

KRIBIOLISA® Avelumab ELISA

REF : KBI1164

Ver 1.0

RUO

Enzyme Immunoassay for the Quantitative Determination of
Avelumab in serum, plasma and cell culture supernatant

RUO	For Research Use Only	REF	Catalog Number
	Store At	LOT	Batch Code
	Manufactured By		Biological Risk
	Expiry Date		Consult Operating Instructions

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REF KBI1164

 96 tests

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Introduction:

Avelumab is a recombinant human IgG1 monoclonal antibody that selectively targets and binds to programmed death-ligand 1 (PD-L1), an immune checkpoint protein expressed on tumor cells and immune cells. It is used in the treatment of certain advanced or metastatic cancers, including Merkel cell carcinoma and urothelial carcinoma. By binding to PD-L1, avelumab blocks its interaction with the programmed death-1 (PD-1) and B7.1 receptors, thereby releasing PD-L1-mediated inhibition of T-cell activity and enhancing the immune system's ability to recognize and attack tumor cells. As an IgG1 antibody, avelumab may also promote antibody-dependent cellular cytotoxicity (ADCC) against PD-L1-expressing tumor cells.

Intended Use:

The KRIBIOLISA® Avelumab ELISA is used as an analytical tool for quantitative determination of Avelumab in serum, plasma and cell culture supernatant.

Principle:

The method employs the quantitative sandwich enzyme immunoassay technique. Recombinant Human PD-L1 Protein is pre-coated onto microwells. Samples and standards are pipetted into microwells and Avelumab present in the sample are bound by the capture antibody. Then, a HRP (horseradish peroxidase) conjugated Anti-Avelumab is pipetted and incubated which specifically recognizes and binds to Avelumab. After washing microwells in order to remove any non-specific binding, the ready to use substrate solution (TMB) is added to microwells and color develops proportionally to the amount of Avelumab in the sample. Color development is then stopped by addition of stop solution. Absorbance is measured at 450 nm.

Materials Provided:

Part	Description	Qty
Recombinant Human PD-L1 protein Coated Microtiter Plate	96 well polystyrene microplate (12 strips of 8 wells) coated with recombinant Human PD-L1 protein.	12 x 8 wells
Avelumab Standard	Avelumab standard – (lyophilized – 1 ug/ml)	2 vials
Anti-Avelumab:HRP conjugate, concentrated	Anti-Avelumab conjugated to HRP (concentrated, 1 mg/ml – 8 ul)	2 vials
Detection Diluent	Buffered protein base with protein stabilizer and preservatives 0.02% Methylisothiazolinone and 0.02% bromonitrodioxane.	12 ml
(1X) Standard Diluent	Buffered protein base with protein stabilizer and 1:1000 human serum and preservative thiomersol < 0.01%	10 ml
(1X) Sample Diluent	Buffered protein base with BSA and preservative thiomersol < 0.01%.	50 ml x 2
(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 25µl to 1000µl
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. It is advisable to aliquot and store the Anti-Avelumab:HRP conjugate, concentrated at -20°C upon receipt. Rest of the kit components should be stored at 2-8°C. Immediately discard any excess Working Anti-Avelumab:HRP Conjugate, concentrated after running your assay
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 –

- Serum 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.
- Plasma 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.

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. **Standard Preparation:** Reconstitute the lyophilized standard in 1 ml of (1X) Standard diluent to get a concentration of 1 ug/ml. Keep the vial for 5 min with gentle agitation before making further dilutions. Prepare **Standards** as per the below table. Use the (1X) Standard Diluent as the Zero Standard (Standard No. 0)

Standard Concentration	Standard No	Dilution Particulars
1 ug/ml	Reconstituted Standard	Lyophilized Standard provided in the Kit + 1 ml of (1X) Standard Diluent
640 ng/ml	Standard No.7	640 ul of Reconstituted standard + 360 ul (1X) Standard Diluent
320 ng/ml	Standard No.6	500 ul Standard No.7 + 500 ul (1X) Standard Diluent
160 ng/ml	Standard No.5	500 ul Standard No.6 + 500 ul (1X) Standard Diluent
80 ng/ml	Standard No.4	500 ul Standard No.5 + 500 ul (1X) Standard Diluent
40 ng/ml	Standard No.3	500 ul Standard No.4 + 500 ul (1X) Standard Diluent
20 ng/ml	Standard No.2	500 ul Standard No.3 + 500 ul (1X) Standard Diluent
10 ng/ml	Standard No.1	500 ul Standard No.2 + 500 ul (1X) Standard Diluent
0 ng/ml	Standard No.0	500 ul only (1X) Standard Diluent

5. **Working Anti-Avelumab:HRP conjugate** – 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 Avelumab. High Dose Hook Effect is due to excess of antibody for very high concentrations of Avelumab present in the sample.
3. Avoid assay of Samples containing sodium azide (NaN_3), as it could destroy the HRP activity resulting in under-estimation of the amount of Avelumab
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.
2. Pipette **100 ul** of **Standards** or **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.
5. Pipette **100 ul** of **Working Anti-Avelumab:HRP Conjugate** 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 **TMB Substrate** in each well.
9. 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.
10. Pipette out **100 ul** of **Stop Solution**. Wells should turn from blue to yellow in color.
11. Read the absorbance at 450 nm with a microplate reader.

Interpretation 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 450nm) 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 Avelumab 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 Avelumab Concentration. If samples were diluted, multiply by the appropriate dilution factor.

Software which is able to generate a cubic spline curve-fit or 4PL is best recommended for automated results.

Note:

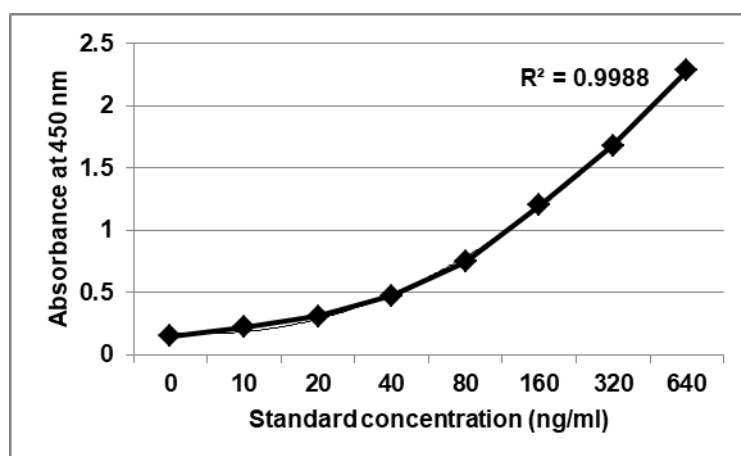
It is recommended to repeat the assay at a different dilution factor in the following cases:

- If the sample absorbance value is below the first standard.
- If the absorbance value is equivalent or higher than the 1000 ng/ml standard.

Typical Data (representative only)

Standard Concentration (ng/ml)	Abs A	Abs B	Mean Abs	Interpolated Concentration	% Interpolated Concentration against Actual Concentration
0	0.118	0.183	0.151	--	--
10	0.190	0.261	0.226	9.1	91.4
20	0.283	0.343	0.313	19.1	95.5
40	0.422	0.530	0.476	39.4	98.6
80	0.700	0.802	0.751	79.6	99.5
160	1.175	1.230	1.202	167.2	104.5
320	1.568	1.793	1.680	308.5	96.4
640	2.282	2.286	2.284	647.8	101.2

Typical Graph (representative only)



Abs = absorbance at 450nm

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.

Standard Calibration Range:

10 ng/ml – 640 ng/ml.

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 10 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 (10 ng/ml), medium (80 ng/ml) and high (640 ng/ml) concentrations. 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%

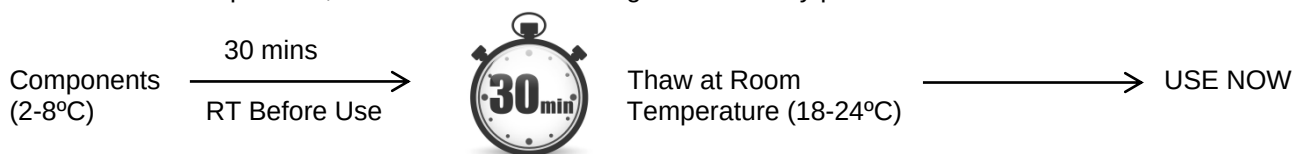
Safety Precautions:

- **This kit is 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.
- 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.



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 prepared Standards / diluted Samples** into each well.

4. Cover plate and incubate for at 37°C.

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

6. Pipette **100 ul Working Anti-Avelumab:HRP Conjugate** into each well.

7. Cover plate and incubate for at 37°C.

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

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

10. Cover plate and incubate for at 37°C.

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

12. Read absorbance at 450nm with a microplate reader within of stopping reaction.

Typical Example of a Work List

Well #	Contents	Absorbance at 450nm	Mean Absorbance	ng/ml Avelumab equivalent
1A 2A	zero std zero std			
1B 2B	10 ng/ml 10 ng/ml			
1C 2C	20 ng/ml 20 ng/ml			
1D 2D	40 ng/ml 40 ng/ml			
1E 2E	80 ng/ml 80 ng/ml			
1F 2F	160 ng/ml 160 ng/ml			
1G 2G	320 ng/ml 320 ng/ml			
1H 2H	640 ng/ml 640 ng/ml			
3A 4A	Sample Sample			
3B 4B	Sample Sample			

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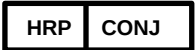
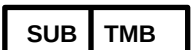
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SYMBOLS KEY

	Recombinant Human PD-L1 protein Coated Microtiter Plate (12x8 wells)
	Avelumab Standard, lyophilized
	Anti-Avelumab:HRP Conjugate, concentrated
	(1X) Sample Diluent
	(1X) Standard Diluent
	Detection Diluent
	(20X) Wash Buffer
	TMB Substrate
	Stop Solution
	Consult Instructions for Use
	Catalog Number
	Expiration Date
	Storage Temperature