

## REFERENCES

- 1.Sokol, C.L., Barton, G.M., Farr, A.G. & Medzhitov, R. (2008). "A mechanism for the initiation of allergeninduced T helper type 2 responses". *Nat Immunol* 9 (3): 310–318.
- 2.Liang, H-E, Reinhardt, R.L., Bando, J.K., Sullivan, B.M., Ho, I-C, & Locksley, R.M. (2012) Divergent expression patterns of IL-4 and IL-13 define unique functions in allergic immunity. *Nature Immunology*, 13: 58–66.
- 3.Howard M, Paul WE (1982). "Interleukins for B lymphocytes". *Lymphokine Res.* 1 (1): 1–4.
4. Yokota T et al. (1986). "Isolation and characterization of a human interleukin cDNA clone, homologous to mouse B-cell stimulatory factor 1, that expresses B-cell- and T-cell-stimulating activities". *Proc. Natl. Acad. Sci. U.S.A.* 83 (16): 5894–8.

## Monkey IL-4 Immunoassay

Catalog Number: SEKMY-0012

For the quantitative determination of Monkey IL-4 concentrations in cell culture supernates, serum, and plasma.

For research use only. Not for use in diagnostic procedures.

**MANUFACTURED AND DISTRIBUTED BY:**

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**REPEATABILITY:** The coefficient of variation of both intra-assay and inter-assay were less than 10%.

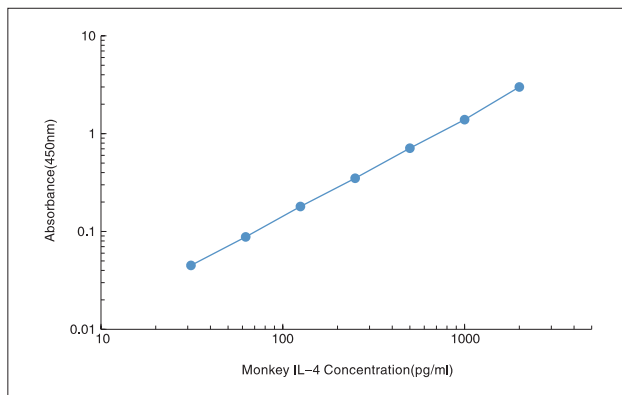
**RECOVERY:** The recovery of IL-4 spiked to three different levels in four samples throughout the range of the assay in various matrices was evaluated.

### Recovery of IL-4 in two matrices

Sample Type	Average % of Expected	Range (%)
Citrate plasma	91	83-101
Cell culture supernatants	94	86-105

**LINEARITY:** To assess the linearity of the assay, three samples were spiked with high concentrations of IL-4 in various matrices and diluted with the appropriate Sample Diluent to produce samples with values within the dynamic range of the assay. (The plasma samples were initially diluted 1:1)

Dilution ratio	Recovery(%)	Citrate plasma	Cell culture supernatants
1:2	Average% of Expected	93	105
	Range (%)	85-102	98-116
1:4	Average% of Expected	94	108
	Range (%)	86-106	99-119



Representative standard curve for IL-4 ELISA.

### Performance Characteristics

**SENSITIVITY:** The minimum detectable dose was 8 pg/mL.

**SPECIFICITY:** This assay recognizes both natural and recombinant Monkey IL-4. The factors listed below were prepared at 10ng/ml in Standard /sample Diluent and assayed for cross-reactivity and no significant cross-reactivity or interference was observed.

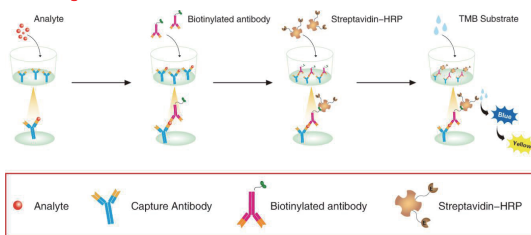
BMP1, BMP2, BMP4, BMP7, CRP, CCL2, CCL4, CCL5, HGF, HSP27, IGF-1, IL-1 $\beta$ , IL-2, IL-5, IL-6, IL-8, IL-12, IL-13, IL-15, IL-17C, IL-21, IFN $\gamma$ , PDGF, PLA2G7, serpin E1, TGF $\beta$ 1, TGF $\beta$ 2, TGF $\beta$ 3, TLR1, TLR2, TLR3, TLR9, TNF- $\alpha$ , TNF RI, TNF RII.

### BACKGROUND

Interleukin-4, abbreviated IL-4, is a cytokine that is expressed in a variety of tissues including lymphocytes and leukocytes, is a key regulator in humoral and adaptive immunity and has many biological roles, including the stimulation of activated B-cell and T-cell proliferation, and the differentiation of CD4+ T-cells into Th2 cells. IL-4 induces differentiation of naive helper T cells (Th0 cells) to Th2 cells. Upon activation by IL-4, Th2 cells subsequently produce additional IL-4. The cell that initially produces IL-4, thus inducing Th0 differentiation, has not been identified, but recent studies suggest that basophils may be the effector cell. It is closely related and has functions similar to Interleukin 13. Like IL-13, Interleukin 4 (IL-4) is critical for responses to parasitic helminthes. IL-4 up-regulates MHC class II production and decreases the production of Th1 cells, macrophages, IFN-gamma, and dendritic cell IL-12. Tissue macrophages play an important role in chronic inflammation and wound repair. The presence of IL-4 in extravascular tissues promotes alternative activation of macrophages into M2 cells and inhibits classical activation of macrophages into M1 cells. An increase in repair macrophages (M2) is coupled with secretion of IL-10 and TGF $\beta$  that result in a diminution of pathological inflammation. This cytokine was co-discovered by Maureen Howard and William Paul and by Dr. Ellen Vitetta and her research group in 1982. The nucleotide sequence for human IL4 was isolated four years later confirming its similarity to a mouse protein called B-cell stimulatory factor-1 (BCSF1).

### PRINCIPLE OF THE ASSAY

This assay employs the quantitative sandwich enzyme immunoassay technique. A monoclonal antibody specific for IL-4 has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any IL-4 present is captured by the coated antibody after incubation. Following extensive washing, a biotin-conjugate antibody specific for IL-4 is added to detect the captured IL-4 protein in sample. For signal development, horseradish peroxidase (HRP)-conjugated Streptavidin is added, followed by tetramethyl-benzidine (TMB) reagent. Following a wash to remove any unbound combination, and enzyme conjugate is added to the wells. Solution containing sulfuric acid is used to stop color development and the color intensity which is proportional to the quantity of bound protein is measurable at 450nm.

**Schematic diagram:****TECHNICAL HINTS AND LIMITATIONS**

1. This Solarbio ELISA should not be used beyond the expiration data on the kit label.
2. To avoid cross-contamination, use a fresh reagent reservoir and pipette tips for each step.
3. To ensure accurate results, some details, such as technique, plasticware and water sources should be emphasized.
4. A thorough and consistent wash technique is essential for proper assay performance.
5. A standard curve should be generated for each set of samples assayed.
6. It is recommended that all standards and samples be assayed in duplicate.
7. Avoid microbial contamination of reagents and buffers. Buffers containing protein should be made under aseptic conditions and be prepared fresh daily.
8. In order to ensure the accuracy of the results, the standard curve should be made every time.

**PRECAUTIONS**

The Stop Solution suggested for use with this kit is an acid solution. Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling.

**CALCULATION OF RESULTS**

1. The standard curve is used to determine the amount of specimens.
2. First, average the duplicate readings for each standard, control, and sample. All O.D. values are subtracted by the mean value of blank control before result interpretation.
3. Construct a standard curve by reducing the data using computer software capable of generating a four parameter logistic (4-PL) curve-fit. As an alternative, construct a standard curve by plotting the mean absorbance for each standard on the y-axis against the concentration on the x-axis and draw a best fit curve through the points on the graph.
4. The data may be linearized by plotting the log of the IL-4 concentrations versus the log of the O.D. and the best fit line can be determined by regression analysis. This procedure will produce an adequate but less precise fit of the data. If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.
5. This standard curve is provided for demonstration only. A standard curve should be generated for each set of samples assayed.

Typical data using the IL-4 ELISA

Std (pg/mL)	O.D.1	O.D.2	Average	Corrected
0	0.04	0.045	0.0425	---
39.06	0.168	0.169	0.168	0.126
78.125	0.281	0.269	0.275	0.232
156.25	0.507	0.521	0.514	0.471
312.5	0.864	0.846	0.855	0.812
625	1.259	1.275	1.267	1.224
1250	1.752	1.773	1.762	1.720
2500	2.117	2.138	2.127	2.085

## DESCRIPTION

Biotin-Conjugate antibody Diluent to make working dilution of Detection Antibody and mix thoroughly prior to the assay. If the partial antibody is used, make a 1:100 dilution of the concentrated Biotin-Conjugate solution with the Biotin-Conjugate antibody Diluent in a clean plastic tube.

**\*The working solution should be used within one day after dilution.**

5. **Working solution of Streptavidin-HRP(120µL)** - Centrifuge for 1 min at 6000 x g to bring down the material prior to open the vial. The vial contains 120 µL HRP Conjugate sufficient for a 96-well plate. Make 1:100 dilutions in Reagent Diluent. If the entire 96-well plate is used, add 100 µL of HRP Conjugate to 10 mL of Streptavidin-HRP Diluent to make working dilution of HRP Conjugate and mix thoroughly prior to the assay. The rest of undiluted HRP Conjugate can be stored at 4°C for up to 6 months. DO NOT FREEZE.

**\*The working solution should be used within one day after dilution.**

## ASSAY PROCEDURE

Prepare all reagents and standards as directed. Wash the plate 3 times before assay.



Add 100µl standard or samples to each well, shaking with Micro-oscillator (100r/min) to incubate 60 minutes at room temperature(25±2°C).



Aspirate and wash 4 times

Add 100µl working solution of Biotin-Conjugate anti-Monkey IL-4 antibody to each well, shaking with Micro-oscillator (100r/min) to incubate 60 minutes at room temperature(25±2°C).



Aspirate and wash 4 times

Add 100µl working solution of Streptavidin-HRP to each well, shaking with Micro-oscillator (100r/min) to incubate 20 minutes at room temperature(25±2°C).



Aspirate and wash 5 times

Add 100µl Substrate solution to each well, incubate 5-20 minutes (depending on signal) at room temperature(25±2°C). Protect from light.



Add 50µl Stop solution to each well. Read at 450nm within 5 minutes.

## DESCRIPTION

### KIT COMPONENTS & STORAGE CONDITIONS

PART	SIZE	STORAGE OF OPENED/ RECONSTITUTED MATERIAL
Microwell Plate - antibody coated 96-well Microplate (8 wells ×12 strips)	1 plate	Return unused wells to the foil pouch containing the desiccant pack. Reseal along entire edge of the zip-seal. May be stored for up to 1 month at 2 – 8°C**
Standard - lyophilized, 2500pg/ml upon reconstitution	2 vials	Aliquot and Store at -20°C** for six months
lyophilized Biotin-Conjugated antibody	1 vial	Store at 2-8°C ***for six months
Concentrated Streptavidin-HRP	1 vial	Store at 2-8°C ***for six months
Standard /sample Diluent	1 bottle	Store at 2-8°C ***for six months
Biotin-Conjugate antibody Diluent	1 bottle	Store at 2-8°C ***for six months
Streptavidin-HRP Diluent	1 bottle	Store at 2-8°C ***for six months
20 x Wash Buffer Concentrate	1 bottle	Store at 2-8°C ***for six months
Substrate Solution	1 bottle	Store at 2-8°C ***for six months
Stop Solution	1 bottle	Store at 2-8°C ***for six months
Plate Cover Seals	4 pieces	

\*\*Provided this is within the expiration date of the kit.

**OTHER SUPPLIES REQUIRED BUT NOT SUPPLIED**

1. Microplate reader capable of measuring absorbance at 450 nm.
2. Pipettes and pipette tips.
3. Deionized or distilled water.
4. Squirt bottle, manifold dispenser, or automated microplate washer.
5. 500 mL graduated cylinder.

**SPECIMEN COLLECTION & STORAGE**

**Cell Culture Supernates** - Centrifuge cell culture media at 1000×g to remove debris. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

**Serum** - Use a serum separator tube (SST) and allow samples to clot for 2 hours at room temperature or overnight at 2-8°C. Centrifuge at approximately 1500×g for 15 minutes at 1000×g. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

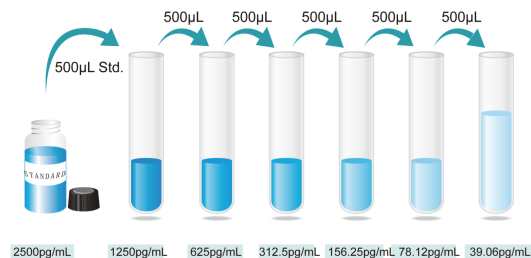
**Plasma** - Collect plasma using EDTA, heparin, or citrate as an anticoagulant. Centrifuge for 15 minutes at 1000×g within 30 minutes of collection. Assay immediately or aliquot and store samples at ≤ -20 °C. Avoid repeated freeze-thaw cycles.

**Note: It is recommended to conduct a pre-test before the formal experiment to determine the dilution ratio**

**REAGENTS PREPARATION**

1. **Temperature returning** - Bring all kit components and specimen to room temperature (20-25°C) before use.
2. **Wash Buffer** - Dilute 30mL of 20x Wash Buffer Concentrate with 570mL of deionized or distilled water to prepare 600mL of Wash Buffer. If crystals have formed in the concentrate Wash Buffer, warm to room temperature and mix gently until the crystals have completely dissolved.

3. **Standard\Sample (2 vials)** - Monkey IL-4 Standard has a total of 2 vials. Each vial contains the standard sufficient for generating a standard curve. Reconstitute the Standard with 1.0mL of Standard /Sample Diluent. This reconstitution produces a stock solution of 2500 pg/mL. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions. Pipette 500uL of Standard/Specimen Diluent into 1250pg/ml tube and the remaining tubes. Use the stock solution of 2500pg/mL to produce a 2-fold dilution series (below). Mix each tube thoroughly(vortex 20 sec for each of dilution step) and change pipette tips between each transfer. The 2500 pg/mL standard serves as the high standard. The Standard/specimen Diluent serves as the zero standard (0 pg/mL).



**Preparation of Monkey IL-4 standard dilutions**

**\*If you do not run out of re-melting standard, store it at -20°C. Diluted standard shall not be reused.**

4. **Working solution of Biotin-Conjugate anti-Monkey IL-4 antibody(1 vials)** - The lyophilized Detection Antibody should be stored at 4°C to -20°C in a manual defrost freezer for up to 6 months, if not used immediately. Centrifuge for 1 min at 6000 x g to bring down the material prior to open the vial. The vial contains sufficient Detection Antibody for a 96-well plate. Add 110uL of sterile Biotin-Conjugate antibody Diluent to each vial and vortex 30 sec to obtain the stock solution. If the entire 96-well plate is used, take 100uL of detection antibody stock solution into 10 mL of