



## Name and Intended Use

Anti-Rib-P is an indirect solid phase enzyme immunoassay (ELISA) for the quantitative measurement of IgG class autoantibodies against ribosomal P proteins in human serum or plasma.

## Summary and Explanation of the Test

Antibodies to ribosomal proteins (anti-Rib-P or Anti-RPP) are of special clinical relevance in the differential diagnosis of systemic lupus erythematosus (SLE). Anti-Rib-P antibodies are directed against a common epitope of three phosphoproteins (P0, P1 and P2), which are major compounds of the 60s subunit of ribosomal RNP complexes.

In cases of systemic lupus which are associated with depression and/or psychotic symptoms anti-Rib-P antibodies have been reported with an incidence of 40 to 90 percent.

Determination of antibodies directed against ribosomal P-proteins is a valuable diagnostic tools for the differential diagnosis of SLE, especially in cases where classic SLE typical antibodies are not present.

## Principle of the Test

Highly purified ribosomal P protein (Rib-P) is bound to microwells. Antibodies to this antigen, if present in diluted serum, bind in the microwells. Washing of the microwells removes unbound serum antibodies. Horseradish peroxidase (HRP) conjugated anti-human IgG immunologically bind to the bound patient antibodies forming a conjugate/antibody/antigen complex. Washing of the microwells removes unbound conjugate. An enzyme substrate in the presence of bound conjugate hydrolyzes to form a blue color. The addition of an acid stops the reaction forming a yellow endproduct. The intensity of this yellow color is measured photometrically at 450 nm. The amount of colour is directly proportional to the concentration of IgG antibodies present in the original sample.

## Warnings and Precautions

1. All reagents of this kit are strictly intended for research use only.
2. Do not interchange kit components from different lots.
3. Components containing human serum were tested and found negative for HBsAg and HIV by FDA approved methods. No test can guarantee the absence of HBsAg or HIV, and so all human serumbased reagents in this kit must be handled as though capable of transmitting infection.
4. Avoid contact with the TMB (3, 3', 5, 5' -Tetramethyl-benzidine). If TMB comes into contact with skin, wash thoroughly with water and soap.
5. Avoid contact with the Stop Solution which contains hydrochloric acid (1 M). If it comes into contact with skin, wash thoroughly with water and seek medical attention.
6. Some kit components (i.e. Controls, Sample buffer and Buffered Wash Solution) contain Sodium Azide as preservative. Sodium Azide ( $\text{NaN}_3$ ) is highly toxic and reactive in pure form. At the product concentrations, though not hazardous. Despite the classification as non-hazardous, we strongly recommend using prudent laboratory practices (see 8, 9, 10)
7. Some kit components contain Proclin 300 as preservative. When disposing reagents containing Proclin 300, flush drains with copious amounts of water to dilute the components below active levels.
8. Wear disposable gloves while handling specimens or kit reagents and wash hands thoroughly afterwards.
9. Do not pipette by mouth.
10. Do not Eat, Drink, Smoke or Apply Makeup in areas where specimens or kit reagents are handled.
11. Avoid contact between the buffered Peroxide Solution and easily oxidized materials, extreme temperature may initiate spontaneous combustion.

Observe the guidelines for performing quality control in medical laboratories by assaying controls and/or pooled sera. During handling of all kit reagents, controls and serum samples observe the existing legal regulations.

**Contents of the Kit**

Qty.1	Divisible microplate consisting of 12 modules of 8 wells coated with highly purified ribosomal P proteins P0, P1 and P2 (Rib-P). Ready to use.
6 vials, 1.5 ml each	Anti-Rib-P Calibrators (A-F) in a serum/buffer matrix (PBS, BSA, NaN <sub>3</sub> <0.1% (w/w)) containing: IgG: 0; 12.5; 25; 50; 100; and 200 U/ml. Ready to use.
2 vials, 1.5 ml each	Anti-Rib-P Controls in a serum/buffer matrix (PBS, BSA, NaN <sub>3</sub> <0.1% (w/w)) positive (1) and negative (2), for the respective concentrations see the enclosed package insert. Ready to use.
1 vial, 20 ml	Sample buffer (Tris, NaN <sub>3</sub> <0.1% (w/w)), yellow, concentrate (5x)
1 vial, 15 ml	Enzyme conjugate solution (PBS, PROCLIN 300 <0.5% (v/v)), (light red) containing polyclonal rabbit anti-human IgG; labelled with horseradish peroxidase. Ready to use.
1 vial, 15 ml	TMB substrate solution. Ready to use.
1 vial, 15 ml	Stop solution (contains acid). Ready to use.
1 vial, 20 ml	Wash solution (PBS, NaN <sub>3</sub> <0.1% (w/w)), concentrate (50x)

**Storage and Stability**

1. Store the kit at 2-8°C.
2. Keep microplate wells sealed in a dry bag with desiccants.
3. The reagents are stable until expiration of the kit.
4. Do not expose test reagents to heat, sun or strong light during storage and usage.
5. Diluted sample buffer and wash buffer are stable for at least 30 days when stored at 2-8°C.

**Materials Required****Equipment**

- Microplate reader capable of endpoint measurements at 450 nm
- Multi-Channel Dispenser or repeatable pipet for 100 µl
- Vortex mixer
- Pipets for 10 µl, 100 µl and 1000 µl
- Laboratory timing device
- Data reduction software

**Preparation of reagents**

- Distilled or deionized water
- Graduated cylinder for 100 and 1000 ml
- Plastic container for storage of the wash solution



## Specimen Collection, Storage and Handling

1. Collect whole blood specimens using acceptable medical techniques to avoid hemolysis.
2. Allow blood to clot and separate the serum by centrifugation.
3. Test serum should be clear and non-hemolyzed. Contamination by hemolysis or lipemia is best avoided, but does not interfere with this assay.
4. Specimens may be refrigerated at 2-8°C for up to five days or stored at -20°C up to six months.
5. Avoid repetitive freezing and thawing of serum samples. This may result in variable loss of autoantibody activity.
6. Testing of heat-inactivated sera is not recommended.

## Procedural Notes

1. Do not use kit components beyond their expiration dates.
2. Do not interchange kit components from different lots.
3. All materials must be at room temperature (20-28°C).
4. Have all reagents and samples ready before start of the assay. Once started, the test must be performed without interruption to get the most reliable and consistent results.
5. Perform the assay steps only in the order indicated.
6. Always use fresh sample dilutions.
7. Pipette all reagents and samples into the bottom of the wells.
8. To avoid carryover contaminations change the tip between samples and different kit controls.
9. It is important to wash microwells thoroughly and remove the last droplets of wash buffer to achieve best results.
10. All incubation steps must be accurately timed.
11. Control sera or pools should routinely be assayed as unknowns to check performance of the reagents and the assay.
12. Do not re-use microplate wells.

For all controls, the respective concentrations are provided on the labels of each vial. Using these concentrations a calibration curve may be calculated to read off the patient results semi-quantitatively.

## Preparation of Reagents

### Preparation of sample buffer

Dilute the contents of each vial of the sample buffer concentrate (5x) with distilled or deionized water to a final volume of 100 ml prior to use. Store refrigerated: stable at 2-8°C for at least 30 days after preparation or until the expiration date printed on the label.



#### Preparation of wash solution

Dilute the contents of each vial of the buffered wash solution concentrate (50x) with distilled or deionized water to a final volume of 1000 ml prior to use. Store refrigerated: stable at 2-8°C for at least 30 days after preparation or until the expiration date printed on the label.

#### Sample preparation

Dilute all patient samples 1:100 with sample buffer before assay. Therefore combine 10 µl of sample with 990 µl of sample buffer in a polystyrene tube. Mix well. Controls are ready to use and need not be diluted.

### Test Procedure

1. Prepare a sufficient number of microplate modules to accommodate controls and prediluted patient samples.
2. Pipet 100 µl of calibrators, controls and prediluted patient samples in duplicate into the wells.
3. Incubate for 30 minutes at room temperature (20-28 °C).
4. Discard the contents of the microwells and wash 3 times with 300 µl of wash solution.
5. Dispense 100 µl of enzyme conjugate into each well.
6. Incubate for 15 minutes at room temperature.
7. Discard the contents of the microwells and wash 3 times with 300 µl of wash solution.
8. Dispense 100 µl of TMB substrate solution into each well.
9. Incubate for 15 minutes at room temperature.
10. Add 100 µl of stop solution to each well of the modules and incubate for 5 minutes at room temperature.
11. Read the optical density at 450 nm and calculate the results. Bi-chromatic measurement with a reference at 600-690 nm is recommended.

**The developed color is stable for at least 30 minutes. Read optical densities during this time.**

#### Automation

The Anti-Rib-P ELISA is suitable for use on open automated ELISA processors. The test procedure detailed above is appropriate for use with or without automation.

### Interpretation of Results

#### Quality Control

This test is only valid if the optical density at 450 nm for Positive Control (1) and Negative Control (2) as well as for the Calibrator A and F complies with the respective range indicated on the Quality Control Certificate enclosed to each test kit! If any of these criteria is not fulfilled, the results are invalid and the test should be repeated.

#### Calculation of results

For Anti-Rib-P ELISA a 4-Parameter-Fit with lin-log coordinates for optical density and concentration is the data reduction method of choice. Smoothed Spline Approximation and log-log coordinates are also suitable.

#### Recommended Lin-Log Plot

First calculate the averaged optical densities for each calibrator well. Use lin-log graph paper and plot the averaged optical density of each calibrator versus the concentration. Draw the best fitting curve approximating the path of all calibrator points. The calibrator points may also be connected with straight line segments. The concentration of unknowns may then be estimated from the calibration curve by interpolation.

#### Interpretation of results

In a normal range study with serum samples from healthy blood donors the following ranges have been established with the Anti-Rib-P test:

	Anti-Rib-P [U/ml]
normal:	< 10
elevated:	≥ 10

Positive results should be verified concerning the entire clinical status of the patient. Also every decision for therapy should be taken individually. It is recommended that each laboratory establishes its own normal and pathological ranges of serum Anti-Rib-P.

### Performance Characteristics

#### Parallelism

In dilution experiments sera with high antibody concentrations were diluted with sample buffer and assayed in the Anti-Rib-P kit. The assay shows linearity over the full measuring range.

#### Precision (Reproducibility)

Statistics for Coefficients of variation (CV) were calculated for each of four samples from the results of 24 determinations in a single run for Intra-Assay precision. Run-to-run precision was calculated from the results of 5 different runs with 6 determinations of each sample:

Intra-Assay			Inter-Assay		
Sample No	Mean (U/ml)	CV [%]	Sample No	Mean (U/ml)	CV [%]
1	24.6	6.3	1	27.2	6.4
2	63.8	2.4	2	65.1	4.4
3	122.4	3.7	3	120.4	3.8

### Sensitivity

The lower detection limit for Anti-Rib-P has been determined at 1.0 U/ml.

### Specificity

The microplate is coated with highly purified ribosomal P protein (Rib-P) as antigen. The Anti-Rib-P test kits recognises only autoantibodies specific to the phospho-proteins P0, P1 and P2 of the 60s subunit of ribosomal RNP complexes. No crossreactivities to other RNP epitopes and autoantigens have been observed.

### Calibration

Since no international reference preparation for Anti-Rib-P autoantibodies is available, the assay system is calibrated in relative arbitrary units.

### **Limitations of Procedure**

The Anti-Rib-P ELISA is a diagnostic aid and by itself is not diagnostic. A definite clinical diagnosis should not be based on the results of a single test, but should be made by the physician after all clinical and laboratory findings have been evaluated.

Not all SLE patients are positive for Anti-Rib-P.

Not all SLE patients with neurological symptoms are positive for Anti-Rib-P.

### **Interfering Substances**

No interference has been observed with haemolytic (up to 1000 mg/dL), lipemic (up to 3 g/dL triglycerides) or bilirubin (up to 40 mg/dL) containing sera. Nor have any interfering effects been observed with the use of anticoagulants. However for practical reasons it is recommended that grossly hemolyzed or lipemic samples be avoided.

## References

1. Bonfa, E.; Viana, V.S.; Barreto, A.C.; Yoshinari, N.H. and Cossermelli, W. Autoantibodies in Chagas' disease. An antibody cross-reactive with human and *Trypanosoma cruzi* ribosomal proteins. *J. Immunol.* 1993; May 1, 150(9): 3917-23.
2. Hay, E.M. and Isenberg, D.A. Autoantibodies in central nervous system lupus. *Br. J. Rheumatol.* 1993; Apr, 32(4): 329-32.
3. Teh, L.S.; Hay, E.M.; Amos, N.; Black, D.; Huddy, A.; Creed, F.; Bernstein, R.M.; Holt, P.J. and Williams, B.D. Anti-P antibodies are associated with psychiatric and focal cerebral disorders in patients with systemic lupus erythematosus. *Br. J. Rheumatol.* 1993; Apr, 32(4): 287-90.
4. Nojima, Y.; Minota, S.; Yamada, A.; Takaku, F.; Aotsuka, S. and Yokohari, R. Correlation of antibodies to ribosomal P protein with psychosis in patients with systemic lupus erythematosus. *Ann. Rheum. Dis.* 1992; Sep, 51(9): 1053-5.
5. Elkon, K.B.; Bonfa, E. and Brot, N. Antiribosomal antibodies in systemic lupus erythematosus. *Rheum. Dis. Clin. North Am.* 1992; May, 18(2): 377-90.
6. Skeiky, Y.A.; Benson, D.R.; Parsons, M.; Elkon, K.B. and Reed, S.G. Cloning and expression of *Trypanosoma cruzi* ribosomal protein P0 and epitope analysis of anti-P0 autoantibodies in Chagas' disease patients. *J. Exp. Med.* 1992; Jul 1, 176(1): 201-11.

## Incubation Scheme

