PRODUCT INFORMATION & MANUAL

HIV-1 Gag p24 Valukine™ ELISA

Catalog Number: VAL180

For the quantitative determination of free and total natural
HIV-1 Gag p24 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 202310.2

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I. BACKGROUND

HIV-1 Gag p24, also known as the capsid protein (CA), is essential for HIV-1 viral replication and the ability of HIV-1 to infect non-dividing cells (1). The mature HIV-1 viral capsid is composed of approximately 1100 Gag p24 monomers assembled into a lattice that encapsulates the viral genome (2, 3). Peptides derived from Gag p24 antigen processing can be presented on infected cells in association with HLA-C molecules. Recognition of these complexes by the inhibitory KIR2DL2 on NK cells enables the survival of infected cells by suppressing NK cell-mediated target cell cytotoxicity (4). Gag p24 concentration in the plasma is commonly used as an indicator of viral load (5-7). The development of anti-Gag p24 humoral responses following viral infection leads to immune complex formation and reduction of the amount of free Gag p24 in circulation (8).

II. OVERVIEW

A. PRINCIPLE OF THE ASSAY

This assay employs the quantitative sandwich enzyme immunoassay technique. An antibody specific for HIV-1 Gag p24 has been pre-coated onto a microplate. Standards and samples are pipetted into the wells and any HIV-1 Gag p24 present is bound by the immobilized antibody. After washing away any unbound substances, a biotinylated detection antibody specific for HIV-1 Gag p24 is pipetted into the wells. After washing away any unbound substances, Streptavidin-HRP is pipetted into the wells. Following a wash to remove any unbound reagent, TMB substrate solution (Chromogenic agent) is added to the wells and color develops in proportion to the amount of HIV-1 Gag p24 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 PROCEDURES.**
- This kit is suitable for cell culture supernates and lentiviral culture samples.
- 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)	463.8	125.7	34.3	467.1	126.1	33.7
Standard Deviation	33.8	5.0	1.2	29.8	4.7	2.1
CV%	7.3	4.0	3.4	6.4	3.7	6.2

B. RECOVERY

The recovery of HIV-1 Gag p24 spiked to different levels throughout the range of the assay in cell culture media was evaluated. The recovery ranged from 82.5 to 107.5% with an average of 94.8%.

C. SENSITIVITY

The minimum detectable dose (MDD) of HIV-1 Gag p24 is typically less than 3.15 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 a highly purified native HIV-1 Gag p24 protein produced at R&D Systems.

E. LINEARITY

To assess the linearity of the assay, different samples were containing or spiked with high concentrations of HIV-1 Gag p24 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	94.2	88.5-97.5
1:4	90.2	85.7-95.0
1:8	92.6	87.5-96.7
1:16	93.9	83.4-101.5

F. SPECIFICITY

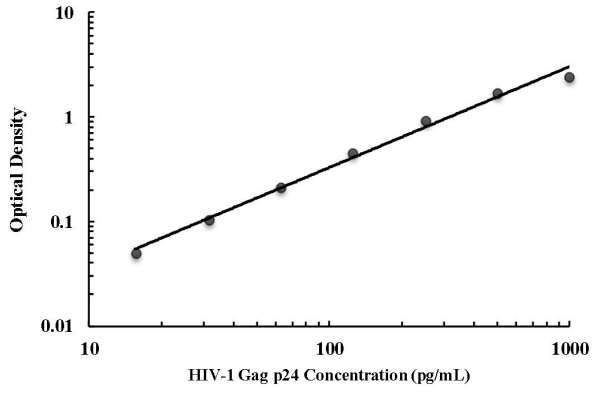
The following factors prepared at 50 ng/mL were assayed and exhibited no cross-reactivity or interference.

Purified proteins:
HTLV-1 p24
HTLV-2 p24
SIV p27

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	0.108 0.107	0.108	-
15.6	0.159 0.155	0.157	0.050
31.3	0.212 0.211	0.212	0.104
62.5	0.308 0.331	0.320	0.212
125	0.567 0.550	0.559	0.451
250	1.011 1.061	1.036	0.929
500	1.725 1.885	1.805	1.698
1000	2.504 2.581	2.543	2.435

V. KIT COMPONENTS AND STORAGE

A. MATERIALS PROVIDED

Parts	Description	Size
HIV-1 Gag p24 Microplate	96 well polystyrene microplate (12 strips of 8 wells) coated with a mouse antibody against HIV-1 Gag p24.	1 plate
HIV-1 Gag p24 Standard	Native HIV-1 Gag p24 in a buffered base; lyophilized. Refer to the vial label for reconstitution volume.	2 vials
HIV-1 Gag p24 Detection Antibody	Biotinylated HIV-1 Gag p24 antibody, lyophilized. Refer to the vial label for reconstitution volume.	1 vial
Calibrator Diluent Concentrate (2×)	A 2× concentrated buffered diluent used to dilute standard and samples.	1 vial
Reagent Diluent Concentrate (2×)	A 2× concentrated buffered protein base used to dilute Detection Antibody and Streptavidin-HRP A.	1 vial
Lysis Buffer	Buffered used to split lentiviral	1 vial
Streptavidin-HRP A (200×)	200× Streptavidin conjugated to horseradish peroxidase.	1 vial
Wash Buffer Concentrate (25×)	A 25× concentrated solution of buffered surfactant with preservatives.	1 vial
TMB Substrate	TMB ELISA Substrate Solution.	1 vial
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="8">Opened/ Reconstituted Reagents</td><td>Streptavidin-HRP A</td><td rowspan="5">May be stored for up to 1 month at 2-8 °C.*</td></tr>
<tr><td>Diluted Wash Solution</td></tr>
<tr><td>Lysis Buffer</td></tr>
<tr><td>TMB Substrate</td></tr>
<tr><td>Stop Solution</td></tr>
<tr><td>Standard</td><td>Prepare fresh for each assay.
Standards may be stored for up to 1 month at -20 °C.*</td></tr>
<tr><td>Detection Antibody</td><td>Aliquot and store for up to 1 month at -20 °C in a manual defrost freezer. *</td></tr>
<tr><td>Reagent Diluent Concentrate (2×)</td><td>May be stored for up to 1 month at 2-8 °C.*
Use and discard diluted Reagent Diluent (1×). Prepare fresh for each assay.</td></tr>
<tr><td>Calibrator Diluent Concentrate (2×)</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.
- Horizontal orbital microplate shaker capable of maintaining a speed of 500±50 rpm.

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 protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling.

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 require dilution with Calibrator Diluent (1×).

Lentiviral culture samples- Samples require dilution with Calibrator Diluent (1×).

B. SAMPLE PREPARATION

Cell culture supernate 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.

Lentiviral culture samples require dilution with 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×).

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

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

Detection Antibody (1×) - Centrifuge briefly before opening. Reconstitution volume refer to vial label to prepare Detection Antibody (100×). Allow the detection antibody to sit for a minimum of 15 minutes with gentle agitation prior to making dilutions. Aliquot and store if needed. Dilute to Detection Antibody (1×) with Reagent Diluent (1×). Prepare at least 15 minutes prior to use.

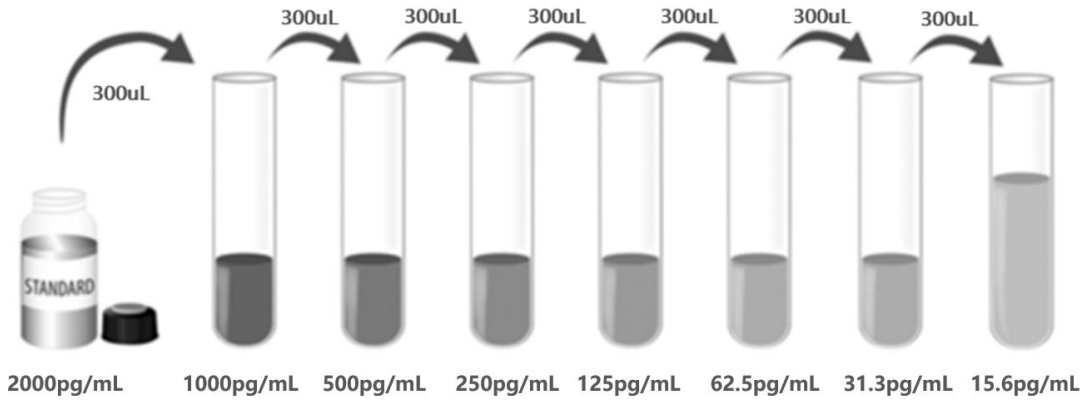
Streptavidin-HRP A (1×) - Centrifuge briefly before opening. Dilute to the working concentration specified on the vial label using Reagent Diluent (1×).

HIV-1 Gag p24 Standard - Centrifuge briefly before opening. 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 300 µL of the appropriate 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 1000 pg/mL standard serves as the high standard. 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 25 µL Lysis Buffer per well. **(Used to split lentiviral, only for quantitative determination of total p24. For quantitative determination of free p24, ignore this step and proceed directly to the next step)**
4. Add 100 µL of standard, prepared sample per well. Cover with the adhesive strip provided. **Incubate for 2 hours at room temperature on a horizontal orbital microplate shaker set at 500±50 rpm**. A plate layout is provided for a record of standards and samples assayed. (Samples may require dilution. See Sample Preparation section.)
5. Aspirate each well and wash, repeating the process three times for a total of four washes. Wash by filling each well with Wash Solution (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.
6. Add 100 µL of the Detection Antibody (1×) diluted in Reagent Diluent (1×), to each well. Cover with a new adhesive strip and **incubate 2 hours at room temperature on a horizontal orbital microplate shaker set at 500±50 rpm**.
7. Repeat the aspiration/wash as in step 5.
8. Add 100 µL of the working dilution of Streptavidin-HRP A to each well. Cover the plate and **incubate for 30 minutes at room temperature. Protect from light.**
9. Repeat the aspiration/wash as in step 5.
10. Add 100 µL of TMB Substrate to each well. **Incubate for 20 minutes at room temperature. Protect from light.**
11. Add 50 µL of Stop Solution to each well. Gently tap the plate to ensure thorough mixing.
12. 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.

13. CALCULATION OF RESULTS

Average the duplicate readings for each standard, 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 HIV-1 Gag p24 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.

14. Determining Virus Titer

p24 values can be used to determine the relative virus titers of your packaging cell supernatants. To calibrate your virus production system and determine a relationship between p24 levels and infectivity, it may be useful to determine the p24 levels of supernatants for which you have already measured the virus titer using an alternative method (i.e., determining infectious units based on expression of a fluorescent protein or drug-selective marker).

Example: the following values and calculations may also be used to determine approximate titers and are based on the observation that each lentiviral particle (LP) contains approximately 2,000 molecules of p24:

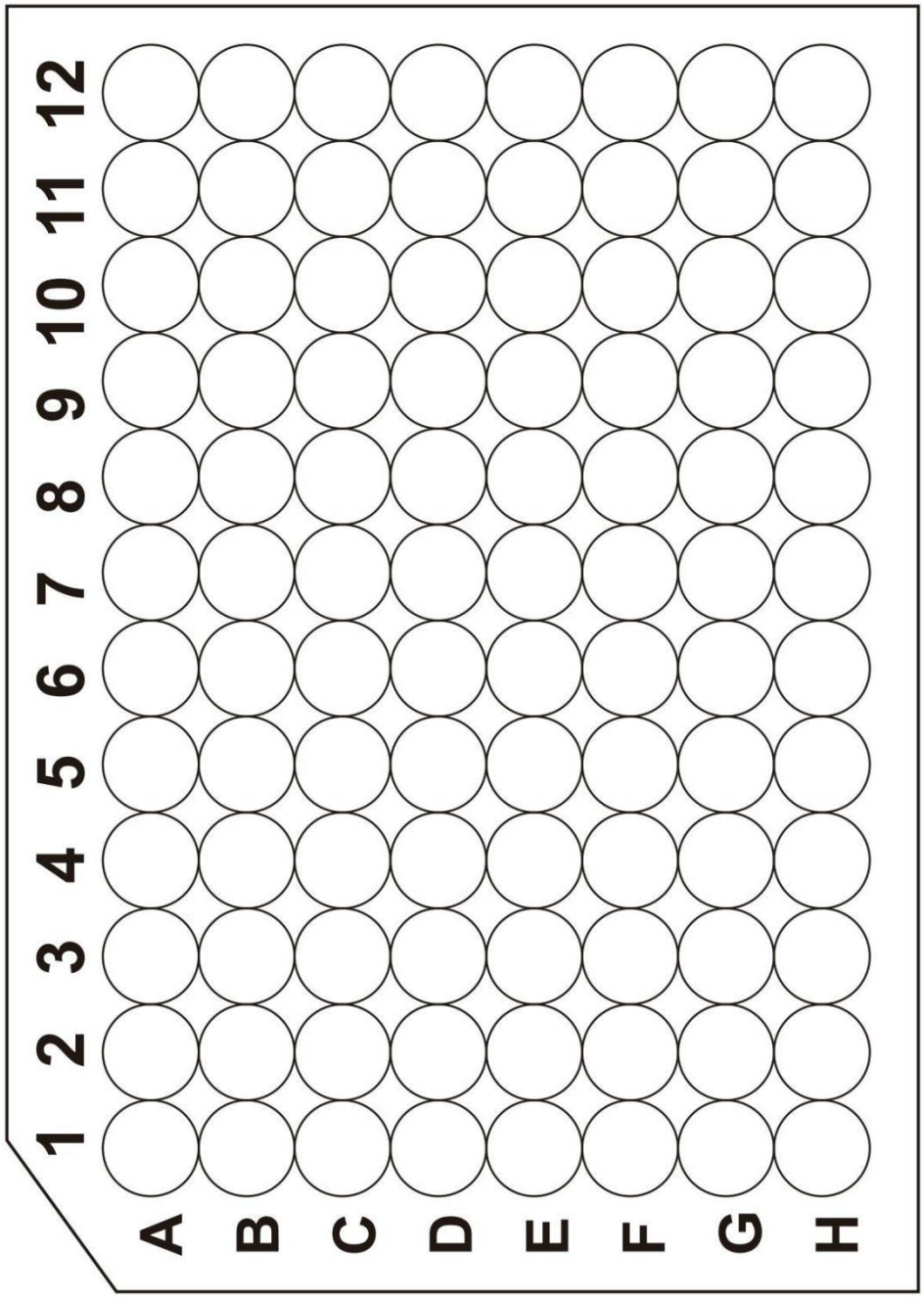
- 1 LP contains 8×10^{-5} pg of p24, derived from: $2{,}000 \times (24 \times 10^{3}\ \text{Da}) / 6 \times 10^{23}$
- 1 ng p24 $\approx 1.25 \times 10^{7}$ LPs
- For a typical lentivirus vector, there is 1 IFU for every 100-1,000 LPs
- Therefore, a supernatant titer of 10^{7} IFU/mL $\approx 10^{9}$-10^{10} LP/mL or 80-800 ng p24/mL

VIII. REFERENCES

1. Yamashita, M. and M. Emerman (2004) J. Virol. 78:5670.
2. Ganser, B.K. et al. (1999) Science 283:80.
3. Pornillos, O. et al. (2011) Nature 469:424.
4. van Teijlingen, N.H. et al. (2014) AIDS 28:1399.
5. Schupbach, J. et al. (2001) J. Med. Virol. 65:225.
6. Schupbach, J. (2002) AIDS Rev. 4:83.
7. Sutthent, R. et al. (2003) J. Clin. Microbiol. 41:1016.
8. McRae, B. et al. (1991) AIDS Res. Hum. Retroviruses 7:637.

PLATE LAYOUT

Use this plate layout to record standards and samples assayed.



产品信息及操作手册

HIV-1 Gag p24 Valukine™ ELISA 试剂盒

目录号：VAL180

适用于定量检测游离和总天然 HIV-1 Gag p24 的浓度

科研专用，不可用于临床诊断

Bio-Techne China Co. Ltd

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有效期详见试剂盒包装标签

Novus 试剂盒确保在你收货日期 3 个月内有效

版本号 202310.2

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I. 背景

HIV-1 Gag p24，也被称为衣壳蛋白(CA)，是HIV-1病毒复制和HIV-1感染非分裂细胞所必需的(1)。成熟的HIV-1病毒衣壳由大约1100个Gag p24单体组成，组装成一个晶格，封装病毒基因组(2, 3)。Gag p24抗原处理产生的多肽可以与HLA-C分子结合递呈于受感染的细胞上。通过抑制NK细胞上的KIR2DL2对这些复合物的识别，从而抑制NK细胞介导的细胞毒性，使受感染细胞存活(4)。血浆中的Gag p24浓度通常被用作病毒载量的指标(5-7)。病毒感染后，抗Gag p24体液反应的发展导致免疫复合物的形成和循环中游离Gag p24数量的减少(8)。

II. 概述

A. 检测原理

本实验采用双抗体夹心ELISA法。抗HIV-1 Gag p24抗体包被于微孔板上，样品和标准品中的HIV-1 Gag p24会与固定在板上的抗体结合，游离的成分被洗去；接着加入生物素化的抗HIV-1 Gag p24检测抗体进行孵育，洗涤去除未结合的物质后，加入链霉亲和素标记的辣根过氧化物酶（Streptavidin-HRP）孵育。洗涤去除未结合的试剂后，加入TMB底物溶液（显色剂）。溶液颜色与结合的目标蛋白成正比；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和慢病毒培养样本；
- 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，在不同板中分别检测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)	463.8	125.7	34.3	467.1	126.1	33.7
标准差	33.8	5.0	1.2	29.8	4.7	2.1
CV%	7.3	4.0	3.4	6.4	3.7	6.2

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HIV-1 Gag p24，测定其回收率。回收率范围在82.5-107.5%，平均回收率在94.8%。

C. 灵敏度

HIV-1 Gag p24的最低可测剂量（MDD）一般小于3.15 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试剂盒经由R&D Systems生产的高纯度天然的HIV-1 Gag p24蛋白所校正。

E. 线性

不同的样本中含有或掺入高浓度的HIV-1 Gag p24，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 (%)	范围 (%)
1:2	94.2	88.5-97.5
1:4	90.2	85.7-95.0
1:8	92.6	87.5-96.7
1:16	93.9	83.4-101.5

F. 特异性

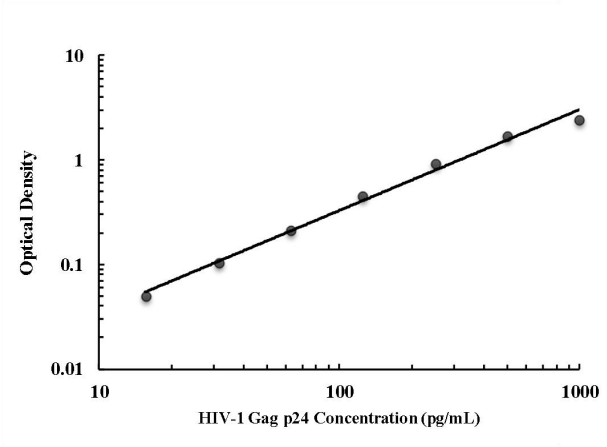
将以下因子配制成50 ng/mL的浓度来检测没有观察到明显的交叉反应。

Purified proteins:
HTLV-1 p24
HTLV-2 p24
SIV p27

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	0.108 0.107	0.108	-
15.6	0.159 0.155	0.157	0.050
31.3	0.212 0.211	0.212	0.104
62.5	0.308 0.331	0.320	0.212
125	0.567 0.550	0.559	0.451
250	1.011 1.061	1.036	0.929
500	1.725 1.885	1.805	1.698
1000	2.504 2.581	2.543	2.435

V. 试剂盒组成及储存

A. 试剂盒组成

组成	描述	规格
HIV-1 Gag p24 Microplate	包被小鼠抗 HIV-1 Gag p24 抗体的 96 孔聚苯乙烯板，8 孔×12 条	1 块板
HIV-1 Gag p24 Standard	标准品（冻干粉），参考瓶身标签进行重溶	2 瓶
HIV-1 Gag p24 Detection Antibody	生物素化的 HIV-1 Gag p24 检测抗体，冻干粉，参考瓶身标签进行重溶	1 瓶
Calibrator Diluent Concentrate (2×)	浓缩的标准品稀释液（2×）用于稀释标准品和样本。	1 瓶
Reagent Diluent Concentrate (2×)	浓缩的试剂稀释液（2×）用于稀释检测抗体和 Streptavidin-HRP A。	1 瓶
Lysis Buffer	裂解液用于裂解慢病毒	1 瓶
Streptavidin-HRP A (200×)	200×浓缩的链霉亲和素标记的 HRP	1 瓶
Wash Buffer Concentrate (25×)	浓缩洗涤缓冲液（25×）	1 瓶
TMB Substrate	TMB ELISA 底物溶液	1 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="9">已打开，稀释或重溶的试剂</td><td>链霉亲和素-HRP A</td><td rowspan="5">2-8℃储存，最多 30 天*</td></tr>
<tr><td>洗涤缓冲液（1×）</td></tr>
<tr><td>裂解液</td></tr>
<tr><td>TMB 底物溶液</td></tr>
<tr><td>终止液</td></tr>
<tr><td>标准品</td><td>使用时新鲜配制*
标准品-20℃储存，最多 30 天*</td></tr>
<tr><td>检测抗体</td><td>分装， -20℃储存，最多 30 天*</td></tr>
<tr><td>试剂稀释液（2×）</td><td>2-8℃储存，最多 30 天*
请每次使用新鲜配制的 1×试剂稀释液</td></tr>
<tr><td>标准品稀释液（2×）</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</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450 nm检测波长的吸收值及540 nm或570 nm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
- 500 mL量筒
- 水平轨道式微孔板振荡器（500±50 rpm）

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。使用后请彻底洗手。

VI. 实验前准备

A. 样品收集及储存

细胞培养上清液：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。

慢病毒培养样本：样本可能需要用标准品稀释液（1×）稀释。

B. 样本准备工作

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

慢病毒培养样本：样本可能需要用标准品稀释液（1×）稀释。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×）。

试剂稀释液（1×）：使用去离子水或蒸馏水稀释配制成试剂稀释液（1×）。

标准品稀释液（1×）：使用去离子水或蒸馏水稀释配制成标准品稀释液（1×）。

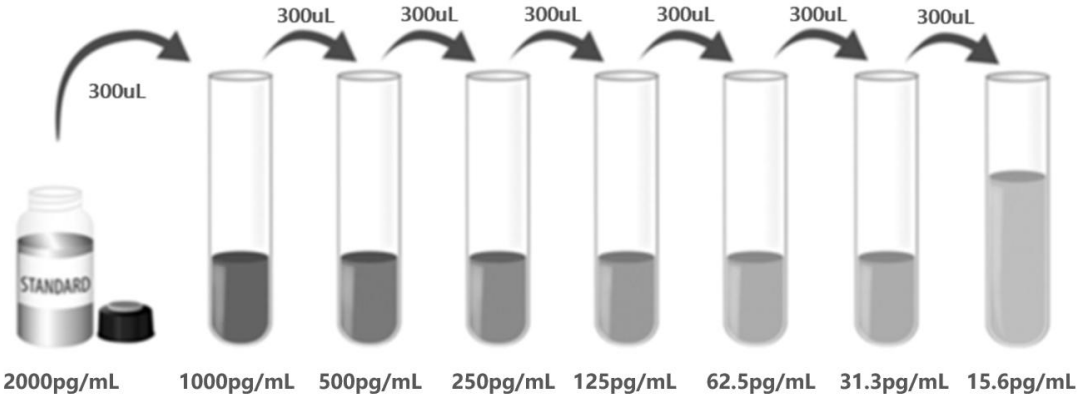
检测抗体（1×）：开盖前请瞬时离心。参考检测抗体瓶标签重溶冻干粉，制备检测抗体（100×）。轻轻震摇至少15分钟，使其充分溶解。如有需要分装保存。再用试剂稀释液（1×）稀释至检测抗体（1×），至少在使用前15分钟准备。

链霉亲和素- HRP A（1×）：开盖前请瞬时离心。用试剂稀释液（1×）将链霉亲和素- HRP A（200×）稀释至工作浓度。

HIV-1 Gag p24标准品：开盖前请瞬时离心。冻干标准品的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，使其充分溶解。

*如有疑问，请咨询我们的技术支持。

向各稀释管中加入300 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。1000 pg/mL管作标准曲线最高点，标准品稀释液（1×）可用作标准品零点（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. 每孔加入25 µL裂解液；**(用于裂解慢病毒，只用于定量检测总p24。检测游离p24，忽略此步骤直接转至下一步骤)**
4. 分别将不同浓度标准品、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500±50 rpm水平振荡孵育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；（样本需要稀释，详情参见样本制备部分。）
5. 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；
6. 在每个微孔内加入100 µL配制好的检测抗体（1×）。用封板膜封住反应孔，**室温500±50 rpm水平振荡孵育2小时；**
7. 重复第5步洗板操作；
8. 在每个微孔内加入100 µL稀释好的链霉亲和素-HRP A工作液。用封板膜封住反应孔，**静置室温孵育30分钟，注意避光；**
9. 重复第5步洗板操作；
10. 在每个微孔内加入100 µL TMB底物溶液，**静置室温孵育20分钟，注意避光；**
11. 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；
12. 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；
13. **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HIV-1 Gag p24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。

14. **确定病毒滴度**

p24值可用于确定包装细胞上清液的相对病毒滴度。为了校准病毒产生系统并确定p24水平与感染性之间的关系，可以使用另一种方法（即基于荧光蛋白或药物选择性标记物的表达来确定感染单位）来确定你已经测量过病毒滴度的上清液的p24水平。

示例：以下值和计算也可用于确定近似滴度，并基于每个慢病毒颗粒（LP）含有约2000个p24分子计算：

- 1 LP包含8×10^{-5} pg p24, 计算方式：$2{,}000 \times (24 \times 10^{3}\ \text{Da}) / 6 \times 10^{23}$
- 1 ng p24 ≈ 1.25×10^{7} LPs
- 对于典型慢病毒，1 IFU ≈ 100-1,000 LPs
- 因此，上清滴度10^{7} IFU/mL ≈ 10^{9}-10^{10} LP/mL or 80-800 ng p24/mL

VIII. 参考文献

1. Yamashita, M. and M. Emerman (2004) J. Virol. 78:5670.
2. Ganser, B.K. et al. (1999) Science 283:80.
3. Pornillos, O. et al. (2011) Nature 469:424.
4. van Teijlingen, N.H. et al. (2014) AIDS 28:1399.
5. Schupbach, J. et al. (2001) J. Med. Virol. 65:225.
6. Schupbach, J. (2002) AIDS Rev. 4:83.
7. Sutthent, R. et al. (2003) J. Clin. Microbiol. 41:1016.
8. McRae, B. et al. (1991) AIDS Res. Hum. Retroviruses 7:637.

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