

Version 4 Last updated 28 September 2018

# ab214565 Human PD-L1 [28-8] SimpleStep ELISA<sup>®</sup> Kit

For the quantitative measurement of PD-L1 in serum, plasma, cell culture supernatant, urine, cell and tissue extracts.

This product is for research use only and is not intended for diagnostic use.

## Table of Contents

1. Overview	1
2. Protocol Summary	2
3. Precautions	3
4. Storage and Stability	3
5. Limitations	4
6. Materials Supplied	4
7. Materials Required, Not Supplied	5
8. Technical Hints	5
9. Reagent Preparation	7
10. Standard Preparation	8
11. Sample Preparation	10
12. Plate Preparation	13
13. Assay Procedure	14
14. Calculations	16
15. Typical Data	17
16. Typical Sample Values	19
17. Assay Specificity	26
18. Species Reactivity	27
19. Troubleshooting	28
20. Notes	29

# 1. Overview

PD-L1 *in vitro* SimpleStep ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for the quantitative measurement of PD-L1 protein in serum, plasma, urine, cell culture supernatant, cell and tissue extracts.

We combined our best-selling RabMAb PD-L1 antibody [clone 28-8] (ab205921) with our 90-minute SimpleStep ELISA protocol to create ab214565 with nearly 2-fold higher sensitivity than our main competitor's published results.

The SimpleStep ELISA employs an affinity tag labeled capture antibody and a reporter conjugated detector antibody which immunocapture the sample analyte in solution. This entire complex (capture antibody/analyte/detector antibody) is in turn immobilized via immunoaffinity of an anti-tag antibody coating the well. To perform the assay, samples or standards are added to the wells, followed by the antibody mix. After incubation, the wells are washed to remove unbound material. TMB Development Solution is added and during incubation is catalyzed by HRP, generating blue coloration. This reaction is then stopped by addition of Stop Solution completing any color change from blue to yellow. Signal is generated proportionally to the amount of bound analyte and the intensity is measured at 450 nm. Optionally, instead of the endpoint reading, development of TMB can be recorded kinetically at 600 nm.

PD-L1 (also known as CD274 or B7-H1) is a membrane bound glycoprotein involved in regulation of the immune system. PD-L1 is expressed on a variety of inflammatory-activated cells as well as some carcinomas and in melanoma. PD-L1 binds to PD-1 and CD80, where it can suppress T cell activation and proliferation as well as induce apoptosis. Levels of PD-L1 are increased in the plasma of cancer patients as well as in cerebrospinal fluid of gliomas. PD-L1 can bind PD-1 in order to regulate T cell apoptosis.

## 2. Protocol Summary

Prepare all reagents, samples, and standards as instructed



Add 50  $\mu$ L standard or sample to appropriate wells



Add 50  $\mu$ L Antibody Cocktail to all wells



Incubate at room temperature for 1 hour



Aspirate and wash each well three times with 350  $\mu$ L 1X Wash Buffer PT



Add 100  $\mu$ L TMB Development Solution to each well and incubate for 10 minutes.



Add 100  $\mu$ L Stop Solution and read OD at 450 nm

### 3. Precautions

**Please read these instructions carefully prior to beginning the assay.**

- All kit components have been formulated and quality control tested to function successfully as a kit.
- We understand that, occasionally, experimental protocols might need to be modified to meet unique experimental circumstances. However, we cannot guarantee the performance of the product outside the conditions detailed in this protocol booklet.
- Reagents should be treated as possible mutagens and should be handled with care and disposed of properly. Please review the Safety Datasheet (SDS) provided with the product for information on the specific components.
- Observe good laboratory practices. Gloves, lab coat, and protective eyewear should always be worn. Never pipet by mouth. Do not eat, drink or smoke in the laboratory areas.
- All biological materials should be treated as potentially hazardous and handled as such. They should be disposed of in accordance with established safety procedures.

### 4. Storage and Stability

**Store kit at +4°C immediately upon receipt. Kit has a storage time of 1 year from receipt, providing components have not been reconstituted.**

Refer to list of materials supplied for storage conditions of individual components. Observe the storage conditions for individual prepared components in the Materials Supplied section.

## 5. Limitations

- Assay kit intended for research use only. Not for use in diagnostic procedures.
- Do not mix or substitute reagents or materials from other kit lots or vendors. Kits are QC tested as a set of components and performance cannot be guaranteed if utilized separately or substituted.

## 6. Materials Supplied

Item	Quantity	Storage Condition
Human PD-L1 Capture Antibody 10X	600 µL	+4°C
Human PD-L1 Detector Antibody (RabMAb® clone 28-8) 10X	600 µL	+4°C
Human PD-L1 Lyophilized Recombinant Protein	2 Vials	+4°C
Antibody Diluent CPI	6 mL	+4°C
Wash Buffer PT 10X	20 mL	+4°C
Cell Extraction Buffer PTR 5X	10 mL	+4°C
Cell Extraction Enhancer Solution 50X	1 mL	+4°C
TMB Development Solution	12 mL	+4°C
Stop Solution	12 mL	+4°C
Sample Diluent NS	50 mL	+4°C
Anti-tag coated microplate (12 x 8 well strips)	96 Wells	+4°C
Plate Seal	1	+4°C

## 7. Materials Required, Not Supplied

These materials are not included in the kit, but will be required to successfully perform this assay:

- Microplate reader capable of measuring absorbance at 450 or 600 nm.
- Method for determining protein concentration (BCA assay recommended).
- Deionized water.
- Multi- and single-channel pipettes.
- Tubes for standard dilution.
- Plate shaker for all incubation steps.
- Optional: Phenylmethylsulfonyl Fluoride (PMSF) (or other protease inhibitors).
- 

## 8. Technical Hints

- Samples generating values higher than the highest standard should be further diluted in the appropriate sample dilution buffers.
- Avoid foaming or bubbles when mixing or reconstituting components.
- Avoid cross contamination of samples or reagents by changing tips between sample, standard and reagent additions.
- Ensure plates are properly sealed or covered during incubation steps.
- Complete removal of all solutions and buffers during wash steps is necessary to minimize background.
- As a guide, typical ranges of sample concentration for commonly used sample types are shown below in Sample Preparation (section 11).
- All samples should be mixed thoroughly and gently.
- Avoid multiple freeze/thaw of samples.
- Incubate ELISA plates on a plate shaker during all incubation steps.
- When generating positive control samples, it is advisable to change pipette tips after each step.

- The provided Antibody Diluents and Sample Diluents contain protease inhibitor aprotinin. Additional protease inhibitors can be added if required.
- The provided 5X Cell Extraction Buffer contains phosphatase inhibitors and protease inhibitor aprotinin. Additional protease inhibitors can be added if required.
- The provided 50X Cell Extraction Enhancer Solution may precipitate when stored at + 4°C. To dissolve, warm briefly at + 37°C and mix gently. The 50X Cell Extraction Enhancer Solution can be stored at room temperature to avoid precipitation.
- **To avoid high background always add samples or standards to the well before the addition of the antibody cocktail.**
- **This kit is sold based on number of tests. A 'test' simply refers to a single assay well. The number of wells that contain sample, control or standard will vary by product. Review the protocol completely to confirm this kit meets your requirements. Please contact our Technical Support staff with any questions.**



## 9. Reagent Preparation

- Equilibrate all reagents to room temperature (18-25°C) prior to use. The kit contains enough reagents for 96 wells. The sample volumes below are sufficient for 48 wells (6 x 8-well strips); adjust volumes as needed for the number of strips in your experiment.
- Prepare only as much reagent as is needed on the day of the experiment. Capture and Detector Antibodies have only been tested for stability in the provided 10X formulations.

### 9.1 1X Cell Extraction Buffer PTR (For cell and tissue extracts only):

Prepare 1X Cell Extraction Buffer PTR by diluting 5X Cell Extraction Buffer PTR and 50X Cell Extraction Enhancer Solution to 1X with deionized water. To make 10 mL 1X Cell Extraction Buffer PTR combine 8 mL deionized water and 2 mL 5X Cell Extraction Buffer PTR. Mix thoroughly and gently. If required protease inhibitors can be added.

### 9.2 1X Wash Buffer PT:

Prepare 1X Wash Buffer PT by diluting 10X Wash Buffer PT with deionized water. To make 50 mL 1X Wash Buffer PT combine 5 mL 10X Wash Buffer PT with 45 mL deionized water. Mix thoroughly and gently.

### 9.3 Antibody Cocktail:

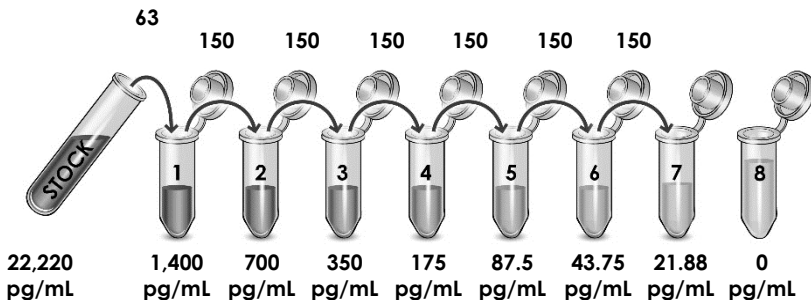
Prepare Antibody Cocktail by diluting the capture and detector antibodies in Antibody Diluent CPI. To make 3 mL of the Antibody Cocktail combine 300  $\mu$ L 10X Capture Antibody and 300  $\mu$ L 10X Detector Antibody with 2.4 mL Antibody Diluent CPI. Mix thoroughly and gently.

## 10. Standard Preparation

- Always prepare a fresh set of standards for every use.
- Discard working standard dilutions after use as they do not store well.
- The following section describes the preparation of a standard curve for duplicate measurements (recommended).

### 10.1 For cell and tissue extract samples follow these instructions:

- 10.1.1 Reconstitute the PD-L1 standard sample by adding 100  $\mu\text{L}$  of water. Hold at room temperature for 10 minutes and mix thoroughly and gently. This is the 22,220  $\text{pg/mL}$  **Stock Standard** Solution.
- 10.1.2 Label eight tubes, Standards 1–8.
- 10.1.3 Add 937  $\mu\text{L}$  of 1X Cell Extraction Buffer PTR into tube number 1 and 150  $\mu\text{L}$  of 1X Cell Extraction Buffer PTR into numbers 2-8.
- 10.1.4 Use the Stock Standard to prepare the following dilution series. Standard #8 contains no protein and is the Blank control:



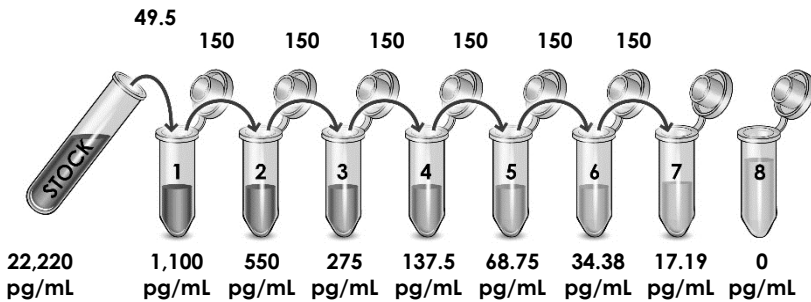
**10.2** For **serum, plasma, urine and cell culture supernatant samples** follow these instructions:

10.2.1 Reconstitute the PD-L1 standard sample by adding 100  $\mu$ L of water. Hold at room temperature for 10 minutes and mix thoroughly and gently. This is the 22,220 pg/mL **Stock Standard** Solution.

10.2.2 Label eight tubes, Standards 1–8.

10.2.3 Add 950.5  $\mu$ L of Sample Diluent NS into tube number 1 and 150  $\mu$ L of Sample Diluent NS into numbers 2-8.

10.2.4 Use the Stock Standard to prepare the following dilution series. Standard #8 contains no protein and is the Blank control:



## 11. Sample Preparation

Typical Sample Dynamic Range	
Sample Type	Range
Human Plasma - Heparin	1.56 – 50%
Human Plasma - EDTA	1.56 – 50%
Human Plasma - Citrate	1.56 – 50%
Human Serum	1.56 – 50%
Human Urine	1.56 – 50%
Cell Culture Supernatant	Varies by type
Jurkat LPS+IFN-gamma Cell Extract	31.25 – 1,000 µg/mL
Placenta Tissue Extract	31.25 – 1,000 µg/mL

### 11.1 Plasma:

Collect plasma using citrate, EDTA or heparin. Centrifuge samples at 2,000 x g for 10 minutes. Dilute samples into Sample Diluent NS and assay. Store un-diluted plasma samples at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.

### 11.2 Serum:

Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 2,000 x g for 10 minutes and collect serum. Dilute samples into Sample Diluent NS and assay. Store un-diluted serum at -20°C or below. Avoid repeated freeze-thaw cycles.

### 11.3 Cell Culture Supernatants:

Centrifuge cell culture media at 2,000 x g for 10 minutes to remove debris. Collect supernatants and assay. Or dilute samples into Sample Diluent NS and assay. Store un-diluted samples at -20°C or below. Avoid repeated freeze-thaw cycles.

### 11.4 Urine:

Centrifuge urine at 2,000 x g for 10 minutes to remove debris. Collect supernatants, dilute in Sample Diluent NS and assay. Store un-diluted samples at -20°C or below. Avoid repeated freeze-thaw cycles.

## **11.5 Preparation of extracts from cell pellets:**

- 11.5.1 Collect non-adherent cells by centrifugation or scrape to collect adherent cells from the culture flask. Typical centrifugation conditions for cells are 500 x g for 5 minutes at 4°C.
- 11.5.2 Rinse cells twice with PBS.
- 11.5.3 Solubilize pellet at  $2 \times 10^7$  cell/mL in chilled 1X Cell Extraction Buffer PTR.
- 11.5.4 Incubate on ice for 20 minutes.
- 11.5.5 Centrifuge at 18,000 x g for 20 minutes at 4°C.
- 11.5.6 Transfer the supernatants into clean tubes and discard the pellets.
- 11.5.7 Assay samples immediately or aliquot and store at -80°C. The sample protein concentration in the extract may be quantified using a protein assay.
- 11.5.8 Dilute samples to desired concentration in 1X Cell Extraction Buffer PTR.

## **11.6 Preparation of extracts from adherent cells by direct lysis (alternative protocol):**

- 11.6.1 Remove growth media and rinse adherent cells 2 times in PBS.
- 11.6.2 Solubilize the cells by addition of chilled 1X Cell Extraction Buffer PTR directly to the plate (use 750  $\mu$ L - 1.5 mL 1X Cell Extraction Buffer PTR per confluent 15 cm diameter plate).
- 11.6.3 Scrape the cells into a microfuge tube and incubate the lysate on ice for 15 minutes.
- 11.6.4 Centrifuge at 18,000 x g for 20 minutes at 4°C.
- 11.6.5 Transfer the supernatants into clean tubes and discard the pellets.
- 11.6.6 Assay samples immediately or aliquot and store at -80°C. The sample protein concentration in the extract may be quantified using a protein assay.
- 11.6.7 Dilute samples to desired concentration in 1X Cell Extraction Buffer PTR.

## **11.7 Preparation of extracts from tissue homogenates:**

- 11.7.1 Tissue lysates are typically prepared by homogenization of tissue that is first minced and thoroughly rinsed in PBS to remove blood (dounce homogenizer recommended).
- 11.7.2 Homogenize 100 to 200 mg of wet tissue in 500  $\mu$ L – 1 mL of chilled 1X Cell Extraction Buffer PTR. For lower amounts of tissue adjust volumes accordingly.
- 11.7.3 Incubate on ice for 20 minutes.
- 11.7.4 Centrifuge at 18,000 x g for 20 minutes at 4°C.

- 11.7.5 Transfer the supernatants into clean tubes and discard the pellets.
- 11.7.6 Assay samples immediately or aliquot and store at -80°C. The sample protein concentration in the extract may be quantified using a protein assay.
- 11.8** Dilute samples to desired concentration in 1X Cell Extraction Buffer PTR.

## 12. Plate Preparation

- The 96 well plate strips included with this kit are supplied ready to use. It is not necessary to rinse the plate prior to adding reagents.
- Unused plate strips should be immediately returned to the foil pouch containing the desiccant pack, resealed and stored at 4°C.
- For each assay performed, a minimum of two wells must be used as the zero control.
- For statistical reasons, we recommend each sample should be assayed with a minimum of two replicates (duplicates).
- Differences in well absorbance or “edge effects” have not been observed with this assay.

## 13. Assay Procedure

- Equilibrate all materials and prepared reagents to room temperature prior to use.
  - We recommend that you assay all standards, controls and samples in duplicate.
  - Prepare all reagents, working standards, and samples as directed in the previous sections.
- 13.1** Prepare all reagents, working standards, and samples as directed in the previous sections.
  - 13.2** Remove excess microplate strips from the plate frame, return them to the foil pouch containing the desiccant pack, reseal and return to 4°C storage.
  - 13.3** Add 50 µL of all sample or standard to appropriate wells.
  - 13.4** Add 50 µL of the Antibody Cocktail to each well.
  - 13.5** Seal the plate and incubate for 1 hour at room temperature on a plate shaker set to 400 rpm.
  - 13.6** Wash each well with 3 x 350 µL 1X Wash Buffer PT. Wash by aspirating or decanting from wells then dispensing 350 µL 1X Wash Buffer PT into each well. Complete removal of liquid at each step is essential for good performance. After the last wash invert the plate and blot it against clean paper towels to remove excess liquid.
  - 13.7** Add 100 µL of TMB Development Solution to each well and incubate for 10 minutes in the dark on a plate shaker set to 400 rpm.
  - 13.8** Add 100 µL of Stop Solution to each well. Shake plate on a plate shaker for 1 minute to mix. Record the OD at 450 nm. This is an endpoint reading.
  - 13.9** Alternative to 13.7 – 13.8: Instead of the endpoint reading at 450 nm, record the development of TMB Substrate kinetically. Immediately after addition of TMB Development Solution begin recording the blue color development with elapsed time in the microplate reader prepared with the following settings:



<b>Mode</b>	<b>Kinetic</b>
Wavelength:	600 nm
Time:	up to 15 min
Interval:	20 sec - 1 min
Shaking:	Shake between readings

**Δ Note:** that an endpoint reading can also be recorded at the completion of the kinetic read by adding 100  $\mu$ L Stop Solution to each well and recording the OD at 450 nm.

**13.10** Analyze the data as described below.

## 14. Calculations

14.1 Calculate the average absorbance value for the blank control (zero) standards. Subtract the average blank control standard absorbance value from all other absorbance values.

14.2 **Create a standard curve** by plotting the average blank control subtracted absorbance value for each standard concentration (y-axis) against the target protein concentration (x-axis) of the standard. Use graphing software to draw the best smooth curve through these points to construct the standard curve.

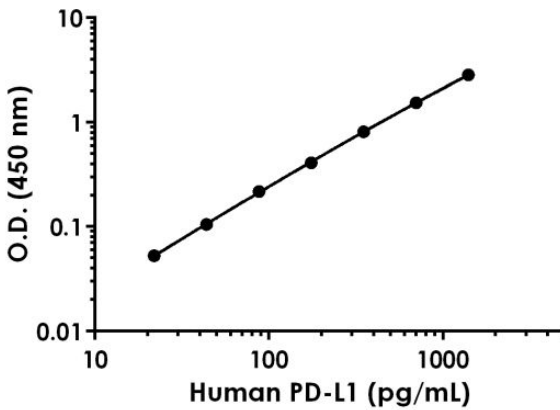
**Δ Note:** Most microplate reader software or graphing software will plot these values and fit a curve to the data. A four parameter curve fit (4PL) is often the best choice; however, other algorithms (e.g. linear, semi-log, log/log, 4 parameter logistic) can also be tested to determine if it provides a better curve fit to the standard values.

14.3 Determine the concentration of the target protein in the sample by interpolating the blank control subtracted **absorbance values against the standard curve**. Multiply the resulting value by the appropriate sample dilution factor, if used, to obtain the concentration of target protein in the sample.

14.4 Samples generating absorbance values greater than that of the highest standard should be further diluted and reanalyzed. Similarly, samples which measure at an absorbance values less than that of the lowest standard should be retested in a less dilute form.

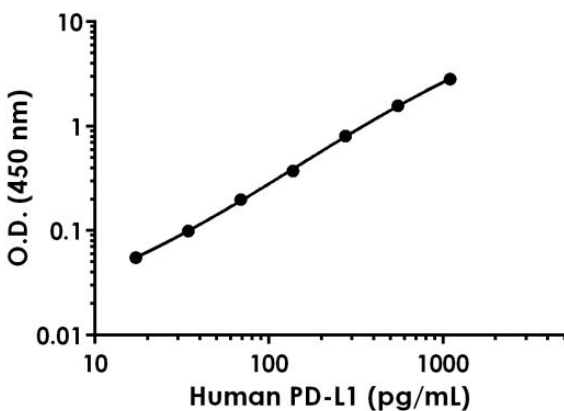
## 15. Typical Data

Typical standard curve – data provided for demonstration purposes only. A new standard curve must be generated for each assay performed.



Standard Curve Measurements			
Concentration (pg/mL)	O.D 450 nm		Mean O.D
	1	2	
0	0.051	0.056	0.053
21.87	0.102	0.110	0.106
43.75	0.154	0.163	0.158
87.5	0.274	0.270	0.272
175	0.461	0.470	0.465
350	0.856	0.881	0.869
700	1.558	1.644	1.601
1400	2.868	2.908	2.888

**Figure 1.** Example of human PD-L1 standard curve in 1X Cell Extraction Buffer PTR. The PD-L1 standard curve was prepared as described in Section 10. Raw data values are shown in the table. Background-subtracted data values (mean +/- SD) are graphed.



Standard Curve Measurements			
Concentration (pg/mL)	O.D 450 nm		Mean O.D
	1	2	
0	0.058	0.059	0.058
17.18	0.110	0.117	0.114
34.37	0.157	0.159	0.158
68.75	0.258	0.258	0.258
137.5	0.406	0.463	0.434
275	0.864	0.878	0.871
550	1.610	1.661	1.636
1100	2.807	2.982	2.895

**Figure 2.** Example of human PD-L1 standard curve in Sample Diluent NS, when applicable]. The PD-L1 standard curve was prepared as described in Section 10. Raw data values are shown in the table. Background-subtracted data values (mean +/- SD) are graphed.

## 16. Typical Sample Values

### SENSITIVITY –

The MDD was determined by calculating the mean of zero standard replicates and adding 2 standard deviations then extrapolating the corresponding concentration.

Sample Diluent Buffer	n=	Minimal Detectable Dose
Sample Diluent NS	24	2.91 pg/mL
1X Cell Extraction Buffer PTR	24	3.81 pg/mL

### RECOVERY –

Three concentrations of PD-L1 were spiked in duplicate to the indicated biological matrix to evaluate signal recovery in the working range of the assay.

Sample Type	Average % Recovery	Range (%)
Human Serum (50%)	86	82 – 91
Human Plasma – Citrate (50%)	84	79 – 88
Human Plasma – Heparin (50%)	92	89 – 93
Human Plasma – EDTA (50%)	85	81 – 88
Human Urine (50%)	91	86 – 96
Jurkat Supernatant (50%)	103	102 – 105
Jurkat + LPS + IFN-gamma Extract (125 µg/mL)	102	100 – 103
Placenta Extract (125 µg/mL)	105	104 – 107

## Linearity of Dilution

Linearity of dilution is determined based on interpolated values from the standard curve. Linearity of dilution defines a sample concentration interval in which interpolated target concentrations are directly proportional to sample dilution.

Native PD-L1 was measured in the following biological samples in a 2-fold dilution series. Sample dilutions are made in 1X Cell Extraction Buffer PTR.

Dilution Factor	Interpolated value	1000 µg/mL Jurkat + LPS + IFN-gamma	1000 µg/mL Human Placenta Extract	1000 µg/mL Human Thyroid Extract
Undiluted	pg/mL	399	663	196
	<b>% Expected value</b>	100	100	100
2	pg/mL	199	322	102
	<b>% Expected value</b>	100	97	104
4	pg/mL	103	157	51.9
	<b>% Expected value</b>	103	94	106
8	pg/mL	52.2	77.5	27.8
	<b>% Expected value</b>	105	94	113
16	pg/mL	24.8	36.7	NL
	<b>% Expected value</b>	99	89	NL

Recombinant PD-L1 was spiked into the following biological samples and diluted in a 2-fold dilution series in Sample Diluent NS.

Dilution Factor	Interpolated value	50% Human Serum	50% Human Plasma (Citrate)	50% Human Plasma (EDTA)	50% Human Plasma (Heparin)	50% Jurkat Supernatant
Undiluted	pg/mL	515	521	563	552	585
	<b>% Expected value</b>	100	100	100	100	100
2	pg/mL	303	310	323	319	306
	<b>% Expected value</b>	118	119	115	115	105
4	pg/mL	150	157	166	162	147
	<b>% Expected value</b>	116	121	118	118	101
8	pg/mL	73.9	77.8	78.9	79.8	74.2
	<b>% Expected value</b>	115	120	116	112	101
16	pg/mL	35.0	37.5	38.5	39.9	36.5
	<b>% Expected value</b>	109	115	116	110	100

Recombinant PD-L1 was spiked into the following biological sample and diluted in a 2-fold dilution series in Sample Diluent NS.

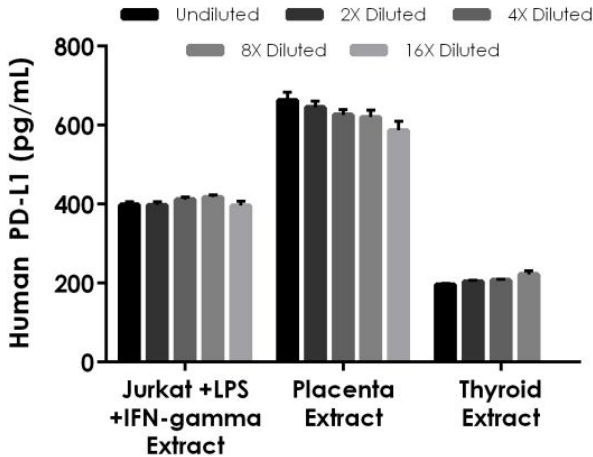
Dilution Factor	Interpolated value	50% Human Urine
Undiluted	pg/mL	459
	<b>% Expected value</b>	100
2	pg/mL	246
	<b>% Expected value</b>	107
4	pg/mL	127
	<b>% Expected value</b>	110
8	pg/mL	65.3
	<b>% Expected value</b>	114
16	pg/mL	30.9
	<b>% Expected value</b>	108

## PRECISION –

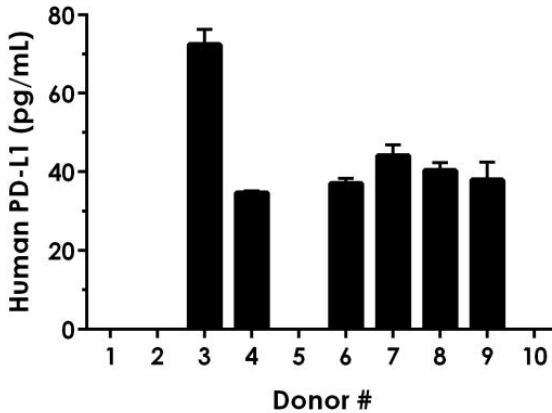
Mean coefficient of variations of interpolated values from Jurkat stimulated with LPS and IFN-gamma extract within the working range of the assay.

	<b>Intra- Assay</b>	<b>Inter- Assay</b>
n =	8	3
CV(%)	5.4	4.1

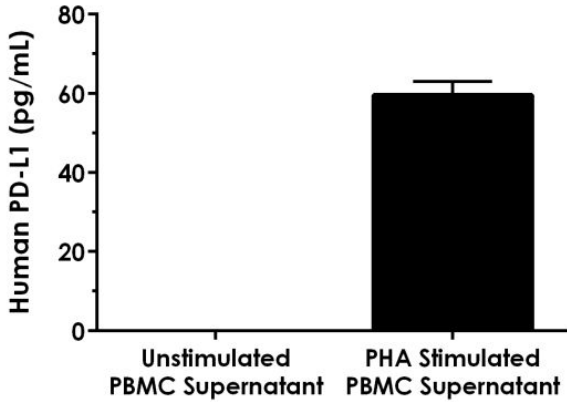




**Figure 3.** Interpolated concentrations of native PD-L1 in human Jurkat stimulated with LPS and IFN-gamma, placenta and thyroid based on a 1,000  $\mu\text{g}/\text{mL}$  extract load. The concentrations of PD-L1 were measured in duplicate and interpolated from the PD-L1 standard curve and corrected for sample dilution. The interpolated dilution factor corrected values are plotted (mean  $\pm$  SD,  $n=2$ ). The mean PD-L1 concentration was determined to be 404.3  $\text{pg}/\text{mL}$  in Jurkat stimulated with LPS and IFN-gamma, 628.4  $\text{pg}/\text{mL}$  in placenta and 207.5  $\text{pg}/\text{mL}$  in thyroid extracts.



**Figure 4.** Serum from ten individual healthy human male donors was measured in duplicate. Interpolated dilution factor corrected values are plotted (mean +/- SD, n=2). PD-L1 was measured in 6 donor serum samples and the remaining 4 samples measured less than the lowest point of the PD-L1 standard curve. Of those measured, the mean PD-L1 concentration was determined to be 44.5 pg/mL with a range of 34.4 – 75.3 pg/mL.



**Figure 5.** Human peripheral blood mononuclear cells were cultured unstimulated or stimulated with 10  $\mu\text{g}/\text{mL}$  PHA. Conditioned media was harvested after 48 hours. PD-L1 was measured in 100% unstimulated and PHA stimulated PBMC supernatant. The concentrations of PD-L1 were measured in duplicate and interpolated from the PD-L1 standard curves. The interpolated values are plotted (mean  $\pm$  SD,  $n=2$ ). The mean PD-L1 concentration was determined to be 59.7  $\text{pg}/\text{mL}$  in PHA stimulated PBMC supernatant. There was no detectable signal in unstimulated supernatant.

## 17. Assay Specificity

This kit recognizes both native and recombinant human PD-L1 protein in serum, plasma, and cell culture supernatant, cell and tissue extract samples only.

### **CROSS REACTIVITY**

Recombinant mouse PD-L1 was prepared at 50 ng/mL and 1250 pg/mL and assayed for cross reactivity. No cross-reactivity was observed.

### **INTERFERENCE**

Recombinant PD-1 was prepared at 50 ng/mL and 1250 pg/mL and tested for interference. No interference with was observed.

## 18. Species Reactivity

This kit recognizes human PD-L1 protein.

Other species reactivity was determined by measuring 50% serum samples of various species, interpolating the protein concentrations from the human standard curve, and expressing the interpolated concentrations as a percentage of the protein concentration in human serum assayed at the same dilution.

Reactivity < 3% was determined for the following species:

- Mouse
- Rat
- Cow

Please contact our Technical Support team for more information.

## 19. Troubleshooting

Problem	Reason	Solution
<b>Poor standard curve</b>	Inaccurate Pipetting	Check pipettes
	Improper standard dilution	Prior to opening, briefly spin the stock standard tube and dissolve the powder thoroughly by gentle mixing
<b>Low Signal</b>	Incubation times too brief	Ensure sufficient incubation times; increase to 2 or 3 hour standard/sample incubation
	Inadequate reagent volumes or improper dilution	Check pipettes and ensure correct preparation
	Incubation times with TMB too brief	Ensure sufficient incubation time until blue color develops prior addition of Stop solution
<b>Large CV</b>	Plate is insufficiently washed	Review manual for proper wash technique. If using a plate washer, check all ports for obstructions.
	Contaminated wash buffer	Prepare fresh wash buffer
<b>Low sensitivity</b>	Improper storage of the ELISA kit	Store your reconstituted standards at -80°C, all other assay components 4°C. Keep TMB Development Solution protected from light.
<b>Precipitate in Diluent</b>	Precipitation and/or coagulation of components within the Diluent.	Precipitate can be removed by gently warming the Diluent to 37°C.

## 20. Notes

# Technical Support

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