

# **ab108912 – Human TGF beta 1 ELISA Kit**

## Instructions for Use

For the quantitative measurement of Human TGF beta 1 in cell culture supernatants.

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

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## 1. BACKGROUND

Abcam's TGF beta 1 Human *in vitro* ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for the quantitative measurement of TGF beta 1 concentrations in cell culture supernatants.

A TGF beta 1 specific antibody has been precoated onto 96-well plates and blocked. Standards or test samples are added to the wells and subsequently a TGF beta 1 specific biotinylated detection antibody is added and then followed by washing with wash buffer. Streptavidin-Peroxidase Conjugate 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 directly proportional to the amount of TGF beta 1 captured in plate. This assay recognizes both natural and recombinant Human TGF beta 1.

Transforming growth factor- $\beta$ 1 (TGF beta 1) is one of the transforming growth factor beta (TGF- $\beta$ ) family cytokines and exerts pleiotropic effects upon a wide variety of cell types. TGF beta 1 has been demonstrated to be of fundamental importance in the development, physiology, and pathology of the vascular system. It is known to maintain a balance between apoptosis and cellular dysfunction. Over-expression of TGF beta 1 is the cellular change associated with abnormal extracellular matrix deposition in nodular glomerulosclerosis and may be a pathogenetic mechanism in tumor progression. High serum levels of TGF beta 1 probably mirror an anti-inflammatory response, which might play a role in controlling the systemic immune response.

## 2. ASSAY SUMMARY

### Primary capture antibody



Prepare all reagents, samples and standards as instructed.

### Sample



Add standard or sample to each well used. Incubate at room temperature.

### Primary detector antibody



Wash and add prepared biotin antibody to each well. Incubate at room temperature.

### Streptavidin Label



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

### Substrate **Colored product**



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.

Modifications to the kit components or procedures may result in loss of performance.

## 4. STORAGE AND STABILITY

Store kit at 4°C immediately upon receipt, apart from the Standard, SP Conjugate & Biotinylated Antibody, which should be stored at -20°C.

Refer to list of materials supplied for storage conditions of individual components. Observe the storage conditions for individual prepared components in sections 9 & 10.

## 5. MATERIALS SUPPLIED

Item	Amount	Storage Condition (Before Preparation)
TGF beta 1 Microplate (12 x 8 well strips)	96 wells	4°C
TGF beta 1 Standard	1 vial	-20°C
10X Diluent M Concentrate	30 mL	4°C
Biotinylated Human TGF beta 1 Antibody	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	2 x 30 mL	4°C
Sealing Tapes	3	N/A
Standard Diluent	2 mL	4°C

### **6. MATERIALS REQUIRED, NOT SUPPLIED**

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

- 1 Microplate reader capable of measuring absorbance at 450 nm.
- Precision pipettes to deliver 1  $\mu$ L 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.
- 8 tubes to prepare standard or sample dilutions.
- PBS
- 0.5 M EDTA
- Centrifuge
- Lysis Buffer (10 mM Tris pH 8.0, 130 mM NaCl, 1% Triton X-100, protease inhibitor cocktail).

### **7. LIMITATIONS**

- Do not mix or substitute reagents or materials from other kit lots or vendors.

### 8. TECHNICAL HINTS

- 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.
- Complete removal of all solutions and buffers during wash steps.
- **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.**

## 9. REAGENT PREPARATION

Equilibrate all reagents to room temperature (18-25°C) prior to use. Prepare fresh reagents immediately prior to use. When diluting concentrates, 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.

### 9.1 1X Diluent M

Dilute the 10X Diluent M Concentrate 1:10 with reagent grade water. Mix gently and thoroughly. *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. Mix gently and thoroughly.

### 9.3 1X Biotinylated TGF beta 1 Detector Antibody

9.3.1 The stock Biotinylated TGF beta 1 Antibody must be diluted with 1X Diluent M according to the label concentration to prepare 1X Biotinylated TGF beta 1 Antibody for use in the assay procedure. Observe the label for the “X” concentration on the vial of Biotinylated TGF beta 1 Antibody.

9.3.2 Calculate the necessary amount of 1X Diluent M to dilute the Biotinylated TGF beta 1 Antibody to prepare a 1X Biotinylated TGF beta 1 Antibody solution for use in the assay procedure according to how many wells you wish to use and the following calculation:

Number of Wells Strips	Number of Wells	(V <sub>T</sub> ) Total Volume of 1X Biotinylated Antibody (μL)
4	32	1,760
6	48	2,640
8	64	3,520
10	80	4,400
12	96	5,280

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

## ASSAY PREPARATION

### Where:

$C_S$  = Starting concentration (X) of stock Biotinylated TGF beta 1 Antibody (variable)

$C_F$  = Final concentration (always = 1X) of 1X Biotinylated TGF beta 1 Antibody solution for the assay procedure

$V_T$  = Total required volume of 1X Biotinylated TGF beta 1 Antibody solution for the assay procedure

$V_A$  = Total volume of (X) stock Biotinylated TGF beta 1 Antibody

$V_D$  = Total volume of 1X Diluent M required to dilute (X) stock Biotinylated TGF beta 1 Antibody to prepare 1X Biotinylated TGF beta 1 solution for assay procedures

Calculate the volume of (X) stock Biotinylated Antibody required for the given number of desired wells:

$$(C_F / C_S) \times V_T = V_A$$

Calculate the final volume of 1X Diluent M required to prepare the 1X Biotinylated TGF beta 1 Antibody:

$$V_T - V_A = V_D$$

### Example:

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

$C_S$  = 50X Biotinylated TGF beta 1 Antibody stock

$C_F$  = 1X Biotinylated TGF beta 1 Antibody solution for use in the assay procedure

$V_T$  = 3,520  $\mu$ L (8 well strips or 64 wells)

$$(1X/50X) \times 3,520 \mu\text{L} = 70.4 \mu\text{L}$$

$$3,520 \mu\text{L} - 70.4 \mu\text{L} = 3,449.6 \mu\text{L}$$

$V_A$  = 70.4  $\mu$ L total volume of (X) stock Biotinylated TGF beta 1 Antibody required

$V_D$  = 3,449.6  $\mu$ L total volume of 1X Diluent M required to dilute the 50X stock Biotinylated Antibody to prepare 1X Biotinylated TGF beta 1 Antibody solution for assay procedures

9.3.3 First spin the Biotinylated TGF beta 1 Antibody vial to collect the contents at the bottom.

9.3.4 Add calculated amount  $V_A$  of stock Biotinylated TGF beta 1 Antibody to the calculated amount  $V_D$  of 1X Diluent M. Mix gently and thoroughly.

### 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 M.

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

## 10. STANDARD PREPARATIONS

- Prepare serially diluted standards immediately prior to use. 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.
- This procedure prepares sufficient standard dilutions for duplicate wells.

10.1 Reconstitution of the TGF beta 1 Standard vial to prepare the 8 ng/mL TGF beta 1 **Stock Standard**:

10.1.1 First consult the TGF beta 1 Standard vial to determine the mass of protein in the vial.

10.1.2 Calculate the appropriate volume of Standard Diluent to add when resuspending the TGF beta 1 Standard vial to produce a 8 ng/mL TGF beta 1 **Stock Standard** by using the following equation:

$C_S$  = Starting mass of TGF beta 1 Standard (see vial label) (ng)

$C_F$  = 8 ng/mL TGF beta 1 **Stock Standard** final required concentration

$V_D$  = Required volume of Standard Diluent for reconstitution ( $\mu$ L)

## ASSAY PREPARATION

Calculate total required volume Standard Diluent 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.**

$C_S$  = 8 ng of TGF beta 1 standard in vial

$C_F$  = 8 ng/mL TGF beta 1 **Stock Standard** final concentration

$V_D$  = Required volume of Standard Diluent for reconstitution

$$(8 \text{ ng} / 8 \text{ ng/mL}) \times 1,000 = 1,000 \text{ } \mu\text{L}$$

- 10.1.3 First briefly spin the TGF beta 1 Standard Vial to collect the contents on the bottom of the tube.
- 10.1.4 Reconstitute the TGF beta 1 Standard vial by adding the appropriate calculated amount  $V_D$  of Standard Diluent to the vial to generate the 8 ng/mL TGF beta 1 **Stock Standard**. Mix gently and thoroughly.
- 10.1.5 Dilute the **Stock Standard** 2 fold with 1 X Diluent M to make a 4 ng/mL TGF beta 1 **Standard #1**
- 10.2 Allow the reconstituted 4 ng/mL TGF beta 1 **Standard #1** to sit for 10 minutes with gentle agitation prior to making subsequent dilutions
- 10.3 Label seven tubes #2 – 8.
- 10.4 Add 120  $\mu\text{L}$  of 1X Diluent M to tube #2 – 8.
- 10.5 To prepare **Standard #2**, add 120  $\mu\text{L}$  of the **Standard #1** into tube #2 and mix gently.
- 10.6 To prepare **Standard #3**, add 120  $\mu\text{L}$  of the **Standard #2** into tube #3 and mix gently.
- 10.7 Using the table below as a guide, prepare subsequent serial dilutions.

# ASSAY PREPARATION

10.8 1X Diluent M serves as the zero standard, 0 ng/mL (tube #8).

**Standard Dilution Preparation Table**

Standard #	Volume to Dilute ( $\mu\text{L}$ )	Volume Diluent M ( $\mu\text{L}$ )	Total Volume ( $\mu\text{L}$ )	Starting Conc. (ng/mL)	Final Conc. (ng/mL)
1	Step 10.1				4.000
2	120	120	240	4.000	2.000
3	120	120	240	2.000	1.000
4	120	120	240	1.000	0.500
5	120	120	240	0.500	0.250
6	120	120	240	0.250	0.125
7	120	120	240	0.125	0.063
8	-	120	120	-	0



## **11. SAMPLE PREPARATION**

### **11.1 Cell Culture Supernatants**

Centrifuge cell culture media at 1500 rpm for 10 minutes to remove debris and collect supernatants. If necessary, dilute samples into 1X Diluent M; user should determine optimal dilution factor depending on application needs. Store undiluted samples at -80°C. Avoid repeated freeze-thaw cycles.

## **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 (18 - 25°C) prior to use.**
- **It is recommended to assay all standards, controls and samples in duplicate.**

- 13.1 Prepare all reagents, working standards and samples as instructed.
- 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 50  $\mu$ L of TGF beta 1 standard or sample to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for two hours. Start the timer after the last sample addition.
- 13.4 Wash five times with 200  $\mu$ L 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  $\mu$ L 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  $\mu$ L of 1X Biotinylated TGF beta 1 Antibody to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for two hours.
- 13.6 Wash microplate as described above.
- 13.7 Add 50  $\mu$ L 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 a sealing tape and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.

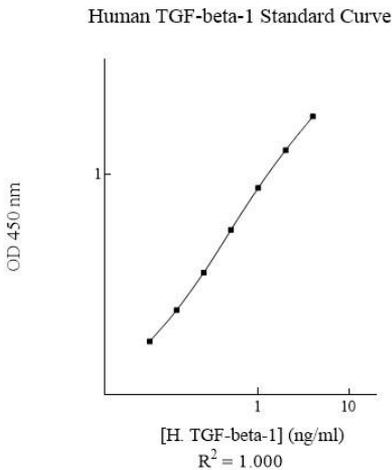
- 13.8 Wash microplate as described above.
- 13.9 Add 50  $\mu\text{L}$  of Chromogen Substrate to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Incubate in ambient light for about 25 minutes or until the optimal blue colour density develops.
- 13.10 Add 50  $\mu\text{L}$  of Stop Solution to each well. The color will change from blue to yellow. Gently tap plate to ensure thorough mixing. Break any bubbles that may have formed.
- 13.11 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.

## 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.



## 16. TYPICAL SAMPLE VALUES

### SENSITIVITY –

The minimum detectable dose of TGF beta 1 is typically ~ 31 pg/mL.

### PRECISION –

	<b>Intra- Assay</b>	<b>Inter- Assay</b>
% CV	6.5	10.9

### SPIKING RECOVERY –

Recovery was determined by spiking one reference control sample with different TGF-beta-1 concentrations.

Sample	Unspiked Sample (ng/ml)	Spiking Value (ng/ml)	Expected	Observed	Recovery (%)
1	0.092	1.885	1.977	2.101	106
		0.498	0.590	0.653	111
		0.122	0.214	0.228	107
<b>Average Recovery (%)</b>					<b>108</b>

## 17. ASSAY SPECIFICITY

This assay recognizes both natural and recombinant Human TGF beta 1.

This kit detects TGF beta 1 in Human samples. Other species have not yet been tested with this kit.

Please contact our Technical Support team for more information.



## 18. TROUBLESHOOTING

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
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
Large CV	Bubbles in wells	Ensure no bubbles present prior to reading plate
	All wells not washed equally/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)

## RESOURCES

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
High background/ Low sensitivity	Wells are insufficiently washed	Wash wells as per protocol recommendations
	Contaminated wash buffer	Make fresh wash buffer
	Waiting too long to read plate after adding STOP solution	Read plate immediately after adding STOP solution
	Improper storage of ELISA kit	Store all reagents as recommended. Please note all reagents may not have identical storage requirements.
	Using incompatible sample type (e.g. Serum vs. cell extract)	Detection may be reduced or absent in untested sample types

## **Technical Support**

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