# *OnSite*® TORCH Panel Rapid Test

## REF R0253C

## Instructions for Use

### INTENDED USE

The *OnSite* TORCH Panel Rapid Test is a lateral flow chromatographic immunoassay for the qualitative detection and differentiation of IgG and IgM antibodies to *Toxoplasma gondii* (*T. gondii*), rubella virus, cytomegalovirus (CMV), herpes simplex virus 1 (HSV-1), and herpes simplex virus 2 (HSV-2) in human serum, plasma, or whole blood. It is intended to be used by healthcare professionals as an aid in the diagnosis of infection with *T. gondii,* rubella virus, CMV, HSV-1 and HSV-2.

Any interpretation or use of this preliminary test result must also rely on other clinical findings as well as on the professional judgment of health care providers. Alternative test method(s) should be considered to confirm the test result obtained by this device.

### SUMMARY AND EXPLANATION OF THE TEST

*T. gondii* is an obligate intracellular protozoan parasite with a worldwide distribution[1, 2]. Serological data indicates that approximately 30% of the population of most industrialized nations is chronically infected with the organism[3]. Women initially infected with *T. gondii* during pregnancy possess a risk of transmission to their unborn child. Seronegative women should avoid risk factors for *T. gondii* transmission including owning cats, eating raw and undercooked meats, and gardening[4].

Rubella virus infection most often occurs during childhood and manifests with mild symptoms. However, if a rubella virus infection occurs during pregnancy, the unborn child may develop a group of birth defects collectively known as congenital rubella syndrome (CRS), including congenital eye defects, deafness, congenital heart diseases, and mental retardation[5]. The presence of anti-rubella virus IgM or high titers of anti-rubella virus IgG (> 200 IU/mL) are suggestive of acute rubella infection[6]. Lower titers of anti-rubella virus IgG (≥ 10-15 IU/mL) are suggestive of previous exposure and protective immunity[7]. An individual with an anti-rubella virus IgG titer less than 10-15 IU/mL is considered to be at risk of acquiring a rubella virus infection[7].

CMV infections are widespread and usually asymptomatic; however, the virus may persist as a latent or chronic infection[8]. The majority of individuals that contract CMV infections remain asymptomatic[9]. Congenital transmission of CMV can lead to hearing loss, mental retardation, or central nervous system motor disorders in infected infants[10]. The presence of anti-CMV IgM is suggestive of primary infection[11]. Differentiation of anti-CMV IgG and IgM can help discriminate between primary and recurrent infections since anti-CMV IgM is rarely found in recurrent infections[11].

Herpes simplex viruses refer to two types of DNA viruses of the *Herpesviridae* family, HSV-1 and HSV-2[12]. HSV-1 is generally acquired during childhood via non-sexual contact and affects mainly the orofacial area. HSV-2 is nearly always sexually transmitted and is the main cause of genital herpes. HSV-1 and HSV-2 can infect both the genital and orofacial areas[12], however they have different prognoses. Type-specific serological diagnosis is beneficial, which can be achieved by using glycoprotein G1 and glycoprotein G2 as recommended by the CDC[13].

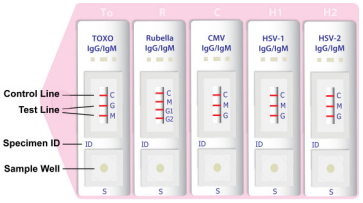
The *OnSite* TORCH Panel Rapid Test detects and differentiates IgG and IgM antibodies in serum, plasma or whole blood generated in response to the infection with each TORCH pathogen. Furthermore, it differentiates between HSV-1 and HSV-2 antibodies using HSV-1 specific glycoprotein G1 and HSV-2 specific glycoprotein G2. The test can be performed within 10 minutes by minimally skilled personnel without the use of laboratory equipment.

### TEST PRINCIPLE

The *OnSite* TORCH Panel Rapid Test is a lateral flow chromatographic immunoassay consisting of 5 panel strips assembled in one cassette. Each panel contains the following components, respectively:

| Panel | Conjugate Pad | Test Line G | Test Line M |
|---|---|---|---|
| **Toxo** | *T. gondii* antigen | Anti-Human IgG | Anti-Human IgM |
| **Rubella** | Rubella virus antigen | Anti-Human IgG (G1, G2) | Anti-Human IgM |
| **CMV** | CMV antigens | Anti-Human IgG | Anti-Human IgM |
| **HSV-1** | HSV-1 specific glycoprotein G1 antigen | Anti-Human IgG | Anti-Human IgM |
| **HSV-2** | HSV-2 specific glycoprotein G2 antigen | Anti-Human IgG | Anti-Human IgM |

When an adequate volume of test specimen is dispensed into the sample well of the test cassette, the specimen migrates by capillary action across the cassette. If present in the specimen, IgM antibodies bind to the target antigen conjugates. The immunocomplex is then captured on the membrane by the pre-coated mouse anti-human IgM forming a colored M line, indicating an IgM positive result for that particular disease.




IgG antibodies, if present in the specimen, will bind to the target antigen conjugates. The immunocomplex is then captured on the membrane by the pre-coated mouse anti-human IgG forming a colored G line, indicating an IgG positive result for that particular disease.

In the case of rubella, an anti-rubella virus IgG titer ≥15 IU/mL produces a colored G1 test line. An anti-rubella virus IgG titer ≥250 IU/mL produces colored G1 and G2 test lines.

Absence of any test lines (M, G, G1, or G2) suggests a negative result for that particular test strip.

The strip in each cassette contains an internal control (C line) which should exhibit a colored line of the immunocomplex of the control antibodies regardless of color development on any of the test lines. If the C line does not develop, the test result for that test strip is invalid, and the specimen must be retested with another device. Each test is read independently. One invalid test does not disqualify the results of other valid tests.

### REAGENTS AND MATERIALS PROVIDED

1. Individually sealed foil pouches containing:
   a. One cassette device
   b. Two desiccants
2. Plastic droppers
3. Sample Diluent (REF SB-R0253, 5 mL/bottle)
4. Instructions for Use

### MATERIALS MAY BE REQUIRED AND NOT PROVIDED

1. Positive Controls
2. Negative Controls

### MATERIALS REQUIRED BUT NOT PROVIDED

1. Clock or timer
2. Lancing device for whole blood test

### WARNINGS AND PRECAUTIONS

**For *In Vitro* Diagnostic Use**

1. Read these instructions for use completely before performing the test. Failure to follow the instructions could lead to inaccurate test results.
2. Do not open the sealed pouch unless ready to conduct the assay.
3. Do not use expired devices.
4. Bring all reagents to room temperature (15-30°C) before use.
5. Do not use components from any other type of kit as a substitute for the components in this kit.
6. Do not use hemolyzed blood specimens for testing.
7. Wear protective clothing and disposable gloves while handling the kit reagents and clinical specimens. Wash hands thoroughly after performing the test.
8. Users of this test should follow the US CDC Universal Precautions for prevention of transmission of HIV, HBV and other blood-borne pathogens.
9. Do not smoke, drink or eat in areas where specimens or kit reagents are being handled.
10. Dispose of all specimens and materials used to perform the test as bio-hazardous waste.
11. Handle the negative and positive controls in the same manner as the patient specimens.
12. The test result should be read 10-15 minutes after a specimen is applied to the sample well or sample pad of the device. Any results interpreted outside the 10-15 minute window should be considered invalid and must be repeated.
13. Do not perform the test in a room with strong air flow, i.e. an electric fan or strong air-conditioning.

### REAGENT PREPARATION AND STORAGE INSTRUCTIONS

All reagents are ready to use as supplied. Store unused test devices unopened at 2-30°C. If stored at 2-8°C, ensure that the test device is brought to room temperature before opening. The test device is stable through the expiration date printed on the sealed pouch. Do not freeze the kit or expose the kit to temperatures above 30°C.

### SPECIMEN COLLECTION AND HANDLING

Consider any materials of human origin as infectious and handle them using standard bio-safety procedures.

**Plasma/Serum**

Step 1: Collect blood specimen into collection tube containing EDTA, citrate or heparin for plasma or collection tube containing no anticoagulants for serum by venipuncture.

Step 2: To make plasma specimen, centrifuge collected specimens and carefully withdraw the plasma into a new pre-labeled tube.

Step 3: To make serum specimen, allow blood to clot, then centrifuge collected specimens and carefully withdraw the serum into a new pre-labeled tube.

Test specimens as soon as possible after collecting. Store specimens at 2-8°C, if not tested immediately. The specimens can be stored at 2-8°C for up to 5 days. The specimens should be frozen at -20°C for longer storage.

Avoid multiple freeze-thaw cycles. Prior to testing, bring frozen specimens to room temperature slowly and mix gently. Specimens containing visible particulate matter should be clarified by centrifugation before testing. Do not use samples demonstrating gross lipemia, gross hemolysis or turbidity in order to avoid interference with result interpretation.

**Whole Blood**

Step 1: Drops of whole blood can be obtained by either fingertip puncture or venipuncture. Collect blood specimen into a collection tube containing EDTA, citrate or heparin. Do not use hemolyzed blood for testing.

Whole blood specimens should be stored in refrigeration (2-8°C), if not tested immediately. The specimens must be tested within 24 hours of collection.

### ASSAY PROCEDURE

Step 1: Bring the specimen and test components to room temperature if refrigerated or frozen. Once the specimen is thawed, mix well prior to performing the assay.

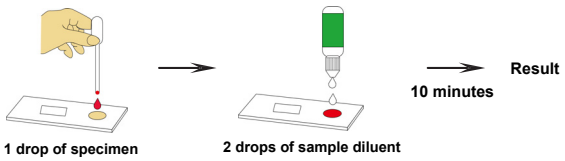
Step 2: When ready to test, open the pouch at the notch and remove the device. Place the test device on a clean, flat surface.

Step 3: Be sure to label the device with specimen ID number.

Step 4: Fill the plastic dropper with specimen.

Holding the dropper vertically, dispense 1 drop (about 10 µL) of serum/plasma or 1 drop of whole blood (about 15 µL) into the center of the sample well in each panel making sure that there are no air bubbles.

Immediately add 2 drops (about 60-80 µL) of sample diluent to the sample well in each panel with the bottle positioned vertically.




Step 5: Set up the timer.

Step 6: Read results at 10 minutes. Positive results may be visible in as short as 1 minute. Negative results must be confirmed at the end of the 15 minutes only. ***However, any results interpreted outside the 10-15 minute window should be considered invalid and must be repeated. Discard used device after interpreting the result following local laws governing the disposal of device.***

### QUALITY CONTROL

1. **Internal Control:** This test contains a built-in control feature, the C line. The C line develops after adding specimen and sample diluent. If the C line does not develop, review the entire procedure and repeat the test with a new device.

2. **External Control:** Good Laboratory Practice recommends using external positive and negative controls to ensure the proper performance of the assay, particularly under the following circumstances:
   a. A new operator uses the kit, prior to performing testing of specimens.
   b. A new lot of test kits is used.
   c. A new shipment of test kits is used.
   d. The temperature during storage of the kit falls outside of 2-30°C.
   e. The temperature of the test area falls outside of 15-30°C.
   f. To verify a higher than expected frequency of positive or negative results.
   g. To investigate the cause of repeated invalid results.

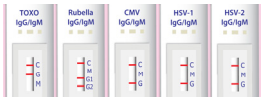
## INTERPRETATION OF ASSAY RESULT

**1. NEGATIVE RESULT:** If only the C line develops, the test indicates that antibodies to the target infection are not detected in the specimen. The result is negative or non-reactive.

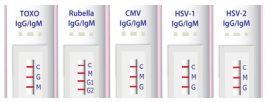

**2. POSITIVE RESULT:**

2.1 **IgM positive:**
In addition to the presence of the C line, if the M line develops in any of the five tests, it indicates the presence of IgM antibodies for that particular infection in the specimen. The result is IgM positive or reactive.


2.2 **IgG positive:**
In addition to the presence of the C line, if the G line develops in any of the five tests, the test indicates the presence of IgG antibodies for that particular infection in the specimen. The result is IgG positive or reactive.

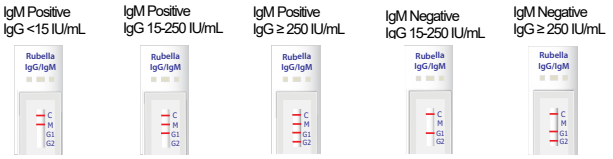



2.3 **IgG and IgM positive:**
In addition to the presence of the C line, if both the M and G line develop in any of the five tests, the test indicates the presence of both IgM and IgG antibodies for that particular infection in the specimen. The result is IgM and IgG positive.




*Refer to 2.4 for interpretation of Rubella results.*

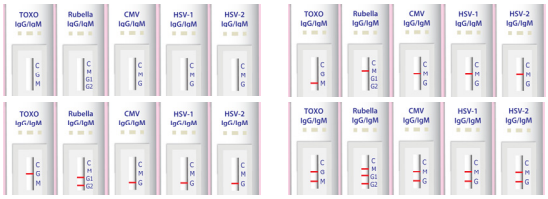
2.4 **RUBELLA TEST RESULT:**




*Specimens with positive results should be confirmed with alternative testing method(s) and clinical findings before a diagnosis is made.*

**3. INVALID:** If no C line develops in any of the five tests, the assay is invalid for that particular test regardless of any color development on the test lines (G and M) as indicated below. Repeat that particular test with a new device.

*Each test is read independently. One invalid test does not disqualify the results of other valid tests.*




## PERFORMANCE CHARACTERISTICS

**1. Analytical Sensitivity of IgG Detection**

Twenty negative specimens were spiked with appropriate reference standards at various concentrations. Specimens were run on the *OnSite* TORCH Panel Rapid Test panel member. Defined as the 95% detection level, the limits of detection, or sensitivity, were determined to be as follows:

| Panel Member | LOD | Reference |
|---|---|---|
| **Toxo** | 2.5 IU/mL | WHO International Standard Anti-Toxoplasma Serum Ig (TOXM) |
| **Rubella** | 15 IU/mL (G1)<br>250 IU/mL (G2) | WHO 1st International Standard (RUBI-1-94) |

**2. Accuracy of IgG Detection**

Clinical IgG positive specimens were collected and tested on each *OnSite* TORCH Panel Rapid Test panel member as well as by commercial ELISA. Comparison for all subjects showed the following overall agreements:

| Panel Member | # of Specimens | IgG Overall Agreement |
|---|---|---|
| **Toxo** | 237 | 94.9% |
| **Rubella** | 214 | 97.7% |
| **CMV** | 258 | 93.4% |
| **HSV-1** | 227 | 90.7% |
| **HSV-2** | 214 | 95.3% |

**3. Accuracy of IgM Detection**

Clinical IgM positive specimens were collected and tested on each *OnSite* TORCH Panel Rapid Test panel member as well as by commercial ELISA. Comparison for all subjects showed the following overall agreements:

| Panel Member | # of Specimens | IgM Overall Agreement |
|---|---|---|
| **Toxo** | 231 | 98.8% |
| **Rubella** | 25 | 96.0% |
| **CMV** | 212 | 93.9% |
| **HSV-1** | 107 | 85.0% |
| **HSV-2** | 26 | 95.2% |

**4. Cross-Reactivity**

No false positive IgG and IgM results were observed on 3-14 specimens from the following disease states or special conditions, respectively:

| | | | | |
|---|---|---|---|---|
| Toxo | Rubella | CMV | HSV-1 | HSV-2 |
| hCG | HAV | HBV | HCV | HEV |
| HIV | TB | *T. pallidum* | Dengue | Malaria |
| *H. pylori* | Typhoid | ANA | HAMA | RF (> 1,000 IU/mL) |

*During cross-reactivity testing for each TORCH infection, self-reactivity was not considered (i.e. rubella positive samples were not tested on the Rubella IgG/IgM Rapid Test). Specimens tested vary for each test of the OnSite TORCH Panel Rapid Test.*

**5. Interference**

Common substances (such as pain and fever medication and blood components) may affect the performance of the *OnSite* TORCH Panel Rapid Test. This was studied by spiking these substances into IgM positive, strong-level IgG positive, medium-level IgG positive, weak-level IgG positive, and IgM and IgG negative specimens, respectively. The results demonstrate that at the concentrations tested, the substances studied do not affect the performance of each panel member of the *OnSite* TORCH Panel Rapid Test.

List of potentially interfering substances and concentrations tested:

| | | | |
|---|---|---|---|
| 1. Albumin | 60 g/L | 6. Hemoglobin | 2 g/L |
| 2. Bilirubin | 20 mg/dL | 7. Heparin | 3,000 U/L |
| 3. Creatinine | 442 µmol/L | 8. Salicylic acid | 4.34 mmol/L |
| 4. EDTA | 3.4 µmol/L | 9. Sodium citrate | 3.8% |
| 5. Glucose | 55 mmol/L | | |

## LIMITATIONS OF TEST

1. The Assay Procedure and the Interpretation of Assay Result sections must be followed closely when testing for the presence of antibodies to *T. gondii*, rubella virus, CMV, HSV-1, and HSV-2 in serum, plasma or whole blood from individual subjects. Failure to follow the procedure may lead to inaccurate test results.
2. The *OnSite* TORCH Panel Rapid Test is limited to the qualitative detection of antibodies to *T. gondii*, rubella virus, CMV, HSV-1, and HSV-2 in serum, plasma or whole blood. The intensities of the test lines do not have linear correlation with the antibody titers in the specimen.
3. A negative or non-reactive result for an individual subject indicates absence of detectable *T. gondii*, rubella virus, CMV, HSV-1, and HSV-2 antibodies. However, a negative test result does not rule out the possibility of exposure to or infection with *T. gondii*, rubella virus, CMV, HSV-1, or HSV-2.
4. A negative or non-reactive result can occur if the quantity of the anti-*T. gondii,* rubella virus, CMV, HSV-1, and HSV-2 antibodies present in the specimen is below the detection limits of the assay or the antibodies that are detected are not present during the stage of the disease in which a sample is collected.
5. Infection may progress rapidly. If the symptoms from any of the 5 individual infections persist, even if the test results from the *OnSite* TORCH Panel Rapid Test were negative or non-reactive, it is recommended to test with an alternative test method for that particular infection.
6. The *OnSite* TORCH Panel Rapid Test has not been validated on specimens from neonates.
7. Some specimens contain unusually high titers of heterophile antibodies or rheumatoid factor, which may affect expected results.
8. The results obtained with this test should only be interpreted in conjunction with other diagnostic procedures and clinical findings.

## REFERENCES

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**Index of Symbols**

| | | | | | |
|---|---|---|---|---|---|
| | Consult instructions for use | IVD | For *in vitro* diagnostic use only | | Use by |
| REF | Catalog # | LOT | Lot Number | Σ N | Tests per kit |
| 2°C 30°C | Store between 2-30°C | | Do not reuse | | |
| | Manufacturer | | Date of manufacture | | |

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