

RPR Screening Test for Syphilis

INTENDED USE

The Thermo Scientific Rapid Plasma Reagin (RPR) Test is a non-Treponemal Flocculation Test that is used to detect and quantify reagin, an antibody present in serum or plasma from persons with syphilis, or with other treponemal diseases. Occasionally individuals with other diseases or conditions may also be reactive in the non-Treponemal Tests.

SUMMARY & PRINCIPLES

Treponema pallidum, the etiologic agent responsible for syphilis produces at least two kinds of antibodies in human infections. Treponemal antibodies can be detected by tests such as the Fluorescent Treponemal Antibody-Absorption (FTA-ABS) Test¹ or MHA-TP whereas the reagin antibody is detected by non-treponemal tests such as the RPR Antigen Card Test². In the presence of the reagin antibody in the reactive sample, the RPR Antigen preparation will produce flocculation consisting of black clumps against the white background of the test card. By contrast, non-reactive samples will yield an even light-grey homogenous suspension.

MATERIALS SUPPLIED

RPR Carbon Antigen: 0.003% cardiolipin, 0.020-0.022% lecithin, 0.09% cholesterol, 0.0125M EDTA, 0.01M Na₂HPO₄, 0.01M KH₂PO₄, 0.1% Thimerosal, 0.0188% Charcoal, and 10% Choline Chloride.

Reactive Control: Human Serum containing 0.1% sodium azide as preservative.

Minimal Reactive Control: Human Serum containing 0.1% sodium azide as preservative.

Non-Reactive Control: Human Serum containing 0.1% sodium azide as preservative.

Antigen Delivery System: 3 ml Dropping bottle and Needle which will deliver 60 +/- 2 drops/ml.

Sufficient Test Cards and Disposable Pipettes.

Additional Items Required:

Mechanical rotator set at 100 +/- 2 rpm with humidity cover, timing device, automatic pipettes, test tubes, gloves, and light source.

STORAGE & STABILITY

When not in use, store reagents and controls at 2—8°C. DO NOT FREEZE. Prior to use, allow reagents and controls to warm up to 23—29°C. The antigen should be agitated gently to ensure homogeneity before use. Remove only enough antigen from the glass bottle for the day's testing use.

PRECAUTIONS

All reagents and controls of human source have been tested for the presence of Hepatitis B Surface Antigen and HIV-1 antibodies and found to be negative. However, all human serum products and patient specimens should be considered potentially hazardous and be handled in the same manner as an infectious agent.

The preservative sodium azide may react with metal plumbing to form explosive metal azides. In disposal, flush with a large volume of water to prevent metal azide build up.

SPECIMEN COLLECTION

EDTA Plasma and unheated or heated serum may be used. Specimen should be free of bacterial contamination and hemolysis. Fresh, uncontaminated serum samples may be stored at 2—8°C up to 5 days prior to testing. Otherwise, the serum samples should be kept frozen. Plasma specimens should be tested within 48 hours³, after that time the specimen should be discarded.

PREPARATION OF CARBON ANTIGEN

This product is for In Vitro Diagnostic Use Only. The bottle dispenser should be thoroughly washed and the needle should be rinsed with distilled water and air dried after use. The accuracy of the needle can be checked by the following procedure:

1. Attach needle to a 2 ml syringe.
2. Fill the syringe with antigen and eliminate air bubbles.
3. Count the number of drops delivered in 0.5 ml by holding the needle in a vertical position. The needle is considered satisfactory if it delivers 30 +/- 1 drop in 0.5 ml.

PROCEDURE

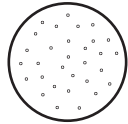
NOTE: All specimens, control serum samples and reagent should be at 23—29°C before use.

Qualitative Card Test

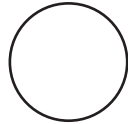
1. The person performing this test should refer to the RESULTS section to become familiar with the expected results before performing test. Otherwise, perform test with the controls supplied to become familiar with the expected results. Dispense 1 drop of EACH control onto separate circles of the test card and follow STEPS 3 to 5 below.
2. Dispense one drop of serum or plasma sample onto a separate circle on the test card with disposable stirrer pipettes supplied. Use a fresh stirrer pipette for each sample. When using the stirrer pipette, hold it in a vertical position to ensure accurate delivery.
3. Using the flat end of the stirrer pipettes, spread the sample over the entire area of the test circle.
4. Mix the carbon antigen reagent well. Attach needle to the dropping bottle. Squeeze the dropping bottle to release air and draw sufficient reagent into the bottle. Discard the first few drops and then dispense 1 drop (17µl) of the antigen (while holding the bottle in a vertical position) to a test circle containing the sample. DO NOT MIX the sample and the antigen.
5. Place the card on an automatic rotator and place a humidity cover over the card. Rotate at 100 rpm for 8 minutes. Following rotation, a brief hand rotation and tilting of the card (3 to 4 times) should be made to aid in differentiating non-reactive from minimally reactive results. Read results macroscopically in the "wet" state under a high intensity incandescent lamp.

RESULTS

A reactive result is indicated by presence of large aggregates in the center or periphery of the test circle. All specimens showing any degree of reactivity or roughness should be quantitated (follow Quantitative Test Procedure). Roughness is sometimes an indication of a sample with a prozone. Minimal reactive samples are indicated by the presence of small or fine aggregates. A negative (non-reactive) result will display a smooth grey appearance.



Reactive



Non-Reactive

Quantitative Card Test

1. Dispense 1 drop (0.05 ml) of specimen using stirrer pipette onto circle 1.
2. Using an automatic 0.05 ml pipette (or stirrer pipette), dispense 1 drop of 0.9% saline onto circles to be numbered 2 to 5. DO NOT SPREAD.
3. Using an accurate volumetric pipette, dispense 0.05 ml of the test sample onto circle 2. Insert the tip of the pipette into the resulting mixture and mix them by drawing the mixture up and down the pipette approximately 8 times. Avoid any bubble formation and transfer 0.05 ml of the mixed sample to the third circle. Repeat this serial dilution procedure to circle 5 and discard 0.05 ml from the last circle. Circles 1 to 5 now represent a dilution series as follows:

Circle	1	2	3	4	5
Dilution	1:1	1:2	1:4	1:8	1:16

4. Using the flat end of the stirrer pipette, spread the diluted samples over the entire area of the test circles starting at circle no. 5 (highest dilution). Repeat this spreading procedure to circles 4, 3, 2, and 1.
5. Dispense 1 drop of carbon antigen from the dropping bottle to each circle. DO NOT MIX. Place the card onto the automatic rotator and rotate for 8 minutes.
6. Immediately after 8 minutes of rotation, read results macroscopically in the "wet" state under a high intensity incandescent lamp. The titre of the sample is the reciprocal of the highest dilution to show macroscopic aggregates (see diagram in the RESULTS section).
7. If the sample is positive in the 1:16 dilution, the dilution series should be extended as follows:
 - a. Prepare a 1:50 dilution of non-reactive serum in 0.9% saline. This is used for making 1:32 and higher dilutions of specimens to be tested. Dispense 0.05 ml of this diluent solution onto circles numbered 2 to 5.
 - b. Prepare a 1:16 dilution of test specimen by adding 0.1 ml of serum to 1.5 ml of 0.9% saline. Mix thoroughly. Dispense 0.05 ml of 1:16 dilution of test specimen onto circles 1 and 2.

- c. On circle 2, insert the tip of an automatic 0.05 ml pipette into the resulting mixture (sample and diluent) and mix by drawing the mixture up and down the pipette approximately 8 times. Avoid any bubble formation. Transfer 0.05 ml of the mixed sample to the next circle. Repeat the mixing procedure. Continue this serial dilution to circle no. 5 and discard 0.05 ml from this last circle.

Circle	1	2	3	4	5
Dilution	1:16	1:32	1:64	1:128	1:256

- d. Proceed with the test procedure described under STEPS 4 and 5 of the Quantitative Card Test.
- e. Continue dilutions until an end-point titre is reached.

RESULTS

1:2	1:4	1:8	1:16	1:32
Reactive	Reactive	Minimal Reactive	Negative	Negative

QUALITY CONTROL

The reactive, minimal reactive and negative controls have been included with the test kit to monitor the performance of the reagent. If the expected results have not been observed, the reagent should not be used.

LIMITATIONS

False positive reactions occur occasionally with the RPR Carbon Antigen Test. Such reactions sometimes occur in drug abuse and in such diseases as lupus erythematosus, mononucleosis, leprosy, viral pneumonia and after smallpox vaccinations. Reactive RPR Test specimens should be subjected to further confirmation tests as recommended in the *Manual of Tests for Syphilis*². As with any other serological testing procedure, the diagnosis of syphilis should not be made on a single reactive result. Temperature of the reagents and specimens is critical to test outcome. Plasma specimens over 48 hours old may give erroneous results.

PERFORMANCE CHARACTERISTICS

The Thermo Scientific RPR Antigen has been tested according to Centers for Disease Control (CDC) RPR Card Test Procedure. The Thermo Scientific RPR Test was compared to the CDC RPR Antigen and to another commercially available RPR Antigen in a clinical evaluation. A total of 205 specimens were used in this study and the overall agreement of the results was 100%. All 109 Negative specimens gave negative results when tested by all 3 types of RPR Antigen. The 96 Positive specimens gave positive results when tested by all 3 types of RPR Antigen. Only 4 out of the 96 Positive specimens differed by 1 dilution difference in titre when quantitative tests were performed. No specific deviation trend has been observed.

Specimens	Thermo Scientific Test	CDC Antigen	Competitor Test
Positive	96	96	96
Negative	109	109	109

REFERENCES

1. Hunter, E.F. Deacon, W.E. and Meyer, P.E., "An Improved FTA Test for Syphilis, The Absorption Procedure (FTA-ABS)," *Public Health Reports*, 79, 410-412, 1964.
2. "Manual of Tests for Syphilis," *Public Health Service Publication*, No. 411, 1969.
3. "Manual of Tests for Syphilis," *Public Health Service Publication*, No. 411, 1990.