



# Daratumumab ELISA

**REF** : KBI1028

Ver 2.0

**RUO**

Enzyme Immunoassay for the quantitative determination of Daratumumab in serum, plasma and cell culture supernatant

**IVD**

**For Research Use Only**

**REF**

**Catalog Number**



**Store At**

**LOT**

**Batch Code**



**Manufactured By**



**Biological Risk**



**Expiry Date**



**Consult Operating Instructions**

*For Research Use Only. Purchase does not include or carry the right to resell or transfer this product either as a stand-alone product or as a component of another product. Any use of this product other than the permitted use without the express written authorization of Eagle Biosciences, Inc. is strictly prohibited.*



**REF**

**KBI1028**



**96 tests**



**Eagle Biosciences, Inc.**

20A NW BLVD., Suite 112  
Nashua, NH 03063  
Phone: +1 (617) 419-2019  
Fax: +1 (617) 419-1110  
Info@eaglebio.com

## Introduction:

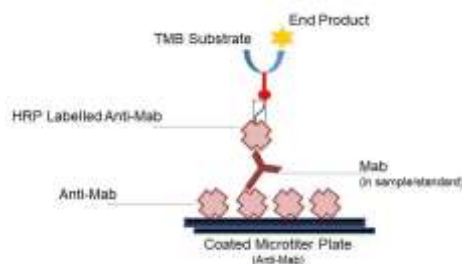
Daratumumab (trade name Darzalex) is an anti-cancer drug. It binds to CD38, which multiple myeloma cells overexpress. Daratumumab was originally developed by Genmab, but it is now being jointly developed by Genmab along with the Johnson & Johnson subsidiary Janssen Biotech, which acquired worldwide commercialization rights to the drug from Genmab. Daratumumab was given breakthrough therapy drug status in 2013 for multiple myeloma. It was awarded orphan drug status for multiple myeloma, diffuse large B cell lymphoma, follicular lymphoma, and mantle cell lymphoma.

## Intended Use:

The Eagle Biosciences Daratumumab ELISA is used as an analytical tool for quantitative determination of Daratumumab in serum, plasma and cell culture supernatant.

## Principle:

The method employs the quantitative sandwich enzyme immunoassay technique. Antibodies to Daratumumab are pre-coated onto microwells. Samples and standards are pipetted into microwells and human Daratumumab present in the sample are bound by the capture antibody. Then, a HRP (horseradish peroxidase) conjugated anti-Daratumumab antibody is pipetted and incubated. 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 Daratumumab in the sample. Color development is then stopped by addition of stop solution. Absorbance is measured at 450 nm.



## Materials Provided:

1. Anti-Daratumumab Coated Microtiter Plate (12x8 wells) – 1 no
2. Daratumumab Standard, (0.1 ml/vial) – 0, 0.2, 0.5, 2, 5, 20, 50 and 100 µg/ml
3. Anti-Daratumumab:HRP Conjugate – 6 ml
4. Assay Diluent – 6 ml
5. Sample Diluent – 50 ml
6. Wash Buffer (20X) – 25 ml
7. TMB Substrate – 12 ml
8. Stop Solution – 12 ml
9. Instruction Manual

## 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. Semi-Log 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.

- 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.
- The Substrate is light-sensitive and should be protected from direct sunlight or UV sources.

### Health Hazard Warnings:

- Reagents that contain preservatives may be harmful if ingested, inhaled or absorbed through the skin.
- 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 1:500 to 1:1000 (v/v), e.g. for 1:500 (1 µl sample + 499 µl 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):

- Label any aliquots made with the kit Lot No and Expiration date and store it at appropriate conditions mentioned.
- Bring all reagents to Room temperature before use.
- To make Wash Buffer (1X); dilute 50 ml of 20X Wash Buffer in 950 ml of DI water.

### Procedural Notes:

- In order to achieve good assay reproducibility and sensitivity, proper washing of the plates to remove excess un-reacted reagents is essential.
- High Dose Hook Effect may be observed in samples with very high concentrations of Daratumumab. High Dose Hook Effect is due to excess of antibody for very high concentrations of Daratumumab 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 Daratumumab concentration of the undiluted sample is less than the diluted sample, this may be indicative of the Hook Effect.
- 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 Daratumumab.
- It is recommended that all Standards and Samples be assayed in duplicates.
- Maintain a repetitive timing sequence from well to well for all the steps to ensure that the incubation timings are same for each well.
- 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.
- The plates should be read within 30 minutes after adding the Stop Solution.
- Make a work list in order to identify the location of Standards and Samples.

### Assay Procedure:

- 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
- Pipette out **50 µl** of **Assay Diluent** in each well.

3. Add **100 µl** of **Standards** or **Samples** into the respective wells.
4. Cover the plate and incubate for 60 minutes at 37°C
5. 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.
6. Pipette without delay in the same order **50 µl** of **Anti-Daratumumab: HRP Conjugate** into each well.
7. Cover the plate and incubate for 60 minutes at 37°C
8. 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.
9. Add **100 µl** of **TMB Substrate** in each well.
10. 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.
11. Pipette out **100 µl** of **Stop Solution**. Wells should turn from blue to yellow in color.
12. 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 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 Daratumumab 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 Daratumumab 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 100 µg/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 0.2µg/ml

## Linearity:

Standards provided in the kit will be used for measuring the linearity range of Daratumumab present in matrix.

## 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 (0.2 µg/ml), medium (5 µg/ml) and high (100 µg/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%

## Limitations of Method

Healthy individuals should be tested negative by the Daratumumab. This kit is for research use only and should not be used as a diagnostic tool.

## Safety Precautions:

- **This kit is for research 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.



## References:

Pharmacokinetics of Daratumumab Following Intravenous Infusion in Relapsed or Refractory Multiple Myeloma After Prior Proteasome Inhibitor and Immunomodulatory Drug Treatment... Pamela L. Clemens, Xiaoyu Yan, Henk M. Lokhorst, Sagar Lonial, Nedjad Losic, Imran Khan, Richard Jansson, Tahamtan Ahmadi, Kristen Lantz, Honghui Zhou, 1 Thomas Puchalski, and Xu Steven Xu... Clin Pharmacokinet... 2017... Springer

Daratumumab, a CD38 Monoclonal Antibody in Patients with Multiple Myeloma - Data From a Dose-Escalation Phase I/II Study... Torben Plesner, Henk Lokhorst, Peter Gimsing, Hareth Nahi, Steen Lisby and Paul G. Richardson... Blood... 2012... American Society of Hematology

Daratumumab, a Novel Therapeutic Human CD38 Monoclonal Antibody, Induces Killing of Multiple Myeloma and Other Hematological Tumors... Michel de Weers, Yu-Tzu Tai, Michael S. van der Veer, Joost M. Bakker, Tom Vink, Daniëlle C. H. Jacobs, Lukas A. Oomen, Matthias Peipp, Thomas Valerius, Jerry W. Sloatstra, Tuna Mutis, Wim K. Bleeker, Kenneth C. Anderson, Henk M. Lokhorst, Jan G. J. van de Winkel and Paul W. H. I. Parren... J Immunol... 2011... American Association of Immunologists

Daratumumab depletes CD38+ immune regulatory cells, promotes T-cell expansion, and skews T-cell repertoire in multiple myeloma Jakub Krejčík, Tineke Casneuf, Inger S. Nijhof, Bie Verbist, Jaime Bald, Torben Plesner, Khaja Syed, Kevin Liu, Niels W. C. J. van de Donk, Brendan M. Weiss, Tahamtan Ahmadi, Henk M. Lokhorst, Tuna Mutis and A. Kate Sasser... Blood... 2016... American Society of Hematology

Direct in Vitro Comparison of Daratumumab with Surrogate Analogs of CD38 Antibodies MOR03087, SAR650984 and Ab79

Jeroen Lammerts van Bueren, Danielle Jakobs, Niels Kaldenhoven, Marcel Roza, Sanne Hiddingh, Joyce Meesters, Marleen Voorhorst, Elke Gresnigt, Luus Wiegman, Antonio Ortiz Buijsse, Grietje Andringa, Marije B. Overdijk, Parul Doshi, Kate Sasser, Michel de Weers and Paul W.H.I. Parren...Blood...2014...American Society of Hematology

Daratumumab for the treatment of multiple myeloma...Touzeau C, Moreau P... Expert Opin Biol Ther....2017...Taylor & Francis

## 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 **50 µl Assay Diluent** into each well.

4. Pipette **100 µl Standards / Samples** into the respective wells.

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

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

7. Pipette **50 µl Anti Daratumumab:HRP** into each well.

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

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

10. Pipette **100 µl TMB Substrate** into each well.

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

12. Pipette **100 µl Stop Solution** into each well.

13. Read absorbance at 450nm 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 Daratumumab equivalent
1A 2A	zero std zero std			
1B 2B	0.2 µg/ml 0.2 µg/ml			
1C 2C	0.5 µg/ml 0.5 µg/ml			
1D 2D	2 µg/ml 2 µg/ml			
1E 2E	5 µg/ml 5 µg/ml			
1F 2F	20 µg/ml 20 µg/ml			
1G 2G	50 µg/ml 50 µg/ml			
1H 2H	100 µg/ml 100 µg/ml			
3A 4A	Sample			
3B 4B	Sample			

### LIMITED WARRANTY

Eagle Biosciences, Inc. warrants its Product(s) to operate or perform substantially in conformance with its specifications, as set forth in the accompanying package insert. This warranty is expressly limited to the refund of the price of any defective Product or the replacement of any defective Product with new Product. This warranty applies only when the Buyer gives written notice to the Eagle Biosciences within the expiration period of the Product(s) by the Buyer. In addition, Eagle Biosciences has no obligation to replace Product(s) as result of a) Buyer negligence, fault, or misuse, b) improper use, c) improper storage and handling, d) intentional damage, or e) event of force majeure, acts of God, or accident.

Eagle Biosciences makes no warranties, either expressed or implied, except as provided herein, including without limitation thereof, warranties as to marketability, merchantability, fitness for a particular purpose or use, or noninfringement of any intellectual property rights. In no event shall the company be liable for any indirect, incidental, or consequential damages of any nature, or losses or expenses resulting from any defective product or the use of any product. Product(s) may not be resold, modified, or altered for resale without prior written approval from Eagle Biosciences, Inc.

For further information about this kit, its application or the procedures in this kit insert, please contact the Technical Service Team at Eagle Biosciences, Inc. at [info@eaglebio.com](mailto:info@eaglebio.com) or at 866-411-8023.

***THANK YOU FOR Eagle Biosciences!***