Overview

Useful For

Detection and identification of *Mycobacterium* species, *Nocardia* species, and other aerobic actinomycetes

Identification is performed using the Hologic/GenProbe AccuProbes for selected *Mycobacterium* species, matrix assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry, or 500-base pair 16S rRNA gene sequencing

M tuberculosis complex species identification can be done upon request using rapid PCR targeting the regions of difference (RD) genomic areas

Reflex Tests

Test ID	Reporting Name	Available Separately	Always Performed
ISMY	ID by 16S Sequencing	No, (Bill Only)	No
RMALM	Id MALDI-TOF Mass Spec AFB	No, (Bill Only)	No
RTBSP	Id, Mtb Speciation, PCR	No, (Bill Only)	No
TBMP	Mycobacteria Probe Ident	No, (Bill Only)	No
TBPB	Mycobacteria Probe Ident Broth	No, (Bill Only)	No
TBT	Concentration, Mycobacteria	No, (Bill Only)	No
TISSR	Tissue Processing	No, (Bill Only)	No

Testing Algorithm

When this test is ordered, a reflex test may be performed and charged.

The following algorithms are available in Special Instructions:

-Mycobacterium and Nocardia Culture Algorithm

-Meningitis/Encephalitis Panel Algorithm

Special Instructions

- Mycobacterium and Nocardia Culture Algorithm
- Meningitis/Encephalitis Panel Algorithm

Method Name

Automated Detection of Positive Cultures Followed by Organism Identification with Rapid Methods, which may include Nucleic Acid Probes, DNA Sequencing, and Matrix Assisted Laser Desorption/Ionization-Time of Flight (MALDI-TOF) Mass Spectrometry

NY State Available

Yes

Specimen

Specimen Type

Varies

Necessary Information

1. Specimen source is required.

2. Alert the laboratory if *Mycobacterium genavense* is suspected, as this species requires addition of mycobactin J to the culture medium for optimal growth and recovery.

Specimen Required

Submit only 1 of the following specimens:

Specimen Type: Body fluid

Container/Tube: Sterile container

Specimen Volume: 1 mL

Specimen Type: Bone marrow

Container/Tube: SPS/Isolator System or green top (lithium heparin)

Specimen Volume: Entire collection

Specimen Type: Gastric washing

Container/Tube: Sterile container

Specimen Volume: 10 mL

Collection Instructions: Neutralize specimen within 4 hours of collection with 100 mg of sodium carbonate per 5 to 10 mL of gastric wash.

Specimen Type: Respiratory

Sources: Bronchoalveolar lavage fluid, bronchial washing, sputum

Container/Tube: Sterile container

Specimen Volume: 3 mL

Collection Instructions:

1. Collect 3 respiratory specimens for acid-fast smears and culture in patients with clinical and chest X-ray findings compatible with tuberculosis.

2. These 3 specimens should be collected at 8- to 24-hour intervals (24 hours when possible) and should include at least 1 **first-morning** specimen.

Specimen Type: Stool

Supplies: Stool Collection Kit, Random (T635)

Container/Tube: Sterile container

Specimen Volume: 5-10 g

Specimen Type: Tissue

Container/Tube: Sterile container

Specimen Volume: 5-10 mm

Collection Instructions: Collect a fresh tissue specimen.

Specimen Type: Urine

Container/Tube: Sterile container

Specimen Volume: 20-50 mL

Collection Instructions: Collect a random urine specimen.

Fresh tissue or body fluid is the preferred specimen type instead of a swab specimen.

Specimen Type: Swab

Sources: Wound, tissue, or body fluid

Container/Tube: Culture transport swab (noncharcoal) culturette

Specimen Volume: Adequate specimen

Collection Instructions:

1. Before collecting specimen, wipe away any excessive amount of secretion and discharge, if appropriate.

2. Obtain secretions or fluid from source with sterile swab.

3. If smear and culture are requested or both a bacterial culture and mycobacterial culture are requested, collect a second swab to maximize test sensitivity.

Forms

If not ordering electronically, complete, print, and send a Microbiology Test Request (T244) with the specimen.

Specimen Minimum Volume

Body Fluid: 1.5 mL
Respiratory Specimen: 3 mL
Fresh Tissue: pea-sized piece

Reject Due To

Other	Blood or fixed tissue; specimen in viral transport medium (including but not limited to M4, M5, BD viral transport media, thioglycolate broth); swab sources of respiratory fluids, swab sources of nasal, sinus, ear, mouth, throat, or scalp; wood shaft or charcoal swab, petri dish

Specimen Stability Information

Specimen Type	Temperature	Time
Varies	Refrigerated (preferred)	7 days
	Ambient	7 days

Clinical and Interpretive

Clinical Information

Mycobacteria species are responsible for significant morbidity and mortality in both immunocompromised and immunocompetent hosts. *Mycobacterium tuberculosis* is the causative agent of tuberculosis and it kills nearly 2 million people in the world each year. Nontuberculous mycobacteria such as *M avium* complex and *M abscessus* cause a variety of infections (eg, respiratory, skin, and soft tissue) and are important to detect and correctly identify in order to aid in clinical decision making. There are more than 170 recognized species of mycobacteria and identification of these organisms to the species level is often required to help guide appropriate therapy. Although there are direct detection methods available for *M tuberculosis*, growth of the organism on culture media is still necessary to allow for antimicrobial susceptibility testing. At this time, direct molecular detection methods are lacking for the nontuberculous mycobacteria and growth in culture is critical for identification and antimicrobial susceptibility testing.

Nocardia species and other aerobic actinomycetes (eg, *Tsukamurella* species, *Gordonia* species, *Rhodococcus* species) are also important causes of disease and isolation on culture media is important to facilitate identification and antimicrobial susceptibility testing. *Nocardia* and the other aerobic actinomycetes grow well on mycobacterial medium and, therefore, ordering a mycobacterial culture is recommended when infection with this group of organisms is suspected.

Reference Values

Negative

Interpretation

A final negative report is issued after 42 days of incubation.

Positive cultures are reported as soon as detected.

Cautions

Recovery of mycobacteria is dependent on the number of organisms present in the specimen, specimen collection methods, methods of processing, and patient factors such as the use of antimycobacteria therapy.

The use of BBL MGIT PANTA antibiotic mixture, although necessary for all nonsterile specimens, may have inhibitory effects on some mycobacteria.

Supportive Data

The Bactec 460 and Bactec MGIT 960 systems were compared. A total of 1,963 patient specimens were cultured, including 1,519 respiratory tract specimens that required decontamination with sodium hydroxide and 444 sterile specimens that did not need to be decontaminated. A total of 168 cultures grew acid-fast bacilli in 1 or both systems (8.5% positivity rate). The contamination rate for positive respiratory tract specimens was 3.8% in the Bactec 460 and 7.9% in the MGIT. Contamination of sterile specimens was 6.3% in the Bactec 460 and 10.1% in the MGIT. Combined rates were 4.3% for the Bactec 460 and 8.4% for the MGIT. The overall recovery rates for mycobacterial species, excluding *Mycobacterium gordonae,* were 82.8%, 79.1%, and 78.4% for the Bactec 460, MGIT 960, and solid media, respectively. Recovery rates for the Bactec 460 and MGIT 960 were considered to be equivalent.

Clinical Reference

1. Pfyffer GE, Palicova F: *Mycobacterium:* general characteristics; laboratory detection, and staining procedures. In Manual of Clinical Microbiology. 10th edition. Vol 1, Edited by J Versalovic, KC Carroll, G Funke, et al: Washington, DC: ASM Press. 2011 pp 472-502

2. Tortoli E: Microbiological features and clinical relevance of new species of the genus Mycobacterium. Clin Microbiol Rev 2014;27(4):727-752 doi:10.1128/CMR.00035-14

3. Wilson WW: Nocardiosis: updates and clinical overview. Mayo Clin Proc 2012;87(7):403-407

Performance

Method Description

The BACTEC MGIT 960 System is designed for the rapid detection of mycobacteria in clinical specimens. The system includes a liquid culture medium (BBL MGIT Mycobacteria Growth Indicator Tube), a growth supplement (BBL MGIT OADC Enrichment), and an antibiotic mixture (BBL MGIT PANTA). BBL MGIT OADC enrichment provides substances essential for the growth of mycobacteria. BBL MGIT PANTA contains a mixture of antimicrobial agents used to suppress the growth of contaminating bacteria.

A fluorescent compound is embedded in silicone on the bottom of each of the MGIT broth tubes. This compound is sensitive to the presence of oxygen dissolved in the broth. Initially, the large amount of dissolved oxygen quenches the emissions from the compound and little fluorescence can be detected. Later, actively respiring (growing) microorganisms consume the oxygen and allow the fluorescence to be detected.

The automated BACTEC MGIT 960 System monitors the tubes hourly for increasing fluorescence. Analysis of the fluorescence is used to determine if the tube is instrument-positive, ie, the test contains viable organisms. Culture tubes that remain negative for a minimum of 42 days and that show no visible signs of positivity are removed from the instrument as negatives.

In addition to the MGIT tube, Middlebrook 7H10/7H10S agar biplates are inoculated and incubated at 37 degrees C. Growth from positive MGIT tubes or agar plates is identified using a variety of techniques including Hologic/GenProbe AccuProbes, matrix assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry, or 16S rRNA gene sequencing. The *Mycobacterium tuberculosis* complex will be identified to the species level upon request, using rapid PCR.(Pfyffer GE, Palicova F: *Mycobacterium:* general characteristics; laboratory detection, and staining procedures. In Manual of Clinical Microbiology. 10th edition. Vol 1, Edited by J Versalovic, KC Carroll, G Funke, et al. Washington, DC: ASM Press. 2011 pp 472-502; Halse TA, Escuyer VE, Musser KA: Evaluation of a single tube multiplex real-time PCR for differentiation of the *Mycobacterium tuberculosis* complex in clinical specimens. J Clin Microbiol 2011 Jul;49[7]:2562-2567 doi: 10.1128/JCM.00467-11)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday through Sunday; Continuously

Analytic Time

42 days/Positive cultures reported as soon as detected, Negative 42 days

Maximum Laboratory Time

70 days

Specimen Retention Time

Raw specimen 3-7 days; Isolates from positive cultures kept 1 year.

Performing Laboratory Location

Rochester

Fees and Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

Test Classification

This test has been cleared or approved by the U.S. Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

87116-Mycobacterial Culture

87015-Mycobacteria Culture, Concentration (if appropriate)

87118-Id MALDI-TOF Mass Spec AFB (if appropriate)

87150-Mycobacteria Probe Ident, Solid (if appropriate)

87150-Mycobacteria Probe Ident, Broth(if appropriate)

87150-Id, Mtb Speciation, PCR (if appropriate)

87153-Mycobacteria Identification by Sequencing (if appropriate)

87176-Tissue Processing (if appropriate)

LOINC® Information

Test Definition: CTB

Mycobacterial Culture

Test ID	Test Order Name	Order LOINC Value
CTB	Mycobacterial Culture	50941-4

Result ID	Test Result Name	Result LOINC Value
CTB	Mycobacterial Culture	50941-4