TB Elimination

QuantiFERON-TB Test

What is it?

The QuantiFERON-TB test (QFT) is a whole-blood test for diagnosing latent tuberculosis (TB) infection (LTBI). If not detected and treated, LTBI may later develop into TB disease. The QFT measures the patient's immune reactivity to *Mycobacterium tuberculosis*, the bacterium that causes TB. This test was approved by the U.S. Food and Drug Administration (FDA) in 2001.

How does it work?

Blood samples are mixed with antigens (protein substances that can produce an immune response) and incubated for 16 to 24 hours. The antigens include tuberculin (purified protein derivative [PPD] from *M. tuberculosis)* and avian sensitin (PPD from *Mycobacterium avium* complex*)*. Controls are also included.

If the patient is infected with *M. tuberculosis*, the blood cells will recognize the tuberculin and release interferon-gamma (IFN-g) in response. The QFT results are based on the proportion of IFN-g that is released in response to tuberculin as compared to that released in response to avian sensitin and to the controls. Additional tests (such as chest radiograph) are needed to exclude TB disease and confirm the diagnosis of LTBI.

What are the advantages?

- Only requires a single patient visit.
- Assesses responses to multiple antigens simultaneously.
- Does not cause the booster phenomenon, which can happen with repeat tuberculin skin tests (TST).
- Is less subject to reader bias and error when compared to the TST.

What are the disadvantages?

- Blood samples must be processed within 12 hours after collection.
- Currently, there is limited laboratory and clinical experience with the QFT.
- The ability of the QFT in predicting a patient's risk of progression to TB disease has not been evaluated.
- As with the TST, additional tests are needed to exclude TB disease and confirm diagnosis of LTBI.

When should you use the test?

Testing programs using the QFT should only be implemented if plans are also in place for the necessary follow-up medical evaluation (such as chest radiograph) and treatment.

Before the QFT is conducted, arrangements should be made with a qualified laboratory to ensure proper processing of blood within the required 12 hours.

The role of the QFT in targeted testing has not yet been defined, but the QFT can be considered for LTBI testing as follows:

- Initial and serial testing of persons with an increased risk of LTBI (such as recent immigrants, injection-drug users, and residents and employees of prisons, jails, and homeless shelters).

CDC discourages use of diagnostic tests for LTBI among populations at low risk for infection with *M. tuberculosis*. However, initial testing is occasionally performed among certain population groups for surveillance purposes or where cases of infectious TB disease might result in extensive transmission to highly susceptible populations, including the following:

- Initial and serial testing of persons who are by history at low risk for LTBI but whose future

activity may place them at increased risk of exposure, and others eligible for LTBI surveillance programs (such as health care workers and military personnel).

- Testing of persons for whom LTBI screening is performed but who are not considered to have an increased possibility of infection (such as persons meeting entrance requirements for certain schools and workplaces).

When should the test not be used?

Because of insufficient evidence on which to base recommendations at this time, the QFT is not recommended for the following:

- Evaluation of persons with suspected TB disease.
- Assessment of contacts of persons with infectious TB disease.
- Screening of children under 17 years of age, pregnant women, or persons with clinical conditions that increase the risk of progression of LTBI to TB disease.
- Confirmation of TST results, because injection of tuberculin may affect subsequent QFT results.
- Diagnosis of *M. avium* complex disease.

What are the steps in administering the test?

- Select an appropriate patient.
- Draw a sample of whole blood from patient into a tube with an anti-clotting agent (heparin), according to manufacturer's instructions.
- Deliver processed blood to a laboratory within 12 hours.
- Schedule an appointment for the patient to receive test results and, if infected, medical evaluation and possible treatment for LTBI.

How do you interpret test results?

Interpretation of QFT results is influenced by the patient's estimated risk for LTBI. Patients at low risk need to produce a stronger tuberculin response – as compared to patients at increased risk of LTBI – before they are considered infected.

The QFT and the TST do not measure the same components of the immunologic response and are not interchangeable. However, confirmation of QFT results with a TST is possible because the use of the QFT does not affect subsequent QFT or TST results. The probability of LTBI is greatest when both the QFT and TST are positive. Conducting additional tests and assessments for TB signs and symptoms to rule out TB disease is necessary.

Considerations for confirmation are as follows:

- When the probability of LTBI is low, confirmation of a positive QFT result with a TST is recommended before initiation of LTBI treatment. LTBI therapy is not recommended for persons at low risk who are QFT-negative, or who are QFT-positive but TST-negative.
- The TST can also be used to confirm a positive QFT for persons at increased risk for LTBI. However, the need for LTBI treatment when the QFT is positive and the subsequent TST is negative should be based on clinical judgment and perceived risk.
- Negative QFT results do not require confirmation, but results can be confirmed with either a repeat QFT or a TST if the accuracy of the initial test is in question.

Additional Information

Centers for Disease Control and Prevention, "Guidelines for Using the QuantiFERON-TB Test for Diagnosing Latent *Mycobacterium Tuberculosis* Infection," *MMWR* 2003; 52 (RR-02): 15-18. http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5202a2.htm

Food and Drug Administration, "QuantiFERON: Summary of Safety and Effectiveness Data," http://www.fda.gov/cdrh/pdf/p010033.html