		1					
Cycloserine	40.00								1		1					
Cycloserine	48.00														1	1
Cycloserine	60.00	1		1												
p-Aminosalicylic acid	0.50	1		1						1	1					
p-Aminosalicylic acid	1.00								1	1	2					
p-Aminosalicylic acid	2.00	18		18												
p-Aminosalicylic acid	4.00				3		3									
p-Aminosalicylic acid	8.00	1		1												
p-Aminosalicylic acid	10.00	4		4												
Amikacin	0.50														1	1
Amikacin	1.00				3		3									
Amikacin	2.00	2		2												
Amikacin	2.50	1		1	1		1									
Amikacin	4.00	2		2												
Amikacin	5.00	1		1	1		1									
Amikacin	6.00	4		4												
Amikacin	7.50														1	1
Amikacin	12.00	2		2												
Amikacin	15.00														1	1
Amikacin	30.00														1	1

Table 1.0: Participant Results for Culture F, *M. tuberculosis*, resistant to isoniazid at 0.2 and 1.0 µg/ml and to streptomycin at 2.0 and 10.0 µg/ml.

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Ofloxacin	1.00	2		2	1		1								1	1
Ofloxacin	1.20	1		1												
Ofloxacin	1.25				1		1							1		1
Ofloxacin	2.00	14		14	9		9	1		1	2	1	3	1		1
Ofloxacin	2.50													1		1
Ofloxacin	4.00	1		1												
Ofloxacin	5.00													1		1
Ofloxacin	8.00				1		1									
Ofloxacin	10.00										1		1			
Ofloxacin	50.00										1		1			
Clarithromycin	6.00														1	1
Clarithromycin	12.00													1		1
Clarithromycin	24.00													1		1
Clofazimine	0.06				1		1									
Clofazimine	0.50				4		4									
Clofazimine	1.00	1		1											1	1
Clofazimine	2.00													1		1
Clofazimine	17.50													1		1
Clofazimine	35.00													1		1
Clofazimine	70.00													1		1
Rifabutin	0.50	6		6	4		4									
Rifabutin	1.00				1		1									
Rifabutin	2.00	4		4											1	1
Rifabutin	4.00													1		1
Ciprofloxacin	0.50														1	1
Ciprofloxacin	1.00	2		2	3		3							1		1
Ciprofloxacin	1.60													1		1
Ciprofloxacin	2.00	8		8	1		1									
Ciprofloxacin	2.50				1		1									
Ciprofloxacin	3.20													1		1
Ciprofloxacin	4.00				1		1									
Ciprofloxacin	6.40													1		1
Levofloxacin	1.00										1		1			
Levofloxacin	2.00				4		4									
Levofloxacin	8.00				1		1									
Linezolid	1.00				1		1									
Moxifloxacin	0.50	1		1												
Moxifloxacin	1.00	2		2												

Table 1.1: Participant Results for Culture G, *M. tuberculosis*, fully susceptible.

DRUG	Conc	Test Method															
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results			
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	
Isoniazid	0.01											1		1			
Isoniazid	0.05														1		1
Isoniazid	0.10				39		39					69		69	4		4
Isoniazid	0.20	20		20	2		2	5		5	1		1	1		1	
Isoniazid	0.40				11		11				26		26	3		3	
Isoniazid	1.00	22		22	1		1	3		3							
Isoniazid	2.00	1		1													
Isoniazid	5.00	3		3													
Isoniazid	10.00							1		1							
Isoniazid	100.00							1		1							
Rifampin	0.50										1		1				
Rifampin	1.00	21		21	4		4	1		1	69		69	3		3	
Rifampin	2.00				39		39				1		1				
Rifampin	5.00	3		3				1		1							
Rifampin	8.00													1		1	
Rifampin	16.00													1		1	
Rifampin	32.00													1		1	
Rifampin	40.00							4		4							
Rifampin	50.00							1		1							
Pyrazinamide	64.00													1		1	
Pyrazinamide	100.00				36		36	1		1	57		57	1		1	
Pyrazinamide	300.00													2	1	3	
Pyrazinamide	400.00							1		1							
Ethambutol	1.00							1		1							
Ethambutol	1.60													1		1	
Ethambutol	2.00							5		5							
Ethambutol	2.50				34	1	35				1		1				
Ethambutol	3.20													1		1	
Ethambutol	5.00	19		19	4		4	1		1	69	1	70	3		3	
Ethambutol	6.40													1		1	
Ethambutol	7.50	1		1	8		8				1		1				
Ethambutol	8.00													3		3	
Ethambutol	10.00	7		7							1		1				
Streptomycin	1.00							1		1	53	1	54				
Streptomycin	2.00	22		22	34		34										
Streptomycin	4.00							4		4	12		12				
Streptomycin	5.00							1		1							
Streptomycin	6.00				7		7										
Streptomycin	7.50													1		1	
Streptomycin	10.00	21		21				1		1							
Streptomycin	15.00													1		1	
Streptomycin	30.00													1		1	
Ethionamide	1.25				1		1										
Ethionamide	2.50				2		2										
Ethionamide	5.00	16		16	1		1				1		1				
Ethionamide	10.00	3		3										1		1	
Ethionamide	20.00							1		1				1		1	
Ethionamide	40.00							1		1				1		1	

Table 1.1: Participant Results for Culture G, *M. tuberculosis*, fully susceptible.

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Kanamycin	4.00				1		1									
Kanamycin	5.00	8		8	2		2				1		1			
Kanamycin	6.00	7		7												
Kanamycin	10.00							1		1						
Kanamycin	20.00							1		1						
Kanamycin	40.00							1		1						
Capreomycin	0.50													1		1
Capreomycin	1.25				3		3									
Capreomycin	5.00				1		1									
Capreomycin	10.00	13		13												
Capreomycin	14.00													1		1
Capreomycin	28.00													1		1
Capreomycin	40.00							1		1						
Capreomycin	56.00													1		1
Cycloserine	12.00													1		1
Cycloserine	20.00							1		1						
Cycloserine	24.00													1		1
Cycloserine	25.00	1		1												
Cycloserine	30.00	5		5				1		1						
Cycloserine	40.00							1		1						
Cycloserine	48.00													1		1
p-Aminosalicylic acid	0.50	1		1				1		1						
p-Aminosalicylic acid	1.00							2		2						
p-Aminosalicylic acid	2.00	13		13												
p-Aminosalicylic acid	4.00				2		2									
p-Aminosalicylic acid	8.00	1		1												
p-Aminosalicylic acid	10.00	3		3												
Amikacin	0.50													1		1
Amikacin	1.00				2		2									
Amikacin	2.00	2		2												
Amikacin	4.00	2		2												
Amikacin	5.00				1		1									
Amikacin	6.00	4		4												
Amikacin	7.50													1		1
Amikacin	12.00	2		2												
Amikacin	15.00													1		1
Amikacin	30.00													1		1
Ofloxacin	0.50													1		1
Ofloxacin	1.00	1		1										1		1
Ofloxacin	1.25													1		1
Ofloxacin	2.00	11		11	5		5	1		1	2		2			
Ofloxacin	2.50													1		1
Ofloxacin	4.00	1		1												
Ofloxacin	5.00													1		1
Ofloxacin	8.00				1		1									

Table 1.1: Participant Results for Culture G, *M. tuberculosis*, fully susceptible.

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Clarithromycin	6.00													1		1
Clarithromycin	12.00													1		1
Clarithromycin	24.00													1		1
Clofazimine	0.06				1		1									
Clofazimine	0.50				2		2	1		1						
Clofazimine	1.00	1		1												
Clofazimine	17.50													1		1
Clofazimine	35.00													1		1
Clofazimine	70.00													1		1
Rifabutin	0.50	5		5					1	1						
Rifabutin	1.00							1		1						
Rifabutin	2.00	3		3												
Ciprofloxacin	0.50													1		1
Ciprofloxacin	1.00				2		2									
Ciprofloxacin	1.60													1		1
Ciprofloxacin	2.00	6		6	1		1									
Ciprofloxacin	3.20													1		1
Ciprofloxacin	4.00				1		1									
Ciprofloxacin	6.40													1		1
Levofloxacin	1.00										1		1			
Levofloxacin	2.00				1		1									
Levofloxacin	8.00				1		1									
Linezolid	1.00				1		1									
Moxifloxacin	0.50	1		1												
Moxifloxacin	1.00	1		1												

Table 1.2: Participant Results for Culture H, *M. tuberculosis*, resistant to rifampin at 1.0 µg/ml.

DRUG	Conc	Test Method																
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results				
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum		
Isoniazid	0.01												1		1			
Isoniazid	0.05															1		1
Isoniazid	0.10				39		39					68	1	69	4		4	
Isoniazid	0.20	23		23	2		2	5		5	1		1	1		1		
Isoniazid	0.40				11		11				26		26	3		3		
Isoniazid	1.00	25		25	1		1	3		3								
Isoniazid	2.00	1		1														
Isoniazid	5.00	4		4														
Isoniazid	10.00							1		1								
Isoniazid	100.00							1		1								
Rifampin	0.50											1		1				
Rifampin	1.00	8	19	27	3	1	4	1		1	56	13	69	3		3		
Rifampin	2.00				21	15	36											
Rifampin	5.00	3		3	1		1	1		1								
Rifampin	8.00														1	1		
Rifampin	10.00				1		1				1		1					
Rifampin	16.00														1	1		
Rifampin	32.00														1	1		
Rifampin	40.00							4		4								
Rifampin	50.00							1		1	1		1					
Pyrazinamide	64.00														1	1		
Pyrazinamide	100.00				36	1	37	1		1	58	1	59	1		1		
Pyrazinamide	300.00														3	3		
Pyrazinamide	400.00							1		1								
Ethambutol	1.00							1		1								
Ethambutol	1.60														1	1		
Ethambutol	2.00							5		5								
Ethambutol	2.50				35		35				1		1					
Ethambutol	3.20														1	1		
Ethambutol	5.00	22		22	4		4	1		1	67	2	69	3		3		
Ethambutol	6.40														1	1		
Ethambutol	7.50	1		1	8		8				1		1					
Ethambutol	8.00														3	3		
Ethambutol	10.00	9		9							1		1					
Streptomycin	1.00							1		1	53	1	54					
Streptomycin	2.00	27		27														
Streptomycin	2.00				35		35											
Streptomycin	4.00							4		4	12		12					
Streptomycin	5.00							1		1								
Streptomycin	6.00				7		7											
Streptomycin	7.50														1	1		
Streptomycin	10.00	24		24				1		1								
Streptomycin	15.00														1	1		
Streptomycin	30.00														1	1		

Table 1.2: Participant Results for Culture H, *M. tuberculosis*, resistant to rifampin at 1.0 µg/ml.

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Ethionamide	1.00	1		1												
Ethionamide	1.25				1		1									
Ethionamide	2.50				1	1	2									
Ethionamide	2.50															
Ethionamide	5.00	22		22	1		1				1		1			
Ethionamide	10.00	3		3											1	1
Ethionamide	20.00							1		1					1	1
Ethionamide	40.00							1		1					1	1
Kanamycin	2.50				1		1									
Kanamycin	4.00				1		1									
Kanamycin	5.00	11		11	3		3				1		1			
Kanamycin	6.00	10		10												
Kanamycin	10.00							1		1						
Kanamycin	20.00							1		1						
Kanamycin	40.00							1		1						
Capreomycin	0.50														1	1
Capreomycin	1.25				3		3									
Capreomycin	2.50				1		1									
Capreomycin	5.00				1		1									
Capreomycin	10.00	18		18												
Capreomycin	14.00														1	1
Capreomycin	40.00							1		1						
Capreomycin	56.00														1	1
Cycloserine	12.00														1	1
Cycloserine	20.00							1		1						
Cycloserine	24.00														1	1
Cycloserine	25.00	1		1												
Cycloserine	30.00	9		9				1		1						
Cycloserine	40.00							1		1						
Cycloserine	48.00														1	1
Cycloserine	60.00	1		1												
p-Aminosalicylic acid	0.50	1		1				1		1						
p-Aminosalicylic acid	1.00							2		2						
p-Aminosalicylic acid	2.00	18		18												
p-Aminosalicylic acid	4.00				2		2									
p-Aminosalicylic acid	8.00	1		1												
p-Aminosalicylic acid	10.00	4		4												
Amikacin	0.50														1	1
Amikacin	1.00				2		2									
Amikacin	2.00	2		2												
Amikacin	2.50	1		1												
Amikacin	4.00	2		2												
Amikacin	5.00	1		1	1		1									
Amikacin	6.00	4		4												
Amikacin	7.50														1	1
Amikacin	12.00	2		2												
Amikacin	15.00														1	1
Amikacin	30.00														1	1

Table 1.2: Participant Results for Culture H, *M. tuberculosis*, resistant to rifampin at 1.0 µg/ml.

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Ofloxacin	1.00		1	1											1	1
Ofloxacin	1.20		1	1												
Ofloxacin	1.25				1	1									1	1
Ofloxacin	2.00	1	13	14	6	6		1	1		1	2	3	1		1
Ofloxacin	2.50														1	1
Ofloxacin	4.00		1	1												
Ofloxacin	5.00														1	1
Ofloxacin	8.00				1	1										
Ofloxacin	50.00										1		1			
Clarithromycin	3.00		1	1												
Clarithromycin	6.00														1	1
Clarithromycin	12.00													1		1
Clarithromycin	24.00													1		1
Clofazimine	0.06				1	1										
Clofazimine	0.50				2	2										
Clofazimine	1.00	1		1											1	1
Clofazimine	2.00													1		1
Clofazimine	17.50													1		1
Clofazimine	35.00													1		1
Clofazimine	70.00													1		1
Rifabutin	0.05				1	1										
Rifabutin	0.25				1	1										
Rifabutin	0.50	5	1	6	4	4										
Rifabutin	2.00	4		4											1	1
Rifabutin	4.00													1		1
Ciprofloxacin	0.50														1	1
Ciprofloxacin	1.00		1	1	2	2								1		1
Ciprofloxacin	1.25				1	1										
Ciprofloxacin	1.60														1	1
Ciprofloxacin	2.00	1	6	7	1	1										
Ciprofloxacin	2.50				1	1										
Ciprofloxacin	3.20														1	1
Ciprofloxacin	4.00				1	1										
Ciprofloxacin	5.00				1	1										
Ciprofloxacin	6.40														1	1
Levofloxacin	1.00											1	1			
Levofloxacin	2.00				1	1										
Levofloxacin	8.00				1	1										
Linezolid	1.00				1	1										
Moxifloxacin	0.50		1	1												
Moxifloxacin	1.00		1	1												
Azithromycin	3.00		1	1												

Table 1.3: Participant Results for Culture I, *M. tuberculosis*, resistant to isoniazid at 0.2 and 1.0 µg/ml and to streptomycin at 2.0 and 10.0 µg/ml.

DRUG	Conc	Test Method															
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results			
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	
Isoniazid	0.05															1	1
Isoniazid	0.10				1	38	39					1	67	68		4	4
Isoniazid	0.20		28	28		3	3		5	5		1	1		1	1	
Isoniazid	0.40					14	14					37	37		3	3	
Isoniazid	1.00		30	30		2	2	1	2	3		2	2				
Isoniazid	2.00		1	1		2	2										
Isoniazid	3.00											1	1				
Isoniazid	5.00		4	4		1	1										
Isoniazid	10.00							1		1		1		1			
Isoniazid	100.00							1		1							
Rifampin	1.00	27	1	28	4		4		1	1		68		68	3	3	
Rifampin	2.00				38	1	39					1		1			
Rifampin	5.00	4		4	1		1		1	1							
Rifampin	8.00														1	1	
Rifampin	16.00														1	1	
Rifampin	32.00														1	1	
Rifampin	40.00							4		4							
Rifampin	50.00							1		1							
Pyrazinamide	64.00														1	1	
Pyrazinamide	100.00				26	7	33	1		1		55	3	58	1	1	
Pyrazinamide	300.00														3	3	
Pyrazinamide	400.00							1		1							
Ethambutol	1.00								1	1							
Ethambutol	1.60														1	1	
Ethambutol	2.00							5	5								
Ethambutol	2.50				1	33	34					1		1			
Ethambutol	3.20														1	1	
Ethambutol	5.00	4	20	24	1	4	5	1	1		35	31	66	3	3		
Ethambutol	6.40														1	1	
Ethambutol	7.50	1	2	3	6	2	8				1		1				
Ethambutol	8.00														3	3	
Ethambutol	10.00	10		10	1		1				1		1				
Streptomycin	1.00								1	1		53		53			
Streptomycin	2.00		31	31	1	35	36					1		1			
Streptomycin	4.00					1	1	4	4		15		15				
Streptomycin	5.00							1	1								
Streptomycin	6.00					9	9										
Streptomycin	7.50														1	1	
Streptomycin	10.00		27	27		1	1	1	1								
Streptomycin	15.00														1	1	
Streptomycin	20.00											1		1			
Streptomycin	30.00														1	1	

Table 1.3: Participant Results for Culture I, *M. tuberculosis*, resistant to isoniazid at 0.2 and 1.0 µg/ml and to streptomycin at 2.0 and 10.0 µg/ml.

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Ethionamide	1.00	1		1												
Ethionamide	1.25				2	1	3									
Ethionamide	1.25															
Ethionamide	2.50				3	2	5				1		1			
Ethionamide	5.00	24	1	25	1		1				1		1			
Ethionamide	5.00															
Ethionamide	10.00	3		3										1		1
Ethionamide	20.00								1		1			1		1
Ethionamide	40.00								1		1			1		1
Kanamycin	2.50				1		1									
Kanamycin	4.00				1		1									
Kanamycin	5.00	10	1	11	6		6				1		1			
Kanamycin	6.00	13		13												
Kanamycin	10.00								1		1					
Kanamycin	20.00								1		1					
Kanamycin	40.00								1		1					
Capreomycin	0.50													1		1
Capreomycin	1.25				6		6									
Capreomycin	2.50				2		2									
Capreomycin	5.00				3		3									
Capreomycin	10.00	19		19												
Capreomycin	14.00													1		1
Capreomycin	28.00													1		1
Capreomycin	40.00								1		1					
Capreomycin	56.00													1		1
Cycloserine	12.00													1		1
Cycloserine	20.00								1		1					
Cycloserine	24.00													1		1
Cycloserine	25.00	1		1												
Cycloserine	30.00	9		9					1		1					
Cycloserine	40.00								1		1					
Cycloserine	48.00													1		1
Cycloserine	60.00	1		1												
p-Aminosalicylic acid	0.50	1		1						1	1					
p-Aminosalicylic acid	1.00								2		2					
p-Aminosalicylic acid	2.00	17	2	19												
p-Aminosalicylic acid	4.00				2	1	3									
p-Aminosalicylic acid	8.00	1		1												
p-Aminosalicylic acid	10.00	4		4												

Table 1.3: Participant Results for Culture I, *M. tuberculosis*, resistant to isoniazid at 0.2 and 1.0 µg/ml and to streptomycin at 2.0 and 10.0 µg/ml.

DRUG	Conc	Test Method																
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results				
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum		
Amikacin	0.50															1		1
Amikacin	1.00				3		3											
Amikacin	2.00	2		2														
Amikacin	2.50	1		1	1		1											
Amikacin	4.00	2		2														
Amikacin	5.00	1		1	1		1											
Amikacin	6.00	4		4														
Amikacin	7.50															1		1
Amikacin	12.00	2		2														
Amikacin	15.00															1		1
Amikacin	30.00															1		1
Ofloxacin	1.00	2		2	1		1									1		1
Ofloxacin	1.20	1		1														
Ofloxacin	1.25				1		1									1		1
Ofloxacin	2.00	14		14	9		9	1		1		3		3		1		1
Ofloxacin	2.50															1		1
Ofloxacin	4.00	1		1														
Ofloxacin	5.00															1		1
Ofloxacin	8.00				1		1											
Ofloxacin	10.00											1		1				
Ofloxacin	50.00											1		1				
Clarithromycin	6.00															1		1
Clarithromycin	12.00															1		1
Clarithromycin	24.00															1		1
Clofazimine	0.06				1		1											
Clofazimine	0.50				4		4											
Clofazimine	1.00	1		1												1		1
Clofazimine	2.00															1		1
Clofazimine	17.50															1		1
Clofazimine	35.00															1		1
Clofazimine	70.00															1		1
Rifabutin	0.50	6		6	4		4											
Rifabutin	1.00				1		1	1		1								
Rifabutin	2.00	4		4												1		1
Ciprofloxacin	0.50															1		1
Ciprofloxacin	1.00	2		2	3		3									1		1
Ciprofloxacin	1.60															1		1
Ciprofloxacin	2.00	8		8	1		1											
Ciprofloxacin	2.50				1		1											
Ciprofloxacin	3.20															1		1
Ciprofloxacin	4.00				1		1											
Ciprofloxacin	6.40															1		1
Levofloxacin	1.00											1		1				
Levofloxacin	2.00				4		4											
Levofloxacin	8.00				1		1											
Linezolid	1.00				1		1											
Moxifloxacin	0.50	1		1														
Moxifloxacin	1.00	2		2														

Table 2: Participant Results for Culture J, *M. fortuitum*

DRUG	Conc	Test Method														
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results		
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum
Amikacin	2.50	1		1												
Amikacin	6.00	1		1												
Amikacin	12.00	1		1												
Amikacin	30.00	1		1										1		1
Clarithromycin	2.50	1		1												
Clarithromycin	3.00		1	1												
Clarithromycin	4.00		1	1												
Capreomycin	14.00														1	1
Ciprofloxacin	1.00	1		1												
Ciprofloxacin	2.00	1		1												
Ciprofloxacin	5.00													1		1
Cycloserine	12.00														1	1
Cycloserine	40.00								1	1						
Cefoxitin	20.00		1	1												
Cefoxitin	30.00	1	1	2										1		1
Doxycycline	2.50	1		1												
Doxycycline	6.00	2		2												
Ethambutol	2.00								1	1						
Ethambutol	2.50					1	1									
Ethambutol	5.00		1	1								2	2			
Ethambutol	6.40														1	1
Erythromycin	15.00														1	1
Gentamicin	4.00		1	1												
Imipenem	1.20	1		1												
Isoniazid	0.01											1	1			
Isoniazid	0.10					1	1					1	1			
Isoniazid	0.20		1	1											1	1
Isoniazid	1.00		1	1					1	1						
Kanamycin	12.00	1		1												
Kanamycin	20.00								1		1					
Minocycline	6.00	1		1												
Minocycline	30.00													1		1
Moxifloxacin	0.16	1		1												
Ofloxacin	2.50														1	1
Ofloxacin	5.00													1		1
p-Aminosalicylic acid	1.00								1	1						
p-Aminosalicylic acid	2.00		1	1												
Pyrazinamide	100.00					1	1									
Pyrazinamide	400.00								1	1						
Rifampin	1.00		1	1								2	2			
Rifampin	2.00					1	1									
Rifampin	16.00														1	1
Rifampin	32.00														1	1
Rifampin	50.00								1	1						

Table 2: Participant Results for Culture J, *M. fortuitum*

DRUG	Conc	Test Method															
		AP Results			BACTEC Results			LJ Prop Results			MGIT Results			Other Tests Results			
		S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	S	R	Sum	
Streptomycin	1.00												2	2			
Streptomycin	2.00		1	1		1	1										
Streptomycin	7.50															1	1
Streptomycin	10.00		1	1													
Streptomycin	100.00								1	1							
Sulfamethoxazole	100.00															1	1
Ethionamide	5.00		1	1													
Ethionamide	40.00								1	1							
Trimethoprim-Sulfamethoxazole	1.00		1	1													
Trimethoprim-Sulfamethoxazole	5.00		1	1													
Trimethoprim-Sulfamethoxazole	25.00															1	1
Trimethoprim-Sulfamethoxazole	30.00	1		1													
Tobramycin	8.00	1		1													
Tobramycin	10.00															1	1

Table 3: Minimum Inhibitory Concentrations for Culture J, *M. fortuitum*

Drug	Test Method	MIC	Susceptible	Resistant	Intermediate	Sum
Amikacin	E-test	0.50	2			2
Amikacin	E-test	1.50	1			1
Amikacin	E-test	2.00	1			1
Amikacin	E-test	3.00	1			1
Amikacin	Microtiter	≥0.50	2			2
Amikacin	Microtiter	≤1.00	5			5
Amikacin	Microtiter	<2.00	1			1
Amikacin	Microtiter	4.00	1			1
Amikacin	Microtiter	<16.00	2			2
Azithromycin	Microtiter	>32.00		1		1
Clarithromycin	E-test	1.00	1			1
Clarithromycin	E-test	3.00			1	1
Clarithromycin	E-test	8.00		1		1
Clarithromycin	Microtiter	0.50	1			1
Clarithromycin	Microtiter	≤2.00	2	1		3
Clarithromycin	Microtiter	≥4.00	1		4	5
Clarithromycin	Microtiter	8.00		2		2
Clarithromycin	Microtiter	16.00		2		2
Ciprofloxacin	E-test	0.05	1			1
Ciprofloxacin	E-test	0.06	1			1
Ciprofloxacin	E-test	0.12	1			1
Ciprofloxacin	E-test	0.94	1			1
Ciprofloxacin	Microtiter	<0.06	1			1
Ciprofloxacin	Microtiter	≤0.12	4			4
Ciprofloxacin	Microtiter	≤0.25	3			3
Ciprofloxacin	Microtiter	>0.50	1			1
Ciprofloxacin	Microtiter	<1.00	2			2
Ciprofloxacin	Microtiter	2.00			1	1
Cefoxitin	E-test	16.00	1			1
Cefoxitin	E-test	32.00		1	1	2
Cefoxitin	E-test	64.00			2	2
Cefoxitin	Microtiter	32.00			6	6
Cefoxitin	Microtiter	≤64.00			3	3
Cefoxitin	Microtiter	128.00		1		1
Doxycycline	E-test	0.25	1			1
Doxycycline	E-test	0.38	2			2
Doxycycline	E-test	0.50	1			1
Doxycycline	E-test	0.94	1			1
Doxycycline	Microtiter	0.06	1			1
Doxycycline	Microtiter	<0.12	2			2
Doxycycline	Microtiter	<0.50	1			1
Doxycycline	Microtiter	<1.00	1			1
Gatifloxacin	Microtiter	0.12	1			1

Table 3: Minimum Inhibitory Concentrations for Culture J, *M. fortuitum*

Drug	Test Method	MIC	Susceptible	Resistant	Intermediate	Sum
Imipenem	E-test	1.00	1			1
Imipenem	E-test	1.50	1			1
Imipenem	E-test	2.00	2			2
Imipenem	E-test	4.00	1			1
Imipenem	Microtiter	0.50	1			1
Imipenem	Microtiter	2.00	4			4
Imipenem	Microtiter	≤4.00	2			2
Imipenem	Microtiter	8.00			2	2
Imipenem	Microtiter	64.00		1		1
Levofloxacin	E-test	0.09	1			1
Linezolid	E-test	2.00	1			1
Linezolid	E-test	24.00		1		1
Linezolid	Microtiter	1.00	1			1
Linezolid	Microtiter	≤2.00	4			4
Linezolid	Microtiter	4.00	2			2
Linezolid	Microtiter	<8.00	1			1
Minocycline	Microtiter	<0.50	4			4
Minocycline	Microtiter	16.00		1		1
Ofloxacin	Microtiter	>0.50	1			1
Rifabutin	Microtiter	>32.00		1		1
Sulfamethoxazole	Microtiter	<4.00	1			1
Sulfamethoxazole	Microtiter	<32.00	2			2
Trimethoprim-Sulfamethoxazole	E-test	0.06	1			1
Trimethoprim-Sulfamethoxazole	E-test	1.50	1			1
Trimethoprim-Sulfamethoxazole	E-test	32.00		1		1
Trimethoprim-Sulfamethoxazole	Microtiter	0.50	3			3
Trimethoprim-Sulfamethoxazole	Microtiter	1.00	3			3
Trimethoprim-Sulfamethoxazole	Microtiter	2.00	1			1
Tobramycin	E-test	48.00		1		1
Tobramycin	Microtiter	16.00		1		1
Tobramycin	Microtiter	32.00		1		1

REFERENCES

1. Woods GL, Brown-Elliott, B.A., Desmond, E.P., Hall, G.S., Heifets, L., Pfyffer, G.E., Ridderhof, J.C., Wallace, R.J., Warren, N.G., Witebsky, F.G. Susceptibility Testing of Mycobacteria, Nocardia, and Other Aerobic Actinomycetes; Approved Standard. *NCCLS*. Vol 23. M24-A ed. Wayne, PA.: NCCLS; 2003.
2. Sniezek PJ, Graham BS, Busch HB, et al. Rapidly growing mycobacterial infections after pedicures. *Arch Dermatol*. May 2003;139(5):629-634.
3. Winthrop KL, Abrams M, Yakrus M, et al. An outbreak of mycobacterial furunculosis associated with footbaths at a nail salon. *N Engl J Med*. May 2 2002;346(18):1366-1371.
4. Griffith DE, Aksamit T, Brown-Elliott BA, et al. An official ATS/IDSA statement: diagnosis, treatment, and prevention of nontuberculous mycobacterial diseases. *Am J Respir Crit Care Med*. Feb 15 2007;175(4):367-416.
5. Inderlied CB, Pfyffer, G.E. *Susceptibility Test Methods: Mycobacteria*. Vol 1. 8 ed. Washington, D.C.: ASM Press; 2003.
6. Kent PT, G.P. Kubica. *Public Health Mycobacteriology: A Guide for the Level III Laboratory*. Atlanta, GA: Centers for Disease Control; 1985.
7. Madison B, Robinson-Dunn B, George I, et al. Multicenter evaluation of ethambutol susceptibility testing of mycobacterium tuberculosis by agar proportion and radiometric methods. *J Clin Microbiol*. Nov 2002;40(11):3976-3979.
8. Pfyffer GE, Brown-Elliott, B. A., Wallace, Richard J. Jr. *Mycobacterium: General Characteristics, Isolation and Staining Procedures*. Vol 1. 8 ed. Washington, D.C.: ASM Press; 2003.
9. Siddiqi SH, Hawkins JE, Laszlo A. Interlaboratory drug susceptibility testing of Mycobacterium tuberculosis by a radiometric procedure and two conventional methods. *J Clin Microbiol*. Dec 1985;22(6):919-923.