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AESKULISA®

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INSTRUCTION MANUAL

AESKULISA® GAD65 SL

Ref 3606

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Instruction Manual

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1 Intended Use

The ***AESKULISA®*** **GAD65 SL** is a solid phase enzyme immunoassay employing recombinant human glutamate decarboxylase 65kDa isoform (GAD65) for the quantitative and qualitative detection of antibodies against human GAD65 in human serum.

The assay is a tool in the diagnosis of type 1 diabetes mellitus.

2 Clinical Application and Principle of the Assay

The insulin dependent diabetes mellitus, also called type I diabetes (T1DM), is a chronic autoimmune disease resulting from the autoimmune destruction of insulin producing ß-cells of Langerhans` islets. It is characterized by largely or complete lack of insulin production and the presence of ß-cell autoantibodies. The autoimmune pathogenesis of T1DM is accompanied by autoantibodies against ß-cells antigens in the pre-clinic phase. The antigens recognized by these antibodies include insulin, glutamate decarboxylase (GAD65 kDa isoform) and tyrosine phosphatase-related protein islet antigen 2 (IA2). GAD is an enzyme that catalyzes the formation of gamma-aminobutyric acid (GABA) from glutamine in nervous and pancreatic tissues. In humans two isoenzymes of GAD exist named after their molecular weight, GAD65 and GAD67. Thereby, autoantibodies are always directed against GAD65 and mainly react with conformational epitopes. Anti-GAD65 antibodies are not only present in 70-80 % of new-onset patients but also in patients with latent autoimmune diabetes in adults (LADA), diabetes-related polyendocrine diseases and in some rare neurologic diseases, notably Stiff Person Syndrome (SPS).

Principle of the test

Serum samples diluted 1:4 are incubated in the microtiter plates coated with the specific antigen. Patient’s antibodies, if present in the specimen, bind to the antigen. The unbound fraction is washed off in the following step. Afterwards GAD65 Biotin is incubated. During this step GAD65 autoantibodies form a bridge between the GAD65 immobilized on the plate and the GAD65 Biotin in the liquid phase. Unbound GAD65 is washed off in the following step. The amount of bound GAD65 Biotin is then determined by the addition of streptavidin-peroxidase (conjugate) that binds to biotin. Unbound streptavidin-peroxidase is washed off in the following step. Addition of TMB-substrate generates an enzymatic colorimetric (blue) reaction, which is stopped by diluted acid (color changes to yellow). The rate of color formation from the chromogen is proportional to the initial concentration of the respective antibodies in the sample.

3 Kit Contents

TO BE RECONSTITUTED				
Item	Quantity	Cap color	Solution color	Description / Contents
Sample Buffer (5x)	1 x 20ml	White	Yellow	5 x concentrated Tris, sodium chloride (NaCl), bovine serum albumin (BSA), sodium azide < 0.1% (preservative)
Wash Buffer (50x)	1 x 20ml	White	Green	50 x concentrated Tris, NaCl, Tween 20, sodium azide < 0.1% (preservative)
GAD65 Biotin	3 vials	White	-	Biotin conjugated to recombinant human GAD65; bovine serum albumin (BSA), lyophilized
READY TO USE				
Item	Quantity	Cap color	Solution color	Description / Contents
Reconstitution Buffer	1 x 20ml	Red	Red	PBS, bovine serum albumin (BSA)
Negative Control	1 x 1ml	Green	Colorless	Control material (diluted), bovine serum albumin (BSA), sodium azide < 0.1% (preservative)
Positive Control	1 x 1ml	Red	Yellow	Control material (diluted), bovine serum albumin (BSA), sodium azide < 0.1% (preservative)
Cut-off Calibrator	1 x 1ml	Blue	Yellow	Calibrator material (diluted), bovine serum albumin (BSA), sodium azide < 0.1% (preservative)
Calibrators	6 x 1ml	White	Yellow *	Concentration of each calibrator: 0, 25, 75, 125, 250, 500 IU/ml. Calibrator material (diluted), bovine serum albumin (BSA), sodium azide < 0.1% (preservative)
Conjugate	1 x 15ml	Blue	Blue	Streptavidin coupled to horseradish peroxidase; bovine serum albumin (BSA)
TMB Substrate	1 x 15ml	Black	Colorless	Stabilized tetramethylbenzidine and hydrogen peroxide (TMB/H_2O_2)
Stop Solution	1 x 15ml	White	Colorless	1M Hydrochloric Acid
Microtiter plate	12 x 8 well strips	N/A	N/A	With breakaway microwells. Refer to paragraph 1 for coating.

* Color increasing with concentration

MATERIALS REQUIRED, BUT NOT PROVIDED

Microtiter plate reader 450 nm reading filter and recommended 620 nm reference filter (600-690 nm). Glass ware (cylinder 100-1000ml), test tubes for dilutions. Vortex mixer, precision pipettes (10, 100, 200, 500, 1000 µl) or adjustable multipipette (100-1000µl). Microplate washing device (300 µl repeating or multichannel pipette or automated system), adsorbent paper. Our tests are designed to be used with purified water according to the definition of the United States Pharmacopeia (USP 26 - NF 21) and the European Pharmacopeia (Eur.Ph. 4th ed.).

4 Storage and Shelf Life

Store all reagents and the microplate at 2-8 °C/35.6-46.4 °F, in their original containers. Reconstituted GAD65 Biotin has to be used on day of reconstitution. Once prepared, reconstituted solutions are stable at 2-8 °C/35.6-46.4 °F for 1 month. Reagents and the microplate shall be used within the expiry date indicated on each component, only. Avoid intense exposure of TMB solution to light. Store microplates in designated foil, including the desiccant, and seal tightly.

5 Precautions of Use

5.1 Health hazard data

THIS PRODUCT IS FOR IN VITRO DIAGNOSTIC USE ONLY. Thus, only staff trained and specially advised in methods of in vitro diagnostics may perform the kit. Although this product is not considered particularly toxic or dangerous in conditions of the intended use, refer to the following for maximum safety:

Recommendations and precautions

This kit contains potentially hazardous components. Though kit reagents are not classified being irritant to eyes and skin we recommend to avoid contact with eyes and skin and wear disposable gloves.

WARNING ! Calibrators, Controls and Buffers contain sodium azide (NaN_3) as a preservative. NaN_3 may be toxic if ingested or adsorbed by skin or eyes. NaN_3 may react with lead and copper plumbing to form highly explosive metal azides. On disposal, flush with a large volume of water to prevent azide build-up. Please refer to decontamination procedures as outlined by CDC or other local/national guidelines.

Do not smoke, eat or drink when manipulating the kit. Do not pipette by mouth.

All biological source material used for some reagents of this kit has been tested by approved methods and found negative for HbsAg, Hepatitis C and HIV 1. However, no test can guarantee the absence of viral agents in such material completely. Thus handle these as if capable of transmitting infectious diseases and according to national requirements.

The kit contains material of animal origin as stated in the table of contents, handle according to national requirements.

5.2 General directions for use

In case that the product information, including the labeling, is defective or incorrect please contact the manufacturer or the supplier of the test kit.

Do not mix or substitute reagents or microplates from different lot numbers. This may lead to variations in the results.

Allow all components to reach room temperature (20-32 °C/68-89.6 °F) before use, mix well and follow the recommended incubation scheme for an optimum performance of the test.

Incubation: We recommend test performance at 30 °C/86 °F for automated systems.

Never expose components to higher temperature than 37 °C/ 98.6 °F.

Always pipette substrate solution with brand new tips only. Protect this reagent from light. Never pipette conjugate with tips used with other reagents prior.

A definite clinical diagnosis should not be based on the results of the performed test only, but should be made by the physician after all clinical and laboratory findings have been evaluated. The diagnosis is to be verified using different diagnostic methods.

6 Sample Collection, Handling and Storage

Use preferentially freshly collected serum samples. Blood withdrawal must follow national requirements. Do not use icteric, lipemic, hemolysed or bacterially contaminated samples. Sera with particles should be cleared by low speed centrifugation (<1000 x g). Blood samples should be collected in clean, dry and empty tubes.

After separation, the serum samples should be used during the first 8h, respectively stored tightly closed at 2-8 °C/35.6-46.4 °F up to 48h, or frozen at -20 °C/-4 °F for longer periods. (Thomas: Labor und Diagnose; CLSI Guideline GP44-A4)

7 Assay Procedure

7.1 Preparations prior to starting

Please bear in mind that only reagents should be prepared which will be used at the same day!
Dilute concentrated reagents:

Dilute the concentrated sample buffer 1:5 with distilled water (e.g. 20 ml plus 80 ml).

Dilute the concentrated wash buffer 1:50 with distilled water (e.g. 20 ml plus 980 ml).

To avoid mistakes we suggest to mark the cap of the different calibrators.

Samples:

Dilute serum samples 1:4 with sample buffer (1x) e.g. 225 µl sample buffer (1x) + 75 µl serum. Mix well!

Reconstitute and dilute GAD65 Biotin:

Reconstitute lyophilized GAD65 Biotin in two steps: First, add 1 ml reconstitution buffer to one vial, let it stand for 5 minutes and mix it until GAD65 Biotin is completely dissolved. Make sure that no remaining lyophilized or reconstituted GAD65 Biotin is in the cap. In a second step, transfer 1 ml reconstituted GAD65 Biotin to 5 ml reconstitution buffer and mix well. One vial of reconstituted GAD65 Biotin is sufficient for six stripes. If more stripes will be used in one test, the two vials of lyophilized GAD65 Biotin have to be reconstituted and diluted as described above and then combined. Mix well!

Washing:

Prepare 20 ml of diluted wash buffer (1x) per 8 wells or 200 ml for 96 wells

e.g. 4 ml concentrate plus 196 ml distilled water.

Automated washing:

Consider excess volumes required for setting up the instrument and dead volume of robot pipette.

Manual washing:

Discard liquid from wells by inverting the plate. Knock the microwell frame with wells downside vigorously on clean adsorbent paper. Pipette 300 µl of diluted wash buffer into each well, wait for 20 seconds. Repeat the whole procedure twice again.

Microplates:

Calculate the number of wells required for the test. Remove unused wells from the frame, replace and store in the provided plastic bag, together with desiccant, seal tightly (2-8 °C/35.6-46.4 °F).

7.2 Pipetting Scheme

We suggest pipetting calibrators, controls and samples as follows:

For *QUANTITATIVE* interpretation

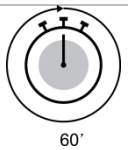
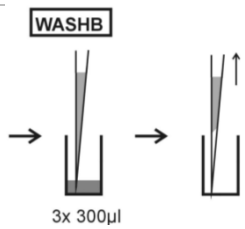
	1	2	3	4...
A	Cal A	Cal E	P1	
B	Cal A	Cal E	P1	
C	Cal B	Cal F	P2	
D	Cal B	Cal F	P2	
E	Cal C	PC	P3	
F	Cal C	PC	P3	
G	Cal D	NC	…	
H	Cal D	NC	…	

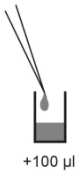
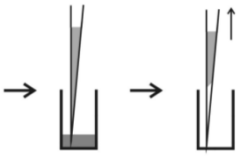
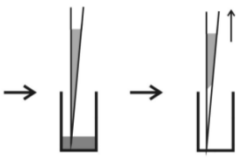
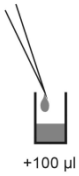
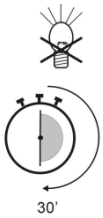
For *QUALITATIVE* interpretation

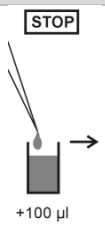
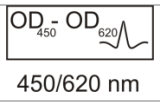
	1	2	3	4...
A	NC	P2		
B	NC	P2		
C	CC	P3		
D	CC	P3		
E	PC	…		
F	PC	…		
G	P1	…		
H	P1	…		

CalA: calibrator A
CalB: calibrator B
CalC: calibrator C
CalD: calibrator D
CalE: calibrator E
CalF: calibrator F
PC: positive control
NC: negative control
CC: cut-off calibrator
P1: patient 1
P2: patient 2
P3: patient 3

7.3 Test Steps

Step	*Description*
1.	Ensure preparations from step 7.1 above have been carried out prior to pipetting.
2.	Use the following steps in accordance with quantitative/ qualitative interpretation results desired:
	CONTROLS & SAMPLES
3.	 Pipette into the designated wells as described in chapter 7.2 above, 100 µl of either: a. Calibrators (CAL.A to CAL.F) for *QUANTITATIVE* or b. Cut-off Calibrator (CC) for *QUALITATIVE* interp. and 100 µl of each of the following: • Negative control (NC) and Positive control (PC), and • Patients diluted serum (P1, P2...)
4.	 Incubate for 60 minutes at 20-32 °C/68-89.6 °F.
5.	 Wash 3x with 300 µl washing buffer (diluted 1:50).

GAD65 Biotin		
6.	GAD65-BIOTIN 	Pipette 100 µl GAD65 Biotin solution (as described in chapter 7.1 above) into each well.
7.		Incubate for 30 minutes at 20-32 °C/68-89.6 °F.
8.	WASHB 	Wash 3x with 300 µl washing buffer (diluted 1:50).
CONJUGATE		
9.	CONJ 	Pipette 100 µl conjugate into each well.
10.		Incubate for 30 minutes at 20-32 °C/68-89.6 °F.
11.	WASHB 	Wash 3x with 300 µl washing buffer (diluted 1:50).
SUBSTRATE		
12.	SUB 	Pipette 100 µl TMB substrate into each well.
13.		Incubate for 30 minutes at 20-32 °C/68-89.6 °F, protected from intense light.

STOP		
14.		Pipette 100 µl stop solution into each well, using the same order as pipetting the substrate.
15.		Incubate 5 minutes minimum.
16.		Agitate plate carefully for 5 sec.
17.		Read absorbance at 450 nm (recommended 450/620 nm) within 30 minutes.

8 Quantitative and Qualitative Interpretation

For **quantitative interpretation** establish the standard curve by plotting the **optical density (OD) of each calibrator (y-axis)** with respect to the corresponding concentration values in **IU/ml (x-axis)**. For best results we recommend log/lin coordinates and 4-Parameter Fit. From the OD of each sample, read the corresponding antibody concentrations expressed in **IU/ml.**

Normal Range	Equivocal Range	Positive Results
< 20 IU/ml	20 – 30 IU/ml	> 30 IU/ml

Example of a standard curve

Do NOT use this example for interpreting patient´s result

Calibrators IgG	OD 450/620 nm	CV % (Variation)
0 IU/ml	0.129	5.8
25 IU/ml	0.380	4.8
75 IU/ml	0.743	5.5
125 IU/ml	1.134	3.1
250 IU/ml	1.612	1.1
500 IU/ml	2.484	2.8

Example of calculation

Patient	Replicate (OD)	Mean (OD)	Result (IU/ml)
P 01	0.454/0.442	0.448	54.39
P 02	1.279/1.265	1.272	170.09

Samples above the highest calibrator range should be reported as >Max. They should be diluted as appropriate and re-assayed. Samples below calibrator range should be reported as < Min.

For lot specific data, see enclosed quality control leaflet. Medical laboratories might perform an in-house quality control by using own controls and/or internal pooled sera, as foreseen by national regulations.

Each laboratory should establish its own normal range based upon its own techniques, controls, equipment and patient population according to their own established procedures.

In case that the values of the controls do not meet the criteria the test is invalid and has to be repeated.

The following technical issues should be verified: Expiration dates of (prepared) reagents, storage conditions, pipettes, devices, photometer, incubation conditions and washing methods.

If the items tested show aberrant values or any kind of deviation or that the validation criteria are not met without explicable cause please contact the manufacturer or the supplier of the test kit.

For **qualitative interpretation** read the optical density of the cut-off calibrator and the patient samples. Compare patient´s OD with the OD of the cut-off calibrator. For qualitative interpretation we recommend to consider sera within the range of 20% around the cut-off value as equivocal. All samples with higher ODs are considered positive, samples with lower ODs are considered negative.

Negative:	**OD patient**	**<**	**OD cut-off**		
Equivocal:	**0.8 x OD cut-off**	**≤**	**OD patient**	**≤**	**1.2 x OD cut-off**
Positive:	**OD patient**	**>**	**OD cut-off**		

9 Technical Data

Sample material:	serum
Sample volume:	75 µl of sample diluted 1:4 with 1x sample buffer
Total incubation time:	150 minutes at 20-32 °C/68-89.6 °F
Calibration range:	0-500 IU/ml
Analytical sensitivity:	9.25 IU/ml
Storage:	at 2-8 °C/35.6-46.4 °F use original vials only
Number of determinations:	96 tests

10 Performance Data

10.1 Normal Range

Sera of healthy donors have been investigated on ***AESKULISA®* GAD65 SL** and resulted in the following distribution:

Number of Samples	negative	borderline	positive
128	127 (99.2 %)	1 (0.8 %)	0 (0 %)

We also recommend that each laboratory should establish its own normal range.

10.2 Precision

Precision of test results obtained with ***AESKULISA®* GAD65 SL, REF 3606** were assessed by the determination of the intra- and inter-assay precision as well as the lot-to-lot variance by the analysis of the multiple samples of different antibody activities.

Sample ID	Intra Assay Precision		Inter Assay Precision		LOT to LOT Precision	
	mean (IU/ml)	CV	mean (IU/ml)	CV	mean (IU/ml)	CV
Sample 1	24.49	10.85	24.49	13.72	23.41	12.98
Sample 2	47.54	5.80	47.54	11.15	40.94	22.18
Sample 3	63.93	6.32	63.93	10.39	60.98	16.50
Sample 4	131.03	5.40	131.03	6.87	127.70	9.26
Sample 5	286.53	3.63	286.53	7.85	285.01	8.99
Sample 6	405.27	5.46	405.27	8.77	401.82	9.23

10.3 Sensitivity and Specificity
Analytical sensitivity

The analytical sensitivity has been assessed by multiple analysis of sample buffer and low positive samples and calculating the limit of detection.
For ***AESKULISA®* GAD65 SL, REF 3606**, a **LOD of 9.25 IU/ml** has been determined.

10.4 Linearity

Three sera covering the whole test range were diluted serially with a negative serum sample. Measured and expected values of the distinct dilutions were used to calculate a linear regression. According to the results of linearity testing a measurable range of 12-500 IU/ml was determined for ***AESKULISA®* GAD65 SL.**

10.5 Calibration

The ***AESKULISA®* GAD65 SL** is calibrated against the WHO reference serum Islet Cell Antibodies.

11 Disposal

Please observe the relevant statutory requirements!

12 Literature

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Winter WE, Harris N, Schatz D (2002). Type 1 diabetes islet autoantibody markers. Diabetes Technol Ther 4(6):817-839.

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CLSI Guideline GP44-A4: Procedures for the Handling and Processing of Blood Specimens for Common Laboratory Test

13 Regulatory Symbols

IVD	- Diagnosi in vitro	- For in vitro diagnostic use
	- Pour diagnostic in vitro	- Para uso diagnóstico in vitro
	- In Vitro Diagnostikum	- In Vitro Διαγνωστικό μέσο
	- Para uso Diagnóstico in vitro	
REF	- Numero d'ordine	- Cataloge number
	- Référence Catalogue	- Numéro de catálogo
	- Bestellnummer	- Αριθμός παραγγελίας
	- Número de catálogo	
LOT	- Descrizione lotto	- Lot
	- Lot	- Lote
	- Chargen Bezeichnung	- Χαρακτηρισμός παρτίδας
	- Lote	
UDI	- Identificatore univoco del dispositivo	- Unique Device Identifier
	- Identifiant unique de l'appareil	- Identificador único del dispositivo
	- eindeutige Produktidentifizierung	- Μοναδικό αναγνωριστικό συσκευής
	- Identificador único do dispositivo	
CE	- Conformità europea	- EC Declaration of Conformity
	- Déclaration CE de Conformité	- Declaración CE de Conformidad
	- Europäische Konformität	- Ευρωπαϊκή συμφωνία
	- Déclaracão CE de Conformidade	
Σ 96	- 96 determinazioni	- 96 tests
	- 96 tests	- 96 pruebas
	- 96 Bestimmungen	- 96 προσδιορισμοί
	- 96 Testes	
eIFU WWW.AESKU.COM	- Rispettare le istruzioni elettroniche per l'uso	- See electronical instructions for use
	- Voir les instructions d'utilisation électronique	- Siga las instrucciones electrónicas de uso
	- Elektronische Gebrauchsanweisung beachten	- Ακολουθήστε τις ηλεκτρονικές οδηγίες χρήσης
	- Seguir as instruções electrónicas de utilização	
	- Da utilizzarsi entro	- Use by
	- Utilise avant le	- Utilizar antes de
	- Verwendbar bis	- Χρήση μέχρι
	- Utilizar antes de	
+2°C +8°C	- Conservare a 2-8°C (35.6-46.4°F)	- Store at 2-8°C (35.6-46.4°F)
	- Conserver à 2-8°C (35.6-46.4°F)	- Conservar a 2-8°C (35.6-46.4°F)
	- Lagerung bei 2-8°C (35.6-46.4°F)	- Φυλάσσεται στους 2-8°C (35.6-46.4°F)
	- Conservar entre 2-8°C (35.6-46.4°F)	
	- Prodotto da	- Manufactured by
	- Fabriqué par	- Fabricado por
	- Hergestellt von	- Κατασκευάζεται από
	- Fabricado por	
CO-CAL	- Calibratore cut-off	- Cut off Calibrator
	- Etalon Seuil	- Calibrador de cut-off
	- Grenzwert Kalibrator	- Οριακός ορός Αντιδραστήριο βαθμονόμησης
	- Calibrador de cut-off	
CON +	- Controllo positivo	- Positive Control
	- Contrôle Positif	- Control Positivo
	- Positiv Kontrolle	- Θετικός ορός ελέγχου
	- Controlo positivo	
CON −	- Controllo negativo	- Negative Control
	- Contrôle Négatif	- Control Negativo
	- Negativ Kontrolle	- Αρνητικός ορός ελέγχου
	- Controlo negativo	
CAL	- Calibratore	- Calibrator
	- Etalon	- Calibrador
	- Kalibrator	- Αντιδραστήριο βαθμονόμησης
	- Calibrador	
CONJ	- Coniugato	- Conjugate
	- Conjugé	- Conjugado
	- Konjugat	- Σύζευγμα
	- Conjugado	
MP	- Micropiastra rivestita	- Coated microtiter plate
	- Microplaque sensibilisée	- Microplaca sensibilizada
	- Beschichtete Mikrotiterplatte	- Επικαλυμμένη μικροπλάκα
	- Microplaca revestida	
WASHB 50x	- Tampone di lavaggio	- Wash buffer
	- Tampon de Lavage	- Solución de lavado
	- Waschpuffer	- Ρυθμιστικό διάλυμα πλύσης
	- Solucão de lavagem	
SUB	- Tampone substrato	- Substrate buffer
	- Substrat	- Tampón sustrato
	- Substratpuffer	- Ρυθμιστικό διάλυμα υποστρώματος
	- Substrato	
STOP	- Reagente bloccante	- Stop solution
	- Solution d'Arrêt	- Solución de parada
	- Stopreagenz	- Αντιδραστήριο διακοπής αντίδρασης
	- Solucão de paragem	
SB 5x	- Tampone campione	- Sample buffer
	- Tampon Echantillons	- Tampón Muestras
	- Probenpuffer	- Ρυθμιστικό διάλυμα δειγμάτων
	- Diluente de amostra	

GAD65-BIOTIN	- GAD65 Biotin	- GAD65 Biotin
	- GAD65 Biotine	- GAD65 Biotina
	- GAD65 Biotin	- GAD65 Βιοτίνη
	- GAD65 Biotina	
add	- aggiunta di	- addition of
	- addition d'	- Además de
	- Zugabe von	- πξνζζήζε
	- adição de	
RB	- Tampone per la diluizione	- Reconstiutution Buffer
	-Tampon de reconstitution	- Tampón para reconstitución
	- Rekonstitutionspuffer	- Ρυθμιστικό διάλυμα ανασύστασης
	- Tampão de reconstituição	