




Instructions for Use


GAD₆₅ - Antibody ELISA

Enzyme Immuno Assay for the Quantitative Determination of Antibodies against Glutamic Acid Decarboxylase in Serum



REF EA104/96

 12 x 8

 2 – 8 °C

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1. Principle of the Test

Insulin-dependent diabetes mellitus (IDDM) is characterised by the presence of several distinct circulating autoantibodies including autoantibodies to insulin and autoantibodies to glutamic acid decarboxylase (GAD). Two isoforms of GAD of molecular weights 65,000 (GAD 65) and 67,000 (GAD 67) have been identified. GAD 65 is the predominant form found in human islets and has been shown to be a major target for autoantibodies in IDDM.

The GAD₆₅ Antibody ELISA depends on the ability of GAD autoantibodies to act divalently and form a bridge between GAD coated on ELISA plate wells and liquid phase GAD-biotin. The GAD-biotin bound is then quantitated by addition of streptavidin peroxidase and a colorogenic substrate (TMB) with reading of final absorbance at 2 wavelengths (450 and 405 nm) to obtain maximum measuring range (0-2,000 units per ml of WHO reference preparation NIBSC 97/550).

Note:

This kit is manufactured under licence to US patent 5,512,447, European patent 0502 188 B 1 and related patents and patents pending in other countries. Also European patent 1448 993 B1, Chinese patent ZL02822274.1, Indian patent 226484 and related patents pending in other countries apply.

2. Precautions

- For in vitro use only.
- Some reagents contain sodium azide as preservative. Avoid skin contact.
- All reagents of human origin used in this kit are tested for HIV I/II antibodies, HCV and HBsAg and found to be negative. However, because no test method can offer complete assurance that infectious agents are absent, these reagents should be handled as potentially biohazardous materials.
- Material of animal origin used in the preparation of the kit has been obtained from animals certified as healthy but these materials should be handled as potentially infectious.

3. Sample Collection and Storage

Serum should be used in the assay. Sera to be analysed should be assayed soon after separation or stored (preferably in aliquots) at 2 - 8 °C for one week or at -20 °C for longer periods.

About 70 µl is sufficient for one assay. Subsequent freezing and thawing or increase in storage temperature must be avoided. Incorrect storage of serum samples can lead to loss of anti-GAD₆₅ autoantibodies. Do not use grossly haemolysed or lipaemic serum samples. Do not use plasma in the assay.

When required, thaw test sera at room temperature and mix gently to ensure homogeneity. Centrifuge the serum prior to assay (preferably for 5 min at 10-15,000 g in a microfuge) to remove any particulate matter. Please do not omit this centrifugation step if sera are cloudy or contain particulates.

On arrival, store the kit at 2-8 °C. Once opened the kit is stable until its expiry date. For stability of prepared reagents refer to Preparation of Reagents.

4. Contents of the Kit

4.1 **MT strips** **STRIPS** 12 strips
8 wells per strip
coated with human recombinant GAD₆₅,
after opening the pouch, place in the self seal plastic bag
provided, store at 2-8°C and use within 16 weeks

4.2 **Calibrator 1 – 6** **CAL 1 - 6** 6 vials
0.7 ml each, ready for use
Concentrations (NIBSC 97/550 units):

Calibrator	1	2	3	4	5	6
U/ml	5	18	35	120	250	2,000

4.3 **Positive Control** **CON +** 1 vial
0.7 ml, ready for use
values for the control are given on the vial label

4.4 **Negative Control** **CON -** 1 vial
0.7 ml, ready for use

4.5	GAD₆₅ Biotin freeze-dried; reconstitute with 5.5 ml buffer (coloured red) prior to use, store at 2-8°C and use within 3 days of reconstitution	GAD-BIOTIN	3 vials
4.6	Reconstitution Buffer 15 ml, coloured red, ready for use for reconstituting GAD ₆₅ biotin	RECONST	2 vial
4.7	Streptavidin-peroxidase 0.7 ml; 20 x concentrated; dilute 20 x with SA-POD Diluent prior to use; store at 2-8°C and use within 16 weeks	SA-POD	1 vial
4.8	SA-POD Diluent 15 ml, ready for use for reconstituting SA-POD	DIL	1 vial
4.9	Substrate 15 ml tetramethyl benzidine (TMB), ready for use	SUB	1 vial
4.10	Wash Buffer 125 ml, 10 x concentrated dilute to 1 litre with pure water before use. Store at 2-8 °C after dilution	WASH	1 vial
4.11	Stop Solution 12 ml, ready for use 0.5 M sulphuric acid	STOPP	1 vial

Additional materials and equipment required but not provided:

- Pipettes for 25 µl, 50 µl, 100 µl
- Orbital shaker (up to 500 rpm)
- Pure water
- Microtiter plate reader (405 and 450 nm)

5. Test Procedure

5.1. Preparation of Reagents

MT strips

Before opening a packet of strip wells, allow it to stand at room temperature for at least 30 minutes. After opening, keep any unused wells in the original foil packet (reseal with adhesive tape) and in the self-seal plastic bag with the desiccant provided. Store at 2-8°C and use within 16 weeks.

GAD₆₅-Biotin

Reconstitute the contents of one vial with 5.5 ml Reconstitution Buffer (coloured red) prior to use. Store at 2-8°C for up to 3 days after reconstitution.

Streptavidin-Peroxidase (SA-POD)

Dilute 20 x with Streptavidin-Peroxidase (SA-POD) Diluent prior to use. Store at 2-8°C for up to 16 weeks after reconstitution.

Wash Buffer

Dilute the contents of one bottle to 1 litre with pure water before use. Store at 2-8°C after dilution until expiry date of the kit.

5.2. Assay Procedure

Calculate the number of individual ELISA plate wells needed for the assay. Allow all the reagents supplied, including the appropriate number of packets of strips to reach room temperature (at least 30 min), remove the number of strip wells required and fit them firmly into the frame provided. Negative and Positive Controls in duplicate must always be included in each assay run.

1. Pipette each 25 µl of Calibrator 1 - 6, Negative and Positive Controls and test sera into the appropriate wells (duplicates are recommended).
2. Cover the plate and incubate for 1 hours at room temperature on an ELISA plate shaker (shaking at 500 rpm).

3. During this 1 hour incubation, reconstitute the GAD₆₅ Biotin, dilute the required amount of Streptavidin-Peroxidase (SA-POD) and dilute the concentrated Wash Buffer.
4. After the 1-hour incubation, aspirate or discard the samples from the wells, add 300 µl of Wash Buffer and aspirate or discard again. Repeat two more times. Tap the inverted wells gently on a clean dry absorbent surface to remove any droplets of Wash Buffer.
5. Pipette 100 µl of reconstituted GAD₆₅ biotin into each well and incubate for 1 hour at room temperature on an ELISA plate shaker (shaking at 500 rpm).
6. After the 1-hour incubation with GAD₆₅ biotin, aspirate or discard the reagent from the wells, add 300 µl of Wash Buffer and aspirate or discard again. Repeat two more times. Tap the inverted wells gently on a clean dry absorbent surface to remove any droplets of Wash Buffer.
7. Pipette 100 µl of SA-POD into each well and incubate for 20 minutes at room temperature on an ELISA plate shaker (shaking at 500 rpm).
8. Aspirate or discard the reagent from the wells and wash three times with Wash Buffer followed by one wash with pure water to remove any foam from the wells. If a plate washing machine is used, wash 3 times with Wash Buffer only (i.e. omit water wash). Tap the inverted wells gently on a clean dry absorbent surface to remove any droplets.
9. Pipette 100 µl of Substrate (TMB) into each well and incubate for 20 minutes at room temperature in the dark without shaking during which time a blue colour will develop.
10. Stop the substrate reaction by addition of 100 µl of Stop Solution to each well (this will cause the blue colour to turn yellow) and shake the plate for about 5 seconds on a plate shaker to ensure uniformity of the solution in each well.
11. As soon as possible read the absorbance at 450 nm and 405 nm using an ELISA plate reader blanked against a well containing 100 µl Substrate plus 100 µl of Stop Solution.

6. Calculation of Results

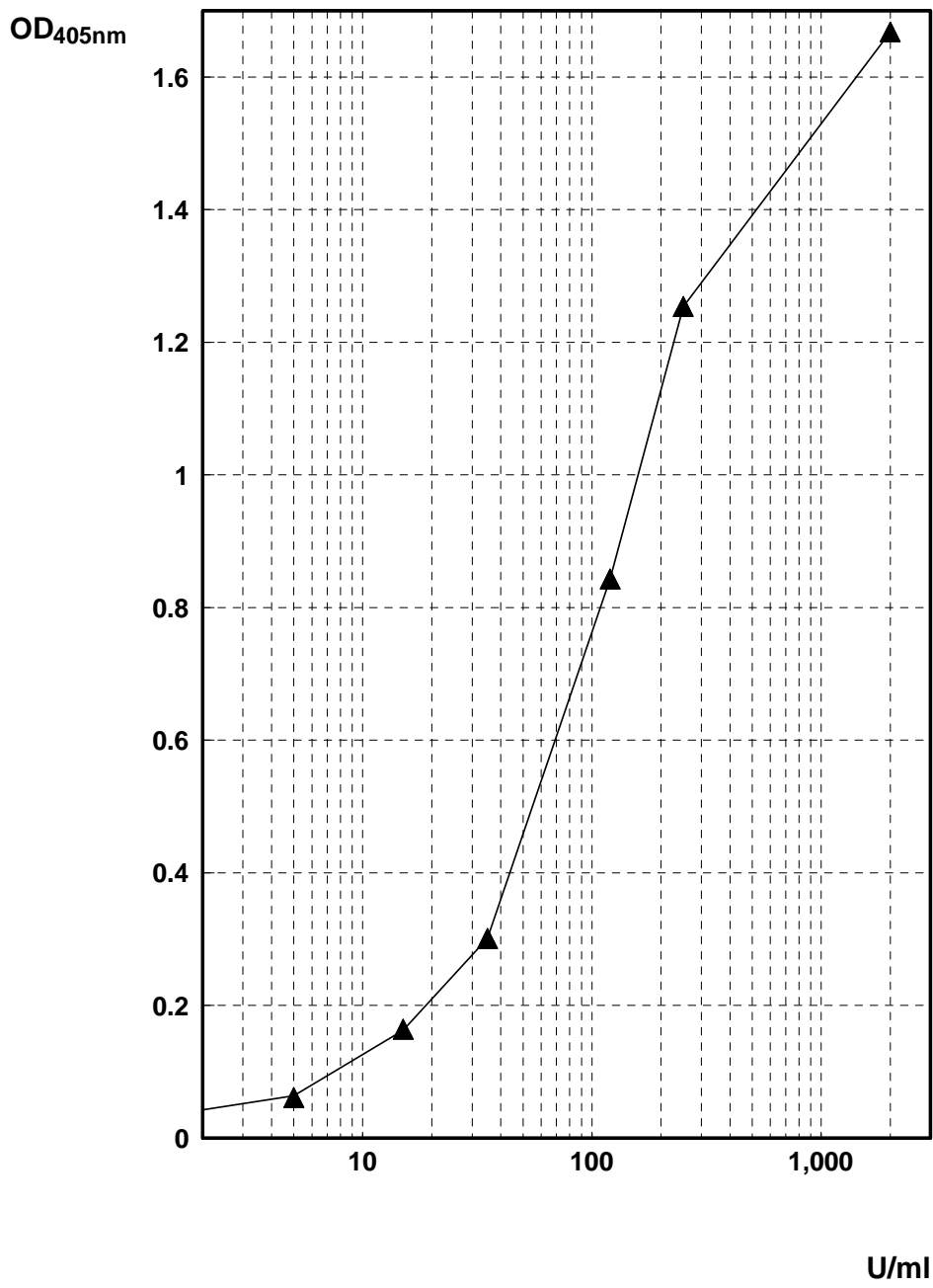
A standard curve can be plotted with absorbance at 450 nm or 405 nm at the vertical axis and \log_{10} Standards concentration on the horizontal axis. Other data reduction procedures can also be used.

Typical Example

In the presence of the negative control, absorbance values at 450 nm should be about 0.1 increasing to above 4 with the with the higher concentration calibrators. Reading at 405 nm allows quantitation of the high absorbances as shown in the table. Low values should be read off the 450 nm curve.

Typical results are shown in the following table.

Calibrator U/ml	OD _{450 nm}	OD _{405 nm}
Negative Control	0.035	0.012
5	0.199	0.061
18	0.527	0.164
35	0.975	0.301
120	2.794	0.843
250	4.264	1.254
2,000	5.671	1.668



7. Expected Values

99% of healthy blood donor sera give values of less than 5 Units per ml (NIBSC 97/550) in the assay suggesting that values of 5 U/ml or greater can be considered positive for GAD autoantibodies. However, a provisional cut off for positivity of 10 Units per ml is recommended until individual laboratories have established their own cut off values using appropriate control sera.

8. Assay Characteristics

Clinical Sensitivity and Specificity

In the DASP 2005 study the kit achieved 98% (n=100) specificity and 92% (n=50) sensitivity.

Precision

The intra and inter assay coefficients of variation (cv) were measured using two samples at different concentration.

intra assay variation		
sample	mean (U/ml)	cv (%)
1	97	7.3
2	20	8.5

inter assay variation		
sample	mean (U/ml)	cv (%)
1	97	5.7
2	21	5.2

9. Literature

- Schmidli RS; Colman PG; Bonifacio E
Disease sensitivity and specificity of 52 assays for glutamic acid decarboxylase antibodies. The Second International GADAB Workshop.
Diabetes 44 (1995) 636 - 640
- Petersen JS; Dyrberg T; Karlsen AE; Molvig J; Michelsen B; Nerup J; Mandrup-Poulsen T
Glutamic acid decarboxylase (GAD65) autoantibodies in prediction of beta-cell function and remission in recent-onset IDDM after cyclosporin treatment. The Canadian-European Randomized Control Trial Group.
Diabetes 43 (1994) 1291 - 1296
- E. Hatziagelaki, C. Jaeger, E. Maeser, R.G. Bretzel
GAD 65 antibody but not ICA positivity in adult-onset diabetic patients is associated with early progression to clinical insulin dependency
Acta Diabetol 33 (1996) 291 - 294

Pipetting Scheme GAD₆₅ Antibody ELISA

	B ₀	Calibrator	Positive Control	Patients
Calibrator 1 - 6 μl		25		
Positive Control μl			25	
Negative Control μl	25			
Patient Sample μl				25

Cover and incubate for 1 hours at RT on a shaker (500 rpm)

Aspirate / discard and wash three times with each 300 μl Wash Buffer

GAD ₆₅ -Biotin μl	100	100	100	100
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Cover and incubate for 1 hour at RT on a shaker (500 rpm)

Aspirate / discard and wash three times with each 300 μl Wash Buffer

SA-POD μl	100	100	100	100
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Cover and incubate for 20 minutes at RT on a shaker (500 rpm)

Aspirate / discard and wash three times with each 300 μl Wash Buffer
Wash once with 300 μl pure water

TMB-Substrate μl	100	100	100	100
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Cover and incubate for 20 minutes at RT in the dark without shaking

Stop Solution μl	100	100	100	100
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5 sec shaking on an ELISA plate shaker

Reading of absorbance at 450 nm and 405 nm