

## Rat IL-1 $\alpha$ ELISA KIT

Catalog Number  
EA100180

Size  
96 Tests



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## Rat IL-1 $\alpha$ ELISA KIT

**For the quantitative determination of rat interleukin 1 alpha (IL-1 $\alpha$ ) concentrations in cell culture supernates, serum, and plasma. This package insert must be read in its entirety before using this product. If you have questions or experience problems with this product, please contact our Technical Support staff. Our scientists commit themselves to providing rapid and effective help.**

**FOR RESEARCH USE ONLY  
NOT FOR USE IN DIAGNOSTIC PROCEDURES**

## INTRODUCTION

Interleukin-1 $\alpha$  (IL-1 $\alpha$ , also known as IL-1F1) and IL-1 $\beta$  (IL-1F2) are pleiotropic cytokines that belong to the IL-1 gene family. IL-1 $\alpha$  and IL-1 $\beta$  bind to the same cell surface receptors and share biological functions. The two proteins have approximately 23% amino acid (aa) sequence homology and both are synthesized as 31 kDa precursors that lack hydrophobic signal peptide sequences. Current evidence suggests that IL-1 proteins may be secreted via non-classical pathways (1-4).

Rat IL-1 $\alpha$  cDNA encodes a 270 aa residue pro-IL-1 $\alpha$  precursor (5). The 114 aa pro-region contains a nuclear localization sequence, a lysine-based myristoylation site, one phosphorylation site, and one potential N-linked glycosylation site (5-8). The 156 aa mature region contains no cysteines and one potential N-linked glycosylation site (5). Pro-IL-1 $\alpha$  is primarily localized to the cytosol after synthesis. It is known to translocate to the nucleus after cell activation and initiate gene transcription (9, 10). Some IL-1 $\alpha$  is released extracellularly and exists as either a membrane-bound form or as a circulating 17 kDa molecule. When membranebound, membrane association is mediated either via a poorly-understood cell surface lectin interaction with the glycosylated IL-1 $\alpha$  pro-form, or by interaction of myristoylated pro-IL-1 $\alpha$  with plasma membrane phospho-lipids (8, 11-13). When released as a 17 kDa soluble form, calpain initiates cleavage of the pro-IL-1 $\alpha$  precursor (14). Unlike pro-IL-1 $\beta$ , which is biologically inactive, both pro-IL-1 $\alpha$  and mature IL-1 $\alpha$  have been shown to be biologically active (15, 16). Within the mature protein, rat IL-1 $\alpha$  shares 79%, 60%, 59%, 58%, 57%, and 56% aa sequence identity with mouse, rabbit, human, bovine, canine and feline proteins, respectively (17-21). Mammalian cells known to express IL-1 $\alpha$  include brown adipocytes (22), keratinocytes (23), monocytes (24), macrophages (25), endothelial and smooth muscle cells (26), mast cells (27), Schwann cells (28), as well as osteoblasts and osteoclasts (29).

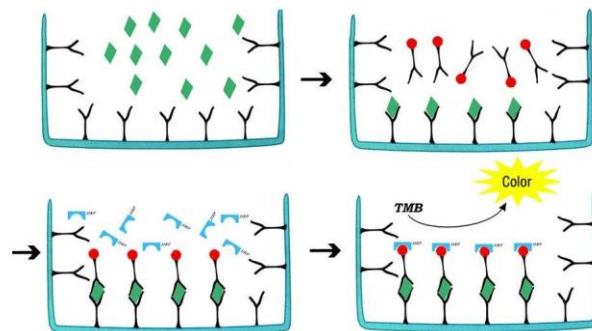
Three type I transmembrane immunoglobulin superfamily proteins, IL-1 receptor type I (IL-1 R1), IL-1 receptor type II (IL-1 R2), and IL-1 receptor accessory protein (IL-1 RAcP, IL-1 R3) are involved in the formation of high affinity cell surface IL-1 receptor complexes. Both IL-1 R1 and IL-1 R2 can bind directly to IL-1 $\alpha$ . IL-1 RAcP does not bind IL-1 $\alpha$  directly, but interacts with IL-1 R1 in the presence of IL-1 to form the high-affinity receptor

complex which is required for intracellular signal transduction. IL-1 RAcP also interacts with IL-1 R2 to form a non-functional high-affinity receptor complex that does not transduce IL-1 signals. Therefore, IL-1 R2 functions as a decoy receptor that attenuates IL-1 $\alpha$  functions (16, 30, 31).

IL-1 $\alpha$  possesses a wide variety of biological activities and plays a central role in mediating immune and inflammatory responses. Normal production of IL-1  $\alpha$  is critical for hematopoiesis, angiogenesis, osteoclast differentiation, and initiation of normal host responses to injury and infection(15,32-34). Inappropriate production of IL-1 $\alpha$  has been implicated in the production of a variety of pathological conditions including sepsis, rheumatoid arthritis, inflammatory bowel disease, insulin-dependent diabetes mellitus, and atherosclerosis (1, 13, 15).

## PRINCIPLE OF THE ASSAY

This assay employs the quantitative sandwich enzyme immunoassay technique. A monoclonal antibody specific for IL-1 $\alpha$  has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any IL-1 $\alpha$  present is bound by the immobilized antibody. Following incubation unbound samples are removed during a wash step, and then a detection antibody specific for IL-1 $\alpha$  is added to the wells and binds to the combination of capture antibody- IL-1 $\alpha$  in sample. Following a wash to remove any unbound combination, and enzyme conjugate is added to the wells. Following incubation and wash steps a substrate is added. A coloured product is formed in proportion to the amount of IL-1 $\alpha$  present in the sample. The reaction is terminated by addition of acid and absorbance is measured at 450nm. A standard curve is prepared from seven IL-1 $\alpha$  standard dilutions and IL-1 $\alpha$  sample concentration determined.



**Figure 1: Schematic diagram of the assay**

## **REAGENTS**

1. Aluminium pouches with a Microwell Plate coated with monoclonal antibody to rat IL-1 $\alpha$  (8x12)
2. 2 vials rat IL-1 $\alpha$  Standard lyophilized, 1000 pg/ml upon reconstitution
3. 2 vials concentrated Biotin-Conjugate anti-rat IL-1 $\alpha$  antibody
4. 2 vials Streptavidin-HRP solution
5. 1 bottle Standard /sample Diluent
6. 1 bottle Biotin-Conjugate antibody Diluent
7. 1 bottle Streptavidin-HRP Diluent
8. 1 bottle Wash Buffer Concentrate 20x (PBS with 1% Tween-20)
9. 1 vial Substrate Solution
10. 1 vial Stop Solution
11. 4 pieces Adhesive Films
12. Package insert

**NOTE:** [96 Tests]

## STORAGE

Table 1: Storage of the kit

<b>Unopened Kit</b>	Store at 2 - 8° C. Do not use past kit expiration date.	
	Standard /sample Diluent	May be stored for up to 1 month at 2 - 8° C.**
	Concentrated Biotin-Conjugate	
	Streptavidin-HRP solution	
	Biotin-Conjugate antibody Diluent	
	Streptavidin-HRP Diluent	
	Wash Buffer Concentrate 20x	
	Substrate Solution	
	Stop Solution	
<b>Opened/ Reconstituted Reagents</b>	Standard	Aliquot and store for up to 1 month at -20°C. Avoid repeated freeze-thaw cycles. Diluted standard shall not be reused.
	Microplate Wells	Return unused wells to the foil pouch containing the desiccant pack, reseal along entire edge of zip-seal. May be stored for up to 1 month at 2 - 8° C.**

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

### THE REQUIRED ITEMS (not provided, but can help to buy):

1. Microplate reader (450nm).
2. Micro-pipette and tips: 0.5-10, 2-20, 20-200, 200-1000µl.
3. 37 °C incubator, double-distilled water or deionized water, coordinate paper, graduated cylinder.

### PRECAUTIONS FOR USE

1. Store kit reagents between 2°C and 8°C. After use all reagents should be immediately returned to cold storage (2°C to 8°C).
2. Please perform simple centrifugation to collect the liquid before use.

3. To avoid cross contamination, please use disposable pipette tips.
4. The Stop Solution suggested for use with this kit is an acid solution. Wear eye, hand, face, and clothing protection when using this material. Avoid contact of skin or mucous membranes with kit reagents or specimens. In the case of contact with skin or eyes wash immediately with water.
5. Use clean, dedicated reagent trays for dispensing the washing liquid, conjugate and substrate reagent. Mix all reagents and samples well before use.
6. After washing microtiter plate should be fully pat dried. Do not use absorbent paper directly into the enzyme reaction wells.
7. Do not mix or substitute reagents with those from other lots or other sources. Do not use kit reagents beyond expiration date on label.
8. Each sample, standard, blank and optional control samples should be assayed in duplicate or triplicate.
9. Adequate mixing is very important for good result. Use a mini-vortexer at the lowest frequency or Shake by hand at 10min interval when there is no vortexer.
10. Avoid microtiter plates drying during the operation.
11. Dilute samples at the appropriate multiple, and make the sample values fall within the standard curve. If samples generate values higher than the highest standard, dilute the samples and repeat the assay.
12. Any variation in standard diluent, operator, pipetting technique, washing technique, incubation time and temperature, and kit age can cause variation in binding.
13. This method can effectively eliminate the interference of the soluble receptors, binding proteins and other factors in biological samples.

## **SAMPLE COLLECTION AND STORAGE**

1. **Cell Culture Supernates** - Remove particulates by centrifugation.
2. **Serum** - Use a serum separator tube (SST) and allow samples to clot for 30 minutes before centrifugation for 15 minutes at approximately 1000 x g. Remove serum, avoid hemolysis and high blood lipid samples.
3. **Plasma** - Recommended EDTA as an anticoagulant in plasma. Centrifuge for 15 minutes at 1000 x g within 30 minutes of collection.

4. Assay immediately or aliquot and store samples at -20°C. Avoid repeated freeze-thaw cycles.
5. Dilute samples at the appropriate multiple (recommended to do pre-test to determine the dilution factor).

**Note: The normal rat serum or plasma samples are suggested to make a 1:2 dilution.**

## REAGENT PREPARATION

1. Bring all reagents to room temperature before use.
2. **Wash Buffer** - Dilute 10ml of Wash Buffer Concentrate into deionized or distilled water to prepare 200ml 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** - Reconstitute the Standard with 1ml of Standard /sample Diluent. This reconstitution produces a stock solution of 1000 pg /ml. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions.

Pipette 500µl of Standard/sample Diluent into the 500 pg/ml tube and the remaining tubes. Use the stock solution to produce a 2-fold dilution series (below). Mix each tube thoroughly and change pipette tips between each transfer. The 1000 pg/mL standard serves as the high standard. The Standard/ sample Diluent serves as the zero standard (0 pg/ml).

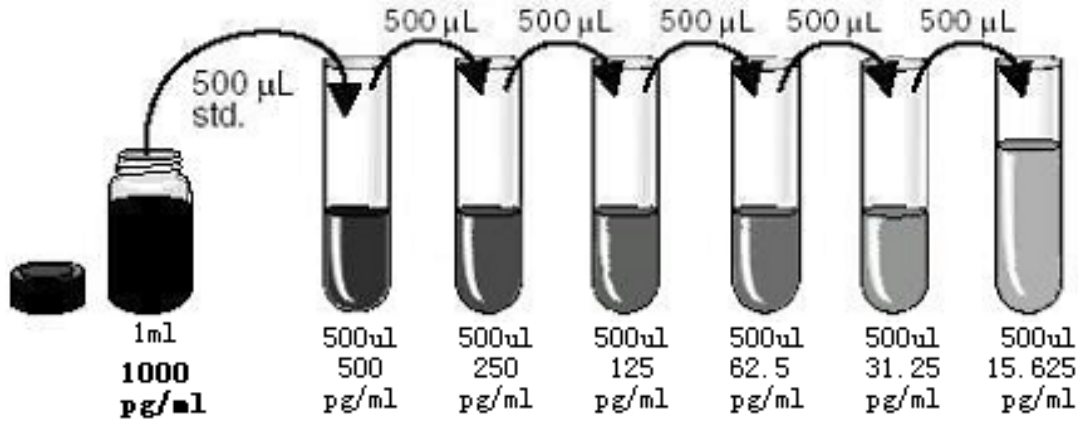
**If you do not run out of re-melting standard, store it at -20°C. Diluted standard shall not be reused.**

4. Working solution of Biotin-Conjugate anti-rat IL-1 $\alpha$  antibody:  
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: Make a 1:100 dilution of the concentrated Streptavidin-HRP solution with the Streptavidin-HRP Diluent in a clean plastic tube.

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



**Figure 2: Preparation of IL-1 $\alpha$  standard dilutions**

## GENERAL ELISA PROTOCOL

1. Prepare all reagents and working standards as directed in the previous sections.
2. Determine the number of microwell strips required to test the desired number of samples plus appropriate number of wells needed for running blanks and standards. Remove extra microwell strips from holder and store in foil bag with the desiccant provided at 2-8°C sealed tightly.
3. Add 100 $\mu$ l of Standard, control, or sample, per well, then add 50 $\mu$ l of the working solution of Biotin-Conjugate to each well. Cover with the adhesive strip provided and incubate 2 hours at RT. Adequate mixing is very important for good result. Use a mini-vortexer at the lowest frequency.
4. Aspirate each well and wash, repeating the process three times for a total of four washes. Wash by filling each well with Wash Buffer (350 $\mu$ l) using a squirt bottle, manifold dispenser or auto-washer. Complete removal of liquid at each step is essential to good performance. After the last wash, remove any remaining Wash Buffer by aspirating or decanting. Invert the plate and blot it against clean paper towels.
5. Add 100 $\mu$ l of the working solution of Streptavidin-HRP to each well. Cover with a new adhesive strip and incubate for 30 minutes at RT. Avoid placing the plate in direct light.
6. Repeat the aspiration/wash as in step 4.



7. Add 100µl of Substrate Solution to each well. Incubate for 10-20 minutes at RT. Avoid placing the plate in direct light.
8. Add 100µl of Stop Solution to each well. Gently tap the plate to ensure thorough mixing.
9. Determine the optical density of each well immediately, using a microplate reader set to 450 nm.(optionally 650nm as the reference wave length;610-650nm is acceptable)

### ASSAY PROCEDURE SUMMARY

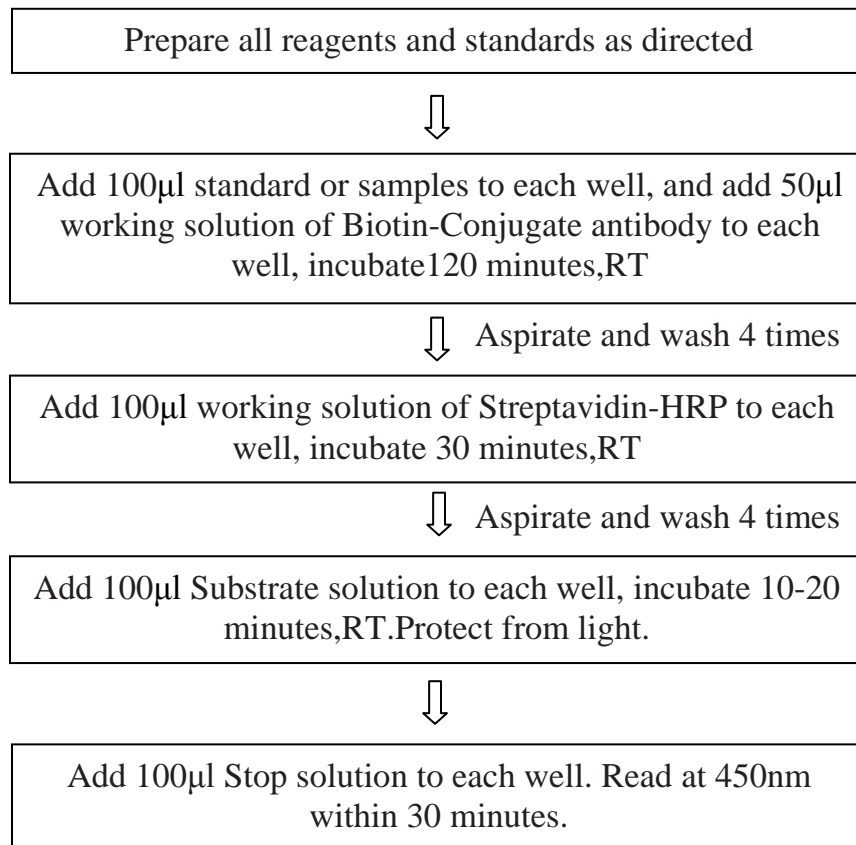


Figure 3: Assay procedure summary

## TECHNICAL HINTS

1. When mixing or reconstituting protein solutions, always avoid foaming.
2. To avoid cross-contamination, change pipette tips between additions of each standard level, between sample additions, and between reagent additions. Also, use separate reservoirs for each reagent.
3. To ensure accurate results, proper adhesion of plate sealers during incubation steps is necessary.
4. Substrate Solution should remain colorless until added to the plate. Stop Solution should be added to the plate in the same order as the Substrate Solution. Keep Substrate Solution protected from light. Substrate Solution should change from colorless to gradations of blue.
5. A standard curve should be generated for each set of samples assayed. According to the content of tested factors in the sample, appropriate diluted or concentrated samples, it is best to do pre-experiment.

## CALCULATION OF RESULTS

1. Average the duplicate readings for each standard, control, and sample and subtract the average zero standard optical density.
2. Create 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.
3. The data may be linearized by plotting the log of the IL-1 $\alpha$  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.
4. This standard curve is provided for demonstration only. A standard curve should be generated for each set of samples assayed.

Table 2: Typical data using the IL-1 $\alpha$  ELISA (Measuring wavelength: 450nm, Reference wavelength: 650nm)

Standardized (pg/ml)	OD.	OD.	Average	Corrected
0	0.076	0.071	0.074	_____
15.625	0.151	0.146	0.149	0.075
31.25	0.220	0.218	0.219	0.145
62.5	0.329	0.323	0.326	0.252
125	0.488	0.474	0.481	0.407
250	0.888	0.875	0.882	0.808
500	1.432	1.421	1.427	1.353
1000	2.132	2.119	2.126	2.052

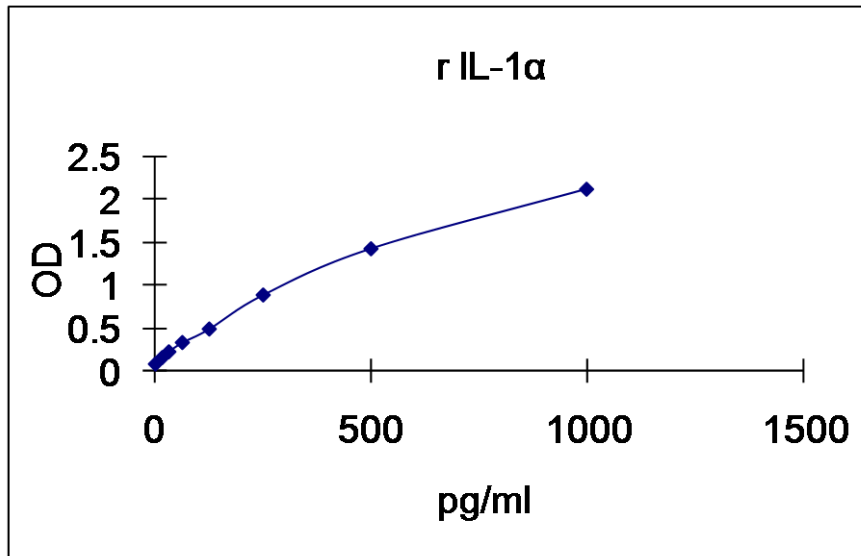


Figure 4: Representative standard curve for IL-1 $\alpha$  ELISA. IL-1 $\alpha$  was diluted in serial two-fold steps in Sample Diluent.

**Do not use this standard curve to derive test results. A standard curve must be run for each group of microwell strips assayed.**

## SENSITIVITY, SPECIFICITY AND REPEATABILITY

1. **REPEATABILITY:** The coefficient of variation of both intra-assay and inter-assay were less than 10%.
2. **SENSITIVITY:** The minimum detectable dose was 7pg/mL.
3. **SPECIFICITY:** This assay recognizes both natural and recombinant rat IL-1 $\alpha$ . The factors listed below were prepared at 50ng/ml in Standard /sample Diluent and assayed for cross-reactivity and no significant cross-reactivity or interference was observed.

Table 3: Factors assayed for cross-reactivity

Recombinant human	Recombinant mouse	Recombinant rat
IL-1 $\alpha$	IL-1 $\alpha$	IL-1ra
IL-1 $\beta$	IL-1 $\beta$	IL-1 $\beta$
IL-1 R1	IL-1ra	IL-2
IL-1 R2	IL-1 R2	IL-4
IL-1 R3	IL-1 R4	IL-6
IL-1 R6		IL-10
IL-1 R9		TNF- $\alpha$
		IFN- $\gamma$

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**If you have any questions, please tell us!**