






# KRIBIOLISA™ Enfuvirtide (Fuzeon™) ELISA

**REF** : KBI5012

Ver 2.1

**RUO**

Enzyme Immunoassay for the quantitative determination of  
Enfuvirtide in human serum and plasma

<b>RUO</b>	For Research Use only	<b>REF</b>	Catalog Number
	Store At	<b>LOT</b>	Batch Code
	Manufactured By		Biological Risk
	Expiry Date		Consult Operating Instructions

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**REF** KBI5012

 96 tests

**KRIBIOLISA™ Enfuvirtide (Fuzeon™) ELISA**

**Introduction:**

Enfuvirtide is an HIV-1 gp41 fusion inhibitor used in patients experiencing HIV-1 replication who are already being treated with other anti-retrovirals. Enfuvirtide is a 36 amino acid biomimetic peptide that is structurally similar to the HIV proteins that are responsible for the fusion of the virus to cell membranes and subsequent intracellular uptake. The first agent in the novel class of antiretroviral drugs called HIV fusion inhibitors, enfuvirtide works by inhibiting HIV-1 fusion with CD4 cells.

It was observed that Enfuvirtide has an absorption pattern of post a 90 mg single subcutaneous injection to the abdomen in 12 HIV-1 infected subjects, the mean peak concentration was 4.59+/-1.5 ug/ml and the median time to peak concentration was 8 hours (ranged from 3 to 12 hours).

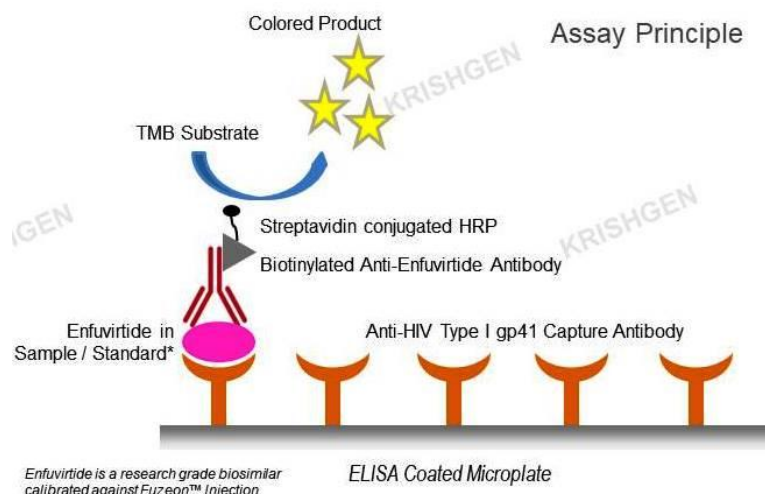
The KRIBIOLISA™ Enfuvirtide (Fuzeon™) ELISA has an assay range of 0 - 4000 ng/ml and offers optimal dilutional linearity to estimate Enfuvirtide in serum and plasma.

**Intended Use:**

The KRIBIOLISA™ Enfuvirtide (Fuzeon™) ELISA is used as an analytical tool for quantitative determination of Enfuvirtide (Fuzeon™) in human serum and plasma.

**Principle:**

The method employs the quantitative sandwich enzyme immunoassay technique. Antibodies to HIV Type1 gp41 are pre-coated onto microwells. Samples and standards are pipetted into microwells and human Enfuvirtide present in the sample are bound by the capture antibody. Then, a Biotinylated Anti-Enfuvirtide is pipetted and incubated. After washing microwells in order to remove any non-specific binding, Streptavidin HRP is added. After washing the ready to use substrate solution (TMB) is added to microwells and color develops proportionally to the amount of Enfuvirtide in the sample. Color development is then stopped by addition of stop solution. Absorbance is measured at 450 nm.



**Materials Provided:**

Part	Description	Qty
Anti-HIV Type1 gp41 Coated Microtiter Plate	96 well polystyrene microplate (12 strips of 8 wells) coated with Anti-HIV Type1 gp41 monoclonal antibody.	1 x 96 wells
Enfuvirtide Standard	Enfuvirtide in a buffered protein with protein stabilizer and preservatives 0.02% methylisothiazolone and 0.02% bromonitrodioxane.– lyophilized (1 ug/ml)	2 vials
(1X) Standard Diluent	Buffered protein base with protein stabilizer and preservatives 0.02% methylisothiazolone and 0.02% bromonitrodioxane with 1:1000 dilution human serum.	10ml

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Part	Description	Qty
Anti Enfuvirtide:Biotin antibody	Anti Enfuvirtide Biotinylated antibody Concentrated (1 mg/ml)	1 vial
Biotin Diluent	Buffered protein base with protein stabilizer and preservatives 0.02% methylisothiazolone and 0.02% bromonitrodioxane.	12 ml
Streptavidin:HRP Conjugate	Concentrated Streptavidin HRP (375 ul)	2 vials
Streptavidin:HRP diluent	Buffered protein base with protein stabilizer and preservatives 0.02% methylisothiazolone and 0.02% bromonitrodioxane with BSA and Tween 20.	12 ml
(1X) Sample Diluent	Buffered protein base with protein stabilizer and preservatives 0.02% methylisothiazolone and 0.02% bromonitrodioxane	2 x 50 ml
(20X) Wash Buffer	20-fold concentrated solution of buffered surfactant with preservative thiomersol < 0.01%. May turn yellow over time.	25 ml
TMB Substrate	Stabilized Chromogen	12 ml
Stop Solution	0.73M Phosphoric Acid	12 ml
Instruction Manual		1 no

**Materials to be provided by the End-User:**

1. Microtiter Plate Reader able to measure absorbance at 450 nm.
2. Adjustable pipettes and multichannel pipettor to measure volumes ranging from 25 ul to 1000 ul.
3. Deionized (DI) water
4. Wash bottle or automated microplate washer
5. Graph paper or software for data analysis
6. Timer
7. Absorbent Paper

**Handling/Storage:**

1. All reagents should be stored at 2°C to 8°C for stability.
2. All the reagents and wash solutions should be used within 12 months from manufacturing date.
3. Before using, bring all components to room temperature (18-25°C). Upon assay completion ensure all components of the kit are returned to appropriate storage conditions.
4. The Substrate is light-sensitive and should be protected from direct sunlight or UV sources.

**Health Hazard Warnings:**

1. Reagents that contain preservatives may be harmful if ingested, inhaled or absorbed through the skin.
2. For Research Use Only.

**Sample Preparation and Storage:**

Blood is taken by venipuncture. Serum is separated after clotting by centrifugation. Plasma can be used, too. Lipaemic, hemolytic or contaminated samples should not be run. Repeated freezing and thawing should be avoided. If samples are to be used for several assays, initially aliquot samples and keep at -20°C.

For Cell Culture Supernatant – If necessary, centrifuge to remove debris prior to analysis. Samples can be stored at -20°C or -80°C. Avoid repeated freeze-thaw cycles.

**Preparation before Use:**

Allow samples to reach room temperature prior to assay. Take care to agitate patient samples gently in order to ensure homogeneity.

**Test Sample preparation** - Samples have to be diluted **1:1000 (v/v)**, e.g. for 1:1000 (1 ul sample + 999 ul sample diluent) prior to assay. The samples may be kept at 2-8°C for up to three days. Long-term storage requires -20°C.

**KRIBIOLISA™ Enfuvirtide (Fuzeon™) ELISA****Reagent Preparation (all reagents should be diluted immediately prior to use):**

1. Label any aliquots made with the kit Lot No and Expiration date and store it at appropriate conditions mentioned.
2. Bring all reagents to Room temperature before use.
3. To make Wash Buffer (1X); dilute 25 ml of 20X Wash Buffer in 475 ml of DI water.
4. **Standards Preparation:** Reconstitute the concentrated Standard lyophilized vial with 250 ul of Standard Diluent (1X) to obtain a concentration of 4000 ng/ml. Keep the vial for 15 mins with gentle agitation before making further dilutions. 4000 ng/ml is the top standard. Prepare further **Standards** by serially diluting the Standard Solution as per the below table. Use the Standard Diluent (1X) as the Zero Standard (Standard No.0).

Standard Concentration	Standard Vial	Dilution Particulars
1000 ng/ml	Original Standard	Lyophilized Standard
4000 ng/ml	Standard No.7	Reconstitute Lyophilized Standard in 250 ul Standard Diluent (1X)
2000 ng/ml	Standard No.6	125 ul Standard No.7 + 125 ul Standard Diluent (1X)
1000 ng/ml	Standard No.5	125 ul Standard No.6 + 125 ul Standard Diluent (1X)
500 ng/ml	Standard No.4	125 ul Standard No.5 + 125 ul Standard Diluent (1X)
250 ng/ml	Standard No.3	125 ul Standard No.4 + 125 ul Standard Diluent (1X)
125 ng/ml	Standard No.2	125 ul Standard No.3 + 125 ul Standard Diluent (1X)
62.5 ng/ml	Standard No.1	125 ul Standard No.2 + 125 ul Standard Diluent (1X)
0 ng/ml	Standard No. 0	Only Standard Diluent (1X)

Use the Standards as soon as possible upon reconstitution. Discard balance standard after use.

5. **Working Anti Enfuvirtide Biotinylated antibody**– Refer to the Reagent Preparation sheet attached with the IFU and COA (enclosed in the kit).
6. **Working Streptavidin HRP** – Refer to the Reagent Preparation sheet attached with the IFU and COA (enclosed in the kit).

**Procedural Notes:**

1. In order to achieve good assay reproducibility and sensitivity, proper washing of the plates to remove excess un-reacted reagents is essential.
2. High Dose Hook Effect may be observed in samples with very high concentrations of Enfuvirtide. High Dose Hook Effect is due to excess of antibody for very high concentrations of Enfuvirtide present in the sample. High Dose Hook effect is most likely encountered from samples early in the purification process. If Hook Effect is possible, the samples to be assayed should be diluted with a compatible diluent. Thus if the Enfuvirtide concentration of the undiluted sample is less than the diluted sample, this may be indicative of the Hook Effect.
3. Avoid assay of Samples containing sodium azide ( $\text{NaN}_3$ ), as it could destroy the HRP activity resulting in under-estimation of the amount of Enfuvirtide.
4. It is recommended that all Standards and Samples be assayed in duplicates.
5. Maintain a repetitive timing sequence from well to well for all the steps to ensure that the incubation timings are same for each well.
6. If the Substrate has a distinct blue color prior to use it may have been contaminated and use of such substrate can lead to compromise of the sensitivity of the assay.
7. The plates should be read within 30 minutes after adding the Stop Solution.
8. Make a work list in order to identify the location of Standards and Samples.

**Assay Procedure:**

1. It is strongly recommended that all Controls and Samples be run in duplicates or triplicates. A standard curve is required for each assay. All steps must be performed at 37°C
2. Add **100 ul** of prepared **Standards** or diluted **Samples** into the respective wells.
3. Cover the plate and incubate for 60 minutes at 37°C.
4. Aspirate and wash plate 4 times with **Wash Buffer (1X)** and blot residual buffer by firmly tapping plate upside down on absorbent paper. Wipe of any liquid from the bottom outside of the microtiter wells as any residue can interfere in the reading step.

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5. Add **100 ul** of **working Anti Enfuvirtide Biotinylated antibody** into each well.
6. Cover the plate and incubate for 60 minutes at 37°C.
7. Aspirate and wash plate 4 times with **Wash Buffer (1X)** and blot residual buffer by firmly tapping plate upside down on absorbent paper. Wipe of any liquid from the bottom outside of the microtiter wells as any residue can interfere in the reading step.
8. Add **100 ul** of **working Streptavidin HRP solution** into each well.
9. Cover the plate and incubate for 30 minutes at 37°C.
10. Aspirate and wash plate 4 times with **Wash Buffer (1X)** and blot residual buffer by firmly tapping plate upside down on absorbent paper. Wipe of any liquid from the bottom outside of the microtiter wells as any residue can interfere in the reading step.
11. Add **100 ul** of **TMB Substrate** in each well.
12. Incubate the plate at 37°C for 30 minutes in dark. **DO NOT SHAKE** or else it may result in higher backgrounds and worse precision. Positive wells should turn bluish in color.
13. Pipette out **100 ul** of **Stop Solution**. Wells should turn from blue to yellow in color.
14. Read the absorbance at 450 nm with a microplate reader.

**Calculation of Results:**

Determine the Mean Absorbance for each set of duplicate or triplicate Standards and Samples. Using Semi-Log graph paper, plot the average value (absorbance 450 nm) of each standard on the Y-axis versus the corresponding concentration of the standards on the X-axis. Draw the best fit curve through the standard points. To determine the unknown Enfuvirtide concentrations, find the unknown's Mean Absorbance value on the Y-axis and draw a horizontal line to the standard curve. At the point of intersection, draw a vertical line to the X-axis and read the Enfuvirtide Concentration. If samples were diluted, multiply by the appropriate dilution factor. Software which is able to generate a cubic spline curve-fit is best recommended for automated results.

**Note:**

It is recommended to repeat the assay at a different dilution factor in the following cases:

- If the sample absorbance value is below the first standard.
- If the absorbance value is equivalent or higher than the 4000 ng/ml standard.

**Quality Control:**

It is recommended that for each laboratory assay appropriate quality control samples in each run to be used to ensure that all reagents and procedures are correct.

**Performance Characteristics of the Kit:**

This kit has been validated as per EMA/FDA guidelines in line with ICH Code for Harmonization of Biological Assays.

**Sensitivity:**

**Limit Of Detection:** It is defined as the lowest detectable concentration corresponding to a signal of Mean of '0' standard plus 2\* SD.

10 replicates of '0' standards were evaluated and the LOD was found to be less than 62 ng/ml

**Precision:**

Precision is defined as the percent coefficient of variation (%CV) i.e. standard deviation divided by the mean and multiplied by 100. Assay precision was determined by both intra (n=5 assays) and inter assay (n=5 assays) reproducibility on two pools with low (62.5 ng/ml), medium (500 ng/ml) and high (4000 ng/ml) concentrations.

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While actual precision may vary from laboratory to laboratory and technician to technician, it is recommended that all operators achieve precision below these design goals before reporting results.

Pool	Intra Assay %CV	Inter Assay %CV
Low	<10%	<10%
Medium	<5%	<5%
High	<5%	<5%

**Safety Precautions:**

- **For Research Use Only.** Follow the working instructions carefully.
- The expiration dates stated on the kit are to be observed. The same relates to the stability stated for reagents
- Do not use or mix reagents from different lots.
- Do not use reagents from other manufacturers.
- Avoid time shift during pipetting of reagents.
- All reagents should be kept in the original shipping container.
- Some of the reagents contain small amount of sodium azide (< 0.1 % w/w) as preservative. They must not be swallowed or allowed to come into contact with skin or mucosa.
- Source materials maybe derived from human body fluids or organs used in the preparation of this kit were tested and found negative for HBsAg and HIV as well as for HCV antibodies. However, no known test guarantees the absence of such viral agents. Therefore, handle all components and all patient samples as if potentially hazardous.
- Since the kit contains potentially hazardous materials, the following precautions should be observed
  - Do not smoke, eat or drink while handling kit material
  - Always use protective gloves
  - Never pipette material by mouth
  - Wipe up spills promptly, washing the affected surface thoroughly with a decontaminant.
- In any case GLP should be applied with all general and individual regulations to the use of this kit.

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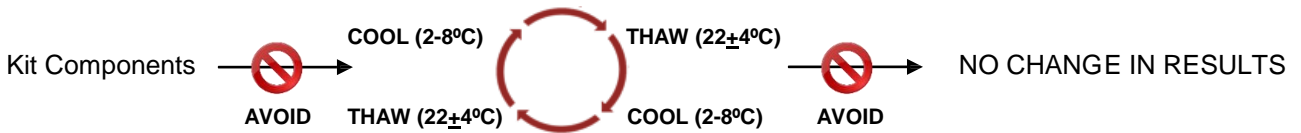
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**SCHEMATIC ASSAY PROCEDURE**

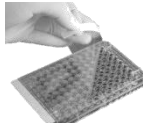

1. Remove all components, 30 minutes before adding into the assay plate.



2. Avoid repeated cool-thaw of the components as there will be a loss of activity and this can affect the results.






3.  Pipette **100 ul Standards / Samples** into the respective wells.

4.  Cover plate and incubate for  **60 min** at 37°C.

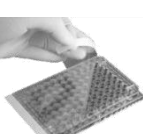

5.  Aspirate and wash wells 4 times with **Wash Buffer (1X)**.


6.  Pipette **100 ul working Anti Enfuvirtide Biotinylated antibody** into each well.

7.  Cover plate and incubate for  **60 min** at 37°C.

8.  Aspirate and wash wells 4 times with **Wash Buffer (1X)**.

9.  Pipette **100 ul of working Streptavidin:HRP** to all wells

10.  Cover plate and incubate for  **30 min** at 37°C.

11.  Aspirate and wash wells 4 times with **Wash Buffer (1X)**.

12.  Pipette **100 ul TMB Substrate** into each well.

13.  Cover plate and incubate for  **30 min** at 37°C.

14.  Pipette **100 ul Stop Solution** into each well.

15. Read absorbance at 450 nm with a  microplate reader within  **30 min** of stopping reaction.

### Typical Example of a Work List

Well #	Contents	Absorbance at 450nm	Mean Absorbance	ng/ml Enfuvirtide equivalent
1A	zero std			
2A	zero std			
1B	62.5 ng/ml			
2B	62.5 ng/ml			
1C	125 ng/ml			
2C	125 ng/ml			
1D	250 ng/ml			
2D	250 ng/ml			
1E	500 ng/ml			
2E	500 ng/ml			
1F	1000 ng/ml			
2F	1000 ng/ml			
1G	2000 ng/ml			
2G	2000 ng/ml			
1H	4000 ng/ml			
2H	4000 ng/ml			
3A	Sample			
4A				
3B	Sample			
4B				

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## SYMBOLS KEY

	Anti- HIV Type1 gp41 Coated Microtiter Plate (12x8 wells)
	Enfuvirtide Standard lyophilized
	(1X) Standard Diluent
	(1X) Sample Diluent
	Anti Enfuvirtide:Biotin antibody concentrated
	Biotin Diluent
	Streptavidin:HRP Conjugate
	Streptavidin HRP diluent
	(20X) Wash Buffer
	TMB Substrate
	Stop Solution
	Consult Instructions for Use
	Catalog Number
	Expiration Date
	Storage Temperature