

## WHAT IS A NAAT FOR TB?

A nucleic acid amplification test, or NAAT, for tuberculosis (TB) is a molecular test used to detect the DNA (deoxyribonucleic acid) of *Mycobacterium tuberculosis* complex (MTBC) in a sputum or other respiratory sample. Because the amount of DNA in a sample is very small, NAA testing includes a step that amplifies (or copies) the genetic material. Polymerase Chain Reaction (PCR) is a common form of NAAT used in laboratory diagnosis. GeneXpert® MTB/RIF test is a PCR that simultaneously detects MTBC and the genetic mutation that confers rifampin (RIF) resistance.

## WHAT ARE THE ADVANTAGES OF A NAAT FOR TB?

- ✓ A NAAT can detect MTBC genetic material even when very small amounts are present in the sample tested.
- ✓ NAAT results are typically available in 24 to 48 hours.
- ✓ Rapid results enable earlier diagnosis of TB, earlier initiation of treatment, a reduced period of infectiousness, and improved patient outcomes.
- ✓ The GeneXpert MTB/RIF NAAT also provides rapid identification of RIF resistance, a predictor of multi-drug resistant TB. In most cases, patients resistant to RIF are also resistant to isoniazid (INH).

## DOES A NAAT FOR TB REPLACE AN AFB SMEAR OR CULTURE?

A NAAT does **not** replace the need for an acid-fast bacilli (AFB) smear or culture. Culture remains the gold standard for laboratory confirmation of TB and is required for drug-susceptibility testing and genotyping.

## WHEN SHOULD A NAAT BE ORDERED?

- ✓ Order a NAAT on at least one respiratory specimen from a patient with signs and symptoms of pulmonary TB when a diagnosis of TB is considered, but not yet confirmed.
- ✓ If unable to access a laboratory which performs the NAAT, send a specimen to the Pennsylvania Department of Health Bureau of Laboratories (BOL). The BOL TB molecular testing guidelines are available at <http://bit.ly/TBMolecularTesting> and the BOL specimen submission form at <http://bit.ly/BOLMicroSpecimen>.

## HOW ARE NAAT RESULTS INTERPRETED?

- ✓ If the NAAT and AFB smear are both positive, presume the patient has TB and begin anti-TB treatment while awaiting the culture results.
- ✓ If the NAAT is positive and the AFB smear negative, **the clinician should be highly suspicious of active TB** but use clinical judgement whether to begin anti-TB treatment while awaiting the culture results.
  - **In a patient with high suspicion of having TB, TB treatment should be initiated.**

- In a patient with little suspicion of having TB, a single positive NAAT should be viewed with suspicion and the result interpreted in the context of other clinical, radiographic and laboratory findings. If TB is still not suspected, consider whether to do additional diagnostic tests including another NAAT.
- ✓ If the NAAT is negative and the AFB smear is positive, confirm that inhibition testing was performed as part of the NAAT. This is done automatically for PCR testing performed at the BOL and is part of the GeneXpert MTB/RIF test.
- ✓ If the NAAT and AFB smear are both negative, use clinical judgement whether to begin anti-TB treatment while awaiting the results of the culture and any other diagnostic tests.
  - A single negative NAAT result does not definitively exclude TB. The bacterial load in the sample may fall below the detectable limit of the NAAT. Currently available NAATs are not sufficiently sensitive (detecting 50% to 80% of AFB-smear negative, culture positive pulmonary TB cases) to exclude a diagnosis of TB in AFB smear-negative patients suspected of having TB.

## RESOURCES FOR MORE INFORMATION

For more information about NAA testing, see the 2009 CDC Updated Guidelines for the Use of Nucleic Acid Amplification Tests in the Diagnosis of Tuberculosis, available at <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5801a3.htm>.

If you have any questions about NAA testing for TB, call the Pennsylvania TB Program at (717) 787-6267.