ELISA Kit

Catalog # KHC0134 (96 tests)

KHC0133 (192 tests)

Human

IL-13

UltraSensitive

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INTRODUCTION

Interleukin-13 (IL-13), a cytokine produced primarily by Th2 cells, is implicated in asthma, allergy, and host responses to gastrointestinal parasites. Human IL-13, known alternatively as NC30 (or P600 for the murine homolog), is comprised of 107 amino acid residues with M_r= 14-40 kDa due to variable glycosylation. The accession numbers for the human IL-13 gene and protein are L13029 and P35225, respectively. The IL-13 gene is located on the long arm of chromosome 5 in a gene cluster that includes IL-4, IL-5, IL-3, and GM-CSF. IL-13 maps only 2 kilobases from IL-4, a cytokine with which it bears closest homology.

At least two receptors for IL-13 have been identified: IL-13Ra1 and IL-4Ra. Both IL-13Ra1 and IL-4Ra interact with the common gamma chain of the IL-2 receptor, although the IL-13Ra1/IL-4Ra complex appears to be sufficient for serving as a high affinity IL-13 receptor. A third IL-13 receptor, designated IL-13Ra2, has also recently been identified and its role as a putative decoy receptor is currently under investigation. While the production of IL-13 appears to be limited to cells of the immune system, IL-13Ra1 is found to be widely expressed by many tissue and cell types. IL-13 binding to its receptors activates members of the JAK family which in turn phosphorylate and activate STAT6, resulting in enhanced transcription of responsive genes. IL-13 is also observed to induce the phosphorylation of IRS1/2, to activate PI-3 kinase, to mobilize intracellular Ca^{2+} stores, and to elevate cAMP.

IL-13 is observed to exert numerous effects on responding cells. The biological activity of IL-13 is routinely determined by measuring the dose-dependent proliferation of the human myeloid cell line TF1, or a subclone of the B9 hybridoma cell line (B9-1-3). IL-13 modulates

inflammatory responses of macrophages and monocytes, suppressing nitric oxide production, reducing the production of pro-inflammatory cytokines including IL-1, IL-6, IL-8, IL-10, IL-12 and the chemokines MIP and MCP in response to IFN-g or LPS stimulation, inducing differentiation, and enhancing survival time. In B cells, IL-13 enhances CD23 and MHC class II expression, regulates proliferation and immunoglobulin class switching to IgE. By inducing IgE synthesis, IL-13 plays an important role in regulating IgE-associated atopic diseases. IL-13 has also been implicated in suppression of HIV replication in monocytes and macrophages.

PURPOSE

The Invitrogen Human Interleukin-13 Ultrasensitive (Hu IL-13 US) ELISA is to be used for the quantitative determination of Hu IL-13 in human serum, buffered solution, or cell culture medium. The assay will recognize both natural and recombinant Hu IL-13.

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Read entire protocol before use.

PRINCIPLE OF THE METHOD

The Invitrogen Hu IL-13 US kit is a solid phase sandwich Enzyme Linked-Immuno-Sorbent Assay (ELISA). A monoclonal antibody specific for Hu IL-13 has been coated onto the wells of the microtiter strips provided. Samples, including standards of known Hu IL-13 content, control specimens, and unknowns, are pipetted into these wells, followed by the addition of a biotinylated polyclonal second antibody.

During the first incubation, the IL-13 antigen binds to the immobilized (capture) antibody on one site. After washing, a biotinylated antibody specific for Hu IL-13 is added. During the second incubation, this antibody binds to the immobilized IL-13 captured during the first incubation.

After removal of excess second antibody, Streptavidin-Peroxidase (enzyme) is added. This binds to the biotinylated antibody to complete the four-member sandwich. After a second incubation and washing to remove all the unbound enzyme, a substrate solution is added, which is acted upon by the bound enzyme to produce color. The intensity of this colored product is directly proportional to the concentration of IL-13 present in the original specimen.

REAGENTS PROVIDED

Note: *Store all reagents at 2 to 8°C.*

Reagent	***96 Test Kit***	***192 Test Kit***
Hu IL-13 Standard, recombinant Hu IL-13. Contains 0.1% sodium azide. Refer to vial label for quantity and reconstitution volume.	2 vials	4 vials
Standard Diluent Buffer. Contains 0.1% sodium azide; 25 mL per bottle.	1 bottle	2 bottles
Antibody Coated Wells. 12 x 8 Well Strips.	1 plate	2 plates
Hu IL-13 Biotin Conjugate, (Biotin-labeled anti-IL-13). Contains 0.1% sodium azide; 11 mL per bottle.	1 bottle	2 bottles
Streptavidin-HRP (100X). Contains 3.3 mM thymol; 0.125 mL per bottle.	1 vial	2 vials
Streptavidin-HRP Diluent. Contains 3.3 mM thymol; 25 mL per bottle.	1 bottle	1 bottle
Wash Buffer Concentrate (25X); 100 mL per bottle.	1 bottle	1 bottle
Stabilized Chromogen, Tetramethylbenzidine (TMB); 25 mL per bottle.	1 bottle	1 bottle
Stop Solution; 25 mL per bottle.	1 bottle	1 bottle
Plate Covers, adhesive strips.	3	4

Disposal Note: This kit contains materials with small quantities of sodium azide. Sodium azide reacts with lead and copper plumbing to form explosive metal azides. Upon disposal, flush drains with a large volume of water to prevent azide accumulation. Avoid ingestion and contact with eyes, skin and mucous membranes. In case of contact, rinse affected area with plenty of water. Observe all federal, state and local regulations for disposal.

SUPPLIES REQUIRED BUT NOT PROVIDED

1. Microtiter plate reader capable of measurement at or near 450 nm.
2. Calibrated adjustable precision pipettes, preferably with disposable plastic tips. (A manifold multi-channel pipette is desirable for large assays.)
3. Distilled or deionized water.
4. Plate washer: automated or manual (squirt bottle, manifold dispenser, etc.).
5. Data analysis and graphing software. Graph paper: linear (Cartesian), log-log, or semi-log, as desired.
6. Glass or plastic tubes for diluting and aliquoting standard.
7. Absorbent paper towels.
8. Calibrated beakers and graduated cylinders in various sizes.

PROCEDURAL NOTES/LAB QUALITY CONTROL

1. When not in use, kit components should be refrigerated. All reagents should be warmed to room temperature before use.
2. **Microtiter plates should be allowed to come to room temperature before opening the foil bags.** Once the desired number of strips has been removed, immediately reseal the bag and store at 2 to 8°C to maintain plate integrity.

3. Samples should be collected in pyrogen/endotoxin-free tubes.
4. Samples should be frozen if not analyzed shortly after collection. Avoid multiple freeze-thaw cycles of frozen samples. Thaw completely and mix well prior to analysis.
5. When possible, avoid use of badly hemolyzed or lipemic sera. If large amounts of particulate matter are present, centrifuge or filter prior to analysis.
6. It is recommended that all standards, controls and samples be run in duplicate.
7. Samples that are >50 pg/mL should be further diluted in the *Standard Diluent Buffer*.
8. When pipetting reagents, maintain a consistent order of addition from well-to-well. This ensures equal incubation times for all wells.
9. Cover or cap all reagents when not in use.
10. **Do not mix or interchange different reagent lots from various kit lots**.
11. Do not use reagents after the kit expiration date.
12. Read absorbances within 2 hours of assay completion.
13. In-house controls should be run with every assay. If control values fall outside pre-established ranges, the accuracy of the assay is suspect.
14. All residual wash 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.
15. Because *Stabilized Chromogen* is light sensitive, avoid prolonged exposure to light. Also avoid contact between *Stabilized Chromogen* and metal, or color may develop.

SAFETY

All blood components and biological materials should be handled as potentially hazardous. Follow universal precautions as established by the Centers for Disease Control and Prevention and by the Occupational Safety and Health Administration when handling and disposing of infectious agents.

DIRECTIONS FOR WASHING

Incomplete washing will adversely affect the test outcome. All washing must be performed with *Wash Buffer Concentrate (25X)* provided.

Washing can be performed manually as follows: completely aspirate the liquid from all wells by gently lowering an aspiration tip (aspiration device) into the bottom of each well. Take care not to scratch the inside of the well.

After aspiration, fill the wells with at least 0.4 mL of diluted wash solution. Let soak for 15 to 30 seconds, then aspirate the liquid. Repeat as directed under **ASSAY METHOD**. After the washing procedure, the plate is inverted and tapped dry on absorbent tissue.

Alternatively, the wash solution may be put into a squirt bottle. If a squirt bottle is used, flood the plate with wash buffer, completely filling all wells. After the washing procedure, the plate is inverted and tapped dry on absorbent tissue.

If using an automated washer, the operating instructions for washing equipment should be carefully followed.

REAGENT PREPARATION AND STORAGE

A. Reconstitution and Dilution of Hu IL-13 Standard

This assay has been calibrated against the WHO reference preparation 94/622 (NIBSC, Hertfordshire, UK, EN6 3QG). One microgram equals 1000 units.

Note: Either glass or plastic tubes may be used for standard dilutions.

1. Reconstitute standard to 10,000 pg/mL with *Standard Diluent Buffer*. Refer to standard vial label for instructions. Swirl or mix gently and allow to sit for 10 minutes to ensure complete reconstitution. Use standard within 1 hour of reconstitution.
2. Add 0.015 mL of the reconstituted standard to a tube containing 2.985 mL *Standard Diluent Buffer*. Label as 50 pg/mL Hu IL-13. Mix.
3. Add 0.300 mL of *Standard Diluent Buffer* to each of 6 tubes labeled 25, 12.5, 6.2, 3.1, 1.6, and 0.78 pg/mL Hu IL-13.
4. Make serial dilutions of the standard as described in the following dilution table. Mix thoroughly between steps.

B. Dilution of Hu IL-13 Standard

Standard:	Add:	Into:
50 pg/mL	Prepare as described in Step 2.	
25 pg/mL	0.300 mL of the 50 pg/mL std.	0.300 mL of the Diluent Buffer
12.5 pg/mL	0.300 mL of the 25 pg/mL std.	0.300 mL of the Diluent Buffer
6.2 pg/mL	0.300 mL of the 12.5 pg/mL std.	0.300 mL of the Diluent Buffer
3.1 pg/mL	0.300 mL of the 6.2 pg/mL std.	0.300 mL of the Diluent Buffer
1.6 pg/mL	0.300 mL of the 3.1 pg/mL std.	0.300 mL of the Diluent Buffer
0.78 pg/mL	0.300 mL of the 1.6 pg/mL std.	0.300 mL of the Diluent Buffer
0 pg/mL	0.300 mL of the Diluent Buffer	An empty tube

Discard all remaining reconstituted and diluted standards after completing assay. Return the *Standard Diluent Buffer* to the refrigerator.

C. Storage and Final Dilution of Streptavidin-HRP (100X)

Please Note: The *Streptavidin-HRP (100X)* is in 50% glycerol. This solution is viscous. To ensure accurate dilution, allow *Streptavidin-HRP (100X)* to reach room temperature. Gently mix. Pipette *Streptavidin-HRP (100X)* slowly. Remove excess concentrate solution from pipette tip by gently wiping with clean absorbent paper.

1. Dilute 10 µL of this 100X concentrated solution with 1 mL of *Streptavidin-HRP Diluent* for each 8-well strip used in the assay. Label as Streptavidin-HRP Working Solution.

For Example:

# of 8-Well Strips	Volume of Streptavidin-HRP (100X)	Volume of Diluent
2	20 µL solution	2 mL
4	40 µL solution	4 mL
6	60 µL solution	6 mL
8	80 µL solution	8 mL
10	100 µL solution	10 mL
12	120 µL solution	12 mL

2. Return the unused *Streptavidin-HRP (100X)* to the refrigerator.

D. Dilution of Wash Buffer

Allow the *Wash Buffer Concentrate (25X)* to reach room temperature and mix to ensure that any precipitated salts have redissolved. Dilute 1 volume of the *Wash Buffer Concentrate (25X)* with 24 volumes of deionized water (e.g., 50 mL may be diluted up to 1.25 liters, 100 mL may be diluted up to 2.5 liters). Label as Working Wash Buffer.

Store both the concentrate and the Working Wash Buffer in the refrigerator. The diluted buffer should be used within 14 days.

ASSAY METHOD: PROCEDURE AND CALCULATIONS

Be sure to read the *Procedural Notes/Lab Quality Control* section before carrying out the assay.

Allow all reagents to reach room temperature before use. Gently mix all liquid reagents prior to use.

Note: A standard curve must be run with each assay.

1. Determine the number of 8-well strips needed for the assay. Insert these in the frame(s) for current use. (Re-bag extra strips and frame. Store these in the refrigerator for future use.)
2. For the standard curve, add 100 µL of the standards to the appropriate wells. Add 100 µL of the *Standard Diluent Buffer* to zero wells. Well(s) reserved for chromogen blank should be left empty.

3. Serum, plasma, and tissue culture samples require a 2-fold dilution. For these samples, add 50 µL of the *Standard Diluent Buffer* to each well, followed by 50 µL of sample. Controls may be assayed undiluted. Tap gently on the side of the plate to mix.
4. Cover plate with *plate cover* and incubate for **2 hours at room temperature**.
5. Thoroughly aspirate or decant solution from wells and discard the liquid. Wash wells 4 times. See **DIRECTIONS FOR WASHING**.
6. Pipette 100 µL of biotinylated *Hu IL-13 Biotin Conjugate* solution into each well except the chromogen blank(s). Tap gently on the side of the plate to mix.
7. Cover plate with *plate cover* and incubate for **1 hour at room temperature**.
8. Thoroughly aspirate or decant solution from wells and discard the liquid. Wash wells 4 times. See **DIRECTIONS FOR WASHING**.
9. Add 100 µL Streptavidin-HRP Working Solution to each well except the chromogen blank(s). (Prepare the working dilution as described in **REAGENT PREPARATION AND STORAGE,** Section C.)
10. Cover plate with the *plate cover* and incubate for **30 minutes at room temperature**.
11. Thoroughly aspirate or decant solution from wells and discard the liquid. Wash wells 4 times. See **DIRECTIONS FOR WASHING**.
12. Add 100 µL of *Stabilized Chromogen* to each well. The liquid in the wells will begin to turn blue.

13. Incubate for **30 minutes at room temperature and in the dark**. ***Please Note*: Do not cover the plate with aluminum foil or metalized mylar**. The incubation time for chromogen substrate is often determined by the microtiter plate reader used. Many plate readers have the capacity to record a maximum optical density (O.D.) of 2.0. The O.D. values should be monitored and the substrate reaction stopped before the O.D. of the positive wells exceed the limits of the instrument. The O.D. values at 450 nm can only be read after the *Stop Solution* has been added to each well. If using a reader that records only to 2.0 O.D., stopping the assay after 20 to 25 minutes is suggested.
14. Add 100 µL of *Stop Solution* to each well. Tap side of plate gently to mix. The solution in the wells should change from blue to yellow.
15. Read the absorbance of each well at 450 nm having blanked the plate reader against a chromogen blank composed of 100 µL each of *Stabilized Chromogen* and *Stop Solution.* Read the plate within 2 hours after adding the *Stop Solution.*
16. Plot on graph paper the absorbance of the standards against the standard concentration. (Optimally, the background absorbance may be subtracted from *all* data points, including standards, unknowns and controls, prior to plotting.) Draw the best smooth curve through these points to construct the standard curve. If using curve fitting software, the four parameter algorithm provides the best curve fit.
17. Read the Hu IL-13 concentrations for unknown samples and controls from the standard curve plotted in Step 16. Multiply value(s) obtained for serum, plasma, or tissue culture sample(s) by 2 to correct for the 1:2 dilution in step 3. (Samples producing

signals greater than that of the highest standard (50 pg/mL) should be diluted in *Standard Diluent Buffer* and reanalyzed, multiplying the concentration found by the appropriate dilution factor.)

TYPICAL DATA

The following data were obtained for the various standards over the range of 0 to 50 pg/mL Hu IL-13.

Standard Hu IL-13 (pg/mL)	Optical Density (450 nm)
0	0.020
	0.020
0.78	0.081
	0.082
1.6	0.152
	0.157
3.1	0.301
	0.295
6.2	0.563
	0.561
12.5	1.023
	1.036
25	2.128
	2.057
50	3.360
	3.397

LIMITATIONS OF THE PROCEDURE

Do not extrapolate the standard curve beyond the 50 pg/mL standard point; the dose-response is non-linear in this region and accuracy is difficult to obtain. Dilute samples >50 pg/mL with *Standard Diluent Buffer*; reanalyze these and multiply results by the appropriate dilution factor.

The influence of various drugs, aberrant sera (hemolyzed, hyperlipidemic, jaundiced, etc.) and the use of biological fluids in place of serum samples have not been thoroughly investigated. The rate of degradation of native Hu IL-13 in various matrices has not been investigated. The immunoassay literature contains frequent references to aberrant signals seen with some sera, attributed to heterophilic antibodies. Though such samples have not been seen to date, the possibility of this occurrence cannot be excluded.

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PERFORMANCE CHARACTERISTICS

SENSITIVITY

The minimum detectable dose of Hu IL-13 is <0.5 pg/mL. This was determined by adding two standard deviations to the mean O.D. obtained when the zero standard was assayed 20 times.

PRECISION

1. Intra-Assay Precision

Samples of known Hu IL-13 concentration were assayed in replicates of 14 to determine precision within an assay.

	Sample 1	Sample 2	Sample 3
Mean (pg/mL)	4.1	13.5	35.5
SD	0.2	0.69	2.0
%CV	5.8	5.1	5.6

SD = Standard Deviation
CV = Coefficient of Variation

2. Inter-Assay Precision

Samples were assayed 42 times in multiple assays to determine precision between assays.

	Sample 1	Sample 2	Sample 3
Mean (pg/mL)	3.9	13.1	34.6
SD	0.3	0.9	3.1
%CV	7.8	6.9	9.0

SD = Standard Deviation
CV = Coefficient of Variation

LINEARITY OF DILUTION

Human serum, plasma, and tissue culture medium containing 10% fetal calf serum were spiked with 40 pg/mL of Hu IL-13 and serially diluted in *Standard Diluent Buffer* over the range of the assay. Linear regression analysis of samples versus the expected concentration yielded a correlation coefficient of 0.96 for serum, 0.97 for plasma, and 0.95 for tissue culture medium.

RECOVERY

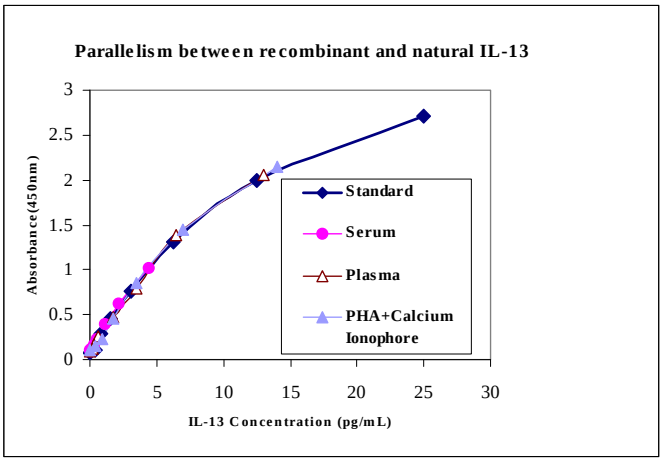
The recovery of Hu IL-13 spiked to four levels in various matrices was evaluated.

Sample Type	Recovery Range	Average % Recovery
Human serum*	95 – 108%	102%
Human EDTA plasma*	88 - 105%	96%
Human citrate plasma*	82 – 92%	87%
Human heparin plasma*	87 – 102%	88%
RPMI + 10% FBS*	85 – 99%	91%
DMEM + 10% CS*	89 – 118%	98%

* All matrices were pre-diluted 2-fold in the *Standard Diluent Buffer*.

PARALLELISM

Human serum, plasma, and tissue culture samples were serially diluted in *Standard Diluent Buffer*. The optical density of each dilution was plotted against the IL-13 standard curve. Parallelism was demonstrated by the figure below and indicated that the standard accurately reflects the IL-13 content in natural samples.



SPECIFICITY

Buffered solutions of a panel of substances at known concentrations were assayed with the Invitrogen Hu IL-13 US kit. The following substances were tested at 10,000 - 50,000 pg/mL and found to have no cross-reactivity: human EGF, VEGF, Eotaxin, IP-10, G-CSF, GM-CSF, MCP-1, MIG, MIP-1α, MIP-1β, RANTES, TNF-α, IFN-γ, IL-1β, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-12, IL-16; monkey IL-4, IL-12; Swine IL-8, IL-10; rat GM-CSF, MIP-2, TNF-α, IFN-γ, IL-1β, IL-4, IL-6, IL-10, IL-12, IL-13; mouse GM-CSF, MIP-2, TNF-α, IL-1β, IL-2, IL-4, IL-5, IL-6, IL-10, IL-12, IL-13.

EXPECTED VALUES

Seventeen sera and twenty-seven plasma samples from apparently normal individuals were evaluated with Invitrogen Human IL-13 US kit.

Sample	Average (pg/mL)	Range (pg/mL)
Serum (n = 17)	16.1	0 – 79.1
Plasma Citrate (n = 8)	8.2	0 – 29.0
Plasma EDTA (n = 9)	18.0	0 – 61.3
Plasma Heparin (n = 10)	2.0	0 – 15.9

Human PBMCs were cultured under the following conditions and the culture supernatants were assayed for Hu IL-13 released.

PBMC Culture Conditions	**Natural IL-13 Levels (pg/mL)**
Unstimulated	undetectable
LPS (1 μg/mL) – 4 hr	undetectable
PHA (5 μg/mL) – 4 hr	undetectable
PMA (10 ng/mL) – 4 hr	undetectable
PHA (5 μg/mL) + Ca^{2+} Ionophore (10 ng/mL) – 4 hr	undetectable
LPS (1 μg/mL) – 1 day	undetectable
PHA (5 μg/mL) – 1 day	26.4
PMA (10 ng/mL) – 1 day	952.7
LPS (1 μg/mL) – 5 day	undetectable
PHA (5 μg/mL) – 5 day	undetectable
PMA (10 ng/mL) – 5 day	341.8
PHA (5 μg/mL) + Ca^{2+} Ionophore (10 ng/mL) – 5 day	822.2

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Explanation of symbols

Symbol	Description	Symbol	Description
REF	Catalogue Number	LOT	Batch code
RUO	Research Use Only	IVD	*In vitro* diagnostic medical device
	Use by		Temperature limitation
	Manufacturer	EC REP	European Community authorised representative
[-]	Without, does not contain	[+]	With, contains
	Protect from light		Consult accompanying documents
	Directs the user to consult instructions for use (IFU), accompanying the product.		

Human IL-13 US Assay Summary