OnSite™ Rubella IgG/IgM Rapid Test
REF R0243C

INTENDED USE

The OnSite Rubella IgG/IgM Rapid Test is a lateral flow immunassay for the semi-quantitative detection and differentiation of IgG and IgM antibodies to rubella virus 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 rubella virus. Any use or interpretation of this preliminary test result must also rely on other clinical findings and 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

An infection with rubella virus occurs most often during childhood. The infection usually leads to mild symptoms including maculopapular rash of head and trunk, fever, arthritis and lymphadenopathy. However, if a rubella virus infection occurs during pregnancy, a group of birth defects collectively known as congenital rubella syndrome (CRS) may develop, including congenital eye defects, deafness, congenital heart diseases and mental retardation. Clinical diagnosis of Rubella is unreliable and unspecific. Therefore, laboratory diagnosis is essential to confirm an acute infection. During an acute infection with rubella virus, anti-rubella virus IgM can be detected 3-6 days after onset of symptoms and generally decrease to undetectable levels within 12-14 weeks. Anti-rubella virus IgG can be detected within 2-3 weeks post infection and levels may rise during the acute phase of the disease to levels above 200 IUL/mL. Protective immunity from an infection with rubella virus is indicated by an anti-rubella virus IgG level ≥ 10-15 IUL/mL. However, the presence of anti-rubella virus IgG ≥ 10-15 IUL/mL does not necessarily ensure protection from future infection with rubella virus. A patient without protective levels of anti-rubella virus IgG (< 10-15 IUL/mL) is considered at risk of acquiring a rubella virus infection during pregnancy and infected pregnant women should be vaccinated if they have not been vaccinated previously.

The OnSite Rubella IgG/IgM Rapid Test allows detection and differentiation of anti-rubella virus IgG and IgM in human serum, plasma and whole blood. The test allows differentiation of high titer anti-rubella virus IgG (> 250 IUL/mL) from low titer anti-rubella virus IgG (≥ 15 IUL/mL and < 250 IUL/mL). The test can be performed by minimally skilled personnel without the use of laboratory equipment.

TEST PRINCIPLE

The OnSite Rubella IgG/IgM Rapid Test is a lateral flow chromatographic immunassay. The test cassette consists of: 1) a burgundy colored conjugate pad containing rubella virus antigens conjugated with colloidal gold (rubella conjugates) and a control antibody conjugated with colloidal gold, 2) a nitrocellulose membrane strip containing three test lines (M, G1, G2 lines) and a control line (C line). The M line is pre-coated with mouse anti-human IgM for detection of anti-rubella virus IgM. The G1 and G2 lines are pre-coated with mouse anti-human IgG for detection of different levels of anti-rubella virus IgG. The C line is pre-coated with a control antibody.

When an adequate volume of test specimen and sample diluent are dispensed into the sample well, the anti-rubella virus IgG, if present in the specimen, will bind to the rubella conjugates. The immunocomplex is then captured on the membrane by the pre-coated mouse anti-human IgM forming a burgundy colored M line, indicating an anti-rubella virus IgM positive test result.

Anti-rubella virus IgG, if present in the specimen, will bind to the rubella conjugates. The immunocomplex is then captured on the membrane by the pre-coated mouse anti-human IgG forming burgundy-colored G1 and/or G2 test lines, indicating an anti-rubella virus IgG positive test result. An anti-rubella virus IgG titer ≥ 250 IU/mL produces a burgundy colored G1 test line. An anti-rubella virus IgG titer ≥ 2500 IU/mL produces burgundy-colored G1 and G2 test lines. Absence of any test lines (M, G1 or G2) suggests a negative result.

The test contains an internal control (C line) which would exhibit a burgundy colored line of the immunocomplex of the control antibodies, regardless of color development on the test lines (G1, G2 and M). If the C line does not develop, the test result is invalid, and the specimen must be retested with another device.

REAGENT AND MATERIALS PROVIDED

1. Individually sealed foil pouches containing:
   a. 1 cassette device
   b. 1 reaction device
   c. 10 µL capillary tubes
   d. 1 sample diluent (REF SB-R0243, 5 mL/bottle)
   e. 1 package insert (instruction for use)

MATERIALS REQUIRED BUT NOT PROVIDED

1. Positive control
2. Negative control

MATERIALS REQUIRED FOR THE TEST

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

QUALITY CONTROL

1. Internal Control: This test contains a built-in control feature, the C line. The C line develops after adding the specimen and the 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 controls, positive and negative, to assure the proper performance of the assay, particularly under the following circumstances:
   a. A new lot of control material is used.
   b. A new lot of test kit is used.
   c. A new shipment of test kits is used.
   d. The temperature during storage of the kits falls outside of 2-20°C. The test 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.
   e. To verify a higher than expected frequency of positive or negative results.
   f. To investigate the cause of repeated invalid results.

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**OnSite Rubella IgG/IgM Rapid Test - Cassette (Serum / Plasma / Whole Blood)**

**INTRODUCTION OF ASSAY RESULT**

1. **NEGATIVE RESULT:** If only the C line develops, the test indicates that the levels of anti-rubella virus IgG and IgM in the specimen are below the detection limits of the assay. The result is negative or non-reactive.

2. **INVALID:** If no C line is developed, the assay is invalid regardless of color development on any of the test lines (M, G1, G2). Repeat the assay with a new device.

**PERFORMANCE CHARACTERISTICS**

1. **Analytic Sensitivity of IgG Detection**
   
   Twelve groups of matrices were spiked with anti-rubella virus IgG to the WHO 1st International Standard (RUBI-1-94) concentrations of 0, 5, 10, 15, 20, 30, 60, 100, 160, 200, 250, and 300 IU/mL. The specimens were run on the OnSite Rubella IgG/IgM Rapid Test. Defined as the 95% detection level, the limit of detection or sensitivity for the OnSite Rubella IgG/IgM Rapid Test G1 and G2 test lines is 15 IU/mL and 250 IU/mL, respectively.

   **LOD for G1 test line**
   
<table>
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<tr>
<th>IgG IU/mL</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>60</th>
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<td>13</td>
<td>19</td>
<td>20</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Number Negative</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>19</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>LOD</td>
<td>15 IU/mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
   
   **LOD for G2 test line**
   
<table>
<thead>
<tr>
<th>IgG IU/mL</th>
<th>30</th>
<th>60</th>
<th>100</th>
<th>160</th>
<th>200</th>
<th>250</th>
<th>300</th>
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<tbody>
<tr>
<td>Number Positive</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>19</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Number Negative</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>19</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>LOD</td>
<td>15 IU/mL</td>
<td></td>
<td></td>
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</tbody>
</table>

   **Accuracy of IgG Detection**
   
   A total of 214 specimens were collected and tested with the OnSite Rubella IgG/IgM Rapid Test and by a commercial rubella IgG ELISA with positive cut off level at 10 IU/mL. Comparison of all subjects is shown in the following table:

   ![Table](Image)

   **Interpretation of Assay Result**
   
<table>
<thead>
<tr>
<th>Reference</th>
<th>Positive</th>
<th>Negative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>OnSite Rubella IgG/IgM Rapid Test</td>
<td>171</td>
<td>38</td>
<td>209</td>
</tr>
<tr>
<td>Abbott EI/A-Rubella</td>
<td>173</td>
<td>41</td>
<td>214</td>
</tr>
</tbody>
</table>

   **Relative Sensitivity:** 98.3%. **Relative Specificity:** 95.0%. **Overall Agreement:** 97.7%.

   Among the 214 specimens, 3 specimens were detected to have IgG levels higher than 250 IU/mL. These specimens were all detected as positive on the OnSite Rubella IgG/IgM Rapid Test G1 and G2 test line.

2. **Positive Rate on the Random Clinical Specimens**
   
   The positive rate of the OnSite Rubella IgG/IgM Rapid Test was evaluated with 10,000 clinical specimens. M, G1 and G2 positive rates were 0.3%, 87% and 7%, respectively.

3. **Boston Biomedica Inc (BBI) Mixed Titer Performance Panel**
   
   The performance of the OnSite Rubella IgG/IgM Rapid Test and a commercially available rubella IgM Rapid Test were evaluated using BBI Mixed Titer Performance Panel PTR-201. The results are shown in the following table:

   ![Table](Image)

4. **Cross-Reactivity**
   
   No false positive anti-rubella virus IgG and IgM test results were observed with 4-10 specimens from the following disease stages or special conditions, respectively:

   - HAV
   - HBV
   - HCV
   - HIV
   - Syphilis
   - TB
   - Dengue
   - H. pylori
   - CMV
   - HSV-1
   - HSV-2
   - Toxoplasma
   - ANA
   - HAMA
   - RP (up to 2,500 IU/mL)

5. **EXPECTED VALUES**

   Anti-rubella virus IgG and IgM positive rates vary depending on the age of the population studied, the local vaccination programs. The reported anti-rubella virus IgG positive rates at 210-15 IU/mL and >200 IU/mL are 89-94% and 34%, respectively\(^3\). The reported anti-rubella virus IgM positive rate is 0.3-1.7%\(^3\).

6. **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 rubella virus in serum, plasma or whole blood from individual subjects. Failure to follow the procedure may lead to inaccurate results.

   2. The OnSite Rubella IgG/IgM Rapid Test is limited to the qualitative detection of antibodies to rubella virus in human serum, plasma or whole blood. The intensity of the test line does not have linear correlation with the titer of rubella antibody in the specimen.

   3. A negative or non-reactive test result does not preclude the possibility of exposure to or infection with rubella virus. A negative or non-reactive result can occur if the titer of anti-rubella virus antibody present in the specimen is below the level detectable by the assay or if rubella virus antibody was not present during the stage of disease in which the sample was collected.

   4. Infection may progress rapidly. If the symptom persists, while the result from OnSite Rubella IgG/IgM Rapid Test is negative or non-reactive, it is recommended to test with an alternative test method.

   5. The OnSite Rubella IgG/IgM Rapid Test has not been validated on specimens from neonates.

   6. Specimens from patients with infectious mononucleosis or high titers of heterophile antibodies, rheumatoid factor (>2,500 IU/mL) may affect expected results.

   7. The OnSite Rubella IgG/IgM Rapid Test does not differentiate antibodies generated by vaccine from that by infection.

   8. Results obtained with the OnSite Rubella IgG/IgM Rapid Test should only be interpreted in conjunction with other diagnostic procedures and clinical findings.

**REFERENCES**


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