Test Definition: CTB

Mycobacteria and Nocardia Culture, Varies

Overview

Useful For

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

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
TBT	Concentration, Mycobacteria	No, (Bill Only)	No
TISSR	Tissue Processing	No, (Bill Only)	No
LCTB	Id, MTB complex Rapid PCR	No, (Bill Only)	No

Testing Algorithm

When this test is ordered, a reflex test may be performed at an additional charge.

The following algorithms are available:
-*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 /DNA Sequencing/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: 1.5 mL

Specimen Type: Bone marrow
Container/Tube: Sterile container, or green top (lithium or sodium 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 to 10 g

Specimen Type: Tissue
Container/Tube: Sterile container
Specimen Volume: 5 to 10 mm
Collection Instructions: Collect a fresh tissue specimen.

Specimen Type: Urine
Container/Tube: Sterile container
Specimen Volume: 20 to 50 mL
Collection Instructions: Collect a random urine specimen.

Fresh tissue or body fluid are preferred over a swab specimen. Recovery of mycobacteria from swabs is generally very low yield. Only submit a swab specimen if tissue biopsy or fluid aspiration is not possible.

Specimen Type: Swab
Supplies: BD E-swab (T853)
Sources: Surgically collected wound, tissue, or body fluid
Container/Tube: Sterile, screw-capped tube containing Liquid Amies Medium with flocked swab (eg, E-swab)
Specimen Volume: Flocked swab in 1 mL of Liquid Amies Medium
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 flocked swab. **Paranasal sinus collections must use a nasopharyngeal flocked swab.**
3. Place flocked swab in sterile, screw-capped tube containing 1 mL of Liquid Amies Medium.
4. If smear and culture are requested or both a bacterial culture and mycobacterial culture are requested, collect a second swab to maximize test sensitivity. Submit each swab in a separate sterile, screw-capped tube with 1 mL of Liquid Amies Medium.
Additional Information: Swabs from the following sources are **not acceptable**: respiratory fluid (eg, sputum), nasal, sinus, outer ear, mouth, throat, or scalp. Surgically collected inner ear swabs **are** acceptable.

Forms

If not ordering electronically, complete, print, and send 1 of the following:
-Microbiology Test Request (T244)
-General Request (T239)

Specimen Minimum Volume

See Specimen Required

Reject Due To

Blood, Serum or fixed tissue Environmental sources Specimen in viral transport medium (including but not limited to M4, M5, BD viral transport media, thioglycolate broth) Saliva Swab sources	Reject

of respiratory fluids (eg, sputum) Swab sources of nasal, sinus, outer ear, mouth, throat, or scalp Wood shaft or charcoal swab Petri dish Boric acid tubes Culture transport swab (eg, Culturette)	

Specimen Stability Information

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

Clinical & 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 *Mycobacterium avium* complex and *Mycobacterium 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 approximately 200 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 anti-mycobacteria 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 1963 patient specimens were cultured, including 1519 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. Martin I, Pfyffer GE, Parrish N: Mycobacterium: General characteristics, laboratory detection and staining procedures. In: Carroll KC, Pfaller MA, Landry ML, et al, eds. Manual of Clinical Microbiology. 12th ed. Vol 1. ASM Press;2011:472-5022.

2.Banaei N, Musser KA, Salfinger M, Somoskovi A, Zelazny AM. Novel assays/applications for patients suspected of mycobacterial diseases. Clin Lab Med. 2020;40(4):535-552. doi:10.1016/j.cll.2020.08.010

3. Lafont E, Conan PL, Rodriguez-Nava V, Lebeaux D. Invasive nocardiosis: Disease presentation, diagnosis and treatment - old questions, new answers? Infect Drug Resist. 2020;13:4601-4613. doi:10.2147/IDR.S249761

Performance

Method Description

The BACTEC MGIT 960 System is a broth system designed for the rapid detection of mycobacteria in clinical specimens. Mycobacteria Growth Indicator Tubes (MGIT) are incubated for up to 42 days and growth is evaluated with mycobacteria identified as soon as a MGIT signals positive on the instrument.

In addition to the MGIT tube, Middlebrook 7H10/7H10S agar biplates are inoculated and incubated at 37 degrees C for 42 days. Growth from positive MGITs or agar plates is identified using a variety of techniques as appropriate including rapid polymerase chain reaction, matrix assisted laser desorption ionization-time of flight (MALDI-TOF) mass spectrometry, or 500 basepair 16S rRNA gene sequencing.

The *Mycobacterium tuberculosis* complex will be identified to the species level upon request using rapid polymerase chain reaction.(Martin I, Pfyffer GE, Parrish N: Mycobacterium: General characteristics, laboratory detection and staining procedures. In: Carroll KC, Pfaller MA, Landry ML, et al, eds. Manual of Clinical Microbiology. 12th ed. Vol 1. ASM Press; 2019:558-575; 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;49[7]:2562-2567. doi:10.1128/JCM.00467-11)

PDF Report
No

Day(s) Performed
Monday through Sunday

Report Available
42 to 70 days

Specimen Retention Time
Raw specimen 3 to 7 days; Isolates from positive cultures kept 1 year.

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

Fees & 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 account representative. For assistance, contact Customer Service.

Test Classification
This test has been cleared, approved, or is exempt by the US 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-Id, Mtb Speciation, PCR (if appropriate)
87153-Mycobacteria Identification by Sequencing (if appropriate)
87176-Tissue Processing (if appropriate)
87150- Id, MTB complex Rapid PCR (if appropriate)

LOINC® Information

Test Definition: CTB

Mycobacteria and Nocardia Culture, Varies

Test ID	Test Order Name	Order LOINC® Value
CTB	Mycobacterial Culture	543-9

Result ID	Test Result Name	Result LOINC® Value
CTB	Mycobacterial Culture	543-9