revvity

AlphaLISA® Interferon Beta (porcine) Detection Kit

Product number: AL577HV/C/F

Research Use Only. Not for use in diagnostic procedures.

Product Information

Application: This kit is designed for the quantitative determination of porcine Interferon beta (pIFNβ) in serum and cell culture media using a homogeneous AlphaLISA assay (no wash steps).

Sensitivity: Lower Detection Limit (LDL): 95 pg/mL

Lower Limit of Quantification (LLOQ): 456 pg/mL

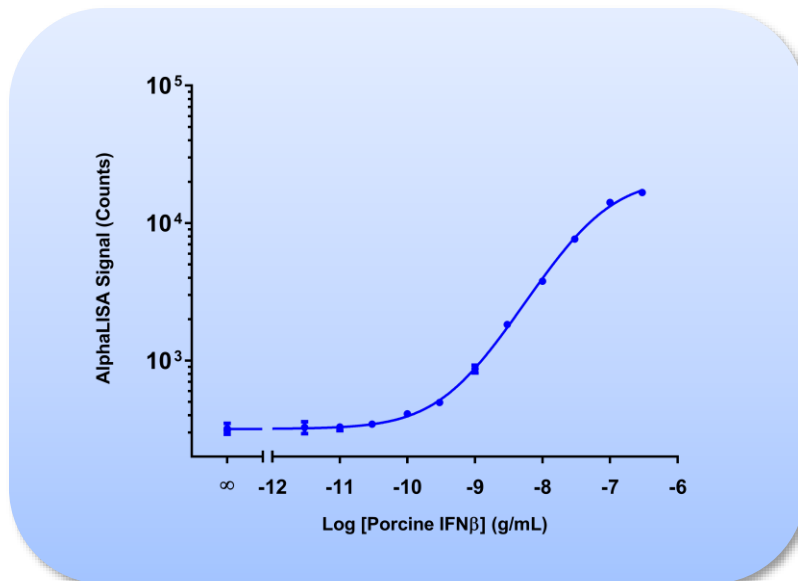EC_{50}: 79 ng/mL

Dynamic range: 95 – 300 000 pg/mL

Figure 1. Typical sensitivity curve in AlphaLISA Immunoassay Buffer. The data was generated using a white Optiplate™-384 microplate and the EnVision® Multilabel Plate Reader 2103 with Alpha option.

Storage: Store kit in the dark at +4°C. For reconstituted analyte aliquot and store at -20°C. Avoid freeze-thaw cycles.

Stability: This kit is stable for at least 12 months from the manufacturing date when stored in its original packaging and the recommended storage conditions.

Analyte of Interest

Interferon beta (IFNβ) is a member of the cytokine super family and is produced by the fibroblast and monocyte cells. In porcine, it is known to be involved in anti-inflammatory immune responses following bacterial or viral infection. In addition to inhibiting the viral or bacterial infections, IFN beta is also involved in regulating and activating immune responses against parasite. In humans, it has been well documented that IFNβ is critical for reducing neuro inflammation and has been used to treat Multiple Sclerosis.

Description of the AlphaLISA Assay

AlphaLISA technology allows the detection of molecules of interest in buffer, cell culture media, and serum in a highly sensitive, quantitative, reproducible and user-friendly mode. In this AlphaLISA assay, a Biotinylated Anti-pIFNβ Antibody binds to the Streptavidin-coated Alpha Donor beads, while another Anti-pIFNβ Antibody is conjugated to AlphaLISA Acceptor beads. In the presence of the pIFNβ, the beads come into close proximity. The excitation of the Donor beads provokes the release of singlet oxygen molecules that triggers a cascade of energy transfer in the Acceptor beads, resulting in a sharp peak of light emission at 615 nm (Figure 2).
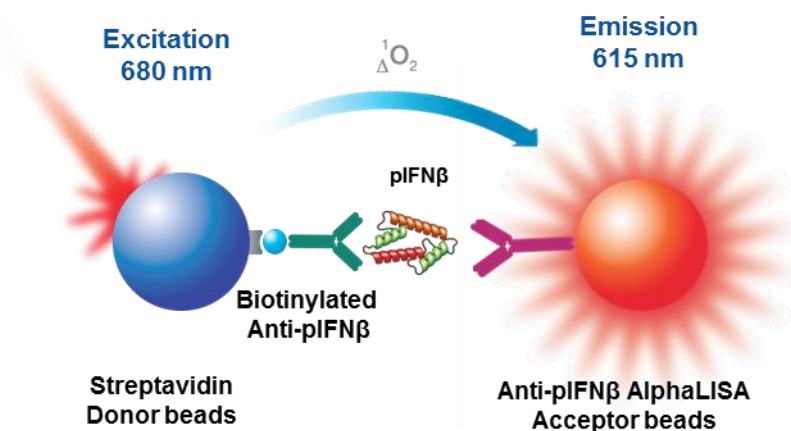

Figure 2. AlphaLISA pIFNβ Assay Principle.

Precautions

- The Alpha Donor beads are light-sensitive. All the other assay reagents can be used under normal light conditions. All Alpha assays using the Donor beads should be performed under subdued laboratory lighting (< 100 lux). Green filters (LEE 090 filters (preferred) or Roscolux filters #389 from Rosco) can be applied to light fixtures.

- Take precautionary measures to avoid contamination of the reagent solutions.

- The Biotinylated Anti-Analyte Antibody contains sodium azide. Contact with skin or inhalation should be avoided.

Kit Content: Reagents and Materials

Kit components	AL577HV (100 assay points***)	AL577C (500 assay points***)	AL577F (5000 assay points***)
AlphaLISA Anti-pIFNβ Acceptor beads stored in PBS, 0.05% Kathon, pH 7.2	40 µL @ 5 mg/mL (1 brown tube, <u>white</u> cap)	100 µL @ 5 mg/mL (1 brown tube, <u>white</u> cap)	1 mL @ 5 mg/mL (1 brown tube, <u>white</u> cap)
Streptavidin (SA)-coated Donor beads stored in 25 mM HEPES, 100 mM NaCl, 0.05% Kathon, pH 7.4	80 µL @ 5 mg/mL (1 brown tube, <u>black</u> cap)	200 µL @ 5 mg/mL (1 brown tube, <u>black</u> cap)	2 X 1 mL @ 5 mg/mL (2 brown tubes, <u>black</u> caps)
Biotinylated Anti-pIFNβ Antibody stored in PBS, 0.1% Tween-20, 0.05% NaN$_3$, pH 7.4	40 µL @ 500 nM (1 tube, <u>black</u> cap)	100 µL @ 500 nM (1 tube, <u>black</u> cap)	1 mL @ 500 nM (1 tube, <u>black</u> cap)
Lyophilized Recombinant Porcine pIFNβ*	1 µg (1 tube, <u>clear</u> cap)	1 µg (1 tube, <u>clear</u> cap)	1 µg (1 tube, <u>clear</u> cap)
AlphaLISA Immunoassay Buffer (10X)**	2 mL, 1 small bottle	10 mL, 1 medium bottle	100 mL, 1 large bottle

*   Reconstitute lyophilized analyte in 100 µL Milli-Q® grade H$_2$O. The reconstituted analyte should be used within 60 minutes or aliquoted into screw-capped polypropylene vials and stored at -20°C for future experiments. Avoid freeze-thaw cycles. One vial contains an amount of analyte sufficient for performing 10 standard curves. Additional vials can be ordered separately (cat # AL577S).

**   Extra buffer can be ordered separately (cat # AL000C: 10 mL, cat # AL000F: 100 mL).

*** The number of assay points is based on an assay volume of 100 µL in 96-well plates or 50 µL in 96- or 384-well assay plates using the kit components at the recommended concentrations.

Sodium azide should **not** be added to the stock reagents. High concentrations of sodium azide (> 0.001 % final in the assay) might decrease the AlphaLISA signal. Note that sodium azide from the Biotinylated Antibody stock solution will not interfere with the AlphaLISA signal (0.0001% final in the assay).

Specific additional required reagents and materials:

The following materials are recommended:

Item	Suggested source	Catalog #
TopSeal™-A Plus Adhesive Sealing Film	Revvity Inc.	6050185
EnVision®-Alpha Reader	Revvity Inc.	-

Recommendations

IMPORTANT: PLEASE READ THE RECOMMENDATIONS BELOW BEFORE USE

- The volume indicated on each tube is guaranteed for single pipetting. Multiple pipetting of the reagents may reduce the theoretical amount left in the tube. To minimize loss when pipetting beads, it is preferable not to pre-wet the tip.

- Centrifuge all tubes (including lyophilized analyte) before use to improve recovery of content (2000g, 10-15 sec). Re-suspend all reagents by vortexing before use.

- Use Milli-Q® grade H_2O (18 MΩ•cm) to dilute 10X AlphaLISA Immunoassay Buffer and to reconstitute the lyophilized analyte.

- When diluting the standard or samples, change tips between each standard or sample dilution. When loading reagents in the assay microplate, change tips between each standard or sample addition and after each set of reagents.

- When reagents are added to the microplate, make sure the liquids are at the bottom of the well.

- Small volumes may be prone to evaporation. It is recommended to cover microplates with TopSeal-A Adhesive Sealing Films to reduce evaporation during incubation. Microplates can be read with the TopSeal-A Film in place.

- The AlphaLISA signal is detected with an EnVision Multilabel Plate Reader equipped with the Alpha option using the AlphaScreen standard settings (e.g. Total Measurement Time: 550 ms, Laser 680 nm Excitation Time: 180 ms, Mirror: D640as, Emission Filter: M570w, Center Wavelength 570 nm, Bandwidth 100 nm, Transmittance 75%).

- AlphaLISA signal will vary with temperature and incubation time. For consistent results, identical incubation times and temperature should be used for each plate.

- The standard curves shown in this technical data sheet are provided for information only. A standard curve must be generated for each experiment.

Assay Procedure

- The manual described below is an example for generating one standard curve in a 50 µL final assay volume (48 wells, triplicate determinations). The manuals also include testing samples in 452 wells. If different amount of samples are tested, the volumes of all reagents have to be adjusted accordingly, as shown in the table below. These calculations do not include excess reagent to account for losses during transfer of solutions or dead volumes.

- The standard dilution manual is provided for information only. As needed, the number of replicates or the range of concentrations covered can be modified.

- Use of four background points in triplicate (12 wells) is recommended when LDL/LLOQ is calculated. One background point in triplicate (3 wells) can be used when LDL/LLOQ is not calculated.

Format	# of data points	Volume					Plate recommendation
		Final	Sample	AlphaLISA Acceptor Beads	Biotinylated Antibody	SA-Donor beads	
AL577HV	100	100 µL	10 µL	20 µL	20 µL	50 µL	White OptiPlate-96 (cat # 6005290) White ½ AreaPlate-96 (cat # 6005560)
AL577C	250	100 µL	10 µL	20 µL	20 µL	50 µL	White OptiPlate-96 (cat # 6005290) White ½ AreaPlate-96 (cat # 6005560)
	500	50 µL	5 µL	10 µL	10 µL	25 µL	White ½ AreaPlate-96 (cat # 6005560) White OptiPlate-384 (cat # 6007290) Light gray AlphaPlate™-384 (cat # 6005350)
	1 250	20 µL	2 µL	4 µL	4 µL	10 µL	Light gray AlphaPlate-384 (cat # 6005350) ProxiPlate™-384 Plus (cat # 6008280) White OptiPlate-384 (cat # 6007290)
	2 500	10 µL	1 µL	2 µL	2 µL	5 µL	Light gray AlphaPlate-1536 (cat # 6004350)
AL577F	5 000	50 µL	5 µL	10 µL	10 µL	25 µL	White ½ AreaPlate-96 (cat # 6005560) White OptiPlate-384 (cat # 6007290) Light gray AlphaPlate-384 (cat # 6005350)
	12 500	20 µL	2 µL	4 µL	4 µL	10 µL	Light gray AlphaPlate-384 (cat # 6005350) ProxiPlate-384 Plus (cat # 6008280) White OptiPlate-384 (cat # 6007290)
	25 000	10 µL	1 µL	2 µL	2 µL	5 µL	Light gray AlphaPlate-1536 (cat # 6004350)

3 Step Manual described below is for 500 assay points including one standard curve (48 wells) and samples (452 wells). *If different amount of samples are tested, <u>the volumes of all reagents have to be adjusted accordingly</u>.*

1) <u>Preparation of 1X AlphaLISA Immunoassay Buffer</u>:
   Add 5 mL of 10X AlphaLISA Immunoassay Buffer to 45 mL Milli-Q® grade H_2O.

2) Preparation of pIFNβ analyte standard dilutions:

    a. Reconstitute lyophilized pIFNβ (1 µg) in 100 µL Milli-Q® grade H_2O.

    b. Prepare standard dilutions as follows in 1X AlphaLISA Immunoassay Buffer (change tip between each standard dilution):

Tube	Vol. of pIFNβ (µL)	Vol. of diluent (µL)*	[pIFNβ] in standard curve (g/mL in 5 µL)	[pIFNβ] in standard curve (pg/mL in 5 µL)
A	10 µL of reconstituted pIFNβ	90	1.00E-06	1 000 000
B	60 µL of tube A	140	3.00E-06	300 000
C	60 µL of tube B	120	1.00E-07	100 000
D	60 µL of tube C	140	3.00E-08	30 000
E	60 µL of tube D	120	1.00E-08	10 000
F	60 µL of tube E	140	3.00E-09	3 000
G	60 µL of tube F	120	1.00E-09	1 000
H	60 µL of tube G	140	3.00E-10	300
I	60 µL of tube H	120	1.00E-10	100
J	60 µL of tube I	140	3.00E-11	30
K	60 µL of tube J	120	1.00E-11	10
L	60 µL of tube K	140	3.00E-12	3
M ** (background)	0	100	0	0
N ** (background)	0	100	0	0
O ** (background)	0	100	0	0
P ** (background)	0	100	0	0

*   Dilute standards in diluent (e.g. 1X AlphaLISA Immunoassay Buffer).
At low concentrations of analyte, a significant amount of analyte can bind to the vial. Therefore, load the analyte standard dilutions in the assay microplate within 60 minutes of preparation.

**   Four background points in triplicate (12 wells) are used when LDL is calculated. If LDL does not need to be calculated, one background point in triplicate can be used (3 wells).

3) Preparation of 5X Anti-pIFNβ AlphaLISA Acceptor beads (100 µg/mL):
    a. Prepare just before use.
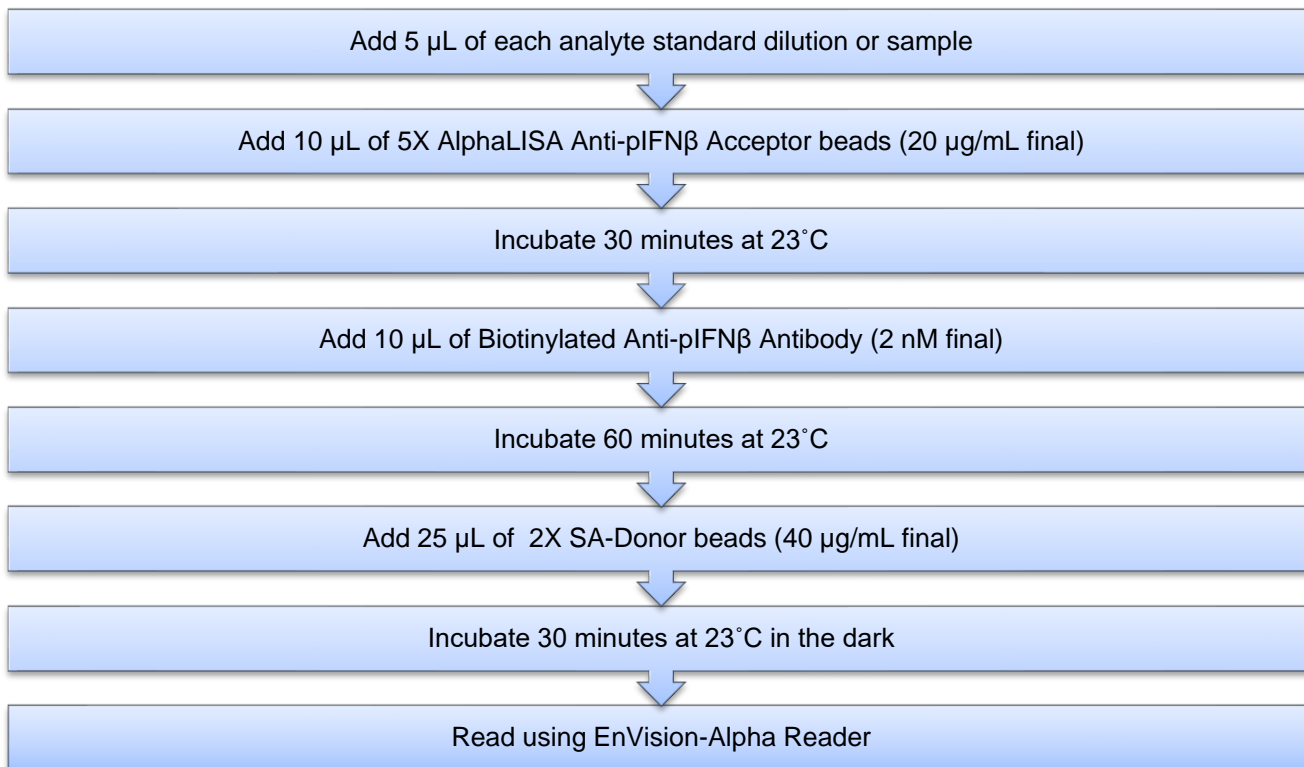   b. Add 100 µL Anti-pIFNβ Acceptor beads to 4900 µl of 1X AlphaLISA Immunoassay Buffer.

4) Preparation of 5X biotinylated Anti-pIFNβ antibody (10 nM):
    a. Prepare just before use.
    b. Add 100 µL 500 nM Biotinylated Anti-pIFNβ Antibody to 4900 µl of 1X AlphaLISA Immunoassay Buffer.

5) Preparation of 2X Streptavidin (SA) Donor beads (80 µg/mL):
    a. Prepare just before use.
    b. Keep the beads under subdued laboratory lighting.
    c. Add 200 µL of 5 mg/mL SA-Donor beads to 12 300 µL of 1X AlphaLISA Immunoassay Buffer.

6) In a white Optiplate (384 wells):

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│           Add 5 µL of each analyte standard dilution or sample        │
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                                    ↓
┌─────────────────────────────────────────────────────────────────────┐
│     Add 10 µL of 5X AlphaLISA Anti-pIFNβ Acceptor beads (20 µg/mL final) │
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│                      Incubate 30 minutes at 23˚C                      │
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┌─────────────────────────────────────────────────────────────────────┐
│       Add 10 µL of Biotinylated Anti-pIFNβ Antibody (2 nM final)       │
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                                    ↓
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│                      Incubate 60 minutes at 23˚C                      │
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┌─────────────────────────────────────────────────────────────────────┐
│          Add 25 µL of  2X SA-Donor beads (40 µg/mL final)             │
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│                 Incubate 30 minutes at 23˚C in the dark               │
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│                     Read using EnVision-Alpha Reader                  │
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Data Analysis

- Calculate the average count value for the background wells.

- Generate a standard curve by plotting the AlphaLISA counts versus the concentration of analyte. A log scale can be used for either or both axes. No additional data transformation is required.

- Analyze data according to a nonlinear regression using the 4-parameter logistic equation (sigmoidal dose-response curve with variable slope) and a $1/Y^2$ data weighting (the values at maximal concentrations of analyte after the hook point should be removed for correct analysis).

- The LDL is calculated by interpolating the average background counts (12 wells without analyte) + 3 x standard deviation value (average background counts + (3xSD)) on the standard curve.

- The LLOQ as measured here is calculated by interpolating the average background counts (12 wells without analyte) + 10 x standard deviation value (average background counts + (10xSD)) on the standard curve. Alternatively, the true LLOQ can be determined by spiking known concentrations of analyte in the matrix and measuring the percent recovery, and then determining the minimal amount of spiked analyte that can be quantified within a given limit (usually +/- 20% or 30% of the real concentration).

- Read from the standard curve the concentration of analyte contained in the samples.

- If samples have been diluted, the concentration read from the standard curve must be multiplied by the dilution factor.

Assay Performance Characteristics

AlphaLISA assay performance described below was determined using the 3 step manual using AlphaLISA Immunoassay Buffer (IAB) as assay buffer. The analytes (standards) were prepared in IAB, DMEM + 10% FBS, RPMI + 10% FBS, or 100% FBS and all other components were prepared in IAB.

- Assay Sensitivity:

The LDL was calculated as described above. The values correspond to the lowest concentration of analyte that can be detected in a volume of 5 µL sample using the recommended assay conditions.

LDL (pg/mL)*	(Analyte diluent)	# of experiments
95	IAB	6
160	DMEM + 10% FBS	6
1227**	RPMI + 10% FBS	6
329	100% FBS	6

*   Note that LDL can be decreased (i.e. sensitivity increased) by increasing the volume of analyte in the assay (e.g. use 10 µL of analyte in a final assay volume of 50 µL).
**   **Use of RPMI with 10%FBS is not recommended.**

- Assay Precision:

The following assay precision data were calculated from the three independent assays using two different kit lots. In each lot, the analytes were prepared in IAB, DMEM + 10% FBS, or 100% FBS. All other components were prepared in IAB. Each assay consisted of one standard curve comprising 12 data points (each in triplicate) and 12 background wells (no analytes). The assays were performed in 384-well format.

- Intra-assay precision:

The intra-assay precision was determined using a total of 16 independent determinations in triplicate. Shown as CV%.

pIFNβ	IAB	DMEM + 10% FBS	100% FBS
CV (%)	3	3	6

- Inter-assay precision:

The inter-assay precision was determined using a total of 3 independent determinations with 9 measurements for 3 ng/mL sample. Shown as CV%.

pIFNβ	IAB	DMEM + 10% FBS	100% FBS
CV (%)	16	14	17

- Spike Recovery:

Three known concentrations of analyte were spiked into IAB, DMEM + 10% FBS, or 100% FBS. All samples, including non-spiked diluents were measured in the assay. Note that the analytes for the respective standard curves were prepared in IAB, DMEM + 10% FBS, or 100% FBS. All other assay components were diluted in IAB.

Spiked pIFNβ (ng/mL)	% Recovery		
	IAB	DMEM + 10% FBS	100% FBS
30	84	87	88
10	88	83	80
3	89	92	95

- Specificity:

Cross-reactivity of the pIFNβ AlphaLISA Kit was tested using the following proteins at 100 ng/mL in IAB.

Tested Proteins	% Cross Reactivity	LDL (pg/mL)
Bovine IFNβ	20*	473

*The % cross reactivity was calculated by interpolating the counts from bovine INFβ to a porcine IFNβ standard curve. If the porcine analyte is switched with bovine analyte (not provided) for the standard curve, the LDL is 473 pg/mL. To test bovine samples, using a recombinant bovine INFβ as the analyte for the standard curve is recommended. However, reduced maximum counts and signal to background ratio should be expected with bovine INFβ as analyte to prepare the standard curve.

- Porcine Serum Experiments

  o Dilution Linearity

Normal porcine serum and pIFNβ-spiked (100 ng/mL) normal porcine serum samples were diluted with 100% FBS and the assay was performed along with a standard curve (analyte) prepared in 100% FBS. All other components of the assay were prepared in IAB. Concentrations of pIFNβ in diluted porcine serum samples were determined by interpolating to the standard curve. The observed values were obtained following the substraction of the endogenous levels at each corresponding dilution. Excellent dilution linearity ($R^2 > 0.999$) was achieved in the pIFNβ-spiked porcine serum samples that were diluted ≥ 8 fold. The results are shown in table and figure below.

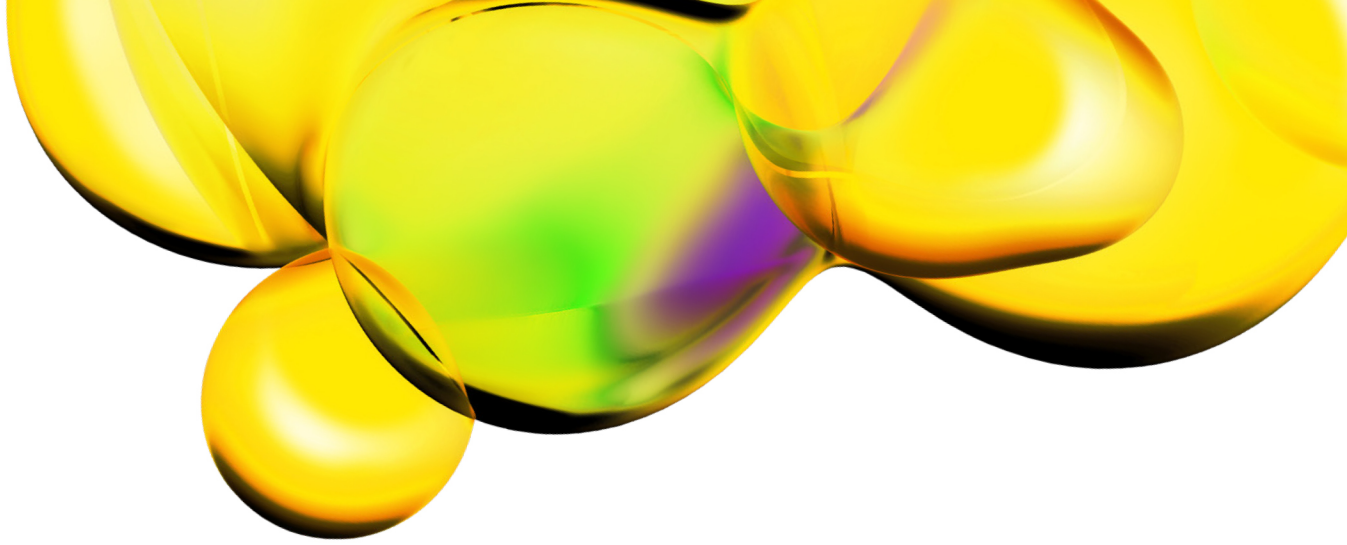| Dilution Factor (x)	pIFNβ Expected (ng/mL)	pIFNβ Observed (ng/mL)
8	12.5	14.8
16	6.25	8.15
32	3.13	3.52
64	1.56	1.38
128	0.78	0.56
256	0.39	0.42
512	0.20	0.14
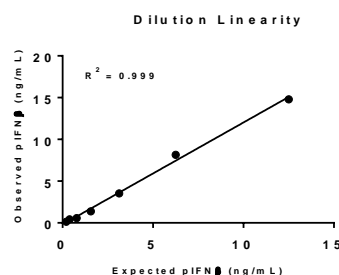
  o Spike Recovery

Three known amounts of pIFNβ were spiked into normal porcine serum (100, 50, and 25 ng/mL pIFNβ in spiked samples) and then the samples were diluted 8-fold into 100% FBS. The standard was prepared in 100% FBS and all other reagents were prepared in IAB. *Recoveries were calculated after the no spike pIFNβ level was subtracted (in this case, 165 ng/mL in normal porcine serum). Excellent recovery was achieved for all three spikes tested. The spike recoveries of pIFNβ were determined and the results are shown in table below.

	Diluent: 100% FBS	
	Spiked sample (Normal Porcine Serum)	
Spike (ng/mL)	Concentration (ng/mL)*	Recovery (%)
No spike	165	NA
25	23	91
50	55	91
100	117	107

Troubleshooting Guide

You will find detailed recommendations for common situations you might encounter with your AlphaLISA Assay kit at: www.revvity.com

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