



AssayMax Human Tumor Necrosis Factor alpha (TNF-alpha) ELISA Kit

Catalog No. ET2010-1

Introduction

Tumor necrosis factor alpha (TNF-alpha) is a potent cytokine with a myriad of innate immune anti-tumor properties. TNF-alpha has a critical role in the bone and cartilage damage associated with rheumatoid arthritis (RA)[1]. TNF-alpha may be involved in the pathogenesis and/or progression of gestational diabetes mellitus (GDM) [2]. TNF-alpha is expressed in myocardium during compensated pressure-overload hypertrophy and contributes to postischemic myocardial dysfunction [3]. The serum levels of TNF-alpha were also significantly elevated in active WG (Wegener's granulomatosis) [4], in the late stages of HIV-associated disease [5], and in the spinal cord of arthritic patients [6].

Principal of the Assay

The AssayMax Human TNF-alpha ELISA kit is designed for detection of TNF-alpha in human plasma, serum or cell culture supernatants. This assay employs a quantitative sandwich enzyme immunoassay technique that measures TNF-alpha in less than 5 hours. A murine monoclonal antibody specific for human TNF-alpha has been pre-coated onto a microplate. TNF-alpha in standards and samples is sandwiched by the immobilized antibody and a biotinylated polyclonal antibody specific for human TNF-alpha, 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

- **TNF-alpha Microplate:** A 96-well polystyrene microplate (12 strips of 8 wells) coated with a murine monoclonal antibody against TNF-alpha.
- **Sealing Tapes:** Each kit contains 3 pre-cut, pressure-sensitive sealing tapes that can be cut to fit the format of the individual assay.
- **TNF-alpha Standard:** Human TNF-alpha in a buffered protein base (2 ng, lyophilized).
- **Biotinylated TNF-alpha Antibody (50x):** A 50-fold concentrated biotinylated polyclonal antibody against TNF-alpha (140 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, 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. The undiluted samples can be stored at -20⁰C or below for up to 3 months. Avoid repeated freeze-thaw cycles. (EDTA or Heparin can also be used as anticoagulant.)
- **Serum** 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. The undiluted samples can be stored 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. The samples can be stored at -20⁰C or below. 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 Concentrate 1:10 with reagent grade water. Store for up to 1 month at 2-8⁰C.
- **Standard Curve:** Reconstitute the 2 ng of human TNF-alpha Standard with 2 ml of MIX Diluent to generate a stock solution of 1 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 TNF-alpha standard solution with equal volume MIX Diluent to produce 0.5, 0.25, 0.125, 0.0625, 0.0313, and 0.0156 ng/ml. MIX Diluent serves as the zero standard (0 ng/ml). Any remaining solution should be frozen at -20⁰C.

Standard Point	Dilution	[TNF-alpha] (ng/ml)
P1	Standard (1 ng/ml)	1.0000
P2	1 part P1 + 1 part MIX Diluent	0.5000
P3	1 part P2 + 1 part MIX Diluent	0.2500
P4	1 part P3 + 1 part MIX Diluent	0.1250
P5	1 part P4 + 1 part MIX Diluent	0.0625
P6	1 part P5 + 1 part MIX Diluent	0.0313
P7	1 part P6 + 1 part MIX Diluent	0.0156
P8	MIX Diluent	0.0000

- **Biotinylated TNF-alpha Antibody (50x):** Spin down the antibody briefly and dilute the desired amount of the antibody 1:50 with MIX Diluent. Any remaining solution should be frozen at -20⁰C.
- **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 -20⁰C.

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 (20-30⁰C).
- 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 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 TNF-alpha Antibody to each well and incubate for two hours.
- Wash the microplate as described above.

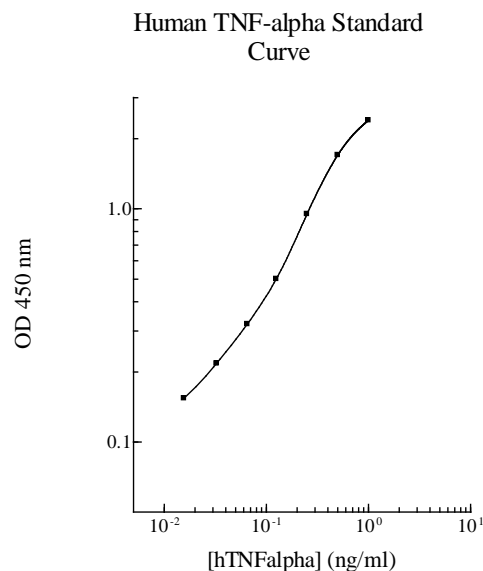
- Add 50 μ l of Streptavidin-Peroxidase Conjugate per well and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.
- Wash the microplate as described above.
- Add 50 μ l of Chromogen Substrate per well and incubate for approximately 20 minutes or till the optimal blue color density develops. Gently tap the plate to ensure thorough mixing and break the bubbles in the well with pipette tip.
- Add 50 μ 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**. 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 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 TNF-alpha is typically \sim 0.015 ng/ml.
- Intra-assay and inter-assay coefficients of variation were 4.8 % and 7.1 % respectively.
- This assay recognizes both natural and recombinant human TNF-alpha.

Linearity

Sample Dilution	Average Percentage of Expected Value	
	Plasma	Serum
No Dilution	101%	101%
1:2	99%	99%
1:4	102%	102%

Recovery

Standard Added Value	0.03 – 0.3 ng/ml
Recovery %	84-110 %
Average Recovery %	98 %

Cross-Reactivity

Species	% Cross Reactivity
Canine	None
Mouse	None
Rat	None
Swine	None
Rabbit	None
Bovine	None
Monkey	40 %

References

- (1) Taylor PC. (2001) *Mol. Biotechnol.* 19(2): 153-68
- (2) Coughlan MT *et al.* (2001) *Diabet. Med.* 18(11): 921-7
- (3) Stamm C *et al.* (2001) *Circulation* 104(12 Suppl 1): I350-5
- (4) Ohta N *et al.* (2001) *Auris. Nasus. Larynx.* 28(4): 311-4
- (5) Caso G *et al.* (2001) *Clin. Sci. (Lond)* 101(6): 583-9
- (6) Nanki T *et al.* (2001) *J. Immunol.* 167(9): 5381-5

Version 3.8

Related products

- EMT2010-1 AssayMax Mouse TNF-alpha ELISA Kit (Plasma, Serum, Cell Culture Supernatants samples)
- ERT2010-1 AssayMax Rat TNF-alpha (Cell Culture Supernatants sample)