

User's Manual

Insulin IgG ELISA Kit

Enzyme Immunoassay for the quantitative measurement of IgG class autoantibodies against insulin in human serum or plasma



BGT-KET-317



96 wells

1. INTENDED PURPOSE

Anti-Insulin is an ELISA test system for the quantitative measurement of IgG class autoantibodies against insulin in human serum or plasma. This product is intended for professional in vitro diagnostic use only.

Anti-Insulin antibodies are found in a large part of patients with autoimmune diabetes (type 1). These antibodies may be directed against endogenous insulin or against therapeutic insulin preparations of human or animal origin.

2. PRINCIPLE OF THE TEST

A mixture of highly purified preparations of bovine, porcine and recombinant human insulin 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 hydrolyses the substrate forming a blue coloured 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.

3. WARNINGS AND 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, Calibrators, sample buffer and wash buffer contain sodium azide (NaN₃) 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.

4. CONTENTS OF THE KIT

Sufficient for 96 determinations

1. **SORB MT** 1 One divisible **microplate** consisting of 12 modules of 8 wells each. Ready to use.
2. **CAL A – F** 6x 1.5 ml **Calibrator A-F** (0, 6.3, 12.5, 25, 50,100 U/ml), containing insulin antibodies in a serum/buffer matrix (PBS, BSA, detergent, NaN₃ 0.09%), yellow. Ready to use.
3. **CONTROL 1 & 2** 2x 1.5 ml **Control positive (1) and negative (2)**, containing insulin antibodies in a serum/buffer matrix (PBS, BSA, detergent, NaN₃ 0.09%), yellow. Ready to use. The concentration is specified on the certificate of analysis
4. **SAM DIL 5x** 20 ml **Sample Buffer P**, containing PBS, BSA, detergent, preservative NaN₃ 0.09%, yellow, 5x.conc
5. **ENZ CONJ** 15 ml **Enzyme Conjugate** containing anti-human IgG antibodies, HRP labelled; PBS, BSA, detergent, preservative ProClin 300 0.05%, light red. Ready to use.
6. **SUB TMB** 15 ml **TMB Substrate**; containing 3,3', 5,5'- Tetramethylbenzidin, colorless. Ready to use.
7. **STOP SOLN** 15 ml **Stop Solution**; contains acid. Ready to use.
8. **WASH SOLN 50x** 20 ml **Wash Buffer**, containing Tris, detergent, preservative NaN₃ 0.09%; 50x conc.
9. **1 Instruction for Use**
10. **1 Certificate of Analysis**

5. MATERIALS REQUIRED

- Microplate reader capable of endpoint measurements at 450 nm; optional: reference filter at 620 nm
- Data reduction software
- Multi-channel dispenser or repeatable pipette for 100 µl
- Vortex mixer
- Pipettes for 10 µl, 100 µl and 1000 µl
- Laboratory timing device
- Distilled or deionised water
- Measuring cylinder for 1000 ml and 100 ml
- Plastic container for storage of the wash solution

This ELISA assay 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.

6. SPECIMEN COLLECTION, STORAGE AND HANDLING

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

7. STORAGE AND STABILITY

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

8. PROCEDURAL NOTES

- Do not use kit components beyond their expiration dates.
- Do not interchange kit components from different lots and products.
- All materials must be at room temperature (20-28°C) prior to use.
- Prepare all reagents and samples. Once started, perform the test without interruption.
- Double determinations may be done. By this means pipetting errors may become obvious.
- Perform the assay steps only in the order indicated.
- Always use fresh sample dilutions.
- Pipette all reagents and samples into the bottom of the wells.
- To avoid carryover or contamination, change the pipette tip between samples and different kit controls.
- Wash microwells thoroughly and remove the last droplets of wash buffer.
- All incubation steps must be accurately timed.
- Do not re-use microplate wells.

9. PREPARATION OF REAGENTS

Wash Buffer

Dilute the contents of one vial of the buffered wash solution concentrate (50x) with distilled or deionised water to a final volume of 1000 ml prior to use.

Sample Buffer

Sample Buffer P: Prior to use dilute the contents (20 ml) of one vial of sample buffer 5x concentrate with distilled or deionised water to a final volume of 100 ml.

Preparation of samples

Dilute patient samples 1:100 before the assay: Put 990 µl of prediluted sample buffer in a polystyrene tube and add 10 µl of sample. Mix well.

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

10. TEST PROCEDURE

1. Prepare enough microplate modules for all calibrators / controls and patient samples.
2. Pipette **100 µl** of calibrators, controls and prediluted patient samples 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
11. Incubate for **5 minutes** at room temperature.
12. Read the optical density at 450 nm (reference 600-690nm) and calculate the results. The developed colour 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										
B	B	P2										
C	C	P3										
D	D											
E	E											
F	F											
G	C+											
H	C-											

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

11. VALIDATION

Test results are valid if the optical densities at 450 nm for 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.

12. 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.

13. PERFORMANCE CHARACTERISTICS

Calibration

This assay system is calibrated in relative arbitrary units, since no international reference preparation is available for this assay.

Measuring range

The calculation range of this ELISA assay is 0 - 100 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 10 U/ml

Interpretation of results

Negative: < 10 U/ml

Positive: ≥ 10 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 U/ml	Expected U/ml	O/E %
1	1:100	77.6	77.6	100
	1:200	41.7	38.8	107
	1:400	21.1	19.4	109
	1:800	10.3	9.7	106
	1:1600	4.7	4.9	96
2	1:100	100.7	100.7	100
	1:200	50.7	50.4	101
	1:400	23.7	25.2	94
	1:800	11.1	12.6	88
	1:1600	5.3	6.3	84

Limit of detection

Functional sensitivity was determined to be: 0.5 U/ml

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		
Sample	Mean U/ml	CV %
1	11.2	2.5
2	27.6	2.9
3	59.7	4.0

Inter-Assay		
Sample	Mean U/ml	CV %
1	11.6	6.0
2	31.2	5.2
3	69.5	4.3

Interfering substances

No interference has been observed with haemolytic (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. Nor have any interfering effects been observed with the use of anticoagulants (Citrate, EDTA, Heparine). However for practical reasons it is recommended that grossly hemolyzed or lipemic samples should be avoided.

Study results

Study population	n	n Pos	%
Diabetes mellitus	100	72	72.0
Normal human sera	160	2	1.3

Clinical Diagnosis

	Pos	Neg	
Pos	72	2	260
Neg	28	158	
	100	160	

Sensitivity:	72.0 %
Specificity:	98.8 %
Overall agreement:	88.5 %

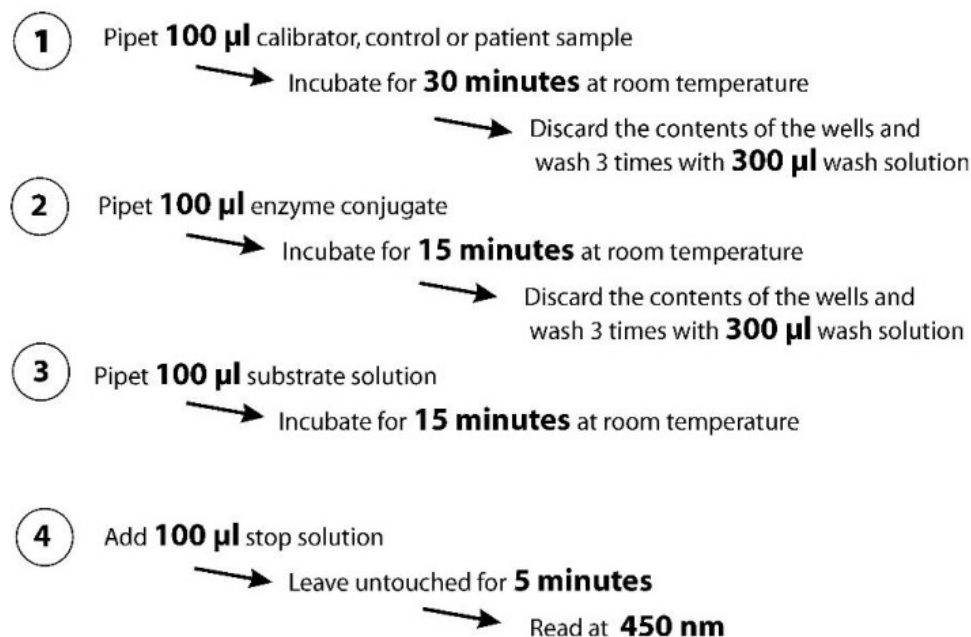
14. LIMITATIONS OF THE PROCEDURE

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.

15. REFERENCES

1. Reeves, W. G. Insulin Antibody Determination: Theoretical and Practical Considerations. *Diabetologia* 24, 399 (1983).
2. Atkinson, M. A., Fisk, D. D., Spillar, R. P. and MacLaren, N. K. Insulin antibodies as markers for Insulin dependent diabetes mellitus (IDD). *Diabetes* 34, 926 - 930 (1985).
3. Willein, T., Nicholson, S. and Casey, C. A Micro Enzyme-Linked Immunosorbent Assay for Insulin Antibodies in Serum. *J. Imm. Methods* 76, 185 (1985).
4. Kobayashi, N. et al. A Solid-Phase Enzyme Immunoassay for Anti-Insulin Antibody in Diabetes Mellitus Patients. *J. Imm. Methods* 84, 245 (1985).
5. Wissllein, T. et al. Value of Insulin Antibodies as Serum marker for Insulin-Dependent Diabetes Mellitus. *Lancet* 1, 480 (1985).
6. Soeldner, J. S. et al. Insulin-Dependent Diabetes Mellitus and Autoimmunity: Islet-Cell Autoantibodies and beta-Cell Failure. *New Engl. J. Med.* 313, 893 (1985).
7. Torfs, C. P. et al. Long Term Frozen Sera for Epidemiological Studies of Antibodies. *Lancet* 1, 503 (1986).
8. Seino, S. et al. Characterisation of Circulating Insulin in Insulin Autoimmune Syndrome. *Clin. Endo. & Metab.* 62, 64 (1986).
9. Boitard, C. H. and McDewitt, H. O. Immunology of insulin-dependent diabetes mellitus. In: Cohen, J. R., (ed.) *Perspectives on autoimmunity*, 39-58 (1987). CRC Press, Boca Raton, FL Nouvo, J. A., Baker, Jr., J. R., Wartowsky, I. et al. Autoantibodies to insulin are present in sera of patients with autoimmune thyroid diseases. *Diabetes*, 37, 317-320 (1988).
10. Witkin, T. J. Insulin Autoantibodies as markers for type I diabetes. *Endocrine Reviews*, 11, 92-104 (1990).



SYMBOLS USED WITH ASSAYS

Symbol	English	Deutsch	Français	Espanol	Italiano
	European Conformity	CE-Konformitätskennzeichnung	Conforme aux normes européennes	Conformidad europea	Conformità europea
	Consult instructions for use	Gebrauchsanweisung beachten	Consulter les instructions d'utilisation	Consulte las Instrucciones	Consultare le istruzioni per l'uso
	In vitro diagnostic device	In-vitro-Diagnostikum	Usage Diagnostic in vitro	Diagnóstico in vitro	Per uso Diagnostica in vitro
	For research use only	Nur für Forschungszwecke	Seulement dans le cadre de recherches	Sólo para uso en investigación	Solo a scopo di ricerca
	Catalogue number	Katalog-Nr.	Référence	Número de catálogo	No. di Cat.
	Lot. No. / Batch code	Chargen-Nr.	No. de lot	Número de lote	Lotto no
	Contains sufficient for <n> tests/	Ausreichend für "n" Ansätze	Contenu suffisant pour "n" tests	Contenido suficiente para <n> ensayos	Contenuto sufficiente per "n" saggi
	Note warnings and precautions	Warnhinweise und Vorsichtsmaßnahmen beachten	Avertissements et mesures de précaution font attention	Tiene en cuenta advertencias y precauciones	Annoti avvisi e le precauzioni
	Storage Temperature	Lagerungstemperatur	Temperature de conservation	Temperatura de conservacion	Temperatura di conservazione
	Expiration Date	Mindesthaltbarkeitsdatum	Date limite d'utilisation	Fecha de caducidad	Data di scadenza
	Legal Manufacturer	Hersteller	Fabricant	Fabricante	Fabbricante
<i>Distributed by</i>	Distributor	Vertreiber	Distributeur	Distribuidor	Distributore