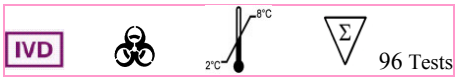
AccuDiag™ Anti-Phospholipid Screen IgG/IgM ELISA Kit

REF 2560-6



Test	Antiphospholipid Screen IgG/IgM ELISA
Method	Enzyme Linked Immunosorbent Assay
Principle	Indirect; Antigen Coated Plate
Detection Range	IgG: 0-100 GPL-U/mL IgM: 0-100 MPL-U/mL
Sample	10 µL serum
Specificity	IgG: 97.3% IgM: 96.7%
Sensitivity	IgG: 91.8% IgM: 53.4%

INTENDED USE

The Diagnostic Automation, Inc. Anti-Phospholipid Screen IgG/IgM assay is a test system to screen for the presence of IgG and IgM class autoantibodies against cardiolipin, phosphatidyl serine, phosphatidyl inositol, phosphatidic acid and ß2-Glycoprotein I in human serum or plasma.

SUMMARY AND EXPLANATION

Anti phospholipid syndrome (APS, Hughes Syndrome) is a systemic autoimmune disease that causes thromboses, recurrent miscarriage, and intrauterine fetal death. Clinical symptoms are accompanied by the occurrence of specific autoantibodies that are detectable in the blood of patients with APS. These antibodies bind to phospholipids like cardiolipin, or phospholipid-binding proteins like beta-2-glycoprotein-1.
The clinical symptoms of APS alone are not sufficiently specific to make a definitive diagnosis. Laboratory tests thus play an important role in the diagnosis of the disease. The Scientific and Standardization Committee of the International Society on Thrombosis and Hemostasis defined clinical criteria and diagnostically relevant laboratory parameters in the Sapporo Criteria for the classification of anti phospholipid syndrome, published in 1999. These were revised and updated in 2006 and 2012.

They include the following laboratory parameters:

- Detection of lupus anticoagulant (LA) in the plasma twice in the span of twelve weeks, according to the guidelines of the International Society on Thrombosis and Hemostasis.
- Elevated anti-cardiolipin titer (IgG and/or IgM) in the blood. The values must be determined on two occasions at least twelve weeks apart using standardized ELISA tests for beta-2-glycoprotien 1 dependent cardiolipin antibodies.
- Elevated beta-2-glycoprotein I antibody titre (IgG and/or IgM). The values must be determined on two occasions at least twelve weeks apart. Detection is performed by means of a standardized ELISA test.

The diagnosis of APS is considered as confirmed when at least one clinical and one of the laboratory criteria are fulfilled. In primary APS autoantibodies against phospholipids appear independently, while in secondary APS phospholipid antibodies are detected in conjunction with other autoimmune diseases, such as lupus erythematosus, rheumatoid arthritis, or Sjogren's syndrome. Phospholipid antibodies are detectable in only 1-5 % of healthy individuals, but they are found in 16-35 % of lupus patients. The presence of anti-cardiolipin antibodies in systemic lupus erythematosus (SLE) can be related to the development of thrombosis and thrombocytopenia. In gynecology they are supposed to cause intrauterine death or recurrent abortion. Furthermore, anti-cardiolipin antibodies have been detected in neurological disorders like cerebrovascular insufficiency, cerebral ischemia, epilepsy or chorea. Anti-cardiolipin autoantibodies occur in the immunoglobulin classes IgG, IgM or IgA. The determination of IgM antibodies is a valuable indicator in the diagnosis of beginning autoimmune diseases, whereas IgG antibodies are present in progressive stages of manifested autoimmune disorders. The determination of IgA antibodies seems to have a greater importance in the African-Caribbean population. Quantitative measurement of anti-cardiolipin antibodies, especially IgG, shows high specificity in therapy-monitoring of secondary APS related to SLE. Clinical indications for determination of anti-cardiolipin antibodies are: SLE, thrombosis, thrombocytopenia, cerebral ischemia, chorea, epilepsy, recurrent abortion, intrauterine death.
The discovery that anti-phospholipid antibodies recognize plasma proteins that are associated with phospholipids rather than binding to the phospholipids themselves has been a major advance in APS research. Several reports indicate that beta-2-glycoprotein I antibodies are clinically relevant. Recent studies suggest the presence of a dominant epitope on the first domain of beta-2-glycoprotein I. In contrast to antibodies recognizing other domains of beta-2-glycoprotein I, antidomain I antibodies are found to be highly associated with clinical symptoms.
Anti-cardiolipin and anti-beta-2-glycoprotein I antibodies are independent risk factors for the occurrence of vascular thrombosis and pregnancy loss. However, patients testing positive for multiple antibody specificities generally have a more severe disease and higher recurrence rates despite treatment.
Besides the standardized laboratory assays for detection of anti-cardiolipin antibodies, antibodies directed to beta 2 glycoprotein I and LA, defined in the classification criteria, several other autoantibodies have shown to be relevant to APS. Among them are antibodies against negatively-charged phospholipids, like phosphatidyl serine, phosphatidyl inositol and phosphatidic acid (PA). These antigens can improve the clinical sensitivity in patient samples with suspected APS but they will not replace the determination of autoantibodies against cardiolipin or beta-2-glycoprotein I.
Autoantibodies that bind to proteins of the coagulation cascade or complexes of these proteins with phospholipids have also been proposed to be relevant for APS. As an example, a test for anti-prothrombin antibodies in conjunction with other parameters may be a good risk marker for thrombosis. Antibodies to Annexin V may also be detectable within the clinical framework of APS with otherwise negative phospholipid antibody results.

TEST PRINCIPLE

A mixture of highly purified cardiolipin, phosphatidyl serine, phosphatidyl inositol, phosphatidic acid and human ß2-Glycoprotein I is bound to microwells.
The determination is based on an indirect enzyme linked immune reaction with the following steps:
Specific antibodies in the patient sample bind to the antigen coated on the surface of the reaction wells. After incubation, a washing step removes unbound and unspecifically bound serum or plasma components.
Subsequently added enzyme conjugate binds to the immobilized antibody-antigen-complexes. After incubation, a second washing step removes unbound enzyme conjugate. After addition of substrate solution the bound enzyme conjugate hydrolyzes the substrate forming a blue colored product. Addition of an acid stops the reaction generating a yellow end product.
The intensity of the yellow color correlates with the concentration of the antibody-antigen-complex and can be measured photometrically at 450 nm.

SPECIMEN COLLECTION AND PREPARATION

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 for up to six months.
5. Avoid repetitive freezing and thawing of serum or plasma samples. This may result in variable loss of activity.
6. Testing of heat-inactivated sera is not recommended.

MATERIALS AND COMPONENTS

Materials provided with the test kits

1. **Plate:** Package size 96 determ.Qty.1
   - Divisible microplate consisting of 12 modules of 8 wells each.
   - Ready to use.
2. **Calibrators** 6 vials, 1.5 ml each.
   - Yellow colored.
   - Combined phospholipid antibodies in a serum/buffer matrix (PBS, BSA, detergent, NaN_3 0.09%):
     IgG: 0; 6.3; 12.5; 25; 50; 100 GPL U/ml, and
     IgM: 0; 6.3; 12.5; 25; 50; 100 MPL U/ml.
   - Ready to use.
3. **Control:** 2 vials, 1.5 ml each
   - Yellow colored.
   - Contain phospholipid antibodies matrix in a serum/buffer matrix (PBS, BSA, detergent, NaN_3 0.09%).
   - Positive (1) and Negative (2), for the respective concentrations see the enclosed QC insert. Ready to use.
4. **Sample Buffer**: 1 vial, 20 ml
   - Yellow colored. Concentrate (5X).
   - Contain PBS, BSA, detergent, preservative sodium azide 0.09%.
5. **Enzyme Conjugate IgG**: 1 vial, 15 ml
   - Light red colored.
   - Contain anti-human IgG antibodies, HRP labelled; PBS, BSA, detergent, preservative Proclin 0.05%.
   - Ready to use.
6. **Enzyme Conjugate IgM**: 1 vial, 15 ml
   - Light red colored.
   - Contain anti-human IgG antibodies, HRP labelled; PBS, BSA, detergent, preservative Proclin 0.05%.
   - Ready to use.
7. **TMB Substrate Solution**: 1 vial, 15 ml
   - Contain 3,3',5,5'-Tetramethylbenzidine.
   - Ready to use.
8. **Stop Solution**: 1 vial, 15 ml
   - Contains acid.
   - Ready to use.
9. **Wash Solution**: 1 vial, 20 ml
   - 50X conc.
   - Contain Tris, detergent, preservative sodium azide 0.09%.

Materials required but not provided

1. Microplate reader capable for endpoint measurements at 450 nm
2. Multi-Channel Dispenser or repeatable pipet for 100 µl
3. Vortex mixer
4. Pipets for 10 µl, 100 µl and 1000 µl
5. Laboratory timing device
6. Data reduction software
7. Distilled or deionized water
8. Graduated cylinder for 100 and 1000 ml
9. Plastic container for storage of the wash solution

This ELISA is suitable for use on open automated ELISA processors. Each assay has to be validated on the respective automated system. Detailed information is provided upon request.

STORAGE AND STABILITY

1. Store test kit at 2°C - 8°C in the dark.
2. Do not expose reagents to heat, sun, or strong light during storage and usage.
3. Store microplate sealed and desiccated in the clip bag provided.
4. Shelf life of the unopened test kit is 18 months from day of production. Unopened reagents are stable until expiration of the kit. See labels for individual batch.
5. Diluted Wash Solution and Sample Buffer are stable for at least 30 days when stored at 2°C - 8°C. We recommend consumption on the same day.

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) prior to use.
4. Prepare all reagents and samples before start of the assay. Once started, the test must be performed without interruption to get the most reliable and consistent results.
5. Double determinations may be done. By this means pipetting errors may become obvious.
6. Perform the assay steps only in the order indicated.
7. Always use fresh sample dilutions.
8. Pipette all regents and samples into the bottom of the wells.
9. To avoid carryover contaminations, change the pipet tip between samples and different kit controls.
10. It is important to wash microwells thoroughly and remove the last droplets of wash buffer to achieve best results.
11. All incubation steps must be accurately timed.
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 standard curve may be calculated to read off the patient results semi-quantitatively.

PREPARATION OF REAGENTS AND SAMPLES

Preparation of sample buffer
Prior to use dilute the contents (20mL) of one vial of sample buffer 5X concentrate with distilled or deionized water to a final volume of 100mL.

Preparation of wash solution
Dilute the contents of one vial of the buffered wash solution concentrate (50X) with distilled or deionized water to a final volume of 1000mL prior to use.

Sample preparation
Dilute all patient samples **1:100** with sample buffer before assy.
Therefore combine 10 µl of sample with 990 µl of prediluted sample buffer in a polystyrene tube. Mix well.

Calibrators and Controls are ready to use and need not be diluted.

TEST PROCEDURE

Prepare enough microplate modules for all calibrators / controls and patient samples.

1. Pipette **100 µL** of calibrators, controls and prediluted patient samples into the wells.
2. Incubate for **30 minutes** at room temperature (20 °C - 28 °C).

3. Discard the contents of the microwells and **wash 3 times with 300 µL** of wash solution.
4. Dispense **100 µL** of enzyme conjugate into each well.
5. Incubate for **15 minutes** at room temperature.
6. Discard the contents of the microwells and **wash 3 times with 300 µL** of wash solution.
7. Dispense **100 µL** of TMB substrate solution into each well.
8. Incubate for **15 minutes** at room temperature
9. Add **100 µL** of stop solution to each well of the modules
10. Incubate for **5 minutes** at room temperature.
11. **Read** the optical density at 450 nm (reference 600-690 nm) and calculate the results. The developed color is stable for at least 30 minutes. Read during this time.

Example for a pipetting scheme:

	1	2	3	4	5	6	7	8	9	10	11	12
A	A	P1	A	P1								
B	B	P2	B	P2								
C	C	P3	C	P3								
D	D	P4	D	P4								
E	E	P5	E	P5								
F	F	P6	F	P6								
G	C+	P7	C+	P7								
H	C-	P8	C-	P8								
	IgG	IgG	IgM	IgM								

P1, ... patient sample, A-F calibrators, C+, C- controls

RESULTS

Quality Control

This test is only valid if the optical density at 450 nm for all calibrators/controls and the results for controls comply with the reference ranges indicated on the Certificate of Analysis enclosed in each test kit.
If these quality control criteria are not met the assay run is invalid and should be repeated.

Calculation of results

For quantitative results plot the optical density of each calibrator versus the calibrator concentration to create a calibration curve. The concentration of patient samples may then be estimated from the calibration curve by interpolation.
Using data reduction software a 4-Parameter-Fit with lin-log coordinates for optical density and concentration is the data reduction method of choice.

Calibration

Calibration is related to the internationally recognized reference sera from E.N. Harris, Louisville and to IRP 97/656 (IgG) and HCAL (IgG)/EY2C9 (IgM).

Measuring Range

The calculation range of this ELISA assay is
IgG: 0-100 GPL-U/mL
IgM: 0-100 MPL-U/mL

Expected values

In a normal range study with samples from healthy blood donors the following ranges have been established with this ELISA assay:
Cut-off IgG: 10 GPL-U/mL
IgM: 10 MPL-U/mL

INTERPRETATION OF RESULTS

Anti-Phospholipid-Ab

	IgG [GPL U/ml]	IgM [MPL U/ml]
Negative:	< 10	< 10
Positive:	≥ 10	≥ 10

PERFORMANCE CHARACTERISTICS

Limit of Detection

Functional sensitivity was determined to be:
IgG: 0.5 GPL-U/mL
IgM: 0.5 MPL-U/mL

Linearity

Patient samples containing high levels of specific antibody were serially diluted in sample buffer to demonstrate the dynamic range of the assay and the upper / lower end of linearity. Activity for each dilution was calculated from the calibration curve using a 4-Parameter-Fit with lin-log coordinates.

Sample	Dilution	Observed [GPL-U/mL / MPL-U/mL]	Expected [GPL-U/mL / MPL-U/mL	O/E [%]
IgG 1	1:100	98.0	98.4	100
	1:200	49.6	49.2	101
	1:400	24.3	24.6	99
	1:800	12.0	12.3	98
	1:1600	5.8	6.2	94
IgG 2	1:100	92.4	92.4	100
	1:200	45.9	46.2	99
	1:400	22.7	23.1	98
	1:800	11.4	11.6	99
	1:1600	5.4	5.8	94
IgM 1	1:100	92.7	92.7	100
	1:200	45.7	46.4	99
	1:400	22.8	23.2	98
	1:800	11.2	11.6	97
	1:1600	5.4	5.8	93
IgM 2	1:100	72.4	74.2	100
	1:200	36.5	37.1	98
	1:400	18.7	18.6	101
	1:800	8.9	9.3	96
	1:1600	4.4	4.6	95

Reproducibility

Intra-assay precision:
Coefficient of variation (CV) was calculated for each of three samples from the results of 24 determinations in a single run. Results for precision-within-assay are shown in the table below.
Inter-assay precision:
Coefficient of variation (CV) was calculated for each of three samples from the results of 6 determinations in 5 different runs. Results for run-to-run precision are shown in the table below.

Intra-Assay IgG		
Sample	Mean [GPL-U/mL]	CV [%]
1	13.5	3.0
2	30.1	2.8
3	70.5	4.1

Inter-Assay IgG		
Sample	Mean [GPL-U/mL]	CV [%]
1	14.0	5.6
2	32.1	6.4
3	68.9	5.7

Intra-Assay IgM		
Sample	Mean [MPL-U/mL]	CV [%]
1	15.0	2.8
2	28.7	3.4
3	72.4	3.1

Inter-Assay IgM		
Sample	Mean [MPL-U/mL]	CV [%]
1	14.7	4.7
2	29.2	6.0
3	74.0	6.2

Interfering substances

No interference has been observed with hemolytic (up to 1000 mg/dL) or lipemic (up to 3 g/dL triglycerides) sera or plasma, or bilirubin (up to 40 mg/dL) containing sera or plasma.

Diagnostic Automation/ Cortez Diagnostics, Inc.
21250 Califa St, Suite 102 and 116, Woodland Hills, CA 91367 USA Phone: 818-591-3030, Fax : 818-591-8383
Email: onestep@rapidtest.com Website: www.rapidtest.com

Nor have any interfering effects observed with the use of anticoagulants (Citrate, EDTA, Heparin).
However for practical reasons it is recommended that grossly hemolyzed or lipemic samples should be avoided.

Study Results

Study Population	n	n Pos IgG	[%]	Pos IgM	[%]
Primary APS	8	7	87.5	6	75.0
Secondary APS	65	60	92.3	33	50.8
Normal human sera	150	4	2.7	5	3.3

		Clinical Diagnosis		
		Pos	Neg	
2560-6 IgG	Pos	67	4	
	Neg	6	146	
		73	150	223

Sensitivity: 91.8%
Specificity: 97.3%
Overall agreement: 95.5%

		Clinical Diagnosis		
		Pos	Neg	
2560-6 IgM	Pos	39	5	
	Neg	34	145	
		73	150	223

Sensitivity: 53.4%
Specificity: 96.7%
Overall agreement: 82.5%

LIMITATIONS OF PROCEDURE

This assay is a diagnostic aid. 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 concerning the entire clinical picture of the patient. Also every decision for therapy should be taken individually.
The above pathological and normal reference ranges for antibodies in patient samples should be regarded as recommendations only. Each laboratory should establish its own ranges according to ISO 15189 or other applicable laboratory guidelines.

PRECAUTIONS

- All reagents of this kit are intended for professional in vitro diagnostic use only.
- Components containing human serum were tested and found negative for HBsAg, HCV, HIV1 and HIV2 by FDA approved methods. No test can guarantee the absence of HBsAg, HCV, HIV1 or HIV2, and so all human serum based reagents in this kit must be handled as though capable of transmitting infection.
- Bovine serum albumin (BSA) used in components has been tested for BSE and found negative.
- Avoid contact with the substrate TMB (3,3´,5,5´-Tetramethyl-benzidine).
- Stop solution contains acid, classification is non-hazardous. Avoid contact with skin.
- Control, sample buffer and wash buffer contain sodium azide 0.09% as preservative. This concentration is classified as non-hazardous.
- Enzyme conjugate contains ProClin 300 0.05% as preservative. This concentration is classified as non-hazardous.

During handling of all reagents, controls and serum samples observe the existing regulations for laboratory safety regulations and good laboratory practice:

- First aid measures:
  In case of skin contact, immediately wash thoroughly with water and soap. Remove contaminated clothing and shoes and wash before reuse. If system fluid comes into contact with skin, wash thoroughly with water. After contact with the eyes carefully rinse the opened eye with running water for at least 10 minutes. Get medical attention if necessary.
- Personal precautions, protective equipment and emergency procedures:
  Observe laboratory safety regulations. Avoid contact with skin and eyes. Do not swallow. Do not pipette by mouth. Do not eat, drink, smoke or apply makeup in areas where specimens or kit reagents are handled. When spilled, absorb with an inert material and put the spilled material in an appropriate waste disposal.
- Exposure controls / personal protection:
  Wear protective gloves of nitrile rubber or natural latex. Wear protective glasses. Used according to intended use no dangerous reactions known.
- Conditions to avoid:
  Since substrate solution is light-sensitive. Store in the dark.
- For disposal of laboratory waste the national or regional legislation has to be observed.

Observe the guidelines for performing quality control in medical laboratories by assaying control sera.

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ISO 13485
ISO 9001

Diagnostic Automation/Cortez Diagnostics, Inc.
21250 Califa Street, Suite 102 and 116,
Woodland Hills, California 91367 USA

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