

BD OptEIA™

Mouse IL-6 ELISA Kit

Instruction Manual

Cat. No. 550950



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BD OptEIA™ ELISA Kits and Sets available from BD Biosciences – Pharmingen:

BD OptEIA ELISA Kits

Human	Cat. No.
C3a Kit	550499
C4a Kit	550947
C5a Kit II	557965
IFN- γ Kit II	550612
IL-1 β Kit II	557966
IL-2 Kit II	550611
IL-4 Kit II	550614
IL-6 Kit II	550799
IL-8 Kit II	550999
IL-10 Kit II	550613
IL-12 p40 Kit II	551116
IL-12 p70 Kit	559258
MCP-1 Kit	559017
TNF Kit II	550610

Mouse

IFN- γ Kit II	558258
IL-6 Kit	550950
TNF Kit II	559732

Rat

TNF Kit	550734
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BD OptEIA ELISA Sets

(Capture antibody, Detection antibody, Streptavidin-HRP, and Standard for 5 or 20 ELISA plates).

Human

Cleaved PARP (5 plate)	552592
Eotaxin	555175
GM-CSF	555126
IFN- γ	555142
IL-1 β Set II	557953
IL-2	555190
IL-2 sR α	559104
IL-3	558979
IL-4	555194
IL-5	555202
IL-6	555220
IL-8	555244
IL-10	555157
IL-12 p40	555171
IL-12 p70	555183
IL-15	559268
IP-10	550926
LT- α (TNF- β)	550995
MCP-1	555179

BD OptEIA ELISA Sets *continued*

Human	Cat. No.
MIG	550998
sFAS	555224
sICAM-1	551424
TGF- β 1	559119
TNF	555212
TNFR1	550996
TRAIL	550948

Mouse

GM-CSF	555167
IFN- γ	555138
IFN- γ (AN-18)	551866
IgE	555248
IgG2a	552576
IL-1 α	550347
IL-1 β	559603
IL-2	555148
IL-3	555228
IL-4	555232
IL-5	555236
IL-6	555240
IL-10	555252
IL-12 p40	555165
IL-12 p70	555256
MCP-1	555260
TNF (Mono/Mono)	555268
TNF (Mono/Poly)	558874

Rat

IFN- γ	558861
IL-4	555198
IL-6	550319
IL-10	555134
MCP-1	555130
TNF	558870

Monkey

IFN- γ	551492
IL-2	551494

BD ELISA Kits

Canine C-Reactive Protein (CRP)	557826
Rat C-Reactive Protein (CRP)	557825

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Introduction

Interleukin-6 (IL-6)¹⁻⁴ is a multifunctional cytokine which regulates immune responses, acute-phase reactions and hematopoiesis. It has also been called IFN- β 2, BSF-2, and HPGF. Reported cellular targets for IL-6 action are: hepatocytes, B and T lymphocytes, neurons, tumor cells and multi-potent hematopoietic cells. Mouse IL-6 is a 21.7 kD protein containing 187 amino acid residues.

The BD OptEIA™ Mouse IL-6 ELISA Kit is for the quantitative determination of mouse IL-6 in serum, plasma, and cell culture supernatant.

Principle of the Test

The BD OptEIA test is a solid phase sandwich ELISA (Enzyme-Linked Immunosorbent Assay). It utilizes a monoclonal antibody specific for IL-6 coated on a 96-well plate. Standards and samples are added to the wells, and any IL-6 present binds to the immobilized antibody. The wells are washed and streptavidin-horseradish peroxidase conjugate mixed with biotinylated anti-mouse IL-6 antibody is added, producing an antibody-antigen-antibody “sandwich”. The wells are again washed and TMB substrate solution is added, which produces a blue color in direct proportion to the amount of IL-6 present in the initial sample. The Stop Solution changes the color from blue to yellow, and the microwell absorbances are read at 450 nm.

Reagents Provided

Antibody Coated Wells:	2 plates of 96 breakable wells (12 strips \times 8 wells) coated with anti-mouse IL-6 monoclonal antibody
Detection Antibody:	30 ml of biotinylated anti-mouse IL-6 monoclonal antibody with 0.15% ProClin™-150 as preservative
Standards:	4 vials of lyophilized recombinant mouse IL-6
Enzyme Concentrate (250 \times):	150 μ l of 250 \times concentrated Streptavidin-horseradish peroxidase conjugate with BSA* and ProClin™-300 as preservative
Standard/Sample Diluent:	30 ml of animal serum* with 0.09% sodium azide as preservative
ELISA Diluent:	12 ml of a buffered protein base with 0.09% sodium azide as preservative
Wash Concentrate (20 \times):	100 ml of 20 \times concentrated detergent solution with ProClin™-150 as preservative
TMB One-Step Substrate Reagent:	30 ml of 3,3',5,5'-tetramethylbenzidine (TMB) in buffered solution
Stop Solution:	13 ml of 1M phosphoric acid
Plate Sealers:	4 sheets with adhesive backing

*Source of all serum proteins is from USDA inspected abattoirs located in the United States

Materials Required but not Provided

- Microplate reader capable of measuring absorbance at 450 nm
- Precision pipettes to deliver 50 μ l and 100 μ l volumes
- Adjustable 1 ml, 5 ml, 10 ml, 25 ml pipettes for reagent preparation
- Deionized or distilled water
- Wash bottle or automated microplate washer
- Log-log graph paper or computer and software for ELISA data analysis
- Tubes to prepare standard dilutions
- Laboratory timer
- Absorbent paper

Storage Information

1. Store kit at 2 – 8°C. Do not use kit after expiration date.
2. Before use, bring all reagents to room temperature (18 – 25°C). Immediately after use, return to proper storage conditions.
3. Lyophilized standards are stable until kit expiration date. After reconstitution, use freshly reconstituted standard within 12 hours (stored at 2 – 8°C).

Warnings and Precautions

1. Reagents that contain preservatives may be toxic if ingested, inhaled, or brought in contact with skin.
2. Avoid contact of skin, eyes, or clothing with Stop Solution or Substrate Reagents.
3. Handle all serum and plasma specimens in accordance with NCCLS guidelines for preventing transmission of blood-borne infections.
4. Standard/Sample Diluent and ELISA Diluent contain less than 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.
5. The Wash Concentrate contains 16% Sodium Chloride and is an irritant.
 - R36/37/38 Irritating to eyes, respiratory system and skin.
 - S7 Keep container tightly closed.
 - S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 - S36/37 Wear suitable protective clothing and gloves.
6. The Stop Solution contains 11.5% Phosphoric Acid and is a corrosive solution.
 - R34 Causes burns.
 - R36/38 Irritating to eyes and skin.
 - S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 - S37 Wear suitable gloves.
 - S45 In case of accident or if you feel unwell, seek medical advice immediately.
 - S60 This material and its container must be disposed of as hazardous waste.

Specimen Collection and Handling

Specimens should be clear, non-hemolyzed and non-lipemic. Samples with expected values higher than the top standard, 1000 pg/ml, should be diluted with Standard/Sample Diluent prior to running the assay.

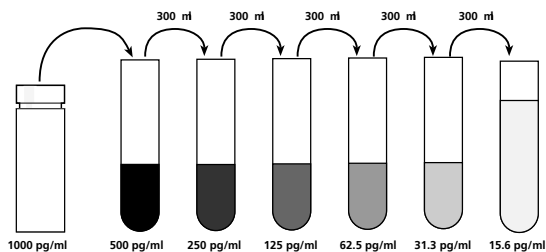
Cell culture supernatants: Remove any particulate material by centrifugation and assay immediately or store samples at $\leq -20^{\circ}\text{C}$. Avoid repeated freeze-thaw cycles.

Serum: Use a serum separator tube (eg, BD Vacutainer® Cat. No. 366430) and allow samples to clot for 30 minutes, then centrifuge for 10 minutes at $1000 \times g$. Remove serum and assay immediately or store samples at $\leq -20^{\circ}\text{C}$. Avoid repeated freeze-thaw cycles.

Plasma: Collect plasma using citrate, EDTA, or heparin as anticoagulant. Centrifuge for 10 minutes at $1000 \times g$ within 30 minutes of collection. Assay immediately or store samples at $\leq -20^{\circ}\text{C}$. Avoid repeated freeze-thaw cycles.

Reagent Preparation

1. Bring all reagents to room temperature (18 – 25°C) before use.
2. Standards
 - a. After warming to room temperature, carefully open vial to avoid loss of material. Reconstitute 1 vial lyophilized Standard with required volume (noted on vial label) of Standard/Sample Diluent to prepare a 1000 pg/ml stock standard. Allow the standard to equilibrate for at least 15 minutes before making dilutions. Gently vortex to mix.
 - b. Add 300 µl Standard/Sample Diluent to 6 tubes. Label as 500 pg/ml, 250 pg/ml, 125 pg/ml, 62.5 pg/ml, 31.3 pg/ml, and 15.6 pg/ml.
 - c. Perform serial dilutions by adding 300 µl of each standard to the next tube and vortexing between each transfer (see *figure* below). The undiluted standard serves as the high standard (1000 pg/ml). The Standard/Sample Diluent serves as the zero standard (0 pg/ml).



3. Working Detector

Note: One-step incubation of Biotin/Streptavidin reagents. See *Assay Procedure*, step 5.

4. Wash Buffer

Note: If the Wash Concentrate contains visible crystals, warm to room temperature and mix gently until dissolved. Dilute required quantity of 20× Wash Concentrate with deionized or distilled water, mix. (To prepare 2.0 L, add 100 ml Wash Concentrate to 1900 ml water. At least 500 ml solution should be prepared for a full 96-well plate).

5. TMB One-Step Substrate Reagent

No more than 15 minutes prior to use, add required volume of TMB One-Step Substrate Reagent to a clean tube or reservoir. To prevent contamination, pipette out from the tube/ reservoir instead of directly from bottle. Avoid prolonged exposure to light or contact with metal, air, or extreme temperature as color may develop.

Assay Procedure

1. Bring all reagents and samples to room temperature (18 – 25°C) prior to use. It is recommended that all standards and samples be run in duplicate. A standard curve is required in each assay run.
2. Remove required quantity of test strips/wells, place in well holder.
Note: Wells are provided in breakable 8-well strips. Strips may be “broken” into individual wells, replaced in well holder, and assayed. Return any unused wells to sealed pouch for 2 – 8°C storage.
3. Pipette 50 µl of ELISA Diluent into each well.
4. Pipette 50 µl of each standard (see **Reagent Preparation**, step 2) and sample into appropriate wells. Gently shake/tap the plate for 5 seconds to mix. Cover wells with Plate Sealer and incubate for 2 hours at room temperature.
5. Prepare Working Detector. Within 15 minutes prior to use, pipette required volume of Detection Antibody into a clean tube or flask. Add in required quantity of Enzyme Concentrate (250×), vortex or mix well. For a full 96-well plate, add 48 µl of Enzyme Concentrate into 12 ml of Detection Antibody.
6. Decant or aspirate contents of wells. Wash wells by filling with at least 300 µl/well prepared Wash Buffer (see **Reagent Preparation**, step 4), followed by decanting/aspirating. Repeat wash 4 times for a total of 5 washes. After the last wash, blot plate on absorbent paper to remove any residual buffer. Complete removal of liquid is required for proper performance.
7. Add 100 µl of prepared Working Detector (see **step 5** above) to each well. Cover wells with Plate Sealer and incubate for 1 hour at room temperature.
8. Wash wells as in Step 6, but a total of 7 times.
Note: In this final wash step, soak wells in wash buffer for 30 seconds to 1 minute for each wash. Thorough washing at this step is very important.
9. Add 100 µl of TMB One-Step Substrate Reagent to each well. Incubate plate (without Plate Sealer) for 30 minutes at room temperature in the dark.
10. Add 50 µl of Stop Solution to each well.
11. Read absorbance at 450 nm within 30 minutes of stopping reaction. If wavelength correction is available, subtract the optical density readings at 570 nm from readings at 450 nm.

Assay Procedure Summary

1. Add 50 μ l ELISA Diluent to each well.
2. Add 50 μ l standard or sample to each well.
Incubate 2 hours at room temperature.
3. Aspirate and wash 5 times.
4. Add 100 μ l prepared Working Detector to each well.
Incubate 1 hour at room temperature.
5. Aspirate and wash/soak 7 times.
6. Add 100 μ l TMB One-Step Substrate Reagent to each well.
Incubate 30 minutes at room temperature.
7. Add 50 μ l Stop Solution to each well.
Read at 450 nm within 30 minutes.
 λ correction 570 nm.

Calculation of Results

Calculate the mean absorbance for each set of duplicate standards, controls and samples. Subtract the mean zero standard absorbance (ie, plate background) from each.

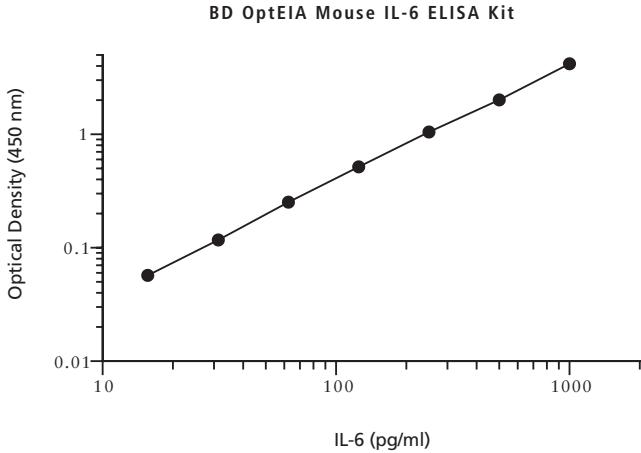
Plot the standard curve on log-log graph paper, with IL-6 concentration on the x-axis and absorbance on the y-axis. Draw the best fit straight line through the standard points.

To determine the IL-6 concentration of the unknowns, find the unknowns' 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 IL-6 concentration. If samples were diluted, multiply the interpolated IL-6 concentration by the dilution factor.

Computer-based curve-fitting statistical software may also be employed.

Typical Data

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



Concentration (pg/ml)	OD1	OD2	Mean	Zero Standard Subtracted
0	0.012	0.024	0.018	0.000
15.6	0.077	0.072	0.075	0.039
31.3	0.133	0.137	0.135	0.081
62.5	0.279	0.260	0.270	0.252
125	0.529	0.539	0.534	0.516
250	1.095	1.035	1.065	1.047
500	2.108	1.946	2.027	2.009
1000	4.200	4.200	4.200	4.182

Limitations of the Procedure

1. Interference by drug metabolites, soluble receptors, or other binding proteins in specimens has not been thoroughly investigated. The possibility of interference cannot be excluded.
2. This kit is intended for use as an integral unit. Do not mix reagents from different kit lots. Reagents from other manufacturers/other available antibody clones should not be used in this kit.

Performance

Limit of Detection

The minimum detectable dose of IL-6 was determined to be 3.8 pg/ml. This is defined as two standard deviations above the mean optical density of 20 replicates of the zero standard.

Recovery

Three different levels of IL-6 were spiked into serum and cell culture media samples. Results are compared with the same amounts of IL-6 spiked into Standard/Sample Diluent, as follows:

	Spike Concentration (pg/ml)	Average % Recovery	Range
Serum (n = 5)	500	110	98 - 116
	250	95	87 - 99
	125	84	80 - 86
Cell culture media (n = 3)	500	105	103 - 106
	250	104	101 - 106
	125	103	102 - 104

Linearity

Samples spiked with high concentrations of IL-6 were serially diluted with Standard/Sample Diluent and run in the BD OptEIA Mouse IL-6 Kit. Results are as follows:

Dilution		Serum (n = 5)	Cell culture media (n = 5)
1:2	Average % of Expected	97	104
	Range	90 - 104	102 - 105
1:4	Average % of Expected	93	109
	Range	86 - 101	106 - 110
1:8	Average % of Expected	87	111
	Range	79 - 96	108 - 111
1:16	Average % of Expected	80	113
	Range	73 - 88	110 - 116

Specificity

Cross Reactivity: The factors listed below were spiked in Standard Diluent at 10 ng/ml to test for any cross reactivity with the BD OptEIA Mouse IL-6 ELISA assay. No cross reactivity was identified.

Recombinant Human

IL-1 α , IL-1 β , IL-2, IL-3, IL-4, IL-5, IL-6, 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, Lymphotoctin, MIP-1 α , MIP-1 β , MCP-1, MCP-2, NT-3, PDGF-AA, SCF, TNF, Lt- α , VEGF

Recombinant Mouse

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

Recombinant Rat

IL-2, IL-4, IL-6, IL-10, GM-CSF, IFN- γ , TNF

Other

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

Precision

Intra-assay: Twenty-four replicates each of three different levels of IL-6 were tested in one plate. The following results were observed:

Number of replicates	24	24	24
Mean Concentration	487 pg/ml	253 pg/ml	133 pg/ml
SD	31.6	16.8	9.2
%CV	6.4	6.6	6.9

Inter-assay: Three different levels of IL-6 were tested in four different plates. The following results were observed:

Number of replicates	24	24	24
Mean Concentration	488 pg/ml	257 pg/ml	129.8 pg/ml
SD	19.6	15.3	12.5
%CV	4.0	5.9	9.6

Standardization

This immunoassay is calibrated against purified Baculovirus-expressed recombinant mouse IL-6 produced at BD Biosciences – Pharmingen.

The NIBSC/WHO mouse IL-6 reference standard 93/730 (recombinant mouse IL-6) was evaluated in this kit. The conversion factor for NIBSC material is as follows:

1 mg NIBSC 93/730 IL-6 = 0.12 mg BD OptEIA IL-6

Experimental Results

Serum: Sixteen mouse serum samples were evaluated in this assay. One sample measured 18 pg/ml. All other samples measured less than 15.6 pg/ml, the lowest standard in this assay

Cell culture supernatants:

BALB/c mouse splenocytes at 1×10^6 cells/ml were activated with 5 µg/ml Con-A and 5 ng/ml of PMA + 500 ng/ml of ionomycin, respectively, each for 24 hours. Mouse PEC cells at 1×10^6 cells/ml were stimulated with 1 µg/ml LPS + 10 ng/ml hIFN-γ for 7 days. Cells were grown in RPMI complete media (10,000 U/ml Penicillin/Streptomycin, 200 mM L-Glutamine, 0.2 M 2-Mercaptoethanol & FBS). Culture supernatants were collected, stored at -20°C, then run in this assay. Results are as follows:

Strain	IL-6 (pg/ml)	Stimulation
BALB/c	223	Splenocytes, Con-A (24 hrs. stim.)
BALB/c	54	Splenocytes, PMA + ionomycin (24 hrs.)
BALB/c	21,982	PEC cells, IFN-γ + LPS (7 days stim.)

Troubleshooting

Problem	Possible Source	Corrective Action
Poor Precision	<ul style="list-style-type: none">• Inadequate washing / aspiration of wells• Inadequate mixing of reagents• Imprecise / inaccurate pipetting• Imprecise sealing of plate	<ul style="list-style-type: none">• Check function of washing system• Ensure adequate mixing• Check / calibrate pipettes• Ensure complete sealing of plate
Poor Standard Curve	<ul style="list-style-type: none">• Improper standard handling / dilution• Incomplete washing / aspiration of wells• Imprecise / inaccurate pipetting	<ul style="list-style-type: none">• Ensure correct preparation of standards• Check function of washing system• Check / calibrate pipettes
Low Signal	<ul style="list-style-type: none">• Inadequate reagent volumes added to wells• Incorrect incubation times / temperature• Overly high wash / aspiration pressure from automated plate-washer.	<ul style="list-style-type: none">• Check / calibrate pipettes• Ensure sufficient incubation times / reagents warmed to room temperature• Utilize manual washing

References

1. Van Snick, J., S. Cayphas, J.-P. Szikora, J.-C. Renauld, E. Van Roost, T. Boon, and R.J. Simpson. 1988. cDNA cloning of murine interleukin-HP1: homology with human interleukin-6. *Eur. J. Immunol.* 18: 193-197.
2. Chiu, C.-P., C. Moulds, R. Coffman, D. Rennick, and F. Lee. 1988. Multiple biological activities are expressed by a mouse interleukin-6 cDNA clone isolated from bone marrow stromal cells. *Proc. Natl. Acad. Sci. USA.* 85: 7099-7103.
3. Van Snick, J., S. Cayphas, A. Vink, C. Uyttenhove, P.G. Coulie, M.R. Rubira, and R.J. Simpson. 1986. Purification and NH2-terminal amino acid sequence of a T cell derived lymphokine with growth factor activity for B cell hybridomas. *Proc. Natl. Acad. Sci. USA* 83: 9679-9683.
4. Van Snick, J. 1990. Interleukin-6: an overview. *Ann. Rev. Immunol.* 8: 253-278.

Plate Templates

	1	2	3	4	5	6	7	8	9	10	11	12
A												
B												
C												
D												
E												
F												
G												
H												

	1	2	3	4	5	6	7	8	9	10	11	12
A												
B												
C												
D												
E												
F												
G												
H												

United States
877.232.8995

Canada
888.259.0187

Europe
32.53.720.550

Japan
0120.8555.90

Asia/Pacific
65.6861.0633

Latin America/Caribbean
55.11.5185.9645



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