



AssayMax Human Alpha1-Antitrypsin ELISA Kit

Catalog No. EA5101-1

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 controls tissue degradation. A reduction of A1AT levels can cause a change in collagen metabolism (1). A1AT inhibits 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), and chronic obstructive pulmonary disease (COPD) (6).

Principal of the Assay

The AssayMax Human A1AT ELISA kit is designed for detection of A1AT in human urine, milk, saliva, and cell culture supernatants. This assay employs a quantitative sandwich enzyme immunoassay technique that measures A1AT in 4 hours. A polyclonal antibody specific for A1AT has been pre-coated onto a microplate. A1AT in standards and samples is sandwiched by the immobilized antibody and a biotinylated polyclonal antibody specific for A1AT, 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

- **Prepare all reagents (working diluent buffer, wash buffer, standards, biotinylated-antibody, and SP conjugate) as instructed, prior to running the assay.**
- **Prepare all samples prior to running the assay. The dilution factors for the samples are suggested in this protocol. However, the user should determine the optimal dilution factor.**
- **Spin down the SP conjugate vial and the biotinylated-antibody vial before opening and using contents.**
- 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 (400 ng, lyophilized).
- **Biotinylated A1AT Antibody (100x):** A 100-fold biotinylated polyclonal antibody against human A1AT (80 µl).

- **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, 2 bottles).
- **Streptavidin-Peroxidase Conjugate (SP Conjugate):** A 100-fold concentrate (80 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 components of the kit at 2-8⁰C or -20⁰C upon arrival up to the expiration date.
- Store SP Conjugate and Biotinylated Antibody at -20⁰C
- Store Microplate, Diluent Concentrate (10x), Wash Buffer, Stop Solution, and Chromogen Substrate at 2-8⁰C
- Opened unused microplate wells may be returned to the foil pouch with the desiccant packs. Reseal along zip-seal. May be stored for up to 1 month in a vacuum desiccator.
- Diluent (1x) may be stored for up to 1 month at 2-8⁰C.
- Store Standard at 2-8⁰C before reconstituting with Diluent and at -20⁰C after reconstituting with Diluent.

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

- **Cell Culture Supernatants:** Centrifuge cell culture media at 2000 x g for 10 minutes to remove debris. Collect supernatants and assay. Store the remaining samples at -20⁰C or below. Avoid repeated freeze-thaw cycles.
- **Urine:** Collect urine using sample tube. Centrifuge samples at 600 x g for 10 minutes and assay. Urine dilution is suggested at 1:20 in MIX Diluent; however, the user should determine the optimal dilution factor. Store samples at -20⁰C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Milk:** Collect milk using sample tube. Centrifuge samples at 600 x g for 10 minutes and assay. Dilute samples 1:2000 into MIX Diluent. Store samples at -20⁰C or below for up to 3 months. Avoid repeated freeze-thaw cycles.
- **Saliva:** Collect saliva using sample tube. Centrifuge samples at 600 x g for 10 minutes and assay. Dilute samples 1:400 into MIX 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.
- **MIX Diluent Concentrate (10x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. Dilute the MIX Diluent 1:10 with reagent grade water. Store for up to 1 month at 2-8⁰C.
- **Standard Curve:** Reconstitute the 400 ng of A1AT Standard with 4 ml of MIX Diluent to generate a solution of 100 ng/ml. Allow the standard to sit for 10 minutes with gentle agitation prior to making dilutions. Prepare duplicate or triplicate standard points by serially diluting the standard solution (100 ng/ml) 1:4 with MIX Diluent to produce 25, 6.25, 1.56 and 0.39 ng/ml

solutions. MIX Diluent serves as the zero standard (0 ng/ml). Any remaining solution should be frozen at -20°C.

| Standard Point | Dilution | [A1AT] (ng/ml) |
|----------------|---------------------------------|----------------|
| P1 | Standard Stock (100 ng/ml) | 100.00 |
| P2 | 1 part P1 + 3 parts MIX Diluent | 25.00 |
| P3 | 1 part P2 + 3 parts MIX Diluent | 6.25 |
| P4 | 1 part P3 + 3 parts MIX Diluent | 1.56 |
| P5 | 1 part P4 + 3 parts MIX Diluent | 0.39 |
| P6 | MIX Diluent | 0.00 |

- **Biotinylated A1AT Antibody (100x):** Spin down the antibody briefly and dilute the desired amount of the antibody 1:100 with MIX Diluent. Any remaining solution should be frozen at -20°C.
- **Wash Buffer Concentrate (20x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. 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°C.

Assay Procedure

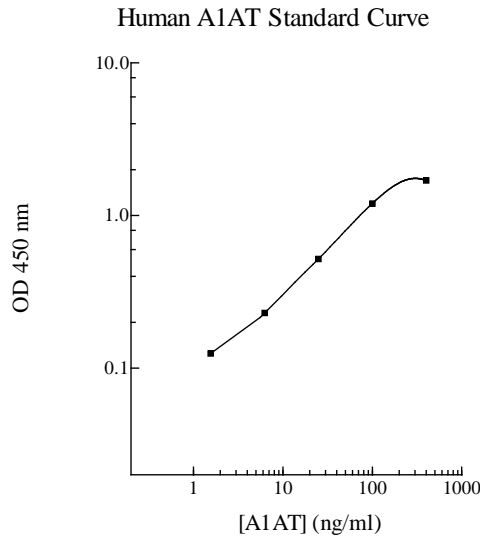
- Prepare all reagents, working standards and samples as instructed. Bring all reagents to room temperature before use. The assay is performed at room temperature (20-30°C).
- Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccant inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.
- Add 50 µl of 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 manually. Invert the plate each time and decant the contents; hit it 4-5 times on absorbent paper towel to completely remove the liquid. If using a machine wash six times with 300 µl of Wash Buffer and then invert the plate, decant the contents; hit it 4-5 times on absorbent paper towel to completely remove the liquid.
- Add 50 µl of Biotinylated A1AT Antibody to each well and incubate for one hour.
- Wash the microplate as described above.
- Add 50 µl of Streptavidin-Peroxidase Conjugate per well and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.
- Wash the microplate as described above.
- Add 50 µl of Chromogen Substrate per well and incubate for about 10 minutes or till the optimal blue color density develops. Gently tap the 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**. 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 high concentration points after stopping the reaction for about 10 minutes, which will reduce the readings.

Data Analysis

- Calculate the mean value of the duplicate or 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 four-parameter or log-log 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.



Sensitivity and Specificity

- The minimum detectable dose of A1AT is typically 0.39 ng/ml.
- Intra-assay and inter-assay coefficients of variation were 4.7% and 7.1% respectively.

Linearity

| | Average Percentage of Expected Value |
|------------------------|--------------------------------------|
| Sample Dilution | Urine |
| 1:10 | 91% |
| 1:20 | 96% |
| 1:40 | 104% |

| | Average Percentage of Expected Value |
|------------------------|--------------------------------------|
| Sample Dilution | Milk |
| 1:1000 | 89% |
| 1:2000 | 97% |
| 1:4000 | 103% |

| | Average Percentage of Expected Value |
|------------------------|---|
| Sample Dilution | Saliva |
| 1:200 | 88% |
| 1:400 | 99% |
| 1:800 | 101% |

Recovery

| | |
|-----------------------------|-------------|
| Standard Added Value | 0.5 – 50 ng |
| Recovery % | 81-114 % |
| Average Recovery % | 98 % |

Cross-Reactivity

| Species | % Cross Reactivity |
|----------------|--|
| Monkey | < 5 (Suggest dilution 1:10 for plasma) |
| Mouse | None |
| Rat | < 0.1 |
| Swine | < 1 |
| Canine | < 0.1 |
| Bovine | < 0.05 |

- If cell culture supernatants contains 10% FBS, the minimum detectable dose of human A1AT will be 2 ng/ml.

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.* 149(37):2057-61.
- (6) Teramoto S (2007) *Intern Med.* 46(2):77-9.

Version 1.7

Related Products

- EA5001-1 AssayMax Human Alpha1-Antitripsin ELISA Kit (Plasma and Serum Samples)