PRODUCT INFORMATION & MANUAL

Human IL-2 Valukine™ ELISA

Catalog Number: VAL110

For the quantitative determination of natural and recombinant human Interleukin 2 (IL-2) concentrations

For research use only.
Not for diagnostic or therapeutic procedures.

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Please refer to the kit label for expiry date.
Novus kits are guaranteed for 3 months from date of receipt

Version 202410.5

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I. BACKGROUND

Human Interleukin 2 (IL-2), also known as T cell growth factor (TCGF), is a 15-18 kDa variably glycosylated α-helical polypeptide that is a member of the common gamma chain (γc) cytokine family (1-4). It exists as a monomer and has a notably short half-life (<30 minutes) (1). Human IL-2 is synthesized as a 153 amino acid (aa) precursor that contains a 20 aa signal sequence plus a 133 aa mature region (5, 6). The mature region contains one utilized O-linked glycosylation site at Thr3, plus three cysteines, two of which form an intrachain disulfide bond that is essential for activity (7). Mature human IL-2 shares 73%, 66%, 78% and 97% aa sequence identity with canine, rat, feline and rhesus monkey IL-2, respectively. Although human IL-2 shares only approximately 60% aa identify with the highly polymorphic mouse IL-2, human IL-2 is known to be active on mouse IL-2 responsive cells. Cells reported to secrete IL-2 include γδ T cells (8), activated conventional $CD4^+$ and $CD8^+$ T cells (1, 9), neurons (10, 11), microglia (12), and hematopoietic stem cells (13).

The receptor for IL-2 (IL-2R) is composed of three subunits, the 55 kDa CD25/IL-2Rα chain, the 70 kDa CD122/IL-2Rβ chain, and the 65 kDa CD132/ γc chain (1, 3). IL-2 first binds to CD25, the binary complex then recruits CD122 and CD132 to form the quaternary signaling complex (1, 14). In addition to IL-2, CD122/IL-2Rβ is used by IL-15 in its quaternary signaling complex. CD132/ γc also serves as a signaling receptor for IL-4, -7, -9, -15 and -21 (1, 3).

In vitro studies have shown an important role for IL-2 in T cell activation and expansion. In vivo, IL-2 is critical for the development, maintenance and function of regulatory T cells (Treg) which provide protection against autoimmune disease. On the other hand, IL-2 can also promote autoimmune inflammation in target organs through its roles in regulating the expression of T cell trafficking genes, and production of Th2 cytokines. Within the $CD8^+$ T cell subset, IL-2 is essential for optimal primary responses and differentiation into terminal effector cells. IL-2 also promotes the development of activated $CD8^+$ T cells into memory cells (1).

II. OVERVIEW

A. PRINCIPLE OF THE ASSAY

This assay employs the quantitative sandwich enzyme immunoassay technique. An antibody specific for human IL-2 has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any human IL-2 present is bound by the immobilized antibody. After washing away any unbound substances, an enzyme-linked antibody specific for human IL-2 is added to the wells. Following a wash to remove any unbound antibody-enzyme reagent, TMB substrate (Chromogenic agent) is added to the wells and color develops in proportion to the amount of human IL-2 bound in the initial step. The color development is stopped, and the intensity of the color is measured.

B. LIMITATIONS OF THE PROCEDURE

- **FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC ROCEDURES.**
- This kit is suitable for cell culture supernate and human serum.
- The kit should not be used beyond the expiration date on the kit label.
- Do not mix or substitute reagents with those from other lots or sources.
- If samples generate values higher than the highest standard, dilute the samples with Calibrator Diluent (1×) and repeat the assay.
- Any variation in operator, pipetting technique, washing technique, incubation time or temperature, and kit age can cause variation in binding.

III. ADVANTAGES

A. PRECISION

Intra-assay Precision (Precision within an assay)

Three samples were tested twenty times on one plate to assess intra-assay precision.

Inter-assay Precision (Precision between assays)

Three samples were tested in twenty separate assays to assess inter-assay precision.

	Intra-assay Precision			**Inter-assay Precision**		
Sample	1	2	3	1	2	3
Mean (pg/mL)	162	435	809	170	470	897
Standard Deviation	6.4	17.3	28.5	11.7	28.4	49.0
CV%	3.9	4.0	3.5	6.9	6.0	5.5

B. RECOVERY

The recovery of human IL-2 spiked to different levels throughout the range of the assay in cell culture media was evaluated. The recovery ranged from 98 to 110% with an average of 106%.

The recovery of human IL-2 spiked to different levels throughout the range of the assay in human serum was evaluated. The recovery ranged from 71 to 95% with an average of 79%.

C. SENSITIVITY

The minimum detectable dose (MDD) of IL-2 is typically less than 15.6 pg/mL.

The MDD was determined by adding two standard deviations to the mean optical density value of twenty zero standard replicates and calculating the corresponding concentration.

D. CALIBRATION

This immunoassay is calibrated against highly purified *E. coli*-expressed recombinant human IL-2 produced at R&D Systems. The NIBSC/WHO 2nd International Standard for IL-2 (86/500), which was intended as a potency standard, was evaluated in this kit. The NIBSC/WHO standard is *E. coli* -derived recombinant human IL-2.

The dose response curve of the International Standard (86/500) parallels the Valukine standard curve. To convert sample values obtained with the Valukine Human IL-2 kit to approximate NIBSC 86/500 units, use the equation below.

NIBSC (86/500) approximate value (IU/mL) = 0.022 × Valukine Human IL-2 value (pg/mL)

E. LINEARITY

To assess the linearity of the assay, different samples were containing or spiked with high concentrations of human IL-2 and diluted with Calibrator Diluent (1×) to produce samples with values within the dynamic range of the assay.

Dilution	Average % of Expected	Range (%)
1:2	103	101 - 107
1:4	109	101 - 120
1:8	111	101 - 117
1:16	112	99 - 122

F. SAMPLE VALUES

Cell Culture Supernates - Human peripheral blood mononuclear cells (1×10^6 cells/mL) were cultured in RPMI supplemented with 10% fetal calf serum, 50 µM β-mercaptoethanol, 2 mM L-glutamine, 100 U/mL penicillin, and 100 µg/mL streptomycin sulfate and stimulated for 24 hours with 10 µg/mL PHA. An aliquot of the cell culture supernate was removed, assayed for levels of natural IL-2, and measured 2172 pg/mL.

Human serum – Five serum samples were evaluated for the presence of IL-2 in this assay. All samples measured below the lowest standard, 31.3 pg/mL.

G. SPECIFICITY

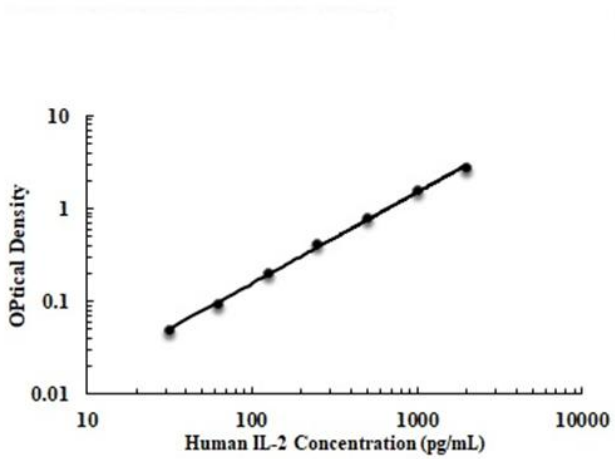
This assay recognizes both natural and recombinant human IL-2. The following factors were prepared at 100 ng/mL and assayed for cross-reactivity. Preparations of the following factors at 100 ng/mL in a mid-range rhIL-2 control were assayed for interference. No significant cross-reactivity or interference was observed.

Recombinant human	Recombinant mouse
IL-2 sRα	IL-2
IL-2 Rβ	IL-4
IL-2 Rγ	
IL-4	

IV. EXPERIMENT

EXAMPLE STANDARD

The standard curve is provided for demonstration only. A standard curve should be generated for each set of samples assayed.



pg/ml	OD	Average	Corrected
0	0.016 0.017	0.017	-
31.3	0.066 0.066	0.066	0.049
62.5	0.110 0.111	0.111	0.094
125	0.212 0.213	0.213	0.196
250	0.417 0.431	0.424	0.407
500	0.789 0.819	0.804	0.787
1000	1.557 1.562	1.560	1.543
2000	2.728 2.741	2.735	2.718

V. KIT COMPONENTS AND STORAGE

A. MATERIALS PROVIDED

Parts	Description	Size
Human IL-2 Microplate	96 well polystyrene microplate (12 strips of 8 wells) coated with an antibody against human IL-2	1 plate
Human IL-2 Conjugate	Solution of antibody against human IL-2 conjugated to horseradish peroxidase	1 vial
Human IL-2 Standard	Recombinant human IL-2 in a buffered protein base; lyophilized. Refer to the vial label for reconstitution volume.	1 vial
Calibrator Diluent (5×)/RD5P	A 5× concentrated buffered protein base used to dilute standard and samples	1 vial
Wash Buffer Concentrate (25×)	A 25× concentrated solution of buffered surfactant	1 vial
TMB Substrate	TMB ELISA Substrate Solution/TMB Substrate Solution	2 vials
Stop Solution	2 N sulfuric acid	1 vial
Plate Sealers	Adhesive strip	3 strips

B. STORAGE

<table>
<tr><td>Unopened Kit</td><td colspan="2">Store at 2-8°C. Do not use past kit expiration date.</td></tr>
<tr><td rowspan="6">Opened/ Reconstituted Reagents</td><td>Wash Buffer (1×)</td><td rowspan="4">May be stored for up to 1 month at 2-8°C.*</td></tr>
<tr><td>Stop Solution</td></tr>
<tr><td>Conjugate</td></tr>
<tr><td>TMB Substrate</td></tr>
<tr><td>Standard</td><td>Aliquot and store for up to 1 month at <-20°C in a manual defrost freezer. * Avoid repeated freeze-thaw cycles.</td></tr>
<tr><td>Calibrator Diluent (5×) /RD5P</td><td>May be stored for up to 1 month at 2-8 °C.*
Use and discard diluted Calibrator Diluent (1×). Prepare fresh for each assay.</td></tr>
<tr><td>Microplate Wells</td><td>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.*</td></tr>
</table>

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

C. OTHER SUPPLIES REQUIRED

- Microplate reader capable of measuring absorbance at 450 nm, with the correction wavelength set at 540 nm or 570 nm.
- Pipettes and pipette tips.
- Deionized or distilled water.
- Squirt bottle, manifold dispenser, or automated microplate washer.
- 500 mL graduated cylinder.

D. PRECAUTION

- Some components in this kit contain a preservative which may cause an allergic skin reaction. Avoid breathing mist.
- The Stop Solution provided with this kit is an acid solution. Wear eye, hand, face, and clothing protection when using this material.

VI. PREPARATION

A. SAMPLE COLLECTION AND STORAGE

Cell Culture Supernates - Remove particulates by centrifugation and assay immediately or aliquot and store samples at ≤-20 °C. Avoid repeated freeze-thaw cycles. Samples may require dilution with Calibrator Diluent (1×).

Serum - Use a serum separator tube (SST) and allow samples to clot for 30 minutes at room temperature before centrifugation for 15 minutes at 1000 × g. Remove serum and assay immediately or aliquot and store samples at ≤-20 °C. Avoid repeated freeze-thaw cycles. Samples may require dilution with Calibrator Diluent (1×).

B. SAMPLE PREPARATION

Human serum samples recommend a 2-fold dilution. A suggested 2-fold dilution is 100 µL of sample + 100 µL of Calibrator Diluent (1×). Optimal dilutions should be determined by the end user.

C. REAGENT PREPARATION

Note: Bring all reagents to room temperature before use.

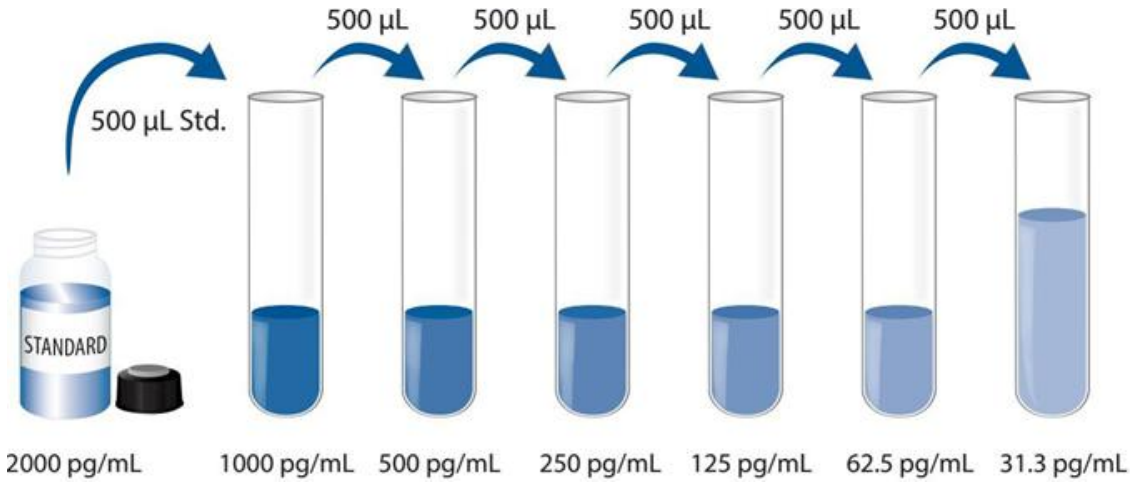
Wash Buffer (1×) - If crystals have formed in the concentrate, warm to room temperature and mix gently until the crystals have completely dissolved. Dilute 20 mL of Wash Buffer Concentrate (25×) into deionized or distilled water to prepare 500 mL of Wash Buffer (1×).

Calibrator Diluent (1×) - Use deionized or distilled water to prepare Calibrator Diluent (1×).

Human IL-2 Standard- Refer to the vial label for the reconstitution volume* This reconstitution produces a stock solution of 2000 pg/mL. Allow the standard to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions.

*If you have any question, please seek help from our Technical Support.

Pipette 500 µL of Calibrator Diluent (1×) into each tube. Use the stock solution to produce a dilution series (below). Mix each tube thoroughly before the next transfer. The undiluted standard serves as the high standard (2000 pg/mL). The Calibrator Diluent (1×) serves as the zero standard (0 pg/mL).



D. TECHNICAL HINTS

- When mixing or reconstituting protein solutions, always avoid foaming.
- 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.
- It is recommended that the samples be pipetted within 15 minutes.
- To ensure accurate results, proper adhesion of plate sealers during incubation steps is necessary.
- TMB Substrate should remain colorless until added to the plate. Keep TMB Substrate protected from light. TMB Substrate should change from colorless to gradations of blue.
- Stop Solution should be added to the plate in the same order as the TMB Substrate. The color developed in the wells will turn from blue to yellow upon addition of the Stop Solution. Wells that are green in color indicate that the Stop Solution has not mixed thoroughly with the TMB Substrate.

VII.ASSAY PROCEDURE

Note: Bring all reagents and samples to room temperature before use. It is recommended that all samples and standards be assayed in duplicate.

1. Prepare all reagents and working standards as directed in the previous sections.
2. Remove excess microplate strips from the plate frame, return them to the foil pouch containing the desiccant pack, and reseal.
3. Add 100 µL of standard and prepared sample per well. Cover with the adhesive strip provided. **Incubate for 2 hours at room temperature.** A plate layout is provided for a record of standards and samples assayed.
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 (400 µL) using a squirt bottle, manifold dispenser, or autowasher. 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 200 µL of IL-2 Conjugate to each well. Cover with a new adhesive strip. **Incubate for 2 hours at room temperature**.
6. Repeat the aspiration/wash as in step 4.
7. Add 200 µL of TMB Substrate to each well. **Incubate for 30 minutes at room temperature. Protect from light**.
8. Add 50 µL of Stop Solution to each well. Gently tap the plate to ensure thorough mixing.
9. Determine the optical density of each well within 10 minutes, using a microplate reader set to 450 nm. If wavelength correction is available, set to 540 nm or 570 nm. If wavelength correction is not available, subtract readings at 540 nm or 570 nm from the readings at 450 nm. This subtraction will correct for optical imperfections in the plate. Readings made directly at 450 nm without correction may be higher and less accurate.
10. **CALCULATION OF RESULTS**

    Average the duplicate readings for each standard and sample and subtract the average zero standard optical density (O.D.). 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 human IL-2 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.

VIII. REFERENCES

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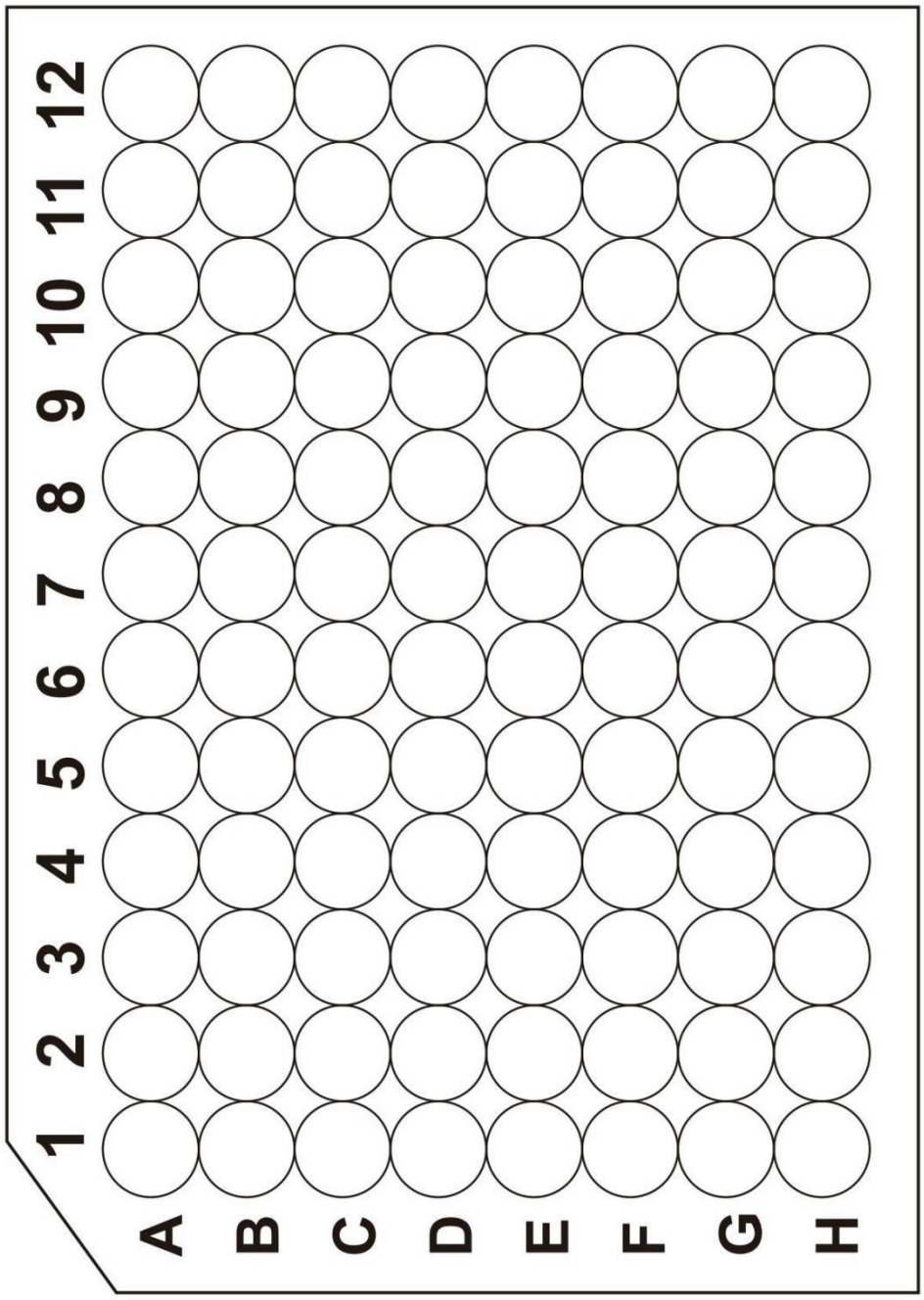
PLATE LAYOUT

Use this plate layout to record standards and samples assayed.



产品信息及操作手册

人 IL-2 Valukine™ ELISA 试剂盒

目录号：VAL110

适用于定量检测天然和重组人白介素 2（IL-2）的浓度

科研专用，不可用于临床诊断

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版本号 202410.5

目录

I. 背景

人白细胞介素2（IL-2），又称为T细胞生长因子（TCGF），是一个15-18 kDa大小的具有不同糖基化的α-螺旋多肽，属于常见的γ链（γc）细胞因子家族成员（1-4）。它以单体存在，半衰期很短（<30分钟）（1）。人IL-2的前体有153个氨基酸，其中包含一个20个氨基酸的信号序列，和一个133个氨基酸的成熟多肽（5, 6）。IL-2成熟蛋白包含一个在3位苏氨酸可O型糖基化的位点和三个半胱氨酸，其中的两个半胱氨酸所形成的链内二硫键是IL-2活性所必不可少的（7）。成熟的人IL-2氨基酸序列与犬、大鼠、猫和猕猴的IL-2同源性分别为73%、66%、78%和97%。虽然人IL-2与高度多态的小鼠IL-2仅有60%的氨基酸同源性，但人IL-2对小鼠细胞也具有生物活性。据报道分泌IL-2的细胞包括γδ T细胞（8）、活化的常规$CD4^+$和$CD8^+$T细胞（1, 9）、神经元（10, 11）、小胶质细胞（12）、造血干细胞（13）。

IL-2受体（IL-2R）由三个亚基构成，即一个55 kDa的CD25/IL-2Rα链、一个70 kDa的CD122/IL-2Rβ链，以及一个65 kDa的CD132/γc链（1, 3）。IL-2先与CD25结合，形成的二亚基复合物再招募CD122和CD132，形成具有四个亚基的信号复合物（1, 14）。除了能与IL-2形成复合物，CD122/IL-2Rβ也可同IL-15形成四亚基信号复合物。CD132/c亦可成为IL-4、IL-7、IL-9、IL-15和IL-21信号的受体（1, 3）。

体外研究表明，IL-2在T细胞活化和扩增中起重要作用。在体内，IL-2是调节性T细胞（Treg）发育、维持和功能的关键，而调节性T细胞可为自身免疫性疾病提供保护。此外，IL-2也可通过调节T细胞贩运基因的表达和Th2型细胞因子的产生，从而促进其靶器官自身免疫性炎症。在$CD8^+$T细胞亚群中，IL-2是获得最佳一级反应和分化到终端效应细胞的必要关键。IL-2也促进了$CD8^+$T细胞的发育和激活成为记忆细胞（1）。

II. 概述

A. 检测原理

本实验采用双抗体夹心ELISA法。抗人IL-2抗体包被于微孔板上，样品和标准品中的人IL-2会与固定在板上的抗体结合，游离的成分被洗去；加入辣根过氧化酶标记的抗人IL-2检测抗体进行孵育。洗涤去除未结合的试剂后，加入TMB底物溶液（显色剂）。溶液颜色与结合目标蛋白成正比；加入终止液；用酶标仪测定吸光度。

B. 检测局限

- **仅供科研使用，不可用于体外诊断；**
- 该试剂盒适用于细胞培养上清样本和人血清样本；
- 请在试剂盒有效期内使用；
- 不同试剂盒及不同批号试剂盒的组分不能混用；
- 样本值若大于标准曲线的最高值，应将样本用标准品稀释液（1×）稀释后重新检测；
- 检测结果的不同可由多种因素引起，包括实验人员的操作、移液器的使用方式、洗板技术、反应时间或温度、试剂盒的效期等。

III. 优势

A. 精确度

板内精确度（同一板内不同孔间的精确度）

已知浓度的三个样本，在同一板内分别检测20次，以确定板内精确度。

板间精确度（不同板之间的精确度）

已知浓度的三个样本，在不同板间分别检测20次，以确定板间精确度。

	板内精确度			板间精确度		
样本	1	2	3	1	2	3
平均值 (pg/mL)	162	435	809	170	470	897
标准差	6.4	17.3	28.5	11.7	28.4	49.0
CV%	3.9	4.0	3.5	6.9	6.0	5.5

B. 回收率

在细胞培养基样本中掺入检测范围内不同水平的人IL-2，测定其回收率。回收率范围在98-110%，平均回收率在106%。

在人血清样本中掺入检测范围内不同水平的人IL-2，测定其回收率。回收率范围在71-95.0%，平均回收率在79%。

C. 灵敏度

人IL-2的最低可测剂量（MDD）一般小于15.6 pg/mL。

MDD是根据20个重复的零标准品孔的吸光度值的平均值加两倍标准差计算得到的相对应浓度。

D. 校正

此ELISA试剂盒是针对R&D Systems生产的大肠杆菌表达的高纯度重组人IL-2进行校准的。NIBSC/WHO IL-2第2国际标准品(86/500)作为效价标准，在本试剂盒中进行了评估。NIBSC/WHO标准品是大肠杆菌来源的重组人IL-2。

国际标准品(86/500)的剂量反应曲线与Valukine标准曲线平行。若要将使用Valukine Human IL-2 kit获得的样本值转换为NIBSC 86/500的近似单位，请使用以下公式：

NIBSC (86/500) approximate value (IU/mL) = 0.022 × Valukine Human IL-2 value (pg/mL)

E. 线性

不同的样本中含有或掺入高浓度的人IL-2，然后用标准品稀释液（1×）将样本稀释到检测范围内，测定其线性。

稀释倍数	平均值/期待值（%）	范围 (%)
1:2	103	101 - 107
1:4	109	101 - 120
1:8	111	101 - 117
1:16	112	99 - 122

F. 样本预值

细胞上清样本-人的外周血单核细胞（1×10^6 细胞/mL）培养于含有10%胎牛血清的RPMI1640 培养基中，细胞培养基还含有2 mM L-谷氨酰胺、50 μM β-巯基乙醇、100 U/mL青霉素、100 μg/mL链霉素，另加10 μg/mL PHA刺激细胞，培养24小时。取细胞上清液测定IL-2含量，结果为2172 pg/mL。

人血清样本-使用本试剂盒检测了5份人血清样本中IL-2的水平。所有样本的检测值均低于最低标准品，31.3 pg/mL。

G. 特异性

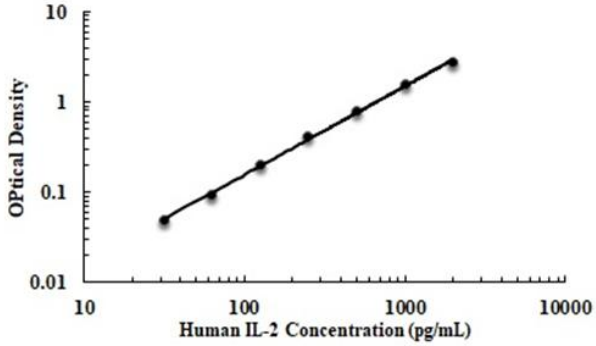
此ELISA法可检测天然及重组人IL-2蛋白。将以下因子配制成100 ng/mL的浓度来检测与人IL-2的交叉反应。将100 ng/mL的干扰因子掺入中间范围的重组人 IL-2对照品中，来检测对人IL-2的干扰。没有观察到明显的交叉反应或干扰。

Recombinant human	Recombinant mouse
IL-2 sRα	IL-2
IL-2 Rβ	IL-4
IL-2 Rγ	
IL-4	

IV. 实验

标准曲线实例

该标准曲线数据仅供参考，每次实验应绘制其对应的标准曲线。



pg/ml	OD	Average	Corrected
0	0.016 0.017	0.017	-
31.3	0.066 0.066	0.066	0.049
62.5	0.110 0.111	0.111	0.094
125	0.212 0.213	0.213	0.196
250	0.417 0.431	0.424	0.407
500	0.789 0.819	0.804	0.787
1000	1.557 1.562	1.560	1.543
2000	2.728 2.741	2.735	2.718

V. 试剂盒组成及储存

A. 试剂盒组成

组成	描述	规格
Human IL-2 Microplate	包被抗人IL-2抗体的96孔聚苯乙烯板，8孔 × 12条	1块板
Human IL-2 Conjugate	酶标检测抗人IL-2抗体	1瓶
Human IL-2 Standard	人IL-2标准品（冻干），参考瓶身标签进行重溶	1瓶
Calibrator Diluent（5×）/RD5P	浓缩标准品稀释液（5×）用于稀释标准品和样本	1瓶
Wash Buffer Concentrate（25×）	浓缩洗涤缓冲液（25×）	1瓶
TMB Substrate	TMB ELISA底物溶液/TMB底物溶液	2瓶
Stop Solution	终止液	1瓶
Plate Sealers	封板膜	3张

B. 试剂盒储存

<table>
<tr><td>未开封试剂盒</td><td colspan="2">2-8℃储存；请在试剂盒有效期内使用</td></tr>
<tr><td rowspan="6">已打开，稀释或重溶的试剂</td><td>洗涤液（1×）</td><td rowspan="4">2-8℃储存，最多30天*</td></tr>
<tr><td>终止液</td></tr>
<tr><td>酶标检测抗体</td></tr>
<tr><td>TMB底物溶液</td></tr>
<tr><td>标准品</td><td>分装，-20℃以下冰箱储存最多30天*；
避免反复冻融。</td></tr>
<tr><td>标准品稀释液（5×）/RD5P</td><td>2-8℃储存，最多 30 天*
请每次使用新鲜配制的1×标准品稀释液，多余的丢弃</td></tr>
<tr><td>包被的微孔板条</td><td>将未用的板条放回带有干燥剂的铝箔袋内，密封；
2-8 ℃储存，最多30天*</td></tr>
</table>

*必须在试剂盒有效期内

C. 实验所需自备试验器材

- 酶标仪（可测量450nm检测波长的吸收值及540nm或570nm校正波长的吸收值）
- 高精度加液器及一次性吸头
- 蒸馏水或去离子水
- 洗瓶（喷瓶）、多通道洗板器或自动洗板机
- 500mL量筒

D. 注意事项

- 试剂盒中的一些组分含有防腐剂，可能引起皮肤过敏反应，避免吸入。
- 试剂盒中的终止液是酸性溶液，使用时请做好眼睛、手、面部及衣服的防护。

VI. 实验前准备

A. 样品收集及储存

细胞培养上清：颗粒物应离心去除；立刻检测样本。样本收集后若不及时检测，需按一次使用量分装，冻存于≤ -20℃冰箱内，避免反复冻融。样本可能需要用标准品稀释液（1×）稀释。

血清样本：用血清分离管(SST)分离血清。使血样室温凝集30分钟，然后1000 × g离心15分钟。吸取血清样本之后即刻用于检测，或者分装，≤-20℃贮存备用。避免反复冻融。样本可能需要用标准品稀释液（1×） 稀释。

B. 样本准备工作

人血清样本建议用标准品稀释液（1×）2倍稀释后进行检测，即100 µL血清+100 µL标准品稀释液（1×）。最佳稀释度应由最终用户确定。

C. 检测前准备工作

使用前请将所有试剂放置于室温

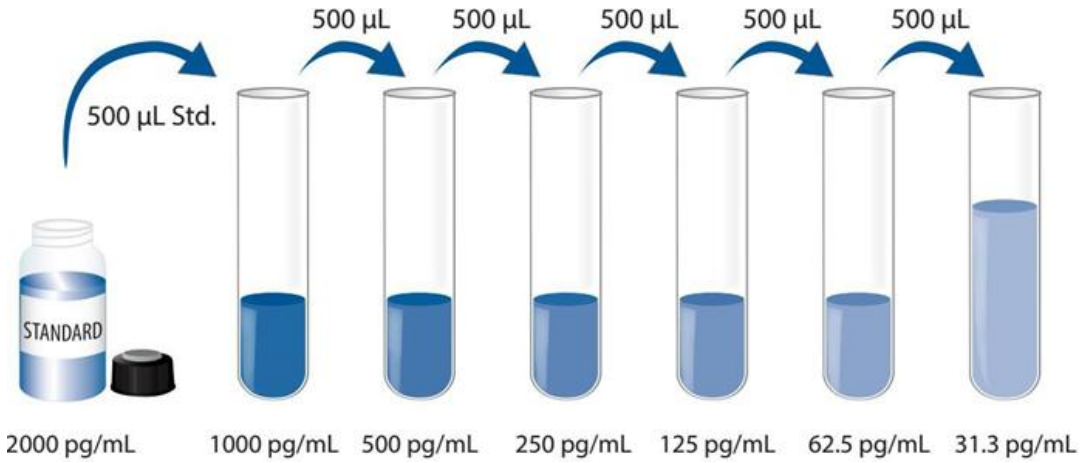
洗涤液（1×）：从冰箱中取出的浓缩洗涤液可能有结晶，属于正常现象；放置室温，轻摇混匀，待结晶完全溶解后再配制洗涤液。可将20 mL浓缩洗涤液（25×）用蒸馏水或去离子水稀释配制成500 mL工作浓度的洗涤液（1×）。

标准品稀释液（1×）：使用蒸馏水或去离子水稀释配制成标准品稀释液（1×）。

人IL-2标准品：重溶体积请参考瓶身标签，得到浓度为2000 pg/mL标准品母液。轻轻震摇至少15分钟，其充分溶解。

*如有疑问，请咨询我们的技术支持。

每个稀释管中加入500 µL标准品稀释液（1×）。将标准品母液参照下图做系列稀释，每管须充分混匀后再移液到下一管。没有稀释的标准品母液可用作标准曲线最高点（2000 pg/mL），标准品稀释液（1×）可用作标准曲线零点（0 pg/mL）。



D. 技术小提示

- 当混合或重溶蛋白液时，尽量避免起沫；
- 为了避免交叉污染，配制不同浓度标准品、上样、加不同试剂都需要更换枪头。另外不同试剂请分别使用不同的移液槽；
- 建议15分钟内完成一块板的上样；
- 每次孵育时，正确使用封板膜可保证结果的准确性；
- TMB底物溶液在上板前应为无色，请避光保存；加入微孔板后，将由无色变成不同深度的蓝色；
- 终止液上板顺序应同TMB底物溶液上板顺序一致；加入终止液后，孔内颜色由蓝变黄； 若孔内有绿色，则表明孔内液体未混匀请充分混合

VII. 操作步骤

使用前请将所有试剂和样本放置于室温，建议所有的实验样本和标准品做复孔检测

1. 按照上一节的说明，准备好所有需要的试剂和标准品；
2. 从已平衡至室温的密封袋中取出微孔板，未用的板条请放回铝箔袋内，重新封口；
3. 分别将不同浓度标准品和实验样本加入相应孔中，每孔100 µL。用封板膜封住反应孔，**室温孵育2小时**。说明书提供了一张96孔模板图，可用于记录标准品和试验样本的板内位置；
4. 将板内液体吸去，使用洗瓶、多通道洗板器或自动洗板机洗板。每孔加洗涤液400 µL，然后将板内洗涤液吸去。重复操作3次，共洗4次。每次洗板尽量吸去残留液体会有助于得到好的实验结果。最后一次洗板结束，请将板内所有液体吸干或将板倒置，在吸水纸拍干所有残留液体；
5. 在每个微孔内加入200 µL酶标检测抗体。用封板膜封住反应孔，**室温孵育2小时**；
6. 重复第4步洗板操作；
7. 在每个微孔内加入200 µL TMB底物溶液，**室温孵育30分钟**。注意避光；
8. 在每个微孔内加入50 µL终止液，请轻拍微孔板，使溶液混合均匀；
9. 加入终止液后10分钟内，使用酶标仪测量450 nm的吸光度值，设定540 nm或570 nm作为校正波长。如果波长校正不可用，以450 nm的读数减去540 nm或570 nm的读数。这种减法将校正酶标板上的光学缺陷。没有校正而直接在450 nm处进行的读数可能会更高且更不准确；
10. 计算结果：

    将每个标准品和样品的复孔吸光值取平均值，然后减去零标准品平均OD值（O.D.），使用计算机软件作四参数逻辑（4-PL）曲线拟合创建标准曲线。另一替代方法是，通过绘制y轴上每个标准品的平均吸光值与x轴上的浓度来构建标准曲线，并通过图上的点绘制最佳拟合曲线。数据可以通过绘制人IL-2浓度的对数与O.D.的对数来线性化，并且最佳拟合线可以通过回归分析来确定。该程序将产生足够但不太精确的数据拟合。

    如果样品被稀释，从标准曲线读取的浓度必须乘以稀释倍数。

VIII. 参考文献

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96 孔模板图

请使用 96 孔模板图来记录标准品及样本在板内的位置