DIAGNOSTIC LABORATORY SERVICES, INC.

LABORATORY MEDICINE BULLETIN

Mycobacterium tuberculosis complex: Detection methods

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The members of the genus *Mycobacterium* are responsible for causing a variety of disease worldwide. An estimated 2 billion people are currently infected with *M. tuberculosis* and other *Mycobacterium species*, and an estimated 3 million people worldwide die annually from associated complications.

The incidence of tuberculosis (TB) in the United States is on the rise, some of which can be attributed to: (1) HIV and the AIDS epidemic, (2) the immigration of peoples from populations and geographic areas with a high-prevalence of TB, (3) transmission in high risk settings such as hospitals and correctional institutions, and (4) the increase in multi-drug resistant organisms.

Prevention remains the most effective means of intervention, but can only be achieved with accurate and time-effective tests. With the continuing development of molecular testing methodologies, avenues for new and improved rapid and accurate testing will continue to become available.

Diagnostic Laboratory Services currently utilizes two molecular testing techniques to detect the presence of *M. tuberculosis* complex, the Amplified Mycobacterium Tuberculosis Direct Test and Mycobacterium Tuberculosis Complex culture identification by DNA probe.

Amplified Mycobacterium Tuberculosis Direct Test (MTD)

The MTD test qualitatively detects the presence of *M. tuberculosis* complex ribosomal ribonucleic acid (rRNA). The rRNA, if present within the patient sample, is amplified using Transcription-Mediated Amplification (TMA). The resultant RNA amplicons are then hybridized to a specific labeled DNA probe. The subsequent RNA:DNA hybrids are detected using a luminometer. The test is intended for use in patients who are suspected of having pulmonary TB based on clinical evaluation and who have never received antituberculosis therapy, received less than 7 days of therapy, or have not received therapy in the last 12 months. The test is intended for use with sputum (induced or expectorated), bronchial aspirates or lavage, and tracheal aspirates. Blood, CSF, tissue, urine, and stool are not appropriate specimens and use of the test for these specimen types is strongly discouraged. Bloody specimens can also give false positive results with the assay and should not be submitted.

The sensitivity and specificity of the test are 72.0% and 99.3% respectively for AFB smear negative patients and 96.9% and essentially 100% respectively for AFB smear positive patients. The PPV and NPV of the test range from 96.2-50.8% and 93.4-99.7%

respectively for AFB smear negative patients and essentially 100% and 88.8%-99.2% respectively for AFB smear positive patients.

Mycobacterium Tuberculosis Complex Culture Identification Test by DNA Probe

The Mycobacterium Tuberculosis Complex Culture Identification Test by DNA probe is performed on ***positive AFB culture specimens,*** as determined by the microbiology lab. It is not approved for use or performed directly on a patient's sample. In this assay, ribosomal RNA is released from the organism(s) obtained from a positive AFB culture. A labeled DNA probe then hybridizes to the specific target ribosomal RNA to form a stable DNA:RNA hybrid which can then be detected with a luminometer. The sensitivity and specificity of the test is 99.9% and 100% respectively. Because of the need for initial specimen processing and incubation, time to results will be longer than those obtained by the direct MTD test.

Test name	Test Code	Price	CPT code
Amplified Mycobacterium Tuberculosis Direct Test (MTD)	643	$195	87556
Mycobacterium Tuberculosis Complex ID by DNA Probe	Orderable by Microbiology only	$140	87555

	MTD test	TB complex ID
Methodology	RNA amplification	DNA probe
Test Site	Special Chemistry	Microbiology
Specimen Requirement	3-5 ml sputum specimen	Specimen for AFB culture
Other acceptable specimens	Bronchial specimens, tracheal aspirates	
Storage Stability	Refrigerated (up to 3 days)	
Test Schedule	2X per week	2X per week

For additional information or questions, please contact client services at 589-5101 or your marketing representative.

REFERENCES:

Koneman, E.W., Allen, S.D., Janda, W.M., Schreckenberger, P.C., and Washington, W.C. Jr. Color Atlas and Textbook of Diagnostic Microbiology. Ed. 5, J.P. Lippincott Company. Philadelphia, PA, 1997.

Murray, P.R., Baron, E.J., Jorgensen, J.H., Pfaller, M.A., and Yolken, R.H. Manual of Clinical Microbiology, Volume 1, 8th Ed. ASM Press, Washington, D.C., 2003.

Amplified Mycobacterium Tuberculosis Direct Test, IN0014 Rev. L, Package Insert. Gen-Probe Incorporated, 2001.

AccuProbe Mycobacterium tuberculosis complex Culture Identification Test, 102896 Rev. L, Package Insert. Gen-Probe Incorporated, 2001.