ab108804
Apolipoprotein AI
(APOA1) ELISA Kit

For the quantitative measurement of Human Apolipoprotein AI (APOA1) in plasma and serum.

This product is for research use only and is not intended for diagnostic use.

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1. Overview

Apolipoprotein AI Human (APOA1) *in vitro* competitive ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for the quantitative measurement of Apolipoprotein AI levels in plasma and serum.

An Apolipoprotein AI specific antibody has been precoated onto 96-well plates and blocked. Standards or test samples are added to the wells along with biotinylated Apolipoprotein AI followed by incubation and washing. Streptavidin-Peroxidase Complex is added and unbound conjugates are washed away with wash buffer. TMB is then used to visualize Streptavidin-Peroxidase enzymatic reaction. TMB is catalyzed by Streptavidin-Peroxidase to produce a blue color product that changes into yellow after adding acidic stop solution. The density of yellow coloration is inversely proportional to the amount of Apolipoprotein AI captured in plate.

Human Apolipoprotein AI comprises about 70% of the high-density lipoprotein's (HDL) protein mass and Apolipoprotein AII another 15-20%. Apolipoprotein AI, a 243-amino acid molecule that contains a series of highly homologous amphipathic alpha-helices, is a 28-kDa single polypeptide that lacks glycosylation or disulfide linkages. About 5-10% of Human plasma Apolipoprotein AI exists in a lipoprotein unassociated state. Apolipoprotein AI appears to have effects on the atherosclerosis inhibition, reverse cholesterol transport, and anti-inflammation. Oxidation of specific amino acid residues in Apolipoprotein AI may contribute to atherogenesis by impairing cholesterol efflux from macrophages. A majority of HDL functionality is derived from the ability of apolipoprotein A-I to sequester phospholipids and cholesterol as well as interact with plasma enzymes and cellular receptors.

During reverse cholesterol transport, HDL interacts with lecithin: cholesteryl acyltransferase (LCAT) and cellular receptors, including ATP-binding cassette transporter protein AI (ABCA1) and the scavenger receptor class B type I in an ordered fashion that is reflected by HDL particle lipid composition. A high-affinity HDL receptor for Apolipoprotein AI is beta-chain of ATP synthase on the surface of hepatocytes. The plasma concentration of Apolipoprotein AI is one of the best indicators of susceptibility to cardiovascular disease

2. Protocol Summary

Prepare all reagents, samples, and standards as instructed

⇩

Add standard or sample to each well used and add prepared biotin protein to each well. Incubate at room temperature.

⇩

Wash and add prepared Streptavidin-Peroxidase Conjugate. Incubate at room temperature.

⇩

Add Chromogen Substrate to each well. Incubate at room temperature

⇩

Add Stop Solution to each well. Read immediately.

3. Precautions

Please read these instructions carefully prior to beginning the assay.

- All kit components have been formulated and quality control tested to function successfully as a kit.
- We understand that, occasionally, experimental protocols might need to be modified to meet unique experimental circumstances. However, we cannot guarantee the performance of the product outside the conditions detailed in this protocol booklet.
- Reagents should be treated as possible mutagens and should be handled with care and disposed of properly. Please review the Safety Datasheet (SDS) provided with the product for information on the specific components.
- Observe good laboratory practices. Gloves, lab coat, and protective eyewear should always be worn. Never pipet by mouth. Do not eat, drink or smoke in the laboratory areas.
- All biological materials should be treated as potentially hazardous and handled as such. They should be disposed of in accordance with established safety procedures.

4. Storage and Stability

Store kit at +4°C immediately upon receipt, apart from the SP Conjugate & Biotinylated Antibody, which should be stored at -20°C. Kit has a storage time of 1 year from receipt, providing components have not been reconstituted.

Refer to list of materials supplied for storage conditions of individual components. Observe the storage conditions for individual prepared components in the Materials Supplied section.

5. Limitations

− Assay kit intended for research use only. Not for use in diagnostic procedures.
− Do not mix or substitute reagents or materials from other kit lots or vendors. Kits are QC tested as a set of components and performance cannot be guaranteed if utilized separately or substituted.

6. Materials Supplied

Item	Quantity	Storage Condition
Apolipoprotein AI Microplate (12 x 8 wells)	96 wells	4°C
Apolipoprotein AI Standard	1 vial	4°C
10X Diluent N Concentrate	30 mL	4°C
Biotinylated Human Apolipoprotein AI (Lyophilized)	1 vial	-20°C
100X Streptavidin-Peroxidase Conjugate (SP Conjugate)	80 µL	-20°C
Chromogen Substrate	7 mL	4°C
Stop Solution	11 mL	4°C
20X Wash Buffer Concentrate	30 mL	4°C
Sealing Tapes	3	N/A

7. Materials Required, Not Supplied

These materials are not included in the kit, but will be required to successfully perform this assay:

- 1 Microplate reader capable of measuring absorbance at 450 nm.
- Precision pipettes to deliver 1 µL to 1 mL volumes.
- Adjustable 1-25 mL pipettes for reagent preparation.
- 100 mL and 1 liter graduated cylinders.
- Absorbent paper.
- Distilled or deionized water.
- Log-log graph paper or computer and software for ELISA data analysis.
- 6 tubes to prepare standard or sample dilutions.

8. Technical Hints

– This kit is sold based on number of tests. A 'test' simply refers to a single assay well. The number of wells that contain sample, control or standard will vary by product. Review the protocol completely to confirm this kit meets your requirements. Please contact our Technical Support staff with any questions.

– Selected components in this kit are supplied in surplus amount to account for additional dilutions, evaporation, or instrumentation settings where higher volumes are required. They should be disposed of in accordance with established safety procedures.

– Make sure all buffers and solutions are at room temperature before starting the experiment.

– Samples generating values higher than the highest standard should be further diluted in the appropriate sample dilution buffers.

– Avoid foaming or bubbles when mixing or reconstituting components.

– Avoid cross contamination of samples or reagents by changing tips between sample, standard and reagent additions.

– Ensure plates are properly sealed or covered during incubation steps.

– Make sure you have the right type of plate for your detection method of choice.

– Make sure the heat block/water bath and microplate reader are switched on before starting the experiment.

9. Reagent Preparation

− Equilibrate all reagents to room temperature (18-25°C) prior to use. The kit contains enough reagents for 96 wells.
− Prepare only as much reagent as is needed on the day of the experiment.

9.1 1X Diluent N

Dilute the 10X Diluent N Concentrate 1:10 with reagent grade water. When diluting the concentrate, make sure to rinse the bottle thoroughly to extract any precipitates left in the bottle. Mix the 1x solution gently until the crystals have completely dissolved. Store for up to 30 days at 2-8°C.

Δ **Note** Store for up to 1 month at 4°C.

9.2 1X Wash Buffer

Dilute the 20X Wash Buffer Concentrate 1:20 with reagent grade water. When diluting the concentrate, make sure to rinse the bottle thoroughly to extract any precipitates left in the bottle. Mix the 1x solution gently until the crystals have completely dissolved.

9.3 2X Biotinylated Apolipoprotein AI

Reconstitute the Biotinylated Human Apolipoprotein A-I Protein with 5 ml of MIX Diluent to generate a stock solution. Allow the vial to sit for 10 minutes with gentle agitation prior to dilution. From the stock solution, dilute 2-fold with 1X Diluent N to produce a 1x working solution.

Δ **Note** Aliquot remaining stock solution to limit repeated freeze-thaw cycles. This solution should be stored at -20°C and used within 15 days.

9.4 1X SP Conjugate

Spin down the 100X Streptavidin-Peroxidase Conjugate (SP Conjugate) briefly and dilute the desired amount of the conjugate 1:100 with 1X Diluent N.

Δ **Note** Any remaining solution should be frozen at -20°C.

10. Standard Preparation

- Always prepare a fresh set of standards for every use.
- Any remaining standard should be stored at -20°C after reconstitution and used within 30 days.
- The following section describes the preparation of a standard curve for duplicate measurements (recommended).

10.1 Reconstitution of the Apolipoprotein AI Standard vial to prepare the 10 µg/ml Apolipoprotein AI **Standard #1:**

10.1.1 First consult the Apolipoprotein AI Standard vial to determine the mass of protein in the vial.

Calculate the appropriate volume of 1X Diluent N to add when resuspending the Apolipoprotein AI Standard vial to produce a 10 µg/ml Apolipoprotein AI **Standard #1** by using the following equation:

C_S = Starting mass of Apolipoprotein AI Standard (see vial label) (µg)

C_F = The 10 µg/mL Apolipoprotein AI **Standard #1** final required concentration

V_D = Required volume of 1X Diluent N for reconstitution (µL)

Calculate total required volume 1X Diluent N for resuspension:

$$(C_S / C_F) \times 1,000 = V_D$$

Example:

NOTE: This example is for demonstration purposes only. Please remember to check your standard vial for the actual amount of standard provided.

C_S = 15 µg of Apolipoprotein AI Standard in vial

C_F = 10 µg/mL Apolipoprotein AI **Standard #1** final concentration

V_D = Required volume of 1X Diluent N for reconstitution

Calculate total required volume 1X Diluent N for resuspension:

$$(15 \text{ µg} / 10 \text{ µg/mL}) \times 1,000 = 1,500 \text{ mL}$$

10.1.2 First briefly centrifuge the Apolipoprotein AI Standard Vial to collect the contents on the bottom of the tube.

10.1.3 Reconstitute the Apolipoprotein AI Standard vial by adding the appropriate calculated amount V_D of 1X Diluent N to the vial to generate the 10 µg/ml Apolipoprotein AI **Standard #1.** Mix gently and thoroughly.

10.2 Allow the reconstituted 10 µg/ml Apolipoprotein AI **Standard #1** to sit for 10 minutes with gentle agitation prior to making subsequent dilutions

10.3 Label five tubes #2 – 6.

10.4 Add 120 µL of 1X Diluent N to tube #2 – 6.

10.5 To prepare **Standard #2**, add 120 µL of the **Standard #1** into tube #2 and mix gently.

10.6 To prepare **Standard #3**, add 120 µL of the **Standard #2** into tube #3 and mix gently.

10.7 Using the table below as a guide, prepare subsequent serial dilutions.

10.8 1X Diluent N serves as the zero standard (0 µg/mL).

Standard #	Volume to dilute (µL)	Volume Diluent N (µL)	Human Apolipoprotein AI (µg/mL)
1	Step 10.1		10
2	120 µL Standard #1	120	5
3	120 µL Standard #2	120	2.5
4	120 µL Standard #3	120	1.25
5	120 µL Standard #4	120	0.625
6	120 µL Standard #5	120	0.313
7	120 µL Standard #6	120	0.156
8 (Blank)	0	120	0

11. Sample Preparation

11.1 Plasma:

Collect plasma using one-tenth volume of 0.1 M sodium citrate as an anticoagulant. Centrifuge samples at 3,000 x g for 10 minutes. Dilute samples 1:800 into 1X Diluent N or within the range 1:400 - 1:2000, and assay. The user should determine the optimal dilution factor. The undiluted samples can be stored at -20°C and below for up to 3 months. Avoid repeated freeze-thaw cycles (EDTA or Heparin can also be used as an anticoagulant).

11.2 Serum:

Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 3,000 x g for 10 minutes and remove serum. Dilute samples 1:800 into 1X Diluent N or within the range 1:400 - 1:2000 and assay. The user should determine the optimal dilution factor. The undiluted samples can be stored at -20°C and below for up to 3 months. Avoid repeated freeze-thaw cycles.

Refer to Dilution Guidelines for further instruction.

Guidelines for Dilutions of 100-fold or Greater	
(for reference only; please follow the insert for specific dilution suggested)	
100x	**10000x**
4 µl sample + 396 µl buffer (100X) = 100-fold dilution *Assuming the needed volume is less than or equal to 400 µl*	A) 4 µl sample + 396 µl buffer (100X) B) 4 µl of A + 396 µl buffer (100X) = 10000-fold dilution *Assuming the needed volume is less than or equal to 400 µl*
1000x	**100000x**
A) 4 µl sample + 396 µl buffer (100X) B) 24 µl of A + 216 µl buffer (10X) = 1000-fold dilution *Assuming the needed volume is less than or equal to 240 µl*	A) 4 µl sample + 396 µl buffer (100X) B) 4 µl of A + 396 µl buffer (100X) C) 24 µl of A + 216 µl buffer (10X) = 100000-fold dilution *Assuming the needed volume is less than or equal to 240 µl*

12. Plate Preparation

— The 96 well plate strips included with this kit are supplied ready to use. It is not necessary to rinse the plate prior to adding reagents.

— Unused well plate strips should be returned to the plate packet and stored at 4°C.

— For statistical reasons, we recommend each sample should be assayed with a minimum of two replicates (duplicates).

— Well effects have not been observed with this assay. Contents of each well can be recorded on the template sheet included in the Resources section.

13. Assay Procedure

– Equilibrate all materials and prepared reagents to room temperature prior to use.

– We recommend that you assay all standards, controls and samples in duplicate.

13.1 Prepare all reagents, working standards and samples as instructed. Equilibrate reagents to room temperature before use. The assay is performed at room temperature (18-25°C).

13.2 Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccant inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.

13.3 Add 25 µL of Apolipoprotein AI Standard or sample per well and immediately add 25 µL of 1X Biotinylated Apolipoprotein AI to each well (on top of Standard or sample). Gently tap plate to ensure thorough mixing. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for two hours at room temperature. Start the timer after the last sample addition.

13.4 Wash five times with 200 µL of 1X Wash Buffer manually. Invert the plate each time and decant the contents; tap it 4-5 times on

absorbent paper towel to completely remove the liquid. If using a machine, wash six times with 300 µL of 1X Wash Buffer and then invert the plate, decant the contents; tap it 4-5 times on absorbent paper towel to completely remove the liquid.

13.5 Add 50 µL of 1X SP conjugate to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with sealing tape and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.

13.6 Wash microplate as described above.

13.7 Add 50 µL of Chromogen Substrate per well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with sealing tape and incubate in ambient light for 12 minutes or till the optimal blue color density develops. Gently tap plate to ensure thorough mixing and break the bubbles in the well with pipette tip.

13.8 Add 50 µL of Stop Solution to each well. The color will change from blue to yellow. Gently tap the plate to ensure thorough mixing. Break any bubbles that may have formed.

13.9 Read the absorbance on a microplate reader at a wavelength of 450 nm immediately. If wavelength correction is available, subtract readings at 570 nm from those at 450 nm to correct optical imperfections. Otherwise, read the plate at 450 nm only. Please note that some unstable black particles may be generated at low concentration points after stopping the reaction for about 10 minutes, which will reduce the readings.

14. Calculations

Calculate the mean value of the triplicate readings for each standard and sample. To generate a Standard Curve, plot the graph using the standard concentrations on the x-axis and the corresponding mean 450 nm absorbance on the y-axis. The best-fit line can be determined by regression analysis using log-log or four-parameter logistic curve-fit. Determine the unknown sample concentration from the Standard Curve and multiply the value by the dilution factor

15. Typical Data

Typical standard curve – data provided **for demonstration purposes only**. A new standard curve must be generated for each assay performed.

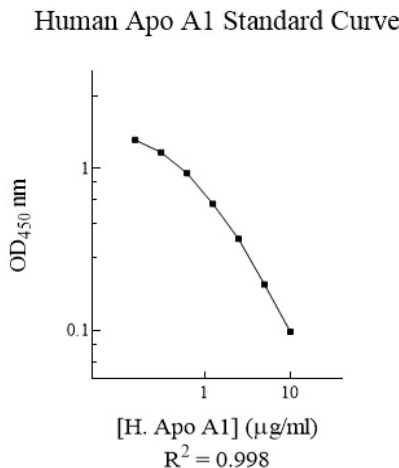Human Apo A1 Standard Curve

$R^2 = 0.998$

Figure 1. Example of Apolipoprotein AI standard curve. The standard curve was prepared as described in Section 10. Raw data values are shown in the table. Background-subtracted data values (mean +/- SD) are graphed.

16. Typical Sample Values

SENSITIVITY –

The minimum detectable dose (MDD) of Apolipoprotein AI is typically 0.12 µg/ml.

PRECISION –

	Intra-assay Precision	Inter-Assay Precision
CV (%)	4.8	10.1

RECOVERY –

Standard Added Value	0.625 – 5 µg/ml
Recovery (%)	91 - 112 %
Average Recovery (%)	98 %

LINEARITY –

	Average Percentage of Expected Value (%)	
Sample Dilution	Plasma	Serum
1:400	90%	91%
1:800	96%	94%
1:1600	109%	110%

17. Assay Specificity

This kit recognizes human Apolipoprotein AI (APOA1) in plasma and serum.

REFERENCE VALUE –
Normal human Apo A1 plasma levels range from 0.73 – 1.7 mg/ml.

18. Species Reactivity

Species	Cross Reactivity (%)
Canine	<5
Bovine	None
Equine	None
Monkey	<50
Mouse	None
Rat	None
Swine	None
Rabbit	None
Protein	**Cross-Reactivity (%)**
Apo J	<1

Please contact our Technical Support team for more information.

19. Troubleshooting

Problem	Reason	Solution
Poor standard curve	Improper standard dilution	Confirm dilutions made correctly
	Standard improperly reconstituted (if applicable)	Briefly spin vial before opening; thoroughly resuspend powder (if applicable)
	Standard degraded	Store sample as recommended
	Curve doesn't fit scale	Try plotting using different scale
Low signal	Incubation time too short	Try overnight incubation at 4°C
	Target present below detection limits of assay	Decrease dilution factor; concentrate samples
	Precipitate can form in wells upon substrate addition when concentration of target is too high	Increase dilution factor of sample
	Using incompatible sample type (e.g. serum vs. cell extract)	Detection may be reduced or absent in untested sample types
	Sample prepared incorrectly	Ensure proper sample preparation/dilution

Problem	Reason	Solution
Large CV	Bubbles in wells	Ensure no bubbles present prior to reading plate
	All wells not washed equally or thoroughly	Check that all ports of plate washer are unobstructed wash wells as recommended
	Incomplete reagent mixing	Ensure all reagents/master mixes are mixed thoroughly
	Inconsistent pipetting	Use calibrated pipettes and ensure accurate pipetting
	Inconsistent sample preparation or storage	Ensure consistent sample preparation and optimal sample storage conditions (eg. minimize freeze/thaws cycles)

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20. Notes

Technical Support

For all technical or commercial enquiries please go to:

www.abcam.com/contactus

www.abcam.cn/contactus (China)

www.abcam.co.jp/contactus (Japan)