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## NEW YORK CITY DEPARTMENT OF HEALTH AND MENTAL HYGIENE

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### Rapid Confirmatory Tests for Tuberculosis (TB) Fact Sheet

The rapid and accurate diagnosis of tuberculosis (TB) remains a global challenge. The microscopic examination of specimens for acid-fast bacilli (AFB) is simple, inexpensive and rapid and has relatively high specificity for mycobacterial species. Therefore for over 100 years, it has remained the most widely used diagnostic test in most parts of the world. However, many patients with a positive AFB smear do not have TB. Therefore, the AFB smear examination is not as specific for *Mycobacterium tuberculosis* complex (*M. tbc*) due to the frequent presence of other mycobacteria in clinical specimens. In addition, many patients have smear negative tuberculosis.

The detection of *M. tbc* with traditional laboratory culture methods requires 1-8 weeks. However, new direct molecular methods can detect *M. tbc* directly from clinical specimens within 3-5 hours

#### Nucleic acid amplification (NAA)

In 1995-96, the Food and Drug Administration (FDA) approved two rapid diagnostic tests based on NAA assays: the Gen-Probe AMPLIFIED™ *Mycobacterium tuberculosis* Direct (MTD) Test for AFB smear positive or negative respiratory specimens and the Roche AMPLICOR® *Mycobacterium tuberculosis* (MTB) Test for smear-positive specimens only. The NAA tests identify genetic material unique to *M. tbc* directly from processed respiratory specimens. Most clinical experience is with the test from patients with moderate to high clinical suspicion of TB.

The tests' sensitivity ranges from 95-100% in AFB smear-positive specimens and 60-80% in smear-negative respiratory specimens from patients with a high clinical suspicion of TB. These tests can be used to rapidly rule out TB in AFB smear-positive patients, and detect TB in smear-negative cases (MTD), leading to improved patient care, reduced medical costs, and more effective use of isolation rooms.

#### Use and interpretation of rapid diagnostic tests

With nearly 96% sensitivity and 100% specificity in AFB smear-positive respiratory specimens, NAA tests are superior to smears for diagnosing TB. Although not FDA approved, studies indicate that the sensitivity and specificity of the tests in non respiratory specimens are comparable. These tests are recommended for AFB smear positive respiratory specimens from persons never treated for TB or have received < 7 days of anti TB treatment during the past year; in addition, the MTD is approved for use in AFB smear-negative respiratory specimens from patients with high clinical suspicion of TB.

In New York City, between 2000 and 2004, 4787 pulmonary AFB smear positive patients were reported. Of these, 2315 (48%) had NAA done and only 1349 (58%) had confirmed TB (of these 93% had a positive NAA). The other 966 (42%) did not have TB and 98.4% of these smear positive patients had a negative NAA test. Few AFB smear negative patients with pulmonary TB have had NAA tests.

A positive NAA test in conjunction with an AFB positive smear is highly predictive of TB disease. However, the results of NAA tests are considered preliminary; mycobacterial culture is still needed for species identification/confirmation and for drug susceptibility testing.

A negative NAA with an AFB positive smear indicates that the AFB is probably non tuberculous mycobacteria. In the absence of clinical symptoms, these results may lead the physician to discontinue

isolation and anti TB treatment; moreover, there may be no need for a contact investigation. The diagnosis in such a case will depend on the overall clinical evaluation, medical judgment, and repeat NAA or other methods of growth and detection of *M. tbc*.

## Limitations

The two NAA based tests are highly sensitive and specific for *M. tbc* on specimens that are smear positive for AFB. In addition, the MTD test has acceptable sensitivity in AFB smear negative respiratory specimens; however, there are occasional false negative or false positive results. Although these tests are reported to be almost 96% sensitive, the result can be falsely negative if there are very few tubercle bacilli or if inhibitors present in the specimen prevents detection of *M. tbc*. Conversely, although the NAA tests are reported to be almost 100% specific, the result can be falsely positive because of laboratory contamination.

In addition, the NAA test can amplify rRNA from both viable and non viable organisms, and therefore may detect non viable tubercle bacilli expelled by an individual being treated for TB; the test result may be positive even though the treatment has decreased the likelihood that the TB is infectious.

## Laboratories that offer rapid diagnostic testing

Two laboratories – the NYC Public Health Laboratory and the Wadsworth Center of the New York State Department of Health (NYS DOH) - provide the MTD test at no charge when TB is newly suspected. The provider can directly send - or the hospital lab can forward - the specimens to the appropriate lab.

### Free MTD Testing

All of the following criteria should be met:

- High clinical suspicion of TB, previously untreated or <7 days of treatment
- Respiratory specimen, **or**
- Non-respiratory specimens (request from the lab on a case by case basis if clinical suspicion is high)

Public Health Laboratory  
212-447-6745  
Obtain order form (TN50)  
<http://healthweb.health.nycnet/pdf/tb/form/tn50.pdf>

Wadsworth Center, NYS DOH  
518-474-4158  
email: [tblab@health.state.ny.us](mailto:tblab@health.state.ny.us) or for more  
information, visit  
<http://www.wadsworth.org/mycobac/index.htm>

When used as approved, a positive MTD test can provide relatively rapid feedback, indicating a high likelihood of TB. However, the test should be interpreted in a clinical context; the final decision as to the use and interpretation of the MTD rests with the physician.

## References

- CDC. Nucleic acid amplification tests for tuberculosis. *MMWR* 1996; 45:950-2.
- CDC. Update: nucleic acid amplification tests for tuberculosis. *MMWR* 2000; 48:593-4.
- Catanzaro A, Davidson BL, Fujiwara PI, et al. Proceedings of the American Thoracic Society Workshop. Rapid diagnostic tests for tuberculosis: what is the appropriate use? *Am J Respir Crit Care Med* 1997; 155:1804-14.
- Pfyffer GE, Kissling P, Jahn EM, et al. Diagnostic performance of amplified *Mycobacterium tuberculosis* direct test with cerebrospinal fluid, other non-respiratory and respiratory specimens. *J Clin Microbiol* 1996; 34:834-41.
- Gamboa F, Manterola JM, Lonca J, et al. Rapid detection of *Mycobacterium tuberculosis* in respiratory specimens, blood and other non-respiratory specimens by amplification of rRNA. *Int J Tuberc Lung Dis* 1997; 1:542-55.
- Forbes B. Critical assessment of gene amplification approaches on the diagnosis of tuberculosis. *Immunol. Investig.* 1997; 26:105-116.