



AssayMax Human Lipoprotein(a) [Lp(a)] ELISA Kit

Catalog Number EL3001-1

Introduction

Lipoprotein(a) [Lp(a)] is an atherogenic lipoprotein particle formed by assembly of LDL particles and apo(a) bound to apoB-100 component of LDL (1). Apo(a) is the main constituent of Lp(a), has serine proteinase activity and is able of autoprolysis (2). Apo(a) has 4548 amino acids, variable sizes from 200 to 700 kDa, multiple isoforms, and structural homology with plasminogen (3 - 5). It competes with plasminogen for its binding site, inhibiting tissue-type plasminogen activator 1 and leading to reduced fibrinolysis (6). The mean Lp(a) protein level ranged from 78 to 175 $\mu\text{g/ml}$ depending on populations and the risk threshold is 300 $\mu\text{g/ml}$ (7 - 9). High level of Lp(a) in blood is a risk factor for myocardial infarction (MI), coronary heart disease (CHD), cerebrovascular disease (CVD), atherosclerosis, thrombosis, and stroke (10 - 11).

Principal of the Assay

The AssayMax Human Lp(a) ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for detection of human Lp(a) in plasma, serum, urine, milk and cell culture samples. This assay employs a quantitative sandwich enzyme immunoassay technique that measures human Lp(a) in less than 4 hours. A polyclonal antibody specific for human Lp(a) has been pre-coated onto a 96-well microplate with removable strips. Lp(a) in standards and samples is sandwiched by the immobilized antibody and biotinylated polyclonal antibody specific for Lp(a), which is recognized by a streptavidin-peroxidase conjugate. All unbound material is then washed away and a peroxidase enzyme substrate is added. The color development is stopped and the intensity of the color is measured.

Caution and Warning

- This kit is for research use only.
- The kit should not be used beyond the expiration date.
- The Stop Solution is an acid solution

Reagents

- **Human Lp(a) Microplate:** A 96-well polystyrene microplate (12 strips of 8 wells) coated with a polyclonal antibody against human Lp(a).
- **Sealing Tapes:** Each kit contains 3 pre-cut, pressure-sensitive sealing tapes that can be cut to fit the format of the individual assay.
- **Human Lp(a) Standard:** Human Lp(a) in a buffered protein base (150 ng, lyophilized).
- **Biotinylated Lp(a) Antibody (70x):** A 70-fold concentrated biotinylated polyclonal

antibody against Lp(a) (120 µl).

- **EIA Diluent Concentrate (10x):** A 10-fold concentrated buffered protein base (30 ml).
- **Wash Buffer Concentrate (20x):** A 20-fold concentrated buffered surfactant (30 ml).
- **Streptavidin-Peroxidase Conjugate (SP Conjugate):** A 100-fold concentrate (90 µl).
- **Chromogen Substrate:** A ready-to-use stabilized peroxidase chromogen substrate tetramethylbenzidine (8 ml).
- **Stop Solution:** A 0.5 N hydrochloric acid to stop the chromogen substrate reaction (12 ml).

Storage Condition

- Store unopened kit at 2-8⁰C up to expiration date.
- Opened EIA Diluent may be stored for up to 1 month at 2-8⁰C. Store reconstituted reagents at -20⁰C or below.
- Opened unused strip wells may return to the foil pouch with the desiccant pack, reseal along zip-seal. May be stored for up to 1 month in a vacuum desiccator.

Other Supplies Required

- Microplate reader capable of measuring absorbance at 450 nm
- Pipettes (1-20 µl, 20-200 µl, 200-1000µl and multiple channel)
- Deionized or distilled reagent grade water

Sample Collection, Preparation and Storage

- **Plasma:** Collect plasma using one-tenth volume of 0.1 M sodium citrate as an anticoagulant. Centrifuge samples at 2000 x g for 10 minutes and assay. Dilute samples 1:8000 into EIA Diluent as follows: add 5 µl of sample to 395 µl of EIA Diluent (1:80) to make Solution A; then add 8 µl of Solution A to 720 µl of EIA Diluent (1:100) to make a final working solution (1:8000). Store samples at -20⁰C or below for up to 3 months. Avoid repeated freeze-thaw cycles. (EDTA or Heparin can also be used as anticoagulant.)
- **Serum:** Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 2000 x g for 10 minutes. Dilute samples 1:8000 into EIA Diluent as follows: add 5 µl of sample to 395 µl of EIA Diluent (1:80) to make Solution A; then add 8 µl of Solution A to 720 µl of EIA Diluent (1:100) to make a final working solution (1:8000). Store samples at -20⁰C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Cell Culture Supernatants:** Centrifuge cell culture media at 2000 x g for 10 minutes to remove debris. Collect supernatants and assay. Store samples at -20⁰C or below. Avoid repeated freeze-thaw cycles.
- **Urine:** Collect urine using sample pot. Centrifuge samples at 600 x g for 10 minutes and assay. Dilute samples 1:4 into EIA Diluent. Store samples at -20⁰C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Milk:** Centrifuge samples at 600 x g for 10 minutes and assay. Dilute samples 1:4000 into EIA Diluent. Store samples at -20⁰C or below for up to 3 months. Avoid repeated freeze-thaw cycles.

Reagent Preparation

- Freshly dilute all reagents and bring all reagents to room temperature before use. If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved.

- **EIA Diluent Concentrate (10x):** Dilute the EIA Diluent 1:10 with reagent grade water. Store for up to 1 month at 2-8°C.
- **Standard Curve:** Reconstitute the 150 ng of Lp(a) Standard with 0.75 ml of EIA Diluent to generate a solution of 200 ng/ml. Allow the standard to sit for 10 minutes with gentle agitation prior to making dilutions. Prepare triplicate standard points by serially diluting the standard solution (200 ng/ml) 1:4 with EIA Diluent to produce 50, 12.5, 3.13 and 0.78 ng/ml solutions. EIA Diluent serves as the zero standard (0 ng/ml). Any remaining solution should be frozen at -20°C.

Standard Point	Dilution	[Lp(a)] (ng/ml)
P1	Standard (200 ng/ml)	200.00
P2	1 part P1 + 3 part EIA Diluent	50.00
P3	1 part P2 + 3 part EIA Diluent	12.50
P4	1 part P3 + 3 part EIA Diluent	3.13
P5	1 part P4 + 3 part EIA Diluent	0.78
P6	EIA Diluent	0.00

- **Biotin Lp(a) Antibody (100x):** Spin down the antibody briefly and dilute the desired amount of the antibody 1:100 with EIA Diluent. Any remaining solution should be frozen at -20°C.
- **Wash Buffer Concentrate (20x):** Dilute the Wash Buffer Concentrate 1:20 with reagent grade water.
- **SP Conjugate (100x):** Spin down the SP Conjugate briefly and dilute the desired amount of the conjugate 1:100 with EIA Diluent. Any remaining solution should be frozen at -20°C.

Assay Procedure

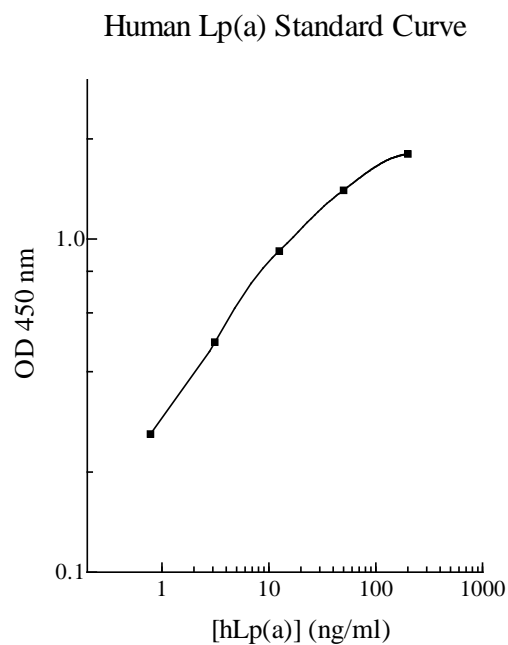
- Prepare all reagents, working standards and samples as instructed. Bring all reagents to room temperature before use. The assay is performed at room temperature (20-30°C).
- Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccant inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.
- Add 50 µl of Lp(a) standard or sample per well. Cover wells with a sealing tape and incubate for two hours. Start the timer after the last sample addition.
- Wash five times with 200 µl of Wash Buffer. Invert the plate and decant the contents, and hit it 4-5 times on absorbent paper towel to completely remove liquid at each step.
- Add 50 µl of Biotinylated Lp(a) Antibody to each well and incubate for one hour.
- Wash five times with 200 µl of Wash Buffer. Invert the plate and decant the contents, and hit it 4-5 times on absorbent paper towel to complete remove liquid at each step.
- Add 50 µl of Streptavidin-Peroxidase Conjugate to each well and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.
- Wash five times with 200 µl of Wash Buffer.
- Add 50 µl of Chromogen Substrate per well and incubate for about 10 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.
- Add 50 µl of Stop Solution to each well. The color will change from blue to yellow.
- Read the absorbance on a microplate reader at a wavelength of 450 nm **immediately**. Please note that after the reaction is stopped for about 10 minutes, some black particles may be generated at high concentration point, which will reduce the readings.

Data Analysis

- 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.

Standard Curve

- The curve is provided for illustration only. A standard curve should be generated each time the assay is performed.



Performance Characteristics

- The minimum detectable dose of Lp(a) is typically 1 ng/ml.
- Intra-assay and inter-assay coefficients of variation were 4.4% and 7.3% respectively.
- No significant cross reactivity with human Apo AI, Apo AII, Apo CI, Apo CIII or Apo E.
- 10% cross reactivity with human Apo B.

Linearity

Sample Dilution	Average Percentage of Expected Value	
	Plasma	Serum
1:4000	95%	93%
1:8000	100%	97%
1:16000	110%	112%

Recovery

Standard Added Value	5 – 50 ng/ml
Recovery %	84 - 110
Average Recovery %	97

Plasma reference value: 78 -178 µg/ml.

References

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Version 1.2