Human Glycated Hemoglobin A1c ELISA Kit (HbA1c)

Catalog No.: RK01542

version: 2.0
This package insert must be read in its entirety before using this product

Introduction

The kit is a sandwich enzyme immunoassay for in vitro quantitative measurement of HbA1c in human serum, plasma, cell culture supernatant, and other biological fluids.

Principle of the Assay

This assay employs the quantitative sandwich enzyme immunoassay technique. An antibody specific for human HbA1c has been pre-coated onto a microplate.Standards and samples are pipetted into the wells and any HbA1c present is bound by the immobilized antibody. After washing away any unbound substances, and then a detection antibody specific for HbA1c is added to the wells and binds to the combination of capture antibody HbA1c in sample. Following a wash to remove any unbound combination, and enzyme conjugate is added to the wells. Following incubation and wash steps, a substrate solution is added to the wells and color develops in proportion to the amount of HbA1c bound in the initial step. The color development is stopped and the absorbance is measured.

Material Provided & Storage Conditions

Unopened kits can be stored at 2-8°C for 1 year, and opened products must be used within 1 month.

Part	Size	Cat. No.	Storage of opened/reconstituted material
Human HbA1c Microwell Plate Coated	8×12	RM03993	Put the unused slats back in the aluminum foil bag with the desiccant and reseal them. They can be stored at 2-8℃ for 1 month.
Human HbA1c Standard Lyophilized	2 vials	RM03994	It is not recommended to use again after redissolving.
Human HbA1c Concentrated Biotin Conjugate Antibody (100×)	1 ×120 μL	RM03995	Store at 2-8℃ for 1 month *

Streptavidin-HRP Concentrated (100×)	1 ×120 μL	RM03996	Store at 2-8°C for 1 month *
Standard/Sample Diluent (R1)	1 ×20 mL	RM00023	Store at 2-8°C for 1 month *
Biotin-Conjugate Antibody Diluent (R2)	1 ×10 mL	RM00024	
Streptavidin-HRP Diluent(R3)	1 ×10 mL	RM00025	
Wash Buffer(25x)	1 ×30 mL	RM00026	
TMB Substrate	1 ×10 mL	RM00027	
Stop Solution	1 ×10 mL	RM00028	
Plate Sealers	4 Strips		
Specification	1		

*Note: The specifications listed in the table are for 96T kit, and the amount of other components in the 48T kit are halved except for the standard, please be aware of this.

Other Supplies Required

1. Microplate reader capable of measuring absorbance at 450 nm, with the correction wavelength set at 630 nm or 570 nm.
2. Pipettes and pipette tips.
3. Deionized or distilled water.
4. Squirt bottle, manifold dispenser, or automated microplate washer.
5. Incubator.
6. Test tubes for dilution of standards and samples.

Precautions

*For Research use only，not be used for diagnosis.

1. The kit should not be used beyond the expiration date on the kit label.
2. Do not mix or substitute reagents with those from other lots or other sources.
3. If the OD value of the sample obtained from the test exceeds the maximum detection limit of the product, please dilute the sample using the standard/sample diluent (R1) in the product. Therefore, it is recommended to pre-test the sample before formally testing the sample.
4. Sample addition, plate washing, incubation time, incubation temperature and other operations during the experiment will affect the final results, please strictly manage the experimental process and keep good records.
5. Variations in sample collection, processing, and storage may cause sample value differences.
6. Until all factors have been tested in this assay, the possibility of interference cannot be excluded.
7. Reagents may be harmful, if ingested, rinse it with an excess amount of tap water.

8. Stop Solution contains strong acid. Wear eye, hand, and face protection.
9. To ensure the best results, please refer to the labels or instructions for storage of relevant reagent components.
10. Mixing of the reagents after preparation is very important for the results, but some proteins or antibodies may be very sensitive to vigorous vortexing, which may cause loss of activity, so please use vortexing with caution.
11. Please use sterilised consumables for reagent preparation to avoid contamination of the reagents, which may affect the final test results.
12. In order to ensure the best detection effect, it is not recommended to reuse the working solution of the solubilised standard protein and related reagents after freezing.
13. The kit should be away from light when it is stored or incubated.
14. To avoid cross contamination, please use disposable pipette tips.
15. Please prepare all the kit components according to the Specification. If the kits will be used several times, please seal the rest strips and preserve with desiccants. Do use

up within 1 months.

16. The 48T kit is also suitable for the specification.

Sample Collection & Storage

Cell Culture Supernatant: Remove particulates by centrifugation. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Serum: Use a serum separator tube (SST) and allow samples to clot for 30 minutes at room temperature before centrifugation for 15 minutes at 1000 x g. Remove serum and assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

Plasma: Collect plasma using EDTA or Heparin as an anticoagulant. Centrifuge for 15 minutes at 1000×g within 30

minutes of collection. Assay immediately or aliquot and store samples at ≤ -20℃. Avoid repeated freeze-thaw cycles. (Note: Citrate plasma has not been validated for use in this assay.)

Other biological fluids: Centrifuge samples for 20 minutes at 1,000 × g. Collect the supernatants and assay immediately or store samples in aliquot at -20°C or -80°C for later use. Avoid repeated freeze-thaw cycles.

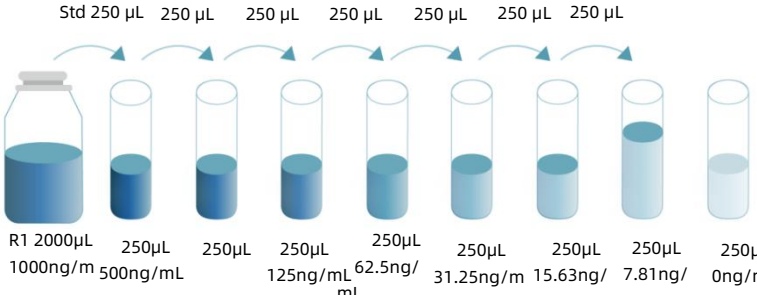
Note: It is suggested that all samples in one experiment be collected at the same time of the day. Avoid hemolytic and hyperlipidemia sample for serum and plasma.

Reagent Preparation

Bring all reagents to room temperature before use. If crystals have formed in the concentrate, Bring the reagent to room temperature and mix gently until the crystals have completely dissolved.

Standard - Reconstitute the Standard Lyophilized with 2 mL Standard/Sample Diluent(R1). This reconstitution produces a stock solution of 1000 ng/mL. Mix the standard to ensure complete reconstitution and allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions.

Use the 1000 ng/mL standard stock to produce a dilution series (below) with Standard/Sample Diluent(R1). Mix each tube thoroughly and change pipette tips between each transfer (recommended concentration for standard curve: 500, 250, 125, 62.5, 31.25, 15.63, 7.81, 0 ng/mL). Use diluted standards within 60 minutes of preparation.



Working Biotin Conjugate Antibody - Dilute 1:100 of Concentrated Biotin Conjugate Antibody (100x) with Biotin-Conjugate Antibody Diluent (R2) before use, for example: Add 20 μL of Concentrated Biotin Conjugate Antibody (100x) to 1980 μ L Biotin-Conjugate Antibody Diluent (R2) to prepare 2000 μL Working Biotin Conjugate Antibody Buffer.

Working Streptavidin-HRP - Dilute 1:100 of Concentrated Streptavidin-HRP (100x) with Streptavidin-HRP Diluent (R3) before use, for example: Add 20 μ L of Concentrated Streptavidin-HRP (100x) to 1980μL Streptavidin-HRP Diluent (R3) to prepare 2000μL Working Streptavidin-HRP Buffer.

Wash Buffer - If crystals have formed in the concentrate, warm to room temperature and mix gently until the crystals have completely dissolved. Dilute 1:25 with double distilled or deionized water before use, for example : Add 16 mL of Wash Buffer Concentrate to 384 mL of deionized or distilled water to prepare 400 mL of Wash Buffer.

Sample preparation

For different samples, the appropriate dilution level should be chosen on a case-by-case basis.

1. Cell Supernatant: As cell supernatant samples vary considerably depending on the experimental conditions, it is recommended to carry out a pre-test to determine the appropriate dilution.

2. Serum/plasma: Due to individual differences, please anticipate the concentration range of the sample in advance and determine the dilution of the sample to be examined by pre-testing.Please refer to the following dilution instructions.

Dilution Method

For 100 fold dilution: One-step dilution. Add 5 μL sample to 495 μL sample diluent to yield 100 fold dilution.

For 1000 fold dilution: Two-step dilution. Add 5 μL sample to 95 μL sample diluent to yield 20 fold dilution, then add 5 μL 20 fold diluted sample to 245 μL sample diluent, after this, the neat sample has been diluted at 1000 fold successfully.

Each dilution step should be performed at a minimum of 3 μL and at a maximum of 100-fold dilution. Each dilution step should be mixed well to avoid foaming.

Assay Procedure

Bring all reagents and samples to room temperature before use. It is recommended that all standards, controls, and samples be assayed in duplicate.

1. Prepare all reagents, working standards, and samples as directed in the previous sections.Remove excess microplate strips from the plate frame, return them to the foil pouch containing the desiccant pack, and reseal properly.
2. Add 100 µL Standard/sample Diluent (R1) in a blank well.
3. Add 100 µL different concentration of standard or sample in other wells, Cover with the adhesive strip provided. Incubate for 2 hours at 37℃. record the plate layout of standards and sample assay.
4. Prepare the Concentrated Biotin Conjugate Antibody (100x) Working Solution 15 minutes early before use.
5. Remove residual liquid in the wells.Add 100 µL Working Biotin Conjugate Antibody in each well, cover with new adhesive Sealer provided.Incubate for 1 hour at 37℃.
6. Prepare the Streptavidin-HRP Concentrated (100x) Working Solution 15minutes early before use.

7. Remove residual liquid in the wells.Add wash buffer 350 μ L/well, aspirate each well after holding 40 seconds, repeating the process two times for a total of three washes.
8. Add 100 μL Working Streptavidin-HRP in each well, cover with new adhesive Sealer provided.Incubate for 1 hour at 37℃.
9. During the incubation, turn on the microplate reader to warm up for 30 minutes before measuring.
10. Repeat the aspiration/wash as in step 7.
11. Add 90 μL TMB Substrate to each well. Incubate for 15-20 minutes at 37℃ .Protect from light.
12. Add 50 μL Stop Solution, determine the optical density of each well within 5 minutes, using a Microplate reader set to 450 nm. If wavelength correction is available, set to 570 nm or 630 nm. If wavelength correction is not available, subtract readings at 570 nm or 630 nm from the readings at 450 nm. This subtraction will correct for optical imperfections in the plate. Readings made directly at 450 nm without correction may cause higher value and less accurate result.

Assay Procedure Summary

Prepare the standard and reagents

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Add 100 μL of standards or test samples to each well

Incubate for 2 hours at 37℃

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Add 100 μL Working Biotin Conjugate Antibody

Incubate for 1 hour at 37℃, then wash 3 times

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Add 100 μL Working Streptavidin-HRP

Incubate for 1 hour at 37℃, then wash 3 times

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Add 90 μL Substrate Solution

Incubate for 15-20 min at 37℃ under dark condition

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Add 50 μL Stop Solution

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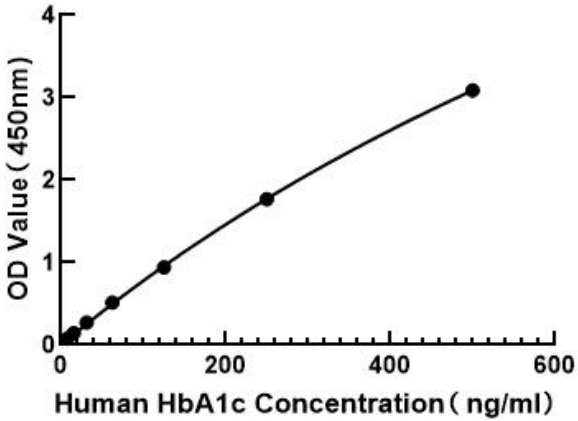
Detect the optical density within 5 minutes under 450nm.

Correction Wavelength set at 570nm or 630nm

Calculation of Results

1. Calculate the average OD value of the replicate wells for each concentration of standard protein, quality control, sample, etc. The OD value of each test should be subtracted from the OD value of the blank wells as well as the OD value of the sub-wavelength.
2. Create a standard curve by reducing the data using computer software capable of generating a four-parameter logistic (4-PL) curve-fit. As an alternative, construct a standard curve by plotting the mean absorbance for each standard on the Y-axis against the concentration on the X-axis and draw a best fit curve through the points on a log/log graph. The data may be linearized by plotting the log of the HbA1c concentrations versus the log of the O.D. on a linear scale, and the best fit line can be determined by regression analysis.
3. If samples have been diluted,the concentration read from the standard curve must be multiplied by the dilution factor.

Typical Data



The standard curves are provided for demonstration only. A standard curve should be generated for each set of HbA1c assayed.

Detection Range

7.81-500 ng/mL

Sensitivity

The minimum detectable dose (MDD) of HbA1c typically less than 3.9 ng/mL.

The MDD was determined by adding two standard deviations to the mean optical density value of twenty zero standard replicates and calculating the corresponding concentration.

Specificity

This assay recognizes both recombinant and natural human HbA1c.
The method has high sensitivity and specificity for the detection of HbA1c .
There is no significant cross-reactivity or interference between HbA1c and analogues.

Note:
Limited by current skills and knowledge, it is impossible for us to complete the cross-reactivity detection between HbA1c and all the analogues, therefore, cross reaction may still exist.

Precision

Intra-plate Precision

3 samples with low, middle and high level HbA1c were tested 20 times on one plate, respectively.

Intra-Assay: CV<10%

Inter-plate Precision

3 samples with low, middle and high level HbA1c were tested on 3 different plates, 20 replicates in each plate.

Inter-Assay: CV<15%

	Intra-Assay Precision			Inter-Assay Precision		
Sample	1	2	3	1	2	3
n	20	20	20	20	20	20
Mean(ng/mL)	19.53	62.5	375	19.53	62.5	375
Standard deviation	0.71	2.52	15.98	0.98	2.54	18.04
CV(%)	3.64	4.03	4.26	5.01	4.06	4.81

Recovery

Matrices listed below were spiked with certain level of HbA1c and the recovery rates were calculated by comparing the measured value to the expected amount of HbA1c in samples.

Sample	Average Recovery（%）	Range（%）
Cell Culture Media(n=5)	97	83-103
Serum(n=5)	101	89-115

Linearity

The linearity of the kit was assayed by testing samples spiked with appropriate concentration of HbA1c and their serial dilutions. The results were demonstrated by the percentage of calculated concentration to the expected.

/	/	Cell Culture Media(n=5)	Serum(n=5)
1:2	Average of Expected（%）	99	105
	Range（%）	85-115	80-114
1:4	Average of Expected（%）	96	99
	Range（%）	92-120	81-119
1:8	Average of Expected（%）	102	100
	Range（%）	95-119	80-104
1:16	Average of Expected（%）	95	98
	Range（%）	90-120	80-112

Trouble Shooting

Problem	Possible Cause	Solution
High Background	Insufficient washing	Sufficiently wash plates as required. Ensure appropriate duration and number of washes. Ensure appropriate volume of wash buffer in each well.
	Incorrect incubation procedure	Check whether the duration and temperature of incubation are set up as required.
	Cross-contamination of samples and reagents	Be careful of the operations that could cause cross-contamination. Use fresh reagents and repeat the tests.
No signal or weak signal	Incorrect use of reagents	Check the concentration and dilution ratio of reagents. Make sure to use reagents in proper order.
	Incorrect use of microplate reader	Warm the reader up before use. Make sure to set up appropriate main wavelength and correction wavelength.
	Insufficient colour reaction time	Optimum duration of colour reaction should be limited to 15-25 minutes.

	Read too late after stopping the colour reaction	Read the plate in 5 minutes after stopping the reaction.
	Matrix effect of samples	Use positive control.
Too much signal	Contamination of TMB substrate	Check if TMB substrate solution turns blue. Use new TMB substrate solution.
	Plate sealers reused	Use a fresh new sealer in each step of experiments.
	Protein concentration in sample is too high	Do pre-test and dilute samples in optimum dilution ratio.
Poor Duplicates	Uneven addition of samples	Check the pipette. Periodically calibrate the pipette.
	Impurities and precipitates in samples	Centrifuge samples before use.
	Inadequate mixing of reagents	Mix all samples and reagents well before loading.

*For research purposes only. Not for therapeutic or diagnostic purposes.