

## Calculation of Results

Calculate the mean absorbance for each set of duplicate standards, controls and samples. Subtract the mean zero standard absorbance from each.

Plot the standard curve on log-log graph paper, with TGF-β1 concentration on the x-axis and absorbance on the y-axis. Draw the best fit curve through the standard points.

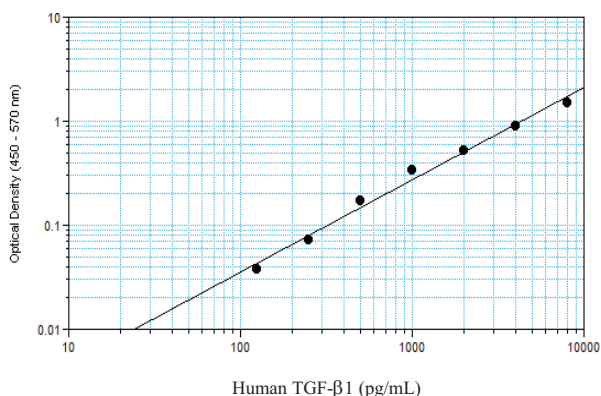
To determine the TGF-β1 concentration of the unknowns, find the unknown's mean absorbance value on the y-axis and draw a horizontal line to the standard curve. At the point of intersection, draw a vertical line to the x-axis and read the TGF-β1 concentration. If samples were diluted, multiply the TGF-β1 concentration by the dilution factor.

Computer data reduction may also be employed, utilizing log-log regression analysis.

## Typical Standard Curve

This standard curve is for demonstration only. A standard curve must be run with each assay.

BD OptEIA™ Human TGF-β1 Set



## Specificity

**Cross Reactivity:** The following factors were tested in the BD OptEIA™ assay at ≥ 10 ng/mL and no cross-reactivity (value ≥ 4 pg/mL) was identified.

### Recombinant Human

IL-1α, IL-1β, IL-2, IL-3, IL-4, IL-5, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12 (p40), IL-12 (p70), IL-13, IL-15, G-CSF, GM-CSF, IFN-γ, CD23, Lymphotactin, MIP-1α, MIP-1β, MCP-2, NT-3, PDGF-AA, SCF, TNF, LT-α (TNF-β), VEGF

### Recombinant Mouse

IL-1β, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-9, IL-10, IL-12 (p70), IL-15, IFN-γ, GM-CSF, TCA3, TNF

### Recombinant Rat

IL-2, IL-4, IL-10, GM-CSF, IFN-γ, TNF

### Other:

Viral IL-10 (1 ng/mL), Rabbit TNF

## Standardization

This immunoassay is calibrated against human TGF-β1.

## Assay Optimization

- BD OptEIA™ Sets allow flexible assay design to fit individual laboratory needs. To design an immunoassay with different sensitivity and dynamic range, the following parameters can be varied: Capture, Detection Antibody titers, incubation time, incubation temperature, Assay Diluent formulation, Buffer pH, ionic strength, protein concentration, type of substrate, washing technique (i.e., number of wash repetitions and soak times).
- “Typical Standard Curve” and 20-plate yield were obtained in the BD Biosciences Pharmingen laboratory, using the recommended procedure and manual plate washing.

## Troubleshooting

### Poor Precision

#### Possible Source

- Inadequate washing/ aspiration of wells
- Inadequate mixing of reagents
- Imprecise/ inaccurate pipetting
- Incomplete sealing of plate

#### Corrective Action

- Check function of washing system
- Ensure adequate mixing
- Check/ calibrate pipettes
- Ensure complete seal on plate

### Poor Standard Curve

#### Possible Source

- Improper standard handling/ dilution

#### Corrective Action

- Ensure correct preparation, storage of standards
- Check function of washing system
- Check/ calibrate pipettes
- Check buffer/ diluent preparation, pH

- Incomplete washing/ aspiration of wells
- Imprecise/ inaccurate pipetting
- Improper buffer/ diluent used

### Low Absorbances

#### Possible Source

- Inadequate reagent volumes added to wells
- Incorrect incubation times/ temperature

#### Corrective Action

- Check/ calibrate pipettes
- Ensure sufficient incubation times/reagents warmed to RT
- Check Capture Ab and Working Detector preparation
- Check buffer/ diluent preparation, pH
- Utilize manual washing

- Incorrect antibody titration

- Improper buffer/ diluent used

- Overly high wash/aspiration pressure from automated plate-washer

### High Background

#### Possible Source

- Insufficient blocking

#### Corrective Action

- Check assay diluent preparation, pH
- Extend incubation time of blocking step

## Limitations of the Procedure

- Samples that generate absorbance values higher than the standard curve should be diluted with Standard Diluent and re-assayed.
- Interference by drug metabolites, soluble receptors, or other binding proteins in specimens has not been thoroughly investigated. The possibility of interference cannot be excluded.
- BD OptEIA™ Sets are intended for use as an integral unit. Do not mix reagents from different Set batches. Reagents from other manufacturers are not recommended for use in this Set.

## Technical Data Sheet

### Human TGF-β1 ELISA Set

Cat. No. 559119

### Materials Provided

The OptEIA™ Set for human transforming growth factor beta1 (TGF-β1) contains the components necessary to develop enzyme-linked immunosorbent assays (ELISA) for natural or recombinant human TGF-β1 in serum, plasma, and cell culture supernatants. Sufficient materials are provided to yield approximately 20 plates of 96-wells if the recommended storage, materials, buffer preparation, and assay procedure are followed as specified in this package.

### Capture Antibody

Anti-Human TGF-β1 monoclonal antibody

### Detection Antibody

Biotinylated Anti-Human TGF-β1 monoclonal antibody

### Enzyme Reagent

Streptavidin-horseradish peroxidase conjugate (SAv-HRP)

### Standards

Human TGF-β1, lyophilized

### Instruction / Analysis Certificate

(lot-specific)

### United States

877.232.8995

### Canada

866.979.9408

### Europe

32.2.400.98.95

### Japan

0120.8555.90

### Asia/Pacific

65.6861.0633

### Latin America/Caribbean

55.11.5185.9995

Toll Free 0800.771.71.57



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## Recommended buffers, solutions

*Note: Do not use sodium azide in these preparations. Sodium azide inactivates the horseradish peroxidase enzyme.*

The BD OptEIA™ Reagent Set B (Cat. No. 550534) containing Coating Buffer, Assay Diluent, Substrate Reagents A and B, Stop Solution and 20X Wash Buffer Concentrate is recommended.

- 1. Coating Buffer** - 0.1 M Sodium Carbonate, pH 9.5  
7.13 g NaHCO<sub>3</sub>, 1.59 g Na<sub>2</sub>CO<sub>3</sub>; q.s. to 1.0 L; pH to 9.5 with 10N NaOH.  
Freshly prepare or use within 7 days of preparation, stored at 2-8°C.
- 2. Assay Diluent**- PBS\* with 10% FBS# or PBS\* with 1% BSA^.  
BD Pharmingen™ Assay Diluent (Cat. No. 555213) is recommended.  
\*Phosphate-Buffered Saline: 80.0 g NaCl, 11.6 g Na<sub>2</sub>HPO<sub>4</sub>, 2.0 g KH<sub>2</sub>PO<sub>4</sub>, 2.0 g KCL, q.s. to 10 L; pH to 7.0.  
#Fetal Bovine Serum: Hyclone Cat. No. SH30088 (heat-inactivated) recommended.  
^Bovine serum albumin: immunoassay grade or Fraction V. USB 10857 recommended  
Freshly prepare or use within 3 days of preparation, with 2-8°C storage.
- 3. Wash Buffer** - PBS\* with 0.05% Tween-20. Freshly prepare or use within 3 days of preparation, stored at 2-8°C.
- 4. Substrate Solution** - Tetramethylbenzidine (TMB) and Hydrogen Peroxide. The BD Pharmingen™ TMB Substrate Reagent Set (Cat. No. 555214) is recommended.
- 5. Stop Solution** - 1 M H<sub>3</sub>PO<sub>4</sub> or 2 N H<sub>2</sub>SO<sub>4</sub>

## Additional Materials Required

- 96-well Nunc-Immuno™ polystyrene Maxisorp ELISA flat bottom plates (ThermoFisher Scientific Cat. No. 442404) are recommended
- Microplate reader capable of measuring absorbance at 450 nm
- Precision pipettes
- Graduated cylinder, one liter
- Deionized or distilled water
- Wash bottle or automated washer
- Log-log graph paper or automated data reduction
- Tubes to prepare standard dilutions
- Laboratory timer
- Plate sealers or parafilm

## Storage Information

- Store unopened reagents at 2-8°C. Do not use reagents after expiration date, or if turbidity is evident.
- Before use, bring all reagents to room temperature (18-25°C). Immediately after use, return to proper storage conditions.
- Lyophilized standards are stable until expiration date. See below for reconstituted standard storage information.

## Specimen Collection and Handling

Specimens should be clear, non-hemolyzed and non-lipemic.

**Cell culture supernatants:** Remove any particulate material by centrifugation and assay immediately or store samples at ≤ -20°C. Avoid repeated freeze-thaw cycles.

**Serum:** Use a serum separator tube and allow samples to clot for 30 minutes, then centrifuge for 10 minutes at 1000 x g. Remove serum and assay immediately or store samples at ≤ -20° C. Avoid repeated freeze-thaw cycles.

**Plasma:** Collect plasma using citrate, EDTA, or heparin as anticoagulant. Centrifuge for 10 minutes at 1000 x g within 30 minutes of collection. Assay immediately or store samples at ≤ -20° C. Avoid repeated freeze-thaw cycles.

## Sample Activation Procedure

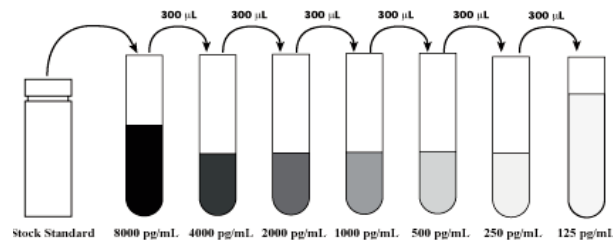
**Serum/Plasma:** Dilute 1:5 with PBS (20 µl specimen + 80 µl PBS), then add 1N HCl at 1:25 (4 µl to the above), incubate 60 minutes at 4 °C. Neutralize with 1N NaOH at 1:25 (4 µl to the above), test immediately or store at -80 °C until testing.

**Note:** Multiply the concentration read from the standard curve by the dilution factor 5.

**Cell Culture Supernatant:** Add 1N HCl at 1:25 (100 µl supernatant + 4 µl of 1N HCl), incubate 60 minutes at 4 °C. Neutralize with 1N NaOH at 1:25 (4 µl to the above), test immediately or store at -80 °C until testing.

## Standards Preparation and Handling

- 1. Reconstitution:** After warming lyophilized standard to room temperature, carefully open vial to avoid loss of material. Reconstitute lyophilized standard with 1.0 mL of deionized water to yield a stock standard. Allow the standard to equilibrate for at least 15 minutes before making dilutions. Vortex gently to mix.
- 2. Storage/ handling of reconstituted standard:** After reconstitution, immediately aliquot standard stock in polypropylene vials at 50 µl per vial and freeze at -80°C for up to 6 months. If necessary, store at 2-8° C for up to 8 hours prior to aliquotting/freezing. Do not leave reconstituted standard at room temperature.
- 3. Standards Preparation for Assay:**
  - Prepare a 8000 pg/mL standard from the stock standard. Vortex to mix. (See dilution instructions on Instruction/Analysis Certificate.)
  - Add 300 µL Assay Diluent to 6 tubes. Label as 4000 pg/mL, 2000 pg/mL, 1000 pg/mL, 500 pg/mL, 250 pg/mL, and 125 pg/mL.
  - Perform serial dilutions by adding 300 µL of each standard to the next tube and vortexing between each transfer. Assay Diluent serves as the zero standard (0 pg/mL).



Serial dilutions within the plate may also be performed by pipetting 100 µL of Assay Diluent into each standard well except the highest (8000 pg/mL), then adding 100 µL of the 8000 pg/mL standard to both that well and the 4000 pg/mL well, mixing the well contents by rinsing the pipette tip, and adding 100 µL of the 2000 pg/mL standard to the 1000 pg/mL well. Continue these dilutions to the 125 pg/mL standard well, out of which the extra 100 µL should be discarded.

## Working Detector Preparation

(Note: One-step incubation of Biotin/Streptavidin reagents.) Add required volume of Detection Antibody to Assay Diluent. Within 15 minutes prior to use, add required quantity of Enzyme Reagent, vortex or mix well. For recommended dilutions, see lot-specific Instruction/Analysis Certificate. For a full 96-well plate, prepare 12 mL of Working Detector. Discard any remaining Working Detector after use.

## Warnings and Precautions

- Reagents which contain preservatives may be toxic if ingested, inhaled, or in contact with skin.
- Handle all serum and plasma specimens in accordance with NCCLS guidelines for preventing transmission of blood-borne infections.
- Capture Antibody contains < 0.1% sodium azide. Sodium azide yields highly toxic hydrazoic acid under acidic conditions. Dilute azide compounds in running water before discarding to avoid accumulation of potentially explosive deposits in plumbing.
- Detection Antibody contains BSA and ProClin® -150 as a preservative.
- Enzyme Reagent contains BSA and ProClin® -150 as a preservative.
- Source of all serum proteins is from USDA inspected abattoirs located in the United States.
- This product contains material derived from human blood cells, which is potentially hazardous material. Use universal precautions when handling. Handle as if product were capable of transmitting disease. Material used in this product has been tested and found negative for antibody to Human Immunodeficiency Virus (HIV-1/HIV-2) and nonreactive for Hepatitis B Surface Antigen (HBsAg). However, no known test method can offer complete assurance that specimens of human origin will not transmit infectious disease. When handling or disposing, follow precautions described in CDC and FDA recommendations and OSHA Bloodborne Pathogen.

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- 8. Warning:** Recombinant Human TGF-β1 lyophilized standard (component 51-26346E) contains 0.02% (w/w), and Detection Antibody Biotin Anti-Human TGF-β1 (component 51-26342E) contains 0.002% (w/w) of a CMIT/MIT mixture (3:1), which is a mixture of: 5-chloro-2-methyl-4-isothiazolin-3-one [EC No 247-500-7] and 2-methyl-4-isothiazolin-3-one [EC No 220-239-6] (3:1).
9. Enzyme Reagent (Streptavidin-horseradish peroxidase conjugate (SAV-HRP)) contains the following preservatives: 1,2-benzisothiazol-3(2H)-one (CAS: 2634-33-5) and CMIT/MIT 3:1 (CAS: 55965-84-9), which is a mixture of 5-chloro-2-methyl-4-isothiazolin-3-one [EC No 247-500-7] and 2-methyl-4-isothiazolin-3-one [EC No 220-239-6] (3:1). The concentration of this material in the enzyme reagent is not classified as hazardous per GHS and CLP. Good chemical hygiene practices are recommended when handling any laboratory chemicals.

**Hazard statements:** May cause an allergic skin reaction.

**Precautionary statements:** Wear protective gloves / eye protection. Wear protective clothing. Avoid breathing mist/vapours/spray. If skin irritation or rash occurs: Get medical advice/attention. IF ON SKIN: Wash with plenty of water. Dispose of contents/container in accordance with local/regional/national/international regulations.

## Recommended Assay Procedure

- Coat microwells with 100 µL per well of Capture Antibody diluted in Coating Buffer. For recommended antibody coating dilution, see lot-specific Instruction/Analysis Certificate. Seal plate and incubate overnight at 4° C.
- Aspirate wells and wash 3 times with ≥ 300 µL/well Wash Buffer. After last wash, invert plate and blot on absorbent paper to remove any residual buffer.
- Block plates with ≥ 200 µL/well Assay Diluent. Incubate at RT for at least 1 hour. A longer incubation time is recommended to minimize non-specific binding.
- Aspirate/wash as in step 2.
- Prepare standard and sample dilutions in Assay Diluent. See “Standards Preparation and Handling”.
- Pipette 100 µL of each standard, sample, and control into appropriate wells. Seal plate and incubate for 2 hours at RT.
- Aspirate/ wash as in step 2, but with 5 total washes.
- Add 100 µL of Working Detector (Detection Antibody + Streptavidin-HRP reagent) to each well. Seal plate and incubate for 1 hour at RT.
- Aspirate/ wash as in step 2, but with 7 total washes. NOTE: In this final wash step, soak wells in wash buffer for 30 seconds to 1 minute for each wash.
- Add 100 µL of Substrate Solution to each well. Incubate plate (without plate sealer) for 30 minutes at room temperature in the dark.
- Add 50 µL of Stop Solution to each well.
- Read absorbance at 450 nm within 30 minutes of stopping reaction. If wavelength correction is available, subtract absorbance at 570 nm from absorbance 450 nm.

## Assay Procedure Summary

- Add 100 µL diluted Capture Ab to each well. Incubate overnight at 4°C.
- Aspirate and wash 3 times.
- Block plates: 200 µL Assay Diluent to each well. Incubate at least 1 hr RT. A longer incubation time is recommended to minimize non-specific binding.
- Aspirate and wash 3 times.
- Add 100 µL standard or sample to each well. Incubate 2 hr RT.
- Aspirate and wash 5 times.
- Add 100 µL Working Detector (Detection Ab + SAV-HRP) to each well. Incubate 1 hr RT
- Aspirate and wash 7 times (with 30 sec to 1 min soaks)
- Add 100 µL Substrate Solution to each well. Incubate 30 min RT in dark
- Add 50 µL Stop Solution to each well. Read at 450 nm within 30 min with λ correction 570 nm.