BioCLIA® Autoimmune Reagent Kit

IAA

Chemiluminescent Microparticle Immunoassay

Magnetic bead chemiluminescence immunoassay (CLIA) for semi-quantitative determination of anti-IAA antibody in human serum

Key to Symbols Used

REF	Catalog Number		Expiration Date
IVD	For *In Vitro* Diagnostic Use	LOT	Lot Number
	Store between +2°C and +8°C		Consult Instruction for Use
	Manufacturer	EC REP	Authorized Representative in European Union
ANTIGEN BIOT	Biotinylated Antigen	Σ	Contains Sufficient for < *n* > Tests
CONJ AP G	Conjugate		Chemical Risk Warning
M STREP	Microparticle		Biological Risk Warning

BioCLIA® Autoimmune Reagent Kit, IAA

Intended Use

BioCLIA IAA assay is intended for the in vitro semi-quantitative measurement of insulin autoantibody (IAA) in human serum as an aid in the diagnosis of insulin-dependent diabetes mellitus (IDDM), latent autoimmune diabetes of adults (LADA) or other related disorders in conjunction with other laboratory and clinical findings. This kit is used on the instrument of BioCLIA® 1200 and BioCLIA® 6500.

Catalog Numbers

MY00133 (50 Tests/kit)

MY00184 (100 Tests/kit)

Summary and Explanation

Insulin-dependent diabetes mellitus (IDDM) is an autoimmune disease that pancreatic β cells damaged and the synthesis and secretion of insulin reduced. [1] Insulin is composed of two peptides, A and B. Peptide A contains 21 amino acids of 11 kinds and peptide B contains 30 amino acids of 15 kinds. Two disulfide bonds formed at A7 (Cys) - B7 (Cys) and A20 (Cys) - B19 (Cys) and made peptides A and B connected. Insulin is a kind of acidic protein, stable in acid or neutral conditions. Recombinant insulin can cause strong cellular and humoral immune response. [2, 3]

Insulin Autoantibody (IAA) auto-antibodies specific to endogenous insulin of individuals which are not injected exogenous Insulin or the injecting time is less than 7-10 days. They are mainly in IgG types and appeared less in older individuals, and exist for a rather short time in bodies. [4, 5] IAA is not a diabetes mellitus specific antibody but also positive in insulin autoimmune syndrome ones, thyroid ones or even healthy people. Detection of insulin autoantibody (IAA) gives clinicians a good guidance for diabetes clinical classification, pancreatic β cells damage prediction, screening IDDM in high-risk population and monitoring prognosis. [6] In addition to IDDM, individuals with multiple autoimmune or other organ specific autoimmune can be detected as IAA positive when they intake mercaptan drugs such as methimazole or penicillamine.

Principles of the Procedure

BioCLIA IAA assay is a two-step immunoassay using microparticle, enzyme-labeled chemiluminescent technology.

In the first step, the streptavidin coated magnetic Microparticle, the biotinylated IAA and human serum sample are mixed in an assay tube, which allows specific anti-IAA antibodies to bind to the surface of microparticle. Secondly, after incubation, unbound reagent and sample matrix are removed by washing, and the Microparticle-IAA-anti-IAA antibodies immune complexes are kept with the help of a magnetic separator. Third, anti-human IgG conjugated alkaline phosphatase is added. Fourth, after incubation, excess enzyme conjugates are removed by washing and finally the bound enzyme is detected by addition of chemiluminescent substrate. The relative light unit (RLU) intensity is proportional to the amount of anti-IAA specific IgG. According to a certain specific IgG RLU-concentration standard curve, the RLU tested can be interpreted to anti-IAA specific IgG concentration in the sample expressed as RU/mL.

For semi-quantitation of anti-IAA antibodies, the BioCLIA IAA assay utilizes a predefined lot specific Master Curve that is uploaded into the instrument through the reagent cartridge barcode. Based on the Master Curve, and results obtained by running two Calibrators, an instrument specific Working Curve is created, which is used to calculate anti-IAA antibodies concentration RU/mL from the relative luminescent units (RLU) obtained for each sample.

Specimen Collection

The appropriate specimen types for BioCLIA IAA reagents are human serum. Cloudy samples should be purified by low-speed centrifugation. To prevent erroneous results due to the presence of fibrin, ensure that complete clot formation has taken place prior to centrifugation of samples. Some samples, particularly those from patients receiving anticoagulant therapy, may require increasing clotting time.

Freshly collected specimens stored in refrigerator (2-8 °C) are valid for testing within 8 days. The unopened specimen should reach to room temperature (18-25°C) before testing, and should not be stored in this temperature condition more than 2 days. All opened/on board specimens should be tested within 10 hours. Three freeze-thaw cycles for specimens do not affect the testing results.

Warnings and Precautions

1. This assay is only for use in the BioCLIA® 1200 and BioCLIA® 6500.

2. This product requires the handling of calibrators, controls and human specimens which contain human sourced materials. It is recommended that all human sourced materials are considered to be potentially infectious and handled in accordance with the OSHA Standard on Bloodborne Pathogens. [7] Biosafety Level 2 or other appropriate biosafety practices should be used for materials that contain or possibly contain infectious agents. [8, 9, 10] Avoid contacting with skin and eyes. Wear suitable protective gloves and clothing.

3. Liquid waste and solid waste are temporarily stored at separate containers in the BioCLIA® 1200 and BioCLIA® 6500 in separate containers. Waste management should also be handled in accordance

with standards mentioned in the chapter Warnings and Precautions point No. 2.

4. Spilled reagents should be cleaned up immediately. Observe all federal, state and local environmental regulations when disposing wastes.

5. Once opened, this reagent cartridge must be stored in the instrument's reagent carousel. Avoid spilling the reagents when the reagent cartridge is placed into the instrument.

6. Chemical contamination of the reagents can resulting from improper cleaning or rinsing of the instrument. Residues from common laboratory chemicals such as formalin, bleach, ethanol, or detergent can cause interference in the assay. Be sure to follow the recommended cleaning procedure of the instrument as outlined in the BioCLIA® 1200 and BioCLIA® 6500 operator.

7. Precautions: 

Proclin 300 added in the reagents (IAA Conjugate) at concentration between 0.0015% - 0.6%.

Storage Instructions

The kit is stable until the expiration date, if it is stored and handled as directed. Routine store the kit in refrigerator (2-8 °C). Vial opened reagents or onboard reagents can be used up to 56 running days(2-8 °C). The BioCLIA® 1200 and BioCLIA® 6500 software monitors the expiration of the reagent cartridge. The system will not accept expired reagents. Three freeze-thaw cycles before testing has no effect on the kit reagents.

Materials Supplied

Components are a matched set. Labels on the inside box are needed for the assay.

- **IAA Antigen** 1 bottle (2.5/5 mL) Biotinylated IAA antigen 0.01M PBS (pH7.4) buffer with stabilizer.

IAA | BIOT

Preservatives: 5-Bromo-5-Nitro-1, 3-Dioxane (BND) < 1%.

- **Conjugate** 1 bottle (6.75/13.5 mL) AP labeled anti-human IgG antibodies in 0.05 M MES (pH6.0) Buffer with stabilizer.

CONJ | AP | G

Preservatives: 0.0015% <Proclin 300 < 0. 6%.

- **Microparticle** 1 bottle (2.5/5 mL) Streptavidin-microparticles in 0.01 M PBS (pH7.4) buffer with stabilizer.

M | STREP

Preservatives: 5-Bromo-5-Nitro-1, 3-Dioxane (BND) < 1%.

Kit Component Supplied Separately

Additional Materials Required But Not Provided:

- BioCLIA® 1200 (Cat No. MA00139)
- BioCLIA®6500 (Cat No. MA00243)
- BioCLIA Autoimmune Calibrator Set, IAA (Cat No. MY00235, 2 x 1 mL; Cat No. MY00286, 4 x 1 mL)
- BioCLIA Autoimmune Control Set, IAA (Cat No. MY00337, 2 x 1 mL; Cat No. MY00388, 4 x 1 mL)
- BioCLIA Sample Diluent I (Cat No. MY00965)
- BioCLIA System Wash Buffer (Cat No. MY00404)
- BioCLIA System Substrate (Cat No. MY00405)
- BioCLIA Cuvettes (Cat No. MA00138, MA00244)
- BioCLIA Silicon Gasket (Small) (Cat No. MV00195)
- BioCLIA Silicon Gasket (Large) (Cat No. MV00196)
- BioCLIA Substrate Tube Maintenance cleanser (Cat No. MA00140)
- BioCLIA Sample Probe Maintenance cleanser (Cat No. MA00141)
- BioCLIA Micro Cup (Cat No. MA00142)
- Distilled Water

Assay Procedure

Note that for optimal performance, it is important to perform all routine maintenance procedures for optimal performance, such as routine cleaning, calibration and control procedures that are defined in the BioCLIA® 1200 and BioCLIA® 6500 User Manual.

See the BioCLIA® 1200 and BioCLIA® 6500 User Manual for preparation, setup, dilutions, adjustment, assay and quality control procedures.

Users should have the periodic calibration procedure for every 56 running days from last calibration. Besides, a calibration procedure should be carried out when a new batch of BioCLIA IAA kit is used.

The control procedure should be done before running the specimens each day. Users also can adjust the control procedure period according to their own lab frequency.

Expected Values

Each Laboratory should establish its own reference ranges.

When the customer see a problem (High CV or unusual values, rerun controls and analyze specimens again.

Result Analysis

With the help of the build in master calibration curve and specified two-point calibrator set for instrument, the BioCLIA will automatically calculate the auto-antibodies concentration of each specimen and interpret the results into RU/mL. The concentration of anti-IAA antibody sample concentration is reported as < 2 RU/mL when it is lower than the minimum detection limit, while reported as > 400 RU/mL when it is higher than the range of measurement.

Sample Dilution

The specimens are diluted with BioCLIA Sample Diluent I before testing (dilution ratio 1:20) by the

BioCLIA® 1200 and BioCLIA® 6500 automatically.

Cut-Off Value Determination

120 clinical samples, including 60 positive sera and 60 negative sera were collected and valued.These samples were venous blood from human the aged between 0 - 80, sealed and stored at 2 - 8oC. Results of 120 clinical samples tested by the BioCLIA IAA kit were analyzed using the receiver-operating characteristic curve (ROC) and the cut-off value was determined at 20 RU/mL.

Test Result Interpretation

Specimen with concentration < 20 RU/mL, interpreted as negative;

Specimen with concentration ≥ 20 RU/mL, interpreted as positive.

Test results only reflect the sample collecting status and should be interpreted/analyzed for diagnosis in conjunction with other laboratory and clinical findings.

Performance Characteristics

APPEARENCE

Kit components are complete with no leakage. No precipitation or floc in liquid reagents. Packing labels are clear and easy to identify.

ACCURACY / RECOVERY

The accuracy/spiked recovery was determined by analyzing samples spiked with known amounts of anti-IAA antibodies into certain matrix. Anti-IAA antibody positive samples (low 100 RU/mL, mid 200 RU/mL, high 300 RU/mL) were spiked into two matrixes (50&100 RU/mL) separately at the volume ratio of 1:9, making totally 6 spiked samples and each sample was tested in triplicate. The spiked recovery for the concentration of anti-IAA antibodies was calculatd.*

	Matrix 50 RU/mL			Matrix 100 RU/mL		
Spiked Conc.	Obs	Exp.	Obs/Exp	Obs	Exp.	Obs/Exp
Neat	50.39			102.85		
100 RU/mL	53.56	55.3	96.8%	99.86	102.6	97.4%
200 RU/mL	65.32	65.3	100.0%	110.93	112.6	98.5%
300 RU/mL	75.75	75.3	100.5%	119.93	122.6	97.8%

*Representative data; results in individual laboratories may vary from these data.

TRACEABILITY

The reported values were determined with multiple runs on the BioCLIA® 1200 and BioCLIA® 6500 using specific reagents against an in-house standard. Results are reported in RU/mL which is interpreted from relative light unit (RLU). Method comparison test showed good sensitivity and specificity.

PRECISION

A study based on guidance from CLSI document EP5-A2 was performed for determining the precision of BioCLIA IAA kit precision. Human sera in the in-house reference panel (RP1, RP2, RP3, RP4) was tested with assayed in 10 replicates per sample for intra-assay precision evaluation, while with 4 replicates per sample for inter-assay precision. Each sample tested in individual runs, and 2 runs per day for 10 days, a total of 80 points. Data from this study are summarized in the following table.*

Intra-assay precision: CV ≤ 10%

Intra-Assay	RP1	RP2	RP3	RP4
Mean(RU/ml)	9.81	19.70	100.24	348.74
CV	4.87%	5.43%	4.44%	4.97%

Inter-assay precision: CV ≤ 15%

Inter-Assay	RP1	RP2	RP3	RP4
Mean(RU/ml)	9.78	19.87	99.43	345.65
CV	7.56%	5.28%	6.88%	6.20%

*Representative data; results in individual laboratories may vary from these data.

LIMIT OF BLANK / DETECTION (LOB/LOD)

LOB/LOD was determined consistent with CLSI EP17-A guideline. LOB/LOD of the BioCLIA IAA assay was lower than 1.0 RU/mL, which is below the analytical measuring range of the assay.

ASSAY REPORTABLE RANGE

The BioCLIA IAA kit has a reportable linear range of 2 - 400 RU/mL. The linear range was determined by diluting a high positive anti-IAA antibody serum sample with a negative sample to several concentrations which covers the entire assay linear range according to the scheme in CLSI EP6-A. The expected value was plotted against the observed value, and linear regression analysis was performed to get slope, intercept and coefficient of correlation (r) values. The results are summarized in the tables below: *

Slope	Intercept	r
0.96	-0.03	0.99

Assay linear range is 2-400 RU/mL. Results below the lower limit will be reported as < 2 RU/mL, while those are above the upper limit will be reported as > 400 RU/mL.

*Representative data; results in individual laboratories may vary from these data.

INTERFERENCE

Bilirubin, hemoglobin, triglycerides, rheumatoid factor (RF), and human anti-mouse antibody (HAMA) will not affect the BioCLIA IAA assay performance when at the level indicated below.

Bilirubin ≤ 40 mg/dL;

Hemoglobin ≤ 150 mg/dL;

Triglycerides ≤ 1,000 mg/dL;

Rheumatoid factor (RF) ≤ 1,000 IU/mL;

Human anti-mouse antibody (HAMA) ≤ 2,000 ng/mL.

METHOD COMPARISON

Method comparison was implemented by comparing BioCLIA IAA assay to the predicated assay.

Clinical Sample		BioCLIA IAA		
		-	+	Total
Predicated Method	-	72	3	75
	+	2	23	25
	Total	74	26	100

Sensitivity	92.0%
Specificity	96.0%
Total agreement	94.0%

Limitations

- The effectiveness of this kit is only confirmed for human serum, the applicability of the other kinds of samples is not verified.
- Reliable and reproducible results will be obtained when the assay procedure is carried out in accordance with the instructions and with adherence to good laboratory practice.
- Clinical diagnosis should not be made on the findings of a single test result, but should be integrated with all clinical and laboratory findings.

References

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10. Clinical and Laboratory Standards Institute. Protection of Laboratory Workers from Occupationally Acquired Infections: Approved Guideline - Third Edition. CLSI Document M29-A3. Wayne, PA: Clinical and Laboratory Standards Institute, 2005.

HOB Biotech Group Co., Ltd

C6 Building, No. 218 Xinghu Road, SuzhouIndustrial Park,

Suzhou, Jiangsu, 215123, China

REGISTRANT/MANUFACTURE: HOB Biotech Group Co., Ltd

ADDRESS/LOCATION:

C6 Building, No. 218 Xinghu Road, Suzhou Industrial Park, Suzhou, Jiangsu,215123 China

CONTACT INFORMATION: TEL (+86)512-69561996 Fax (+86)512-62956652

WEBSITE: www.hob-biotech.com

CUSTOMER SERVICE: HOB Biotech Group Co., Ltd

CUSTOMER SERVICE CONTACT: TEL (+86)4008601202

EUROPE REPRESENTATIVE: Emergo Europe

ADDRESS/LOCATION:

Prinsessegracht 20, 2514 AP The Hague, The Netherlands

Technical Assistance

For technical assistance, contact your National Distributor.

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