

Rat IL-1 β ELISA Kit

Catalog No. BSKR1006 (96 wells)

For Use with serum, plasma and cell culture supernatants

For Research Use Only. Not for use in diagnostic procedures.

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Introductions

The Interleukin 1 (IL-1) family of proteins consists of the classic members IL-1 α , IL-1 β , and IL-1ra, plus IL-18, IL-33, and IL-1F5-10. IL-1 α and IL-1 β bind to the same cell surface receptors and share biological functions. IL-1 is not produced by unstimulated cells of healthy mice with the exception of skin keratinocytes, some epithelial cells, and certain cells of the central nervous system. In response to inflammatory agents, infections, or microbial endotoxins, however, a dramatic increase in the production of IL-1 by macrophages and various other cell types is observed. IL-1 β plays a central role in immune and inflammatory responses, bone remodeling, fever, carbohydrate metabolism, and GH/IGF-1 physiology. Inappropriate or prolonged production of IL-1 has been implicated in a variety of pathological conditions including sepsis, rheumatoid arthritis, inflammatory bowel disease, acute and chronic myelogenous leukemia, insulin-dependent diabetes mellitus, atherosclerosis, neuronal injury, and aging-related diseases.

IL-1 α and IL-1 β are structurally related polypeptides that show approximately 25% homology at the amino acid level. Both are synthesized as 31 kDa precursors that are subsequently cleaved into mature proteins of approximately 17.5 kDa. Cleavage of the IL-1 β precursor by Caspase-1/ICE is a key step in the inflammatory response. Neither IL-1 α nor IL-1 β contains a typical hydrophobic signal peptide, but evidence suggests that these factors can be secreted by non-classical pathways. A portion of unprocessed IL-1 α can be presented on the cell membrane and may retain biological activity. The precursor form of IL-1 β , unlike the IL-1 α precursor, shows little or no biological activity in comparison to the processed form. Both unprocessed and mature forms of IL-1 β are exported from the cell.

IL-1 α and IL-1 β exert their effects through immunoglobulin superfamily receptors that additionally bind IL-1ra. The 80 kDa transmembrane type I receptor (IL-1 RI) is expressed on T cells, fibroblasts, keratinocytes, endothelial cells, synovial lining cells, chondrocytes, and hepatocytes. The 68 kDa transmembrane type II receptor (IL-1 RII) is expressed on B cells, neutrophils, and bone marrow cells. The two IL-1 receptor types show approximately 28% homology in their extracellular domains but differ significantly in that the type II receptor has a cytoplasmic domain of only 29 amino acids (aa), whereas the type I receptor has a 217 amino acid cytoplasmic domain. IL-1 RII does not appear to signal in response to IL-1 and may function as a decoy receptor that attenuates IL-1 function. The IL-1 receptor accessory protein (IL-1 RAcP) associates with IL-1 RI and is required for IL-1 RI signal transduction. IL-1ra is a secreted molecule that functions as a competitive inhibitor of IL-1. Soluble forms of both IL-1 RI and IL-1 RII have been detected in human plasma, synovial fluids, and the conditioned media of several human cell lines. In addition, IL-1 binding proteins that resemble soluble IL-1 RII are encoded by vaccinia and cowpox viruses.

Principle of the Assay

This assay employs the quantitative sandwich enzyme immunoassay technique. A monoclonal antibody specific for IL-1 β has been pre-coated onto a microplate. Standard, control, or sample and the working solution of Biotin-Conjugate are pipetted into the wells. Following incubation and wash steps, any IL-1 β present is bound by the immobilized antibody and the detection antibody specific for IL-1 β binds to the combination of capture antibody-IL-1 β 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 β 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 β standard dilutions and IL-1 β sample concentration determined.

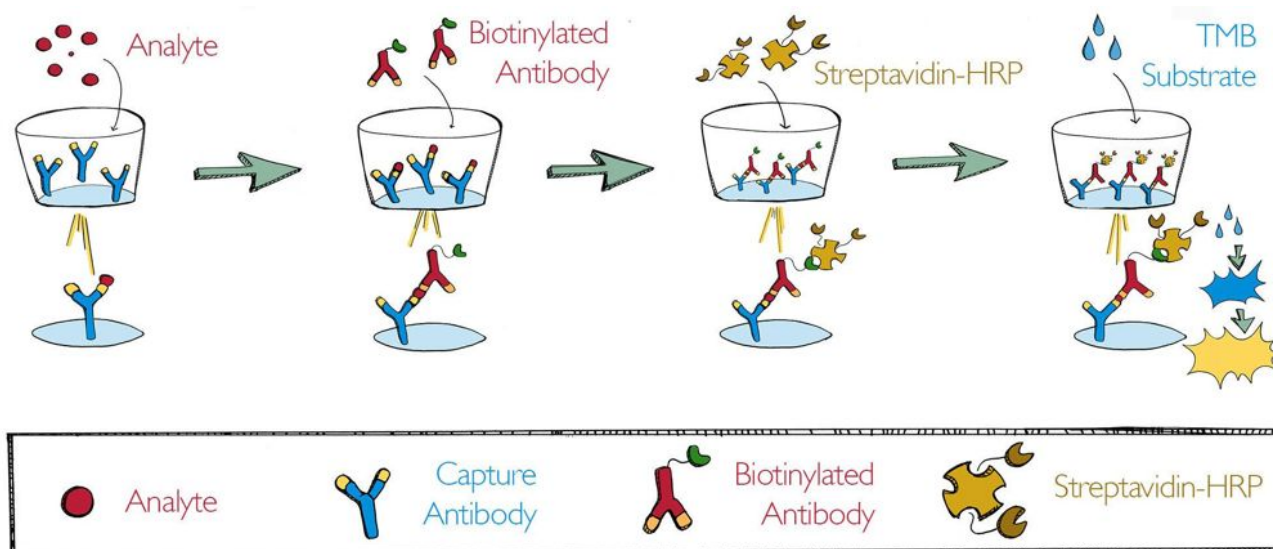


Figure 1. Schematic diagram of the assay

Materials supplied

Table 1. Kit Components

Kit Components	96 wells Quantity/Size
Aluminium pouches with a Microwell Plate coated with antibody to rat IL-1 β (8 \times 12)	1 plate
Rat IL-1 β Standard lyophilized, 4000pg/ml upon reconstitution	2 vials
concentrated Biotin-Conjugate anti-rat IL-1 β antibody	2 vials
Streptavidin-HRP solution	2 vials
Standard /sample Diluent	1 bottle
Biotin-Conjugate antibody Diluent	1 bottle
Streptavidin-HRP Diluent	1 bottle
Wash Buffer Concentrate 20x (PBS with 1% Tween-20)	1 bottle
Substrate Solution	1 vial
Stop Solution	1 vial
Adhesive Films	4 pieces
Product data sheet	1 copy

Storage

Table 2. Storage of the kit

Unopened Kit	Store at 2 - 8°C. Do NOT use past kit expiration date!	
Opened/ Reconstituted Reagents	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	
	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.

Materials Needed but Not Supplied

1. Microplate reader (450nm).
2. Micro-pipette and tips: 0.5-10, 2-20, 20-200, 200-1000µL.
3. 37°C incubator.
4. Double-distilled water or deionized water.
5. Coordinate paper.
6. Graduated cylinder.

Precautions for Use

1. Store kit reagents between 2°C and 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 the label.

- Each sample, standard, blank and optional control samples should be assayed in duplicate or triplicate.
- 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.
- Avoid microtiter plates drying during the operation.
- 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.
- Any variation in standard diluent, operator, pipetting technique, washing technique, incubation time and temperature, and kit age can cause variation in binding.
- This method can effectively eliminate the interference of the soluble receptors, binding proteins and other factors in biological samples.

Sample Collection and Storage

- Cell Culture Supernatants** - Remove particulates by centrifugation.
- 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.
- Plasma** - Recommended EDTA as an anticoagulant in plasma. Centrifuge for 15 minutes at 1000 x g within 30 minutes of collection.
- Assay immediately or aliquot and store samples at -20°C. Avoid repeated freeze-thaw cycles.
- 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

- Bring all reagents to room temperature before use.
- 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.
- Standard** - Reconstitute the Standard with 1mL of Standard /sample Diluent. This reconstitution produces a stock solution of 4000 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 2000 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 4000 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.

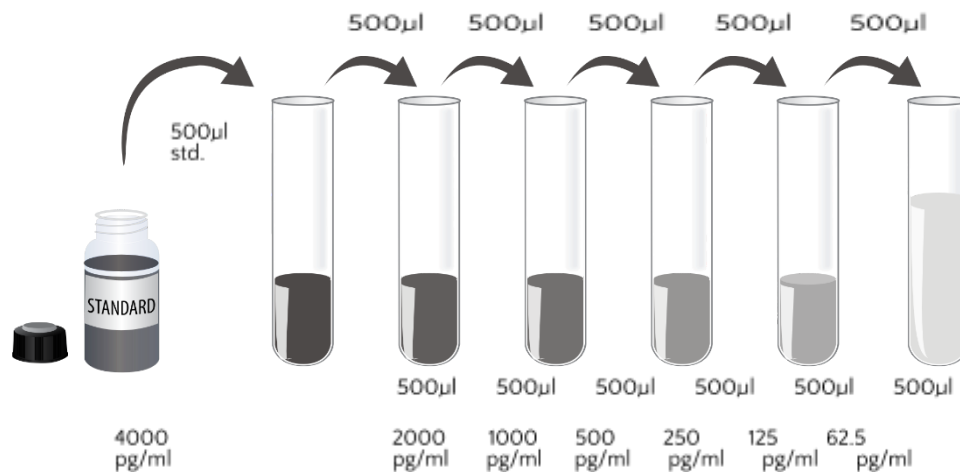


Figure 2. Preparation of IL-1 β standard dilutions

- Working solution of Biotin-Conjugate anti-rat IL-1 β 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.

- 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.

General ELISA Protocol

- Prepare all reagents and working standards as directed in the previous sections.
- 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.
- Add 100 μL of Standard, control, or sample, per well. Cover with the adhesive strip provided. Incubate for 1.5 hours at 37°C.
- 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 μL) 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.
- Add 100 μL of the working solution of Biotin-Conjugate to each well. Cover with a new adhesive strip and incubate 1 hours at 37°C.
- Repeat the aspiration/wash as in step 4.
- Add 100 μL of the working solution of Streptavidin-HRP to each well. Cover with a new adhesive strip and incubate for 30 minutes at 37°C. Avoid placing the plate in direct light.
- Repeat the aspiration/wash as in step 4.
- Add 100 μL of Substrate Solution to each well. Incubate for 10-20 minutes at 37°C. Avoid placing the plate in direct light.
- Add 100 μL of Stop Solution to each well. Gently tap the plate to ensure thorough mixing.

11. Determine the optical density of each well immediately, using a microplate reader set to 450 nm (optionally 630nm as the reference wavelength; 610–650nm is acceptable).

Assay Procedure Summary

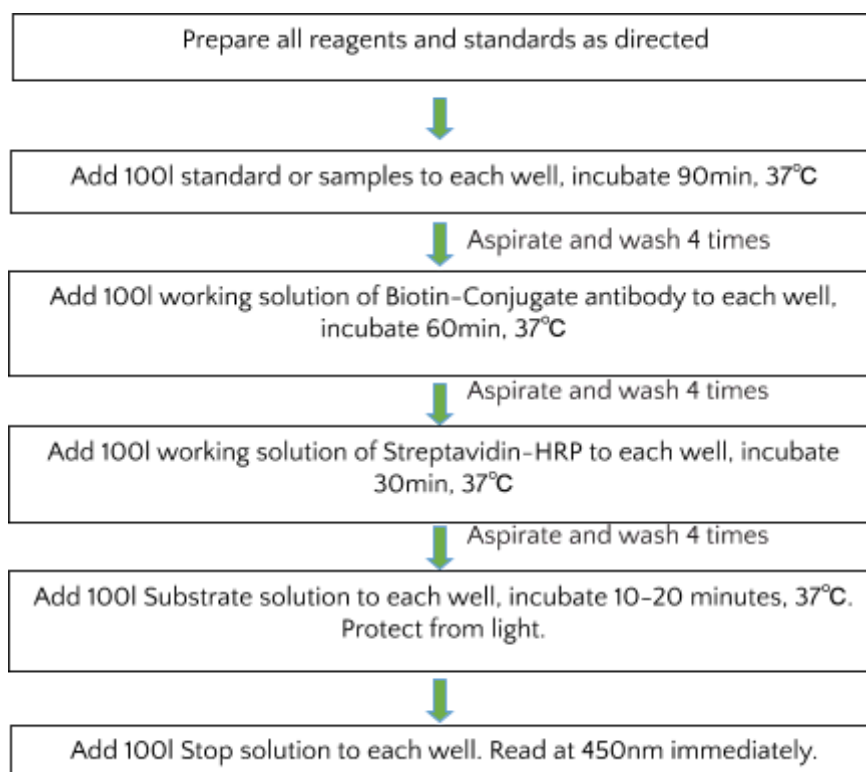


Figure 3. Assay procedure summary

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.

- The data may be linearized by plotting the log of the IL-1 β 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.
- This standard curve is provided **for demonstration only**. A standard curve should be generated for each set of samples assayed.

Table 3. Typical data using the IL-1 β ELISA (Measuring wavelength:450nm, Reference wavelength:630nm)

Standard (pg/ml)	OD.	OD.	Average	Corrected
0	0.055	0.061	0.058	--
62.5	0.130	0.122	0.126	0.128
125	0.192	0.186	0.189	0.199
250	0.338	0.332	0.335	0.333
500	0.580	0.560	0.57	0.574
1000	1.004	0.988	0.996	0.980
2000	1.631	1.526	1.578	1.590
4000	2.320	2.410	2.365	2.362

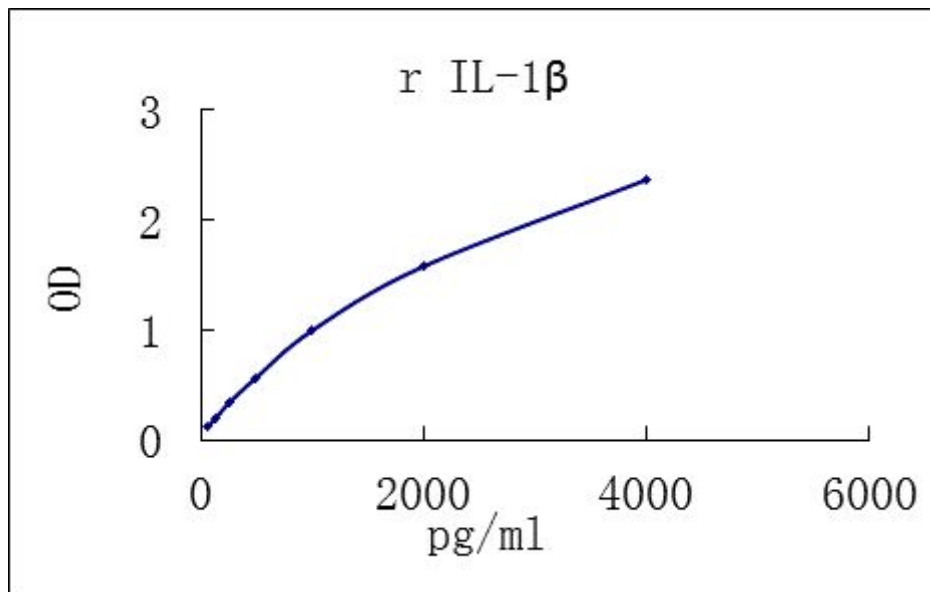


Figure 4. Representative standard curve for IL-1 β ELISA

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

Performance Characteristics

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

SENSITIVITY: The minimum detectable dose was 15pg/mL.

SPECIFICITY: This assay recognizes both natural and recombinant rat IL-1 β . 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 4. Factors assayed for cross-reactivity

Recombinant rat	Recombinant human
IL-1 α	IL-1
IL-2	IL-2
IL-4	IL-6
IL-6	
IL-8	
IL-10	
TNF- α	
IFN- γ	