

Human IL-4 High Sensitivity ELISA Kit

Catalog No.: CDK030A
CDK030B

Quantity: 1 x 96 tests
2 x 96 tests

PRODUCT SPECIFICATIONS :

Specificity : Recognizes both natural and recombinant human IL-4

Range : 0.31 - 10 pg/ml

Sensitivity : 0.31 pg/ml

Incubation : 4 hours

Sample Types : Serum
Plasma
Cell culture supernatant

Cross Reaction : No cross reactivity with other human cytokines

Kit Content : Pre-coated 12 strip plates, Biotinylated Secondary Antibody, Amplifier, Standard, Buffers, Streptavidin-HRP, TMB, Stop Reagent.

1. INTENDED USE

The Cell Sciences Inc.® Human High Sensitivity IL-4 ELISA is to be used for the *in-vitro* quantitative determination interleukin-4 (IL-4) in human sera, plasmas, buffered solutions or cell culture media. The assay will recognize both natural and recombinant human IL-4. **This kit has been configured for research use only.**

2. PRINCIPLE OF THE METHOD

The IL-4 Kit is a solid phase sandwich Enzyme Linked-Immuno- Sorbent Assay (ELISA). A monoclonal antibody specific for IL-4 has been coated onto the wells of the microtiter strips provided. Samples, including standards of known IL-4 concentrations and unknowns are pipetted into these wells. During the first incubation, the IL-4 antigen and a biotinylated monoclonal antibody specific for IL-4 are simultaneously incubated. After washing, the enzyme (streptavidin-peroxidase) is added. All the unbound enzyme is removed by washing and the first amplification step is performed by adding the **Biotin-Tyramine reagent**. Under the action of HRP, a **biotin polymerization reaction** occurs in the region of the HRP linked to the detection antibody. After washing, the second amplification step is performed and the polymerized biotin is revealed by a new streptavidin-HRP step. Finally, after washing, the substrate is added. The intensity of this colored product is directly proportional to the concentration of IL-4 present in the samples.



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3. REAGENTS PROVIDED AND RECONSTITUTION

Reagents (Store @ 2-8°C)	Quantity	Reconstitution
P: 96 well microtiter strip plate	1	Ready to use. (Pre-coated)
A: Plastic plate covers	2	n/a
B: Standard: 10 pg/ml	2 vials	Reconstitute as directed on the vial. (see Assay preparation, section 8)
C: Standard Diluent (Buffer)	1 vial (25 ml)	10x Concentrate, dilute in distilled water (see reagent preparation, section 8)
D: Biotinylated anti-IL-4	1 vials (0.4 ml)	Dilute in biotinylated antibody diluent (see reagent preparation, section 8).
E: Biotinylated Antibody Diluent	1 vial (7.5 ml)	Ready to use.
F: Streptavidin-HRP	2 vials (5 µl)	Add 0.5 ml of HRP diluent prior to use. (see Assay preparation, section 8)
G: Amplification Diluent	1 vial (25 ml)	Ready to use.
H: Amplifier*	1 vials (200 µl)	Dilute in Amplification Buffer.
I: HRP Diluent	1 vials (25 ml)	Ready to use.
J: Wash Buffer	1 vials (10 ml)	200x Concentrate, dilute in distilled water. (see Assay preparation, section 8)
K: TMB Substrate	1 vial (11 ml)	Ready to use.
L: H ₂ SO ₄ stop reagent	1 vials (11 ml)	Ready to use.

*Reagent contains ethyl alcohol

4. MATERIAL REQUIRED BUT NOT PROVIDED

- Microtiter plate reader fitted with appropriate filters (450 nm required with optional 630 nm reference filter)
- Microplate washer or wash bottle
- 10, 50, 100, 200 and 1,000 µl adjustable single channel micropipettes with disposable tips
- 50-300 µl multi-channel micropipette with disposable tips
- Multichannel micropipette reagent reservoirs
- Distilled water
- Vortex mixer
- Miscellaneous laboratory plastic and/or glass, if possible sterile

5. STORAGE INSTRUCTIONS

Store the kit reagents between 2 and 8°C. Immediately after use, remaining reagents should be returned to cold storage (2-8°C). The expiration date of the kit and reagents is stated on box front labels. Expiration of the kit components can only be guaranteed if the components are stored properly, and if, in case of repeated use of one component, the reagent is not contaminated by the first handling.

Wash Buffer: Once prepared, store at 2-8°C for up to 1 week.

Standard Diluent Buffer: Once prepared, store at 2-8°C for up to 1 week.



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Standards: Once prepared, use immediately and do not store.

Biotinylated Secondary Antibody: Once prepared, use immediately and do not store.

Streptavidin-HRP: Once prepared, use immediately and do not store.

6. SPECIMEN COLLECTION, PROCESSING & STORAGE

Cell culture supernatants, serum, plasma or other biological samples are suitable for use in the assay. Remove serum from the clot or red cells respectively, as soon as possible after clotting and separation.

Cell culture supernatants: Remove particulates and aggregates by spinning at approximately 1000 x g for 10 min.

Serum: Avoid any unintentional stimulation of the cells by the procedure. Use pyrogen/endotoxin free collecting tubes. Serum should be removed rapidly and carefully from the red cells after clotting. After clotting, centrifuge at approximately 1000 x g for 10 min and remove serum.

Plasma: EDTA, citrate and heparin plasma can be assayed. Spin samples at 1000 x g for 30 min. to remove particulates. Harvest plasma.

Storage: If not analyzed shortly after collection, samples should be aliquoted (250-500 µl) to avoid repeated freeze-thaw cycles and stored frozen at -80°C. Avoid multiple freeze-thaw cycles of frozen specimens.

Recommendation: Do not thaw by heating at 37°C or 56°C. Thaw at room temperature, and make sure that the sample is completely thawed and homogeneous before use. When possible, avoid use of badly hemolyzed or lipemic sera. If large amounts of particles are present, these should be removed prior to use by centrifugation or filtration.

7. SAFETY AND PRECAUTIONS FOR USE

- Handling of reagents, serum, or plasma specimens should be in accordance with local safety procedures, e.g. CDC/NIH Health manual: "Biosafety in Microbiological and Biomedical Laboratories" 1984.
- The human serum included in this kit has been tested, and found non-reactive for HBsAg, anti HIV1 & 2 and anti VHC. Nevertheless, no known method can offer complete assurance that human blood derivatives will not transmit hepatitis, AIDS or other infections. Therefore, handling of reagents, serum or plasma specimens should be in accordance with local safety procedures.
- Laboratory gloves should be worn at all times.
- Avoid any skin contact with H₂SO₄ and TMB. In case of contact, wash thoroughly with water.
- Do not eat, drink, smoke or apply cosmetics where kit reagents are used.
- Do not pipette by mouth.
- When not in use, kit components should be stored refrigerated or frozen, as indicated on vial or bottle labels.
- All reagents should be warmed to room temperature before use. Lyophilized standards should be discarded after use.
- Once the desired number of strips has been removed, immediately reseal the bag to protect the remaining strips from deterioration.
- Cover or cap all reagents when not in use.
- Do not mix or interchange reagents between different lots.



- Do not use reagents beyond the expiration date of the kit.
- Use a clean, disposable, plastic pipette tip for each reagent, standard, or specimen addition in order to avoid cross contamination for the dispensing of H₂SO₄ and substrate solution. Avoid pipettes with metal parts.
- Use a clean plastic container to prepare the washing solution.
- Thoroughly mix the reagents and samples before use by agitation or swirling.
- All residual washing liquid must be drained from the wells by efficient aspiration, or by decantation, followed by tapping the plate forcefully on absorbent paper. Never insert absorbent paper directly into the wells.
- The TMB solution is light sensitive. Avoid prolonged exposure to light. Also, avoid contact of the TMB solution with metal to prevent color development. **Warning: TMB is toxic. Avoid direct contact with hands. Dispose of properly.**
- If a dark blue color develops within a few minutes after preparation, this indicates that the TMB solution has been contaminated and must be discarded. Read absorbances within 1 hour after completion of the assay.
- When pipetting reagents, maintain a consistent order of addition from well-to-well. This will ensure equal incubation times for all wells.
- Follow incubation times described in the assay procedure.
- Dispense the TMB solution immediately after washing the microtiter plate.

8. ASSAY PREPARATION

Bring all reagents to room temperature before use.

8.1 Assay Design

Determine the number of microwell strips required to test the desired number of samples, plus appropriate number of wells needed for running zeros and standards. Each sample, standard and zero should be tested **in duplicate**. Remove sufficient Microwell Strips for testing from the pouch immediately prior to use. Return any wells not required for this assay with desiccant to the pouch. Seal tightly and return to 2-8°C storage.

Example plate layout (example shown for a 6 point standard curve)

Standards/Controls		Sample Wells											
		1	2	3	4	5	6	7	8	9	10	11	12
A	10	10											
B	5	5											
C	2.5	2.5											
D	1.25	1.25											
E	0.62	0.62											
F	0.31	0.31											
G	zero	zero											
H													

All remaining empty wells can be used to test samples in duplicate.



8.2 Preparation of Wash Buffer

Dilute the (200x) wash buffer concentrate 200 fold with distilled water to give a 1x working solution. Pour entire contents (10 ml) of the Washing Buffer Concentrate into a clean 2,000 ml graduated cylinder. Bring the final volume to 2,000 ml with glass-distilled or deionized water. Mix gently to avoid foaming. Transfer to a clean wash bottle and store at 2°-8°C for up to 1 week.

8.3 Preparation of Standard Diluent Buffer

Add the contents of the vial (10x concentrate) to 225 ml of distilled water before use.

This solution can be stored at 2-8°C for up to 1 week.

8.4 Preparation of Standard

Standard vials must be reconstituted with the volume of standard diluent shown on the vial immediately prior to use. This reconstitution gives a stock solution of 10 pg/ml of IL-4. **Mix the reconstituted standard gently by inversion only.** Serial dilutions of the standard are made directly in the assay plate to provide the concentration range from 10 to 0.31 pg/ml. A fresh standard curve should be produced for each new assay.

- Immediately after reconstitution, add 200 µl of the reconstituted standard to wells A1 and A2, which provides the highest concentration standard at 10 pg/ml.
- Add 100 µl of Standard Diluent to the remaining standard wells B1 and B2 to F1 and F2.
- Transfer 100 µl from wells A1 and A2 to B1 and B2. Mix the well contents by repeated aspirations and ejections, taking care not to scratch the inner surface of the wells.
- Continue this 1:1 dilution, using 100 µl from wells B1 and B2 through to wells F1 and F2, providing a serial diluted standard curve ranging from 10 pg/ml to 0.31 pg/ml.
- Discard 100 µl from the final wells of the standard curve (F1 and F2).

Alternatively, these dilutions can be performed in separate clean tubes and immediately transferred directly into the relevant wells.

8.5 Preparation of Samples

Normal sera and plasmas may be applied undiluted. Nevertheless, sera or plasmas from patients with various pathologies may be applied undiluted and diluted (to prevent too high concentrations). As IL-4 concentrations may vary considerably in cell supernatant samples, it is not easy to recommend a dilution factor. For example, unknown cell supernatant samples may also be tested undiluted and diluted.



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8.6 Preparation of Biotinylated anti-IL-4

It is recommended this reagent is prepared immediately before use. Dilute the biotinylated anti-IL-4 with the biotinylated antibody diluent in an appropriate clean glass vial using volumes appropriate to the number of required wells. Please see example volumes below:

Number of wells required	Biotinylated Antibody (µl)	Biotinylated Antibody Diluent (µl)
16	40	1060
32	80	2120
48	120	3180
96	240	6360

8.7 Preparation of Streptavidin-HRP solutions 1 and 2

It is recommended to centrifuge vial for a few seconds in a microcentrifuge to collect all the volume at the bottom.

Dilute the 5 µl vial with 0.5 ml of HRP diluent **immediately before use**. This pre-dilution will be used for Step 5 and step 11. Do-not keep this diluted vial for future experiments. Further dilute the HRP solution to volumes appropriate for the number of required wells in a clean glass vial. Please see example volumes below:

Streptavidin-HRP solution 1 (step 5)

Number of wells required	Streptavidin-HRP (µl)	Streptavidin-HRP Diluent (ml)
16	10	1.990
32	20	3.980
48	30	5.970
96	55	10.945

Streptavidin-HRP solution 2 (step 11)

Number of wells required	Streptavidin-HRP (µl)	Streptavidin-HRP Diluent (ml)
16	80	1.920
32	160	3.840
48	240	5.760
96	420	10.080

8.8 Preparation of Amplifier



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It is recommended this reagent is prepared immediately before use. Dilute the Amplifier with the Amplification diluent in an appropriate clean glass vial using volumes appropriate to the number of required wells. Please see example volumes below:

Number of wells required	Amplifier (µl)	Amplification Diluent (ml)
16	20	1.980
32	40	3.690
48	60	5.940
96	120	11.880

9. METHOD

We strongly recommend that every vial is mixed thoroughly without foaming prior to use, except the standard vial which must be mixed gently by inversion only. Prepare all reagents as shown in section 8. Note: Final preparation of Biotinylated anti-IL-4 (section 8.6) and Streptavidin-HRP (section 8.7) should occur immediately before use.

Assay Step		Details
1.	Addition	Add 100 µl of each standard, sample and zero (appropriate Standard Diluent Buffer) in duplicate to appropriate number of wells.
2.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for 1 hour .
3.	Wash	Remove the cover and wash the plate as follows: a) Aspirate the liquid from each well. b) Dispense 0.3 ml of 1x washing solution into each well. c) Aspirate the contents of each well. d) Repeat step b and c another two times.
4.	Addition	Add 50 µl of diluted biotinylated anti-IL-4 to all wells.
5.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for 1 hour .
6.	Wash	Repeat wash step 3.
7.	Addition	Add 100 µl of Streptavidin-HRP solution 1 into all wells.
8.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for 20 min .
9.	Wash	Repeat wash step 3.



10.	Addition	Add 100 μ l of diluted Amplifier to all wells.
11.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for 15 min .
12.	Wash	Repeat wash step 3.
13.	Addition	Add 100 μ l of Streptavidin-HRP solution 2 into all wells.
14.	Incubation	Cover with a plastic plate cover and incubate at room temperature (18 to 25°C) with slow shaking for 20 min .
15.	Wash	Repeat wash step 3.
16.	Addition	Add 100 μ l of ready-to-use TMB Substrate Solution into all wells.
17.	Incubation	Incubate in the dark for 10-20 minutes* at room temperature. Avoid direct exposure to light by wrapping the plate in aluminium foil.
18.	Addition	Add 100 μ l of H₂SO₄:Stop Reagent into all wells.
<p>Read the absorbance value of each well (immediately after step 18) on a spectrophotometer using 450 nm as the primary wavelength and optionally 630 nm as the reference wave length (610 nm to 650 nm is acceptable).</p>		

**Incubation time of the substrate solution is usually determined by the ELISA reader performance. Many ELISA readers only record absorbance up to 2.0 O.D. Therefore the color development within individual microwells must be observed by the analyst, and the substrate reaction stopped before positive wells are no longer within recordable range.*

Note: In case of incubation without shaking, the O.D. values may be lower than with shaking; in this case let the color develop longer in order to obtain correct O.D. values.

10. DATA ANALYSIS

Calculate the average absorbance values for each set of duplicate standards and samples. Ideally, duplicates should be within 20% of the mean.

Generate a linear standard curve by plotting the average absorbance of each standard on the vertical axis versus the corresponding Human IL-4 standard concentration on the horizontal axis.

The amount of IL-4 in each sample is determined by extrapolating O.D. values against IL-4 standard concentrations using the standard curve.

Example IL-4 HS Standard Curve

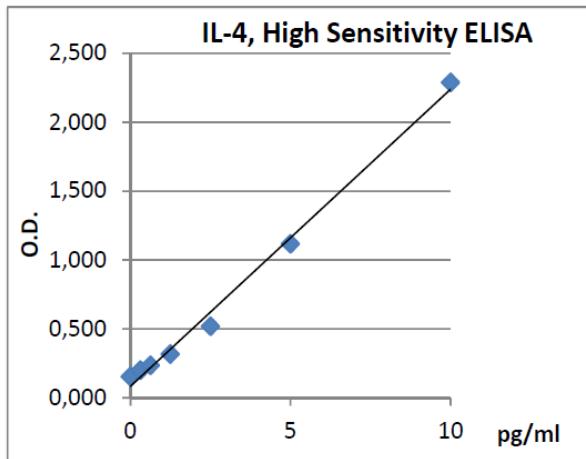


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Standard	IL-4 Conc pg/ml	OD (450nm) mean	CV (%)
1	10	2.289	0.6
2	5	1.118	4.6
3	2.5	0.519	6.9
4	1.25	0.316	0.9
5	0.62	0.235	0.4
6	0.31	0.200	5.3
Zero	0	0.154	-



Note: The curve shown above should not be used to determine results. Every lab must produce a standard curve for each set of microwell strips assayed.

11. ASSAY LIMITATIONS

Do not extrapolate the standard curve beyond the maximum standard curve point. The dose-response is non-linear in this region, and good accuracy is difficult to obtain. Concentrated samples above the maximum standard concentration must be diluted with Standard diluent or with your own sample buffer to produce an OD value within the range of the standard curve. Following analysis of such samples, always multiply results by the appropriate dilution factor to produce actual final concentration.

The influence of various drugs on end results has not been investigated. Bacterial or fungal contamination and laboratory cross-contamination may also cause irregular results.

Improper or insufficient washing at any stage of the procedure will result in either false positive or false negative results. Completely empty wells before dispensing fresh Washing Buffer, fill with Washing Buffer as indicated for each wash cycle and do not allow wells to sit uncovered or dry for extended periods.



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Disposable pipette tips, flasks or glassware are preferred, reusable glassware must be washed and thoroughly rinsed of all detergents before use.

As with most biological assays conditions may vary from assay to assay. Therefore, **a fresh standard curve must be prepared and run for every assay.**

12. PERFORMANCE CHARACTERISTICS

12.1 Sensitivity

This has been determined by adding 3 standard deviations to the mean concentration of 40 zero samples. The minimum detectable dose of IL-4 was less than **0.31 pg/ml**.

12.2. Specificity

Ten specificities were tested with concentrations higher than IL-4 curve concentrations. No cross reaction was observed for IL-2, IL-5, IL-6, IL-7, IL-8, IL-12, IL-13, TNF-a, IFNg and FasL.

12.3 Precision

Two sera and two cell culture medium samples with various concentrations of IL-4 were tested for repeatability and reproducibility. Each assay was carried out with 8 duplicates of each sample. Three independent assays were performed. The intra-assay and inter-assay coefficient of variation has been calculated to be 9.2% and 13.7% respectively.

Intra-Assay					Inter-Assay				
Sample	n	Mean (pg/ml)	SD	CV %	Sample	n	Mean (pg/ml)	SD	CV %
A	8	7.43	0.9	12.3	A	9	7.10	0.83	11.8
B	8	6.20	0.7	10.8	B	9	6.47	0.72	11.1
C	8	8.77	0.7	7.6	C	9	8.76	1.37	15.7
D	8	7.36	0.4	6.0	D	9	7.44	1.20	16.1

12.4 Dilution Parallelism

Two pooled human sera and two cell culture medium samples containing different concentrations of IL-4 were serially diluted in standard buffer diluent. Linearity was evaluated on 4 dilutions. The linear regression of samples versus the expected concentration yielded a quote slope of 0.992. Recoveries ranged from 89% to 125% with an overall mean recovery of 101%.

12.5 Spike Recovery

The spike recovery was evaluated by spiking three levels of IL-4 into two different pooled human sera and two cell culture medium. Recovery was evaluated with one test. The recovery in pooled human sera ranged from 61 to 75% with an mean of 69%. In cell culture medium, recovery was calculated to be between 897% and 127%, with a mean of 95%.



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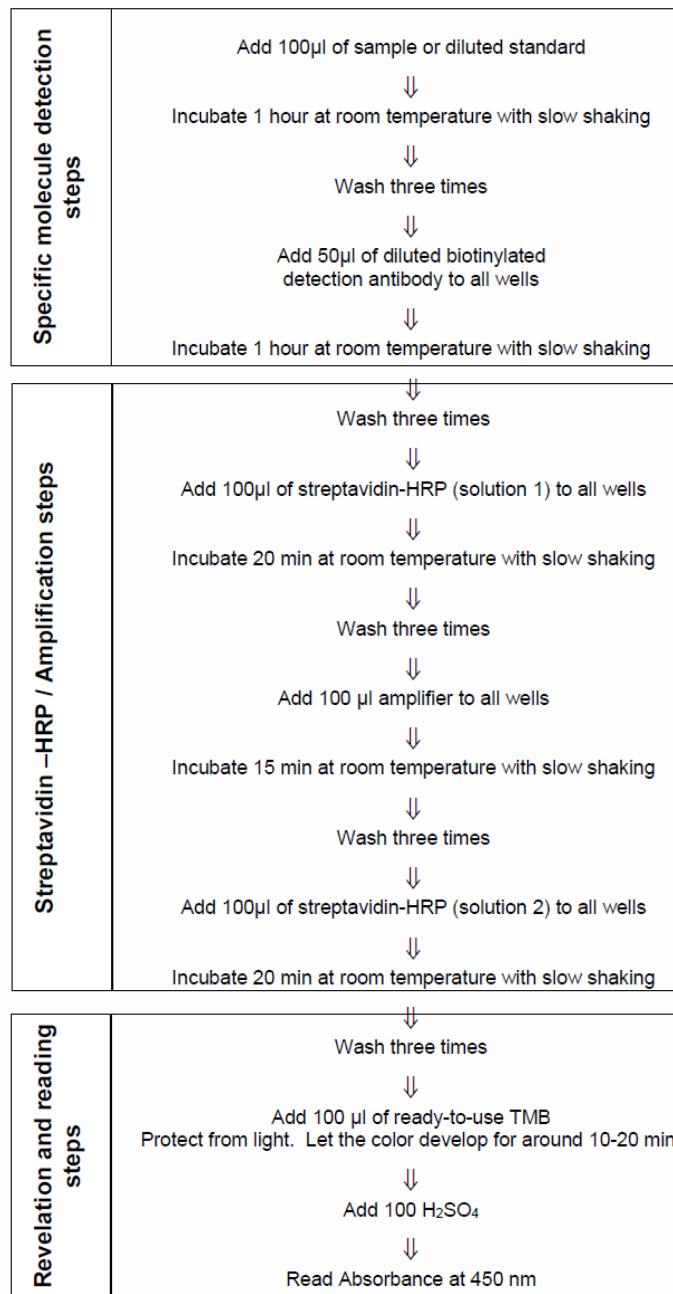
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12.6. Expected Values

38 sera from healthy individual donors were tested undiluted in duplicates. 35 sera were negative and 3 gave positive results with a mean at 4 pg/ml.

13. ASSAY SUMMARY

Total procedure length: 3 hours



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