

**AccuDiag™**  
**Cardiolipin IgA**  
**ELISA Kit**

REF 1493-11



<b>Test</b>	<b>Cardiolipin IgA ELISA</b>
<b>Method</b>	<b>Enzyme Linked Immunosorbent Assay</b>
<b>Principle</b>	<b>Sandwich Complex</b>
<b>Detection Range</b>	<b>5-160 APL</b>
<b>Sample</b>	<b>5µL Serum/Plasma</b>
<b>Specificity</b>	<b>94 %</b>
<b>Sensitivity</b>	<b>67%</b>
<b>Total Time</b>	<b>~ 75 min</b>
<b>Shelf Life</b>	<b>12 Months from the manufacturing date</b>

**INTENDED USE**

The Diagnostic Automation, Inc. Cardiolipin IgA Enzyme-linked Immunosorbent Assay (ELISA), is intended for the detection and semi-quantitative determination of IgA antibodies to Cardiolipin in human sera or plasma. The assay is to be used to detect IgA antibodies in a single specimen. The results of the assay are to be used as an aid in the diagnosis of the Anti-phospholipid syndrome in patients with autoimmune disease.

**SUMMARY AND EXPLANATION**

Anti- Cardiolipin autoantibodies (ACA) are frequently found in patients with systemic lupus erythematosus (SLE). They are also found in patients with other autoimmune diseases, as well as in some individuals with no apparent previous underlying diseases<sup>1,2</sup>. Elevated levels of ACA have been reported to be significantly associated with the presence of both venous and arterial thrombosis, thrombocytopenia, and recurrent fetal loss<sup>3,4</sup>. Anti-phospholipid syndrome has been used to describe patients who present these clinical manifestations, in association with ACA or lupus anticoagulant<sup>5,6</sup>.

ACA are found in the immunoglobulin classes IgG, IgM and IgA. The determination of IgM antibodies is a valuable indicator in the diagnosis of beginning autoimmune disease, whereas IgG antibodies will be found in progressive stages of manifested autoimmune disorders. ACA IgG show a good correlation to the clinical status of the patient in thrombosis, thrombocytopenia, fetal loss, and some neurological disorders. ACA IgA are often associated with IgG antibodies. ACA IgA seem to have a greater validity in thrombosis and fetal loss<sup>4,5,6</sup>.

Testing for ACA of various isotypes by ELISA aid in diagnosis of Anti-phospholipid syndrome in patients with SLE and lupus-like disorders<sup>7,8,9,10</sup>.

**TEST PRINCIPLE**

Purified Cardiolipin antigens are coated on the surface of microwells. Diluted patient serum or plasma, and calibrators, are added to the wells. The Anticardiolipin specific antibodies, if present, bind to the antigens. All unbound materials are washed away. After adding enzyme conjugate, it binds to the antibody-antigen complex. Excess enzyme conjugate is washed off, and TMB Chromogenic substrate is added. The enzyme conjugate catalytic reaction is stopped at a specific time. The intensity of the color generated is proportional to the amount of IgA specific antibodies in the sample. The results are read by a microwell reader, and compared in a parallel manner with calibrators.

**SPECIMEN COLLECTION AND PREPARATION**

1. Collect blood specimens and separate the serum.
2. Specimens may be refrigerated at 2 - 8° C for up to seven days or frozen for up to six months. Avoid repetitive freezing and thawing of serum sample.

**MATERIALS AND COMPONENTS**

**Materials provided with the test kits**

- |  |                |
|--|----------------|
| 1. Microwell strips: Cardiolipin antigen coated wells.   | 12 x 8 wells   |
| 2. Sample Diluent:   | 50 ml / bottle |
| 3. Washing concentrate 20x.  | 50 ml / bottle |
| 4. TMB Chromogenic Substrate: Amber bottle.  | 12 ml / bottle |
| 5. Enzyme conjugate: Red color solution.   | 12 ml / bottle |
| 6. Calibrator set (1:101 prediluted): 5, 10, 20, 40, 80, 160 APL.                                      | 1.0 ml / vial  |
| 7. Control set (1:101 prediluted): Negative and Positive controls. Ranges are indicated on each label. | 1.0 ml / vial  |
| 8. Stop solution   | 12 ml / bottle |

**PRECAUTIONS**

1. Potential biohazardous materials:  
 The calibrator and controls contain human source components, which have been tested and found nonreactive for Hepatitis B surface antigen as well as HIV antibody with FDA licensed reagents. However, as there is no test method that can offer complete assurance that HIV, Hepatitis B virus, or other infectious agents are absent, these reagents should be handled at the Biosafety Level 2, as recommended in the Centers for Disease Control / National Institutes of Health manual, "Biosafety in Microbiological and Biomedical Laboratories." 1984
2. Do not pipette by mouth. Do not smoke, eat, or drink in the areas in which specimens or kit reagents are handled.
3. The components in this kit are intended for use as an integral unit. The components of different lots should not be mixed.
4. This product contains components preserved with sodium azide. Sodium azide may react with lead and copper plumbing to form explosive metal azide. On disposal, flush with a large volume of water.
5. To prevent injury and chemical burns, avoid contact with skin and eyes or inhalation and ingestion of the following reagents: Enzyme conjugate, TMB chromogenic substrate and Stop solution.

**REAGENT PREPARATION**

1. Prepare 1x washing buffer.  
 Prepare washing buffer by adding distilled or deionized water to 20x wash concentrate to make a final volume of 1 liter.
2. Bring all specimens and kit reagents to room temperature (20- 25° C) and gently mix.

## ASSAY PROCEDURE

- Place the desired number of coated strips into the holder.  

PRE-WASH Coated Wells - Repeat washing 3 times with washing buffer.
- Prepare 1:101 dilution of test samples by adding 5 µl of the sample to 500 µl of Sample Diluent. Mix well.  

Do not dilute 1:101 prediluted Calibrators & Controls.
- Dispense 100 µl of diluted sera and prediluted calibrators & controls into the appropriate wells. Tap the holder to remove air bubbles from the liquid and mix well. Incubate for 30 minutes at room temperature.
- Remove liquid from all wells. Repeat washing three times with washing buffer.
- Dispense 100 µl of enzyme conjugate to each well and incubate for 30 minutes at room temperature.
- Remove enzyme conjugate from all wells. Repeat washing three times with washing buffer.
- Dispense 100 µl of TMB Chromogenic Substrate into each well and incubate for 15 minutes at room temperature.
- Add 100 µl of Stop solution to stop reaction.  

Make sure there are no air bubbles in each well before reading.
- Read O.D. at 450 nm with a microwell reader.

## RESULTS

- Construct a standard curve by plotting O.D. 450 nm on the y-axis against the concentration of calibrator APL values on the x-axis on a log-log graph paper or log-lin graph.
- Using the O.D. value of each specimen, determine the concentration from the standard curve.
- A typical example:

Calibrator Set	Cardiolipin IgA (APL)	O.D. 450 nm	O.D. 450 nm Mean	SD	CV %
Calibrator 1	5	0.104	0.094	0.009	7.142
Calibrator 2	10	0.209	0.220	0.0215	3.626
Calibrator 3	20	0.436	0.497	0.0467	9.246
Calibrator 4	40	0.750	0.761	0.0756	1.030
Calibrator 5	80	1.494	1.300	1.397	0.137
Calibrator 6	160	2.535	2.460	2.498	0.053

## QUALITY CONTROL

- The negative control and positive control should be run with every batch of samples tested and the concentration must be within the range stated on its label.
- The O.D. value of Sample Diluent (0 APL) must be lower than 0.150 and the O.D. value of calibrator 160 APL must be greater than 0.750.

Additional controls may be prepared from human serum specimens and kept under -20° C.

## INTERPRETATION OF RESULTS

- Negative: < 10 APL
- Low positive: 10-25 APL
- Moderate positive: 26-40 APL
- High positive: > 40 APL

## EXPECTED VALUE:

- Elevated levels of ACA are occasionally, though infrequently, observed in the normal population. However, several autoimmune and infectious diseases can result in transient or chronic increases in ACA. Elevated ACA levels have been reported in SLE, rheumatoid arthritis, tuberculosis, Behcet's syndrome, and other illnesses<sup>11,12,13,14</sup>. The range of normal ACA values may vary from population to population.
- In a normal range study with 80 normal serum samples, the mean value was found 1.9 APL, SD = 1.098 with range from 1 to 6 APL.
- It is recommended that each laboratory should establish its own normal and pathological ranges of serum ACA-IgA. The values should be regarded as guidelines only.

## PERFORMANCE CHARACTERISTICS

### Sensitivity, specificity, and accuracy:

A total of 63 samples from different sources were assayed with the DIAGNOSTIC AUTOMATION ELISA ACA IgA test and with another commercially available ELISA test kit.

		Reference ELISA		Total
		N	P	
DIAGNOSTIC AUTOMATION ELISA Cardiolipin IgA	N	31 (D)	10	41
	P	(B)	20	22
		2 (C)	(A)	
	Total	33	30	63

Relative sensitivity =  $A / (A+B) = 20 / (20 + 10) = 67\%$

Relative specificity =  $D / (C+D) = 31 / (2 + 31) = 94\%$

Agreement =  $(A+D) / (A+B+C+D) = (20 + 31) / (20 + 10 + 2 + 31) = 51 / 63 = 81\%$

### Cross-reactivity:

- There is no cross reaction to immunoglobulins of ACA IgM and IgG.
- The cross reactivity concerning some immunoglobulins as shown in the following are found negative.  
 Positive DS DNA, ANA, RF,  
 Positive Rubella, CMV, Toxo, HSV1/2.  
 Positive EBV, Dengue, Mumps, Measles, Chlamydia T. and VZV.

### Precision:

The mean, SD, and % CV were calculated inter- and intra-assay:

Intra-assay	n	Mean APL	SD	% CV
Serum 1	8	25.9	3.0	11.6
Serum 2	8	66.4	5.6	8.6
Serum 3	8	105.0	5.7	5.4

Inter-assay	n	Mean APL	SD	% CV
Serum 1	8	25.0	5.2	21.2
Serum 2	8	68.4	10.4	15.2
Serum 3	8	112.2	13.8	12.3

## LIMITATIONS OF THE PROCEDURE

- As with other serological assays, the results of these assays should be used in conjunction with information available from clinical evaluation and other diagnostic procedures.



- Although ACA has been associated with certain SLE subsets, the clinical significance of ACA in SLE and other diseases remains under investigation.

## STORAGE

- Store the kit at 2 - 8°C.
- After opening of pouch, the remaining coated wells must be carefully resealed inside the pouch with desiccants immediately. It is recommended to finish the whole coated wells within 30 days.
- The reagents are stable until expiration of the kit.
- Do not expose test reagents to heat, sun, or strong light during storage or usage.

## REFERENCES

- Roubey R.A.S. 1996. Immunology of the antiphospholipid syndrome. *Arth. & Rheumatism* 39: 1444-1454.
- Harris E.N., Ghavari A.E., Hughes G.R.V. 1985. Anti-phospholipid antibodies. *Clin. Rheum. Dis.* 11(3): 591.
- Love P.E., and S.A. Santoro. 1990. Antiphospholipid antibodies: Anti-cardiolipin and the lupus anticoagulant in systemic lupus erythematosus (SLE) and in non-SLE disorders. Prevalence and clinical significance. *Ann. Intern. Med.* 112:682-98.
- Ghavari A.E., Harris E.N., Asherson R.A., Hughes G.R.V. 1987. Anti-cardiolipin antibodies: isotype distribution and phospholipid specificity. *Ann. Rheum. Dis.* 46:1.
- Harris E.N., Ghavari A.E., Hughes G.R.V. 1985. Anti-phospholipid antibodies. *Clin. Rheum. Dis.* 11(3): 591-609.
- Harris E.N. 1992. Serological detection of antiphospholipid antibodies. *Stroke* 23: [sup1]1-6.
- Loizou S., McCrea J.D., Rudge A.C., Reynolds R., Boyle C.C., Harris E.N. 1985. Measurement of anticardiolipin antibodies by and enzyme-linked immunosorbent assay (ELISA): standardization and quantitation of results. *Clin. Exp. Immunol.* 62:738-45.
- Harris E.N. 1995. The anticardiolipin ELISA test. *Am. Clinical. Lab.* March, 7-8.
- Weidmann C.E., Wallace D.J., Peter J.B., Knight P.J., Bear M.B., Klinenberg J.R. 1988. Studies of IgG, IgM and IgA antiphospholipid antibody isotypes in systemic lupus erythematosus. *J. Rheumatol.* 15:74.
- Kalunian K.C., Peter J.b., Middlekauf H.R., et al. 1988. Clinical significance of a single test for anticardiolipin antibodies in patients with systemic lupus erythematosus. *Am. J. Med.* 85:602-8.
- Santiago M.B., Cossermelli W., Tuma M.F., Pinto M.N., Oliveira R.M. 1989. Anticardiolipin antibodies in patients with infectious diseases. *Clin. Rheumatol.* 8:23-28.
- Pereira R-M. R., Goncalves C.R., Bueno C., de Souza Meirelles E., Cossermelli W., de Oliveira R.M. 1989. Anticardiolipin antibodies in Behcet's syndrome: a predictor of a more severe disease. *Clin. Rheumatol.* 8:289-291.
- Santiago M.B., Stellin R., Gaburo N. Jr., Bueno C., Viana V.S.T., Cossermelli W., de Oliveira M. 1990. Antiphospholipid antibodies in syphilis. *Brazilian J. Med. Res.* 23:397-402.
- Sabbaga J., Neto J.F., Chaddad R., Cecconello I., de Oliveira R.M. 1991. A 'primary' thrombotic syndrome: absence of antiphospholipid antibodies. *Clin. Rheumatol.* 10:81-83.

<b>ISO 13485</b> <b>ISO 9001</b> 	
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