Rapid Response™

Tuberculosis Test Cassette
(Whole Blood/Serum/Plasma)

REF TUB-13C40 Product Insert

A rapid test for the qualitative detection of anti-TB antibodies (Isotypes IgG, IgM and IgA) in human whole blood, serum or plasma specimens.

For professional *in vitro* diagnostic use only.

Intended Use

The Rapid Response™ Tuberculosis Test Cassette is a rapid chromatographic immunoassay for the qualitative detection of anti-TB antibodies (Isotypes IgG, IgM and IgA) in whole blood, serum or plasma specimens.

Summary

Tuberculosis (TB) is spread primarily via airborne transmission of aerosolized droplets developed by coughing, sneezing and talking. Areas of poor ventilation pose the greatest risk of exposure to infection. TB is a major cause of morbidity and mortality worldwide, resulting in the greatest number of deaths due to a single infectious agent. The World Health Organization reports that more than 8 million new cases of active tuberculosis are diagnosed annually. Almost 3 million deaths are attributed to TB as well.[1,2] Timely diagnosis is crucial to TB control, as it provides early initiation of therapy and limits further spread of infection. Several diagnostic methods for detecting TB have been used over the years including skin test, sputum smear, and sputum culture and chest x-ray. But all these methods have some limitations. Newer tests, such as PCR-DNA amplification or interferon-gamma assay, have been recently introduced. However, the turn-around time for these tests is long, they require laboratory equipment and skilled personnel, and some are neither cost effective nor easy to use.[3] These tests are also expensive and not practical for developing countries. Serological methods constitute an attractive alternative, since TB serodiagnosis is simple, inexpensive, relatively non-invasive, and it does not depend on detection of mycobacteria.[4,5,6]
The Rapid Response™ Tuberculosis Test Cassette is a rapid test for qualitative detection of anti-TB antibodies (Isotypes IgG, IgM and IgA) in whole blood, serum or plasma specimens. The test utilizes a combination of recombinant antigens to detect elevated levels of anti-TB antibodies in whole blood, serum or plasma specimens.

Principle

The Rapid Response™ Tuberculosis Test Cassette is a qualitative, solid phase, two-site sandwich immunoassay for the detection of anti-TB antibodies in whole blood, serum or plasma specimens. The membrane is pre-coated with TB recombinant antigen on the test line region of the Cassette. During testing, the anti-TB antibodies, if present in whole blood, serum or plasma specimen react with the particles coated with TB recombinant antigen. The mixture migrates upward on the membrane chromatographically by capillary action to react with TB recombinant antigen on the membrane and generate a colored line. The presence of this colored line in the test region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred.

Reagents

The test cassette contains TB recombinant antigen coated particles and TB recombinant antigen coated on the membrane.

Precautions

- For professional *in vitro* diagnostic use only. Do not use after expiration date.
- Do not eat, drink or smoke in the area where the specimens or kits are handled.
- Do not use test if the package is damaged.
- Handle all specimens as if they contain infectious agents. Observe established precautions against microbiological hazards throughout testing and follow the standard procedures for proper disposal of specimens.
- Wear protective clothing such as laboratory coats, disposable gloves and eye protection when specimens are being tested.
- Humidity and temperature can adversely affect results.
- The used test should be discarded according to local regulations.
- Do not use potassium oxalate as anticoagulant to collect plasma or venous blood samples.

Materials

Materials provided

- Test cassettes
- Product insert
- Disposable specimen droppers
- Buffer (for whole blood only)

Materials required but not provided

- Specimen collection containers
- Lancets (for fingerstick whole blood only)
- Centrifuge
- Timer

Storage and Stability

The kit can be stored at room temperature or refrigerated (35.6-86°F; 2-30°C). The test cassette is stable through the expiration date printed on the sealed pouch. The test cassette must remain in the sealed pouch until use. **DO NOT FREEZE.** Do not use beyond the expiration date.

Specimen Collection and Preparation

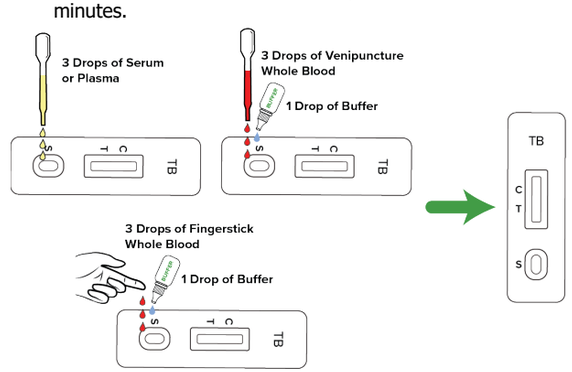
- The Rapid Response™ Tuberculosis Test Cassette can be performed using whole blood (from venipuncture or fingerstick) serum, or plasma specimens.
- To collect Venipuncture Whole Blood Specimens: Collect anti-coagulated blood sample (EDTA, heparin, and sodium citrate) following standard laboratory procedures.
- To collect Fingerstick Whole Blood Specimens:
  - Wash the patient's hand with soap and warm water or clean with an alcohol swab. Allow to dry.
  - Massage the hand without touching the puncture site by rubbing down the hand towards the fingertip of the middle or ring finger.
  - Puncture the skin with a sterile lancet. Wipe away the first sign of blood.
  - Gently rub the hand from wrist to palm to finger to form a rounded drop of blood over the puncture site.
  - Add the Fingerstick Whole Blood specimen to the test cassette by using hanging drop:
    - Position the patient's finger so that the drop of blood is just above the specimen well (S) of the test cassette.
    - Allow 3 hanging drops of fingerstick whole blood to fall into the center of specimen well (S) on the test cassette, or move the patient's finger so that the hanging drop touches the center of the specimen well (S). Avoid touching the finger directly to the specimen well (S).
- Separate serum or plasma from blood as soon as possible to avoid hemolysis. Use only clear, non-hemolyzed specimens.
- Testing should be performed immediately after specimen collection. Do not leave the specimens at room temperature for prolonged periods. Serum and plasma specimens may be stored at 35.6-46.4°F (2-8°C) for up to 3 days. For long term storage, specimens should be kept below -4°F (-20°C). Whole blood collected by venipuncture should be stored at 35.6-46.4°F (2-8°C) if the test is to be run within 2 days of collection. Do not freeze whole blood specimens. Whole blood collected by fingerstick should be tested immediately.
- Bring specimens to room temperature prior to testing. Frozen specimens must be completely thawed and mixed well prior to testing. Specimens should not be frozen and thawed repeatedly.
- If specimens are to be shipped, they should be packed in compliance with federal regulations covering the transportation of etiologic agents.

Test Procedure

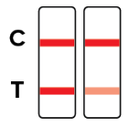
Allow the test cassette, specimen, buffer, and/or controls to equilibrate to room temperature (59-86°F; 15-30°C) prior to testing.

1. Remove the test cassette from the sealed foil pouch and use it as soon as possible. Best results will be obtained if the assay is performed immediately after opening the foil pouch.
2. Place the cassette on a clean and level surface.
- For **Serum or Plasma** Specimens:
  - Hold the dropper vertically, transfer 3 drops of serum or plasma (approximately 75 µL) to the specimen well (S) of test cassette and then start the timer. See illustration below.
- For **Venipuncture Whole Blood** Specimens:
  - Hold the dropper vertically and transfer 3 drops of venipuncture whole blood (approximately 75 µL) to the specimen well (S) of test cassette, then add 1 drop of buffer (approximately 40 µL) and start the timer. See illustration below.
- For **Fingerstick Whole Blood** Specimens:
  - Allow 3 hanging drops of fingerstick whole blood (approximately 75 µL) to fall into the center of the specimen well (S) of test cassette, then add 1 drop of buffer (approximately 40 µL) and start the timer. See illustration below.

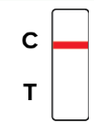
3. Wait for the colored line(s) to appear. The result should be read at 10 minutes. Do not interpret the result after 30 minutes.



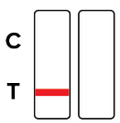
Results Interpretation



POSITIVE:* Two distinct colored lines appear. One line should be in the control region (C) and another line should be in the test region (T). ***NOTE:** The intensity of the color in the test line region (T) will vary depending on the concentration of anti-TB antibodies present in the specimen. Therefore, any shade of color in the test region (T) should be considered positive.



NEGATIVE: One colored line appears in the control region (C). No apparent colored line appears in the test region (T).



INVALID: Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test Cassette. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

Quality Control

A procedural control is included in the test. A colored line appearing in the control region (C) is the internal procedural control. It confirms sufficient specimen volume and correct procedural technique. Control standards are not supplied with this kit; however, it is recommended that positive and negative controls be tested as a good laboratory practice to confirm the test procedure and to verify proper test performance. Some preservatives may interfere with the operation of the test. External controls should be validated before use to ensure valid results.

Limitations

1. The Rapid Response™ Tuberculosis Test Cassette is for *in vitro* diagnostic use only.
2. The test should be used for the detection of anti-TB antibodies in whole blood, serum or plasma specimens. Neither the quantitative value nor the rate of increase in anti-TB antibodies concentration can be determined by this qualitative test.
3. The Rapid Response™ Tuberculosis Test Cassette will only indicate the presence of anti-TB antibodies in the specimen and should not be used as the sole criteria for the diagnosis of active tuberculosis diagnosis.
4. As with all diagnostic tests, all results must be considered with other clinical information available to the physician.

Performance Characteristics

Clinical Sensitivity, Specificity and Accuracy

The Rapid Response™ Tuberculosis Test Cassette has been calibrated against specimens that have been collected from individuals found to be either smear positive/negative or culture positive/negative. The results show that the relative sensitivity of the Rapid Response™ Tuberculosis Test Cassette is 86.4%, the relative specificity is 99.0 % and the relative accuracy is 96.7%.

Rapid Response™ Tuberculosis Test Cassette vs. Smear/Culture

Method		Smear/Culture		Total Results
Rapid Response™ Tuberculosis Test Cassette	**Results**	Positive	Negative	
	Positive	95	5	100
	Negative	15	500	515
Total Results		110	505	615

Relative Sensitivity: 86.4% (95%CI*: 78.5%~92.2%);
Relative Specificity: 99.0% (95%CI*: 97.7%~99.7%);
Relative Accuracy: 96.7% (95%CI*: 95.0%~98.0%).
*Confidence Intervals

Precision

Intra-Assay

Within-run precision has been determined by using 20 replicates of four specimens: a negative, a low positive, a middle positive and a high positive. The negative, low positive, middle positive, high positive values were correctly identified >99% of the time.

Inter-Assay

Between-run precision has been determined by 5 independent assays on the same four specimens: The negative, low positive, middle positive, high positive values. Three different lots of the Rapid Response™ Tuberculosis Test Cassette have been tested using negative, low positive, middle positive and high positive specimens. The specimens were correctly identified >99% of the time.

Cross-Reactivity

The Rapid Response™ Tuberculosis Test Cassette has been tested with specimens positive for: anti-HIV, pulmonary diseases, anti-CMV, Rheumatoid factor (RF), anti-HCV and specimens from children below 15 years, who have been administered BCG vaccine. No cross-reactivity was observed, indicating that the performance of the Rapid Response™ Tuberculosis Test Cassette is stable in presence of these factors.

Interfering Substances

The Rapid Response™ Tuberculosis Test Cassette has been tested for possible interference from visibly hemolyzed and lipemic specimens, as well as serum specimens containing high bilirubin levels. Results indicate that no interference was observed in specimens containing up to 500 mg/dL hemoglobin; up to 30 mg/dL bilirubin; and up to 2,000 mg/dL human serum albumin.

Bibliography

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4. Bothamley G.H. Serological diagnosis of tuberculosis. Eur. Resp. J. (1995), 8: 676s-688s.
5. Lyashchenko K., Colangeli R., Houde M., Jahdali H.A., Menzies D., and Gennaro M.L. Heterogenous antibody responses in tuberculosis. Infect. Immun. (1998), 66: 3936-3940.
6. Lyashchenko K.P., Singh M., Colangeli R., and Gennaro M.L. A multi-antigen print immunoassay for the serological diagnosis of infectious diseases. J. Immunol. Methods (2000), 242: 91-100.

Glossary of Symbols

Consult instructions for use	Test per Kit	Authorized Representative
Store between 35.6°F to 86°F	Use by	Do Not Reuse
Lot Number	For *in vitro* diagnostic use only	Catalogue #
Manufacturer	Do not use if package is damaged	

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