



## AssayMax Human Alpha1-Antitrypsin ELISA Kit (Plasma and Serum Samples)

Catalog Number EA5001-1

### Introduction

Alpha-1 antitrypsin (A1AT) is a protein that protects the lungs. The liver usually makes the protein, and releases it into the bloodstream. A1AT is a major protease inhibitor that control tissue degradation. A reduction of A1AT levels can cause a change in collagen metabolism (1). A1AT inhibit neutrophil elastase release into the lungs during inflammatory states (2). A1AT deficiency is an uncommon genetic disease (3) that can lead to emphysema (4), hepatitis, cirrhosis (5), chronic obstructive pulmonary disease (COPD) (6).

### Principal of the Assay

The AssayMax Human A1AT ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for detection of human A1AT in plasma, and serum. This assay employs a quantitative competitive enzyme immunoassay technique that measures human A1AT in less than 3 hours. A polyclonal antibody specific for human A1AT has been pre-coated onto a 96-well microplate with removable strips. A1AT in standards and samples is competed by a biotinylated A1AT sandwiched by the immobilized antibody and 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 A1AT Microplate:** A 96-well polystyrene microplate (12 strips of 8 wells) coated with a polyclonal antibody against human A1AT.
- **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 A1AT Standard:** Human A1AT in a buffered protein base (20 µg, lyophilized).
- **Biotinylated A1AT:** 1 vial, lyophilized.
- **MIX 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 2-8<sup>0</sup>C up to expiration date.
- Opened MIX Diluent may be stored for up to 1 month at 2-8<sup>0</sup>C. Store reconstituted reagents at -20<sup>0</sup>C 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 1:800 into MIX Diluent. The undiluted samples can be stored at -20<sup>0</sup>C 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. Remove serum and assay. Dilute samples 1:800 into MIX Diluent. The undiluted samples can be stored at -20<sup>0</sup>C 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.
- **MIX Diluent Concentrate (10x):** Dilute the MIX Diluent 1:10 with reagent grade water. Store for up to 1 month at 2-8<sup>0</sup>C.
- **Standard Curve:** Reconstitute the 20 µg of A1AT Standard with 0.5 ml of MIX Diluent to generate a solution of 40 µg/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 (40 µg/ml) 1:4 with MIX Diluent to produce 10, 2.5, 0.625, 0.156 and 0.039 µg/ml solutions. MIX Diluent serves as the zero standard (0 µg/ml). Any remaining solution should be frozen at -20<sup>0</sup>C.

Standard Point	Dilution	[A1AT] ( $\mu\text{g/ml}$ )
P1	Standard (40 $\mu\text{g/ml}$ )	40.000
P2	1 part P1 + 3 parts MIX Diluent	10.000
P3	1 part P2 + 3 parts MIX Diluent	2.500
P4	1 part P3 + 3 parts MIX Diluent	0.625
P5	1 part P4 + 3 parts MIX Diluent	0.156
P6	1 part P5 + 3 parts MIX Diluent	0.039
P7	MIX Diluent	0.000

- **Biotinylated A1AT (2x):** Dilute Biotinylated A1AT with 4 ml MIX Diluent to produce 2-fold stock solution. Allow the biotin to sit for 10 minutes with gentle agitation prior to making dilution. The stock solution can be further diluted 1:2 with MIX Diluent Any remaining solution should be frozen at  $-20^{\circ}\text{C}$ .
- **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 MIX Diluent. Any remaining solution should be frozen at  $-20^{\circ}\text{C}$ .

## 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 ( $20\text{-}30^{\circ}\text{C}$ ).
- 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 25  $\mu\text{l}$  of standard or sample per well, and immediately add 25  $\mu\text{l}$  of Biotinylated A1AT to each well (on top of the Standard or sample) and mix gently. Cover wells with a sealing tape and incubate for two hours. Start the timer after the last sample addition.
- Wash five times with 200  $\mu\text{l}$  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  $\mu\text{l}$  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  $\mu\text{l}$  of Wash Buffer.
- Add 50  $\mu\text{l}$  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  $\mu\text{l}$  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.

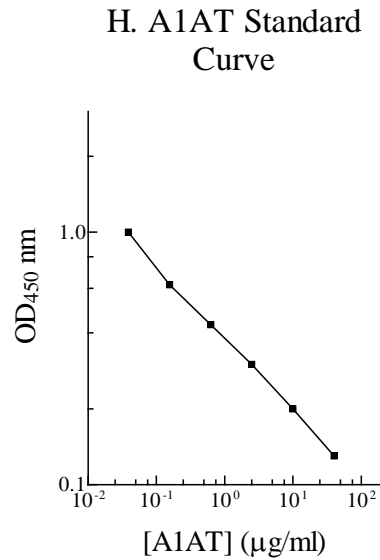
## Data Analysis

- 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.



### Precision, Sensitivity and Specificity

- The minimum detectable dose of A1AT is typically 20 ng/ml.
- Intra-assay and inter-assay coefficients of variation were 4.1% and 7.0% respectively.

### Cross-Reactivity

Species	% Cross Reactivity
Monkey	< 5
Mouse	None
Rat	< 0.1
Swine	< 1
Beagle	None
Bovine	None

### Linearity

Sample Dilution	Average Percentage of Expected Value	
	Plasma	Serum
<b>1:400</b>	94%	95%
<b>1:800</b>	98%	100%
<b>1:1600</b>	107%	106%

## Recovery

<b>Standard Added Value</b>	0.5 – 10 ug/ml
<b>Recovery %</b>	85-111 %
<b>Average Recovery %</b>	98 %

## Reference Value

- The normal blood levels of A1AT are 1.5 -3.5 g/l.

## References

- (1) Hauck EW et al. (2004) *Eur Urol.* 46(5): 623-8; discussion 628.
- (2) Chappell et al. (2004) *Hum Mutat.* 24(6): 535-6.
- (3) Strange C, et al. (2006) *Respiration* 73(2):185-90
- (4) Abboud RT, et al. (2005) *Treat Respir Med.* 4(1): 1-8.
- (5) Kok, KF et al. (2005) *Ned Tijdschr Geneeskd.* Sep 10; 149(37): 2057-61.
- (6) Teramoto, S (2007) *Intern Med.* 46(2): 77-9

## Related Products

- EA5101-1 AssayMax Human Alpha1-Antitrypsin ELISA Kit (Urine & Cell Culture Samples)

Version 1.5