**OnSite™ TORCH Panel Rapid Test**

**INTENDED USE**

The OnSite TORCH Panel Rapid Test is a lateral flow chromatographic immunoassay for the qualitative detection and differentiation of antibodies (IgG and IgM) 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 professionals as a screening test and provides a preliminary test result to 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. Serological data indicate that approximately 30% of the population of most industrialized nations is chronically infected with the organism. 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. 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. The presence of IgM anti-rubella virus or high titers of IgG anti-rubella virus (> 200 IU/mL) are suggestive of acute rubella infection. Lower titers of IgG anti-rubella virus (2-10 IU/mL) are suggestive of previous exposure and protective immunity. An individual with an IgG anti-rubella virus titer less than 10-15 IU/mL is considered to be at risk of acquiring a rubella virus infection.

CMV infections are widespread and usually asymptomatic; however, the virus may persist as a latent or chronic infection. The majority of individuals that contract CMV infections remain asymptomatic.

Congenital transmission of CMV can lead to hearing loss, mental retardation, or central nervous system motor disorders in infected infants. The presence of IgM anti-CMV is suggestive of primary infection. Differentiation of IgM and IgG anti-CMV can help discriminate between primary and recurrent infections since IgM anti-CMV is rarely found in recurrent infections.

Herpes simplex virus refers to two types of DNA viruses of the Herpesviridae family: HSV-1 and HSV-2. HSV-1 is generally acquired during childhood via non-sexual contact and affects mainly the oral cavity 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 oral areas; 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.

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 HSV-1 and HSV-2 antibodies using HSV-1 specific glycoprotein G1 and HSV-2 specific glycoprotein G2.

**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:

<table>
<thead>
<tr>
<th>Panel</th>
<th>Conjugate Pad</th>
<th>Test Line G</th>
<th>Test Line M</th>
</tr>
</thead>
<tbody>
<tr>
<td>T. gondii and Human IgG</td>
<td>Rubella virus antigen</td>
<td>Anti-Human IgG (G1,G2)</td>
<td>Anti-Human IgM</td>
</tr>
<tr>
<td>CMV</td>
<td>CMV antigens</td>
<td>Anti-Human IgG</td>
<td>Anti-Human IgM</td>
</tr>
<tr>
<td>HSV-1</td>
<td>HSV-1 specific glycoprotein G1 antigen</td>
<td>Anti-Human IgG</td>
<td>Anti-Human IgM</td>
</tr>
<tr>
<td>HSV-2</td>
<td>HSV-2 specific glycoprotein G2 antigen</td>
<td>Anti-Human IgG</td>
<td>Anti-Human IgM</td>
</tr>
</tbody>
</table>

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 the specimen contains IgG antibodies to the target antigen conjugates, the immunocomplex is then captured on the membrane by the pre-coated mouse anti-human IgG forming a burgundy 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 burgundy colored G line, indicating an IgG positive result for that particular disease. In the case of rubella, an IgG anti-rubella virus titer ≥15 IU/mL produces a burgundy colored G1 test line. An IgG anti-rubella virus titer ≥30 IU/mL produces burgundy colored G1 and G2 test lines.

**REAGENTS AND MATERIALS PROVIDED**

1. Individually sealed foil pouches containing:
   a. One cassette device
   b. Two desiccants
2. Plastic pipettes
3. Sample Diluent (REF SB-R0253, 5 mL/Bottle)
4. One package insert (instruction for use)

**MATERIALS REQUIRED AND NOT PROVIDED**

- Positive Controls
- Negative Controls

**MATERIALS REQUIRED BUT NOT PROVIDED**

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

**APPLICATION**

**FOR IN VITRO DIAGNOSTIC USE**

1. This package insert must be read completely before performing the test. Failure to follow the insert may lead to inaccurate test results.
2. Do not open the sealed pouch until ready to use.
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 kit of 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 kit 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 this test as biohazardous waste.

**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, 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 result does not disqualify the results of other valid tests.

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 10-30°C.
   f. To verify a higher than expected frequency of positive or negative results.
   g. To investigate the cause of repeated invalid results.

**REFERENCES**

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**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 IgG 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 IgG antibodies for that particular infection in the specimen. The result is IgG positive or reactive.

   2.2 IgM positive:
   In addition to the presence of the C line, if the G 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.

   2.3 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 IgG and IgM positive.

   Refer to 2.4 for interpretation of Rubella results.

2.4 **RUBELLA TEST RESULT:**

<table>
<thead>
<tr>
<th>IgM Positive</th>
<th>IgG ≥ 15 IU/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>IgM Positive</td>
<td>IgG 15-250 IU/mL</td>
</tr>
<tr>
<td>IgG Positive</td>
<td>IgG ≥ 250 IU/mL</td>
</tr>
<tr>
<td>IgG Negative</td>
<td>IgG ≥ 250 IU/mL</td>
</tr>
</tbody>
</table>

Specimens with positive results should be confirmed with alternative testing methods and clinical findings prior to 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:

<table>
<thead>
<tr>
<th>Panel Member</th>
<th>LOD</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxo</td>
<td>2.5 IU/mL</td>
<td>WHO International Standard Anti-Toxoplasma Serum IgG [TOXM]</td>
</tr>
<tr>
<td>Rubella</td>
<td>15 IU/mL (G1) 250 IU/mL (G2)</td>
<td>WHO 1st International Standard [RUBI 1-94]</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Panel Member</th>
<th># of Specimens</th>
<th>IgG Overall Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxo</td>
<td>237</td>
<td>94.9%</td>
</tr>
<tr>
<td>Rubella</td>
<td>214</td>
<td>97.7%</td>
</tr>
<tr>
<td>CMV</td>
<td>258</td>
<td>93.4%</td>
</tr>
<tr>
<td>HSV-1</td>
<td>227</td>
<td>95.7%</td>
</tr>
<tr>
<td>HSV-2</td>
<td>214</td>
<td>95.3%</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Panel Member</th>
<th># of Specimens</th>
<th>IgM Overall Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxo</td>
<td>231</td>
<td>98.8%</td>
</tr>
<tr>
<td>Rubella</td>
<td>25</td>
<td>96.0%</td>
</tr>
<tr>
<td>CMV</td>
<td>212</td>
<td>93.9%</td>
</tr>
<tr>
<td>HSV-1</td>
<td>107</td>
<td>85.0%</td>
</tr>
<tr>
<td>HSV-2</td>
<td>26</td>
<td>95.2%</td>
</tr>
</tbody>
</table>

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
   - IgG: HSV, TB, F. tularensis, Dengue, Malaria
   - IgM: Typhoid, ANA, HAMA, RF (≥ 1.00 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 IgG/IgM 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 tested do not affect the performance of each panel member of the OnSite TORCH Panel Rapid Test.

   Limitations of Test:
   1. The assay procedure and the interpretation of the 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 antibodies. Accuracy of the test results from all five tests was not limited to a particular infection.
   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 five infections persist, 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 test results.
   8. The results obtained with this test should only be interpreted in conjunction with other diagnostic procedures and clinical findings.

**REFERENCES**