Typhoid Rapid Test Cassette (Whole Blood/Serum/Plasma) Package Insert

For professional in vitro diagnostic use only

A rapid test for the qualitative detection of IgG and IgM antibodies to Salmonella typhi (S. typhi) in human whole blood, serum or plasma specimen.

INTENDED USE

The Typhoid Rapid Test Cassette is a rapid chromatographic immunoassay for the simultaneous detection and differentiation of IgG and IgM types of antibodies against Salmonella typhi (S. typhi) in human serum or plasma. It is intended to be used as a screening test as an aid in the diagnosis of infection with S. typhi. Any reactive specimen with the Typhoid rapid test cassette needs to be confirmed with alternative testing method.

SUMMARY

Typhoid fever is caused by S. typhi, a Gram-negative bacterium. World-wide an estimated 17 million cases and 600,000 associated deaths occur annually[1]. Patients who are infected with HIV are at significantly increased risk of clinical infection with S. typhi[2]. Evidence of h. pylori infection also presents an increase risk of acquiring typhoid fever. 1-5% of patients become chronic carrier harboring S. typhi in the gallbladder.

The clinical diagnosis of typhoid fever depends on the isolation of S. typhi from blood, bone marrow or a specific anatomic lesion in the facilities that cannot afford to perform this complicated and time consuming procedure, Widal test (also referred as Weil-Felix Test) is used to facilitate the diagnosis. However, many limitations lead to difficulties in the interpretation of the Widal test [3, 4].

In contrast, the Typhoid Rapid Test Cassette is a simple and rapid laboratory test. The test simultaneously detects and differentiates the IgG and the IgM antibodies to S. typhi specific antigen[5] in whole blood, serum or plasma thus aid in the determination of current or previous exposure the S. typhi.

PRINCIPLE

The Typhoid Rapid Test Cassette is a qualitative, membrane based immunoassay for the detection of antibodies (IgG and IgM) to Salmonella typhi (S. typhi) in human whole blood, serum or plasma. The diagnostic test cassette consists of two components: an IgG component and an IgM component. The IgG line region is pre-coated with reagents for the detection of anti-S. typhi (IgG). The IgM line region is pre-coated with monoclonal anti-human IgM for detection of anti-S. typhi (IgM).

During testing, specimen dispensed into the sample well of the test cassette binds with Typhoid conjugates impregnated in the reagent area, if the specimen contains anti-Typhoid antibodies. The immunocomplex thus formed migrates by capillary action. If the present antibodies in specimen are of IgG types, the immunocomplex is then captured by the pre-coated reagents on the membrane, forming a colored IgG line, indicating a S. typhi IgG positive test result. If the present antibodies in the specimen are of IgM type, the immunocomplex would be captured on the membrane by the pre-coated anti-human IgM antibody, forming a colored IgM line, indicating a S. typhi IgM positive test result.

Absence of any T lines (IgM and IgG) indicates a negative result. A colored control line (C) should always appear in case of a positive or a negative result. Its absence indicates invalid test results.

REAGENTS

The test contains mouse anti-human IgM, mouse anti-human IgG and Typhoid antigen. A goat antibody is employed in the control line system.

PRECAUTIONS

1. For in vitro diagnostic use only. Do not use after the expiration date.
2. Do not smoke, drink, or eat in areas where specimens or kits reagents are handled.
3. Dispose of all specimens and materials used to perform the test as biohazardous waste.
4. This package insert must be read completely before performing the test.
5. Bring all reagents to room temperature (15℃-30℃) before use.
6. Do not interchange the buffer and test cassettes of different lots.
7. Do not use hemolyzed blood specimen for testing.

STORAGE AND STABILITY

Store as packaged in the sealed pouch at room temperature or refrigerated (2-30°C). The test is stable through the expiration date printed on the sealed pouch. The test must remain in the sealed pouch until use. DO NOT FREEZE. Do not use beyond the expiration date.

SPECIMEN COLLECTION AND PREPARATION

- The Typhoid Rapid Test Cassette (Whole Blood/Serum/Plasma) can be performed using whole blood (from venipuncture or fingerstick), serum or plasma.
- 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 by using a capillary tube:
    - Touch the end of the capillary tube to the blood until filled to approximately 40 µL. Avoid air bubbles.
    - Place the bulb onto the top end of the capillary tube, then squeeze the bulb to dispense the whole blood to the specimen area of the test cassette.
  - Add the Fingerstick Whole Blood specimen to the test by using hanging drops:
    - Position the patient's finger so that the drop of blood is just above the specimen area of the test cassette.
    - Allow 1 hanging drop of fingerstick whole blood to fall into the center of the specimen area on the test cassette, or move the patient's finger so that the hanging drop touches the center of the specimen area. Avoid touching the finger directly to the specimen area.
- Separate the serum or plasma from blood as soon as possible to avoid hemolysis. Only clear, non-hemolyzed specimens can be used.
- Testing should be performed immediately after the specimens have been collected. Do not leave the specimens at room temperature for prolonged periods. Serum and plasma specimens may be stored at 2-8°C for up to 3 days. For long term storage, specimens should be kept below 20°C. Whole blood collected by venipuncture should be stored at 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 for transportation of etiologic agents

MATERIALS

Materials provided

• Test cassettes • Sample droppers • Buffer • Package insert

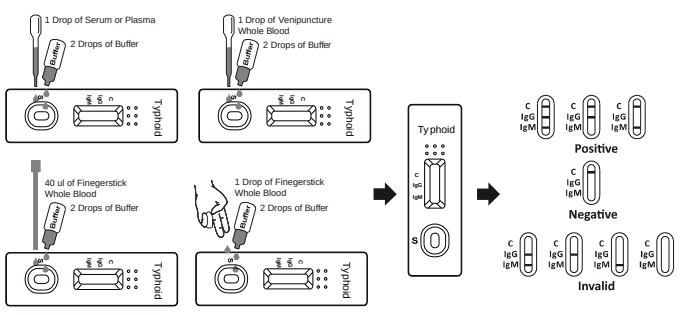
Materials required but not provided

• Specimen collection contain • Centrifuge • Timer

DIRECTIONS FOR USE

Allow test cassette, specimen, and/or controls to equilibrate to room temperature (15-30°C) prior to testing.

1. Bring the pouch to room temperature before opening it. Remove the test cassette from the sealed pouch and use it as soon as possible. Best results will be obtained if the assay is performed within one hour.
2. Place the cassette on a clean and level surface.
   For **Serum or Plasma** specimen: Hold the dropper vertically and **transfer 1 drop of serum or plasma** (approximately 40µL) to the specimen area, then **add 2 drops of buffer** (approximately 80µL),and start the timer, see illustration below.
   For **Venipuncture Whole Blood** specimen: Hold the dropper vertically and **transfer 1 drop of whole blood** (approximately 40µL) to the specimen area, then **add 2 drops of buffer** (approximately 80µL), and start the timer. See illustration below.
   For **Fingerstick Whole Blood** specimen:
   - To use a capillary tube: Fill the capillary tube **and transfer approximately 40µL of fingerstick whole blood specimen** to the specimen area of test cassette, then **add 2 drops of buffer** (approximately 80µL) and start the timer. See illustration below.
   - To use hanging drops: Allow **1 hanging drop of fingerstick whole blood specimen** (approximately 40µL) to fall into the specimen area of test cassette, then **add 2 drops of buffer** (approximately 80µL) and start the timer. See illustration below.
3. Wait for the colored line(s) to appear. Read the result at 15 minutes, do not interpret the result after 20 minutes.



INTERPRETATION OF RESULTS

(Please refer to the illustration above)

POSITIVE:* Two or three lines appear. One colored line should always appear in the control line region (C) and another one or two apparent colored line(s) should be in the test line region(s) (IgM and/or IgG).

IgM Positive: Along with line in Control region (C), a line appears in IgM region. It indicates a positive Test result for antibodies to S. typhi (Isotype IgM)

IgG Positive: Along with line in Control region (C), a line appears in IgG region. It indicates a positive Test result for antibodies to S. typhi (Isotype IgG)

***NOTE:** The intensity of the color in the test line regions (IgM and IgG) may vary depending on the concentration of Typhoid antibodies present in the specimen. Therefore, any shade of color in the test line region (IgM and/or IgG) should be considered positive.

NEGATIVE: **One colored line appears in the control line region (C)**. No line appears in the test line regions (IgM and IgG).

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. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

QUALITY CONTROL

Internal procedural controls are included in the test. A colored line appearing in the control region (C) is an internal positive procedural control. It confirms sufficient specimen volume and correct procedural technique.

LIMITATIONS

1. The assay procedure and the test result interpretation must be followed closely when performing the assay. Failure to follow the procedure may give inaccurate results.
2. The Typhoid Rapid Test Cassette is for qualitative detection of antibodies to S. typhi in human whole blood, serum or plasma. The intensity of the test band has not linear correlation with the antibody titer in the specimen.
3. A negative result only indicates absence of anti-S. typhi antibodies above detectable levels. A negative test result does not preclude the possibility of exposure to S. typhi as a negative result can occur if the quantity of anti-S typhi antibodies present in the specimen is below the detection limit of the assay, or the antibodies that are detected are not present during the stage of disease in which a sample is collected.
4. Specimens containing unusually high titer of heterophile antibodies or rheumatoid factor may affect expected results.
5. The results obtained with this test should only be interpreted in conjunction with other diagnostic procedures and clinical findings.

EXPECTED VALUES

The Typhoid Rapid Test Cassette (Whole Blood/Serum/Plasma) has been compared with a leading commercial Typhoid ELISA test. The correlation between these two systems is over 98%

PERFORMANCE CHARACTERISTICS

Sensitivity and Specificity

A clinical evaluation was conducted comparing the results obtained using the Typhoid Rapid Test Cassette to Typhoid IgG/IgM ELISA Testing. The study included 15 IgG specimens and 33 IgM specimen, and about the IgG specimen both assays identified 298 negative and 13 positive results, about the IgM specimen both assays identified 298 negative and 31 positive results.

IgM Results

Method		S. typhi EIA (IgM)		Total Results
Typhoid Rapid Test Cassette for IgM	Results	Positive	Negative	
	Positive	31	3	34
	Negative	2	298	300
Total Results		33	301	334

Sensitivity: 93.9% (95%CI*: 79.8%~99.2%)
Specificity: 99.0% (95%CI*: 97.1%~99.8%)
Accuracy: 98.5% (95%CI*: 96.5%~99.5%) *Confidence Intervals

IgG Results

Method		S. typhi EIA (IgG)		Total Results
Typhoid Rapid Test Cassette for IgG	Results	Positive	Negative	
	Positive	13	1	14
	Negative	2	298	300
Total Results		15	299	314

Sensitivity: 86.7% (95%CI*: 59.5%~89.3%)
Specificity: 99.6% (95%CI*: 98.2%~99.9%)
Accuracy: 99.0% (95%CI*: 97.2%~99.8%) *Confidence Intervals

Precision

Intra-Assay

Within-run precision has been determined by using 10 replicates of three specimens: a negative, a low positive, and a high positive. The negative, low positive, and high positive values were correctly identified >99% of the time.

Inter-Assay

Between-run precision has been determined by 10 independent assays on the same three specimens: a negative, a low positive, and a high positive. Three different lots of the Typhoid Rapid Test cassette (Whole Blood/Serum/Plasma) have been tested over a 3-day period using negative, low positive, and high positive specimens. The specimens were correctly identified >99% of the time.

Cross-reactivity

The Typhoid Rapid Test Cassette (Whole Blood/Serum/Plasma) has been tested for HBsAg, HBsAb, HbeAg, HBeAb, HBcAb, HCV, HIV, Syphilis, H. Pylori, CMV, Rubella and Toxo positive specimens. The results showed no cross-reactivity.

Interfering Substances

The following potentially interfering substances were added to Typhoid negative and positive specimens.

Acetaminophen: 20 mg/dL	Caffeine: 20 mg/dL
Acetylsalicylic Acid: 20 mg/dL	Gentisic Acid: 20 mg/dL
Ascorbic Acid: 2g/dL	Albumin: 2 g/dL
Bilirubin: 1g/dL	Oxalic Acid: 600mg/dL

None of the substances at the concentration tested interfered in the assay.

BIBLIOGRAPHY

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4. Pang T. False positive Wiadal test I non-typhoid Salmonella infection. Southeast Asian Journal of Tropical Medicine and Public Health 1989;20:163-4
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Index of Symbols

	Attention, see instructions for use	Σ	Tests per kit	EC REP	Authorized Representative
IVD	For in vitro diagnostic use only		Use by		Do not reuse
30°C 2°C	Store between 2-30°C	LOT	Lot Number	REF	Catalog #
	Do not use if package is damaged				

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