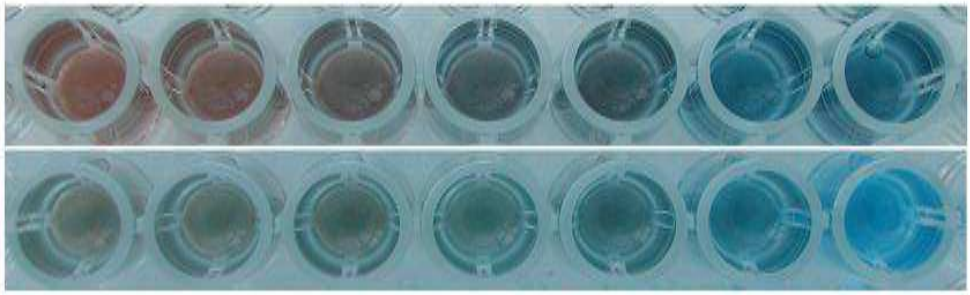
Bradford-Protein Assay Kit

INSTRUCTION MANUAL



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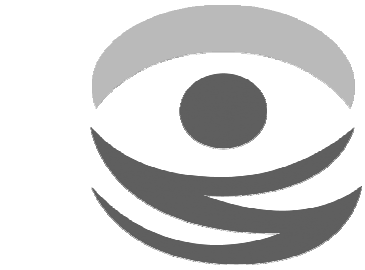

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Bradford - Protein Assay Kit

Instruction Manual

Easy and rapid procedure for measuring the concentration of proteins

New and improved Coomassie solution for better accuracy

List of Protein Assay Kits

Catalog Number	Description	Number of assays [4] in 96-well plates	Number of assays [4] in 1mL cuvettes
BA00100	Bradford – Protein Assay Kit [1]	5000	1000
BA00050	1X Bradford reagent [2]	5000	1000
BA00070	BSA pre-diluted standard [3]	NA	NA

[1] Contains one bottle of 1X Bradford reagent (500 mL) and 2 x 7 vials of pre-diluted BSA standard - [2] Contains one bottle of 1X Bradford reagent (500 mL) - [3] Contains 2 x 7 vials of pre-diluted BSA standard - [4] Number of protein assays given for a concentration range from 0.5 µg/mL to 50 µg/mL.

You can order these products by contacting us. For all other additional information, do not hesitate to contact our dedicated technical support (tech@ozbiosciences.com).

OZ Biosciences SAS
163 avenue de Luminy
Case 922, zone entreprise
13288 Marseille cedex 09 - FRANCE
Ph: +33 (0) 486 948 516
Fax: +33 (0) 486 948 515
contact@ozbiosciences.com
order@ozbiosciences.com

OZ Biosciences INC
4901 Morena Blvd,
Suite 501
San Diego CA 92117 - USA
Ph : + 1-858-246-7840
Fax : + 1-855-631-0626
contactUSA@ozbiosciences.com
orderUSA@ozbiosciences.com

www.ozbiosciences.com

1. Technology

1.1. Description

Congratulations on your purchase of the **Bradford Protein Assay Kit**!

The Bradford Protein Assay Kit is a straightforward and rapid procedure for determining the concentration of protein in solution. The Bradford Protein Assay Kit is based on the binding of Coomassie Brilliant Blue G-250 dye to the proteins and particularly basic and aromatic amino acids residues. The dye exists in three forms: cationic (red), neutral (green) and anionic (blue). Under acidic conditions, the dye is predominantly in the protonated cationic form (red, A_{max} = 470 nm). When the dye binds to proteins, it is converted to a stable unprotonated form (blue, A_{max} = 595 nm). It is this blue unprotonated form that is detected at 595 nm to quantify the concentration of proteins.

This **Bradford Protein Assay Kit** is:

- Simple and rapid
- Ready to use
- Accurate and Economical

OZ Biosciences developed this **Bradford Protein Assay Kit** to accurately quantify the concentration of proteins in solution and to normalize your transfection experiments since it is functional with several reporter gene assay kits such as the β-galactosidase, luciferase assay kits... The improved and optimized 1X Bradford reagent buffer allows superior linearity of response at low and high protein concentrations and determination of protein amount in the presence of detergent (< 0.1%).

1.2. Kit Contents

The Bradford Protein Assay Kit provided is ready to use. The dye reagent (1x concentration contains methanol and phosphoric acid) and the protein assay standard (two sets of 7 pre-diluted concentrations) do not need further dilution. ***Caution***: Phosphoric acid is a corrosive liquid.

The kit contains sufficient reagents to perform:

	Protein Concentration	
	Low: 0.5 – 50 µg/mL	**High**: 50 – 1500 µg/mL
96-well plate	5000	3570
1mL cuvette	1000	595

Kit Contents

Component	Quantity	Storage
1X Bradford reagent	500 mL	4°C
Bovine Serum Albumin 2 sets of 7 standards (1500, 1000, 750, 500, 250, 100, 50 µg/mL)	2 mL each standard	4°C

Standards (µg/mL)	Corresponding color
1500	Red
1000	Orange
750	Pink
500	Purple
250	Light Purple
100	Green
50	White

Standards are provided in a 145mM NaCl, 0.05% NaN_3 solution.

Stability and Storage

Storage — Upon receipt and for long-term use, store all reagents at + 4°C. The **Bradford Protein Assay Kit** is stable for at least one year at the recommended storage temperature.

Shipping condition — The **Bradford Protein Assay Kit** is shipped at ambient temperature.

2. General Considerations

- For your convenience, both the 1X Bradford reagent and the protein assay standard (two sets of 7 pre-diluted concentrations) are ready to use.

- ***Before each use***, let warm the 1X Bradford reagent to ambient temperature and turn upside down the bottle a few times. It is preferable to maintain a constant temperature during the assay since absorbance measurement with the Bradford reagent is temperature dependent.

- Protein stain with the Bradford method is highly protein dependent. Consequently, the best protein to use as a ***standard*** is the protein being assayed. Nevertheless, in the absence of such standard, another protein can be used. The two most common **protein** standards used for protein assays are Bovine Serum Albumin and Bovine Gamma-Globulin. A convenient pre-diluted BSA standard curve is included in this kit that is linear for high and low protein doses. In order to make accurate protein concentration measurements, the protein assayed needs to be in the linear region of the standard curve. Thus, the dilution of the standard curve used need to be adjusted accordingly.

- Some ***chemicals*** interacting with protein can interfere with the assay. Interference from these compounds is due to their ability to shift the equilibrium levels of the dye among the free color species, by direct binding or by shifting the pH. The detergents used to prepare cell lysates, flavonoids and basic buffers are known to alter this protein assay. However, the **Bradford Protein Assay Kit** is compatible with low amount of these chemicals as indicated in the Table 1. See the standard cell lysate protocol developed below for cell lysates or protein samples containing some limited amount of detergents.

Table 1: Concentrations of some common reagents compatible with the Bradford protein assay.

Acetone 10%	Guanidine-HCl, 2M	Sodium acetate pH4.8, 0.2M
Acetonitrile 10%	HCl, 0.1M	Sodium azide, 0.5%
Ammonium sulfate, 1M	HEPES, 0.1M	Sodium bicarbonate, 0.2M
Ampholytes, 0.5%	Imidazole, 0.2M	Sodium carbonate, 0.1M
ASB-14, 0.025%	Magnesium chloride, 1M	Sodium chloride, 2.5M
Ascorbic Acid, 50mM	MES, 0.1M	Sodium citrate, pH4.8 or 6.4, 0.2M
Bis-Tris, pH6.5, 0.2M	Methanol, 10%	Sodium hydroxide, 0.1M
β-mercaptoethanol, 1M	MOPS, 0.1M	Sodium phosphate, 0.5M
Calcium chloride, 40mM	NAD, 2mM	Sucrose 10%
CHAPS, 10%	NP-40, 0.25%	TBP, 5mM
CHAPSO, 10%	Octyl β-glucoside, 0.5%	TCEP, 20mM
Deoxycholic acid, 0.2%	Octyl β-thioglucopyranoside, 1%	Thio-urea, 1M
DMSO, 5%	Phenol Red, 0.5 mg/mL	Tricine, pH8, 50mM
DTE, 10mM	PIPES, 0.2M	Triethanolamine, pH7.8, 50mM
DTT, 5mM	PMSF, 2mM	Tris, 1M
EDTA/EGTA, 0.2M	Potassium chloride, 2M	Tris-glycine
Ethanol, 10%	Potassium phosphate, 0.5M	Triton X-100, 0.05%
Glucose, 20%	RIPA lysis buffer, 1/40 dilution	Tween 20, 0.01%
Glycerol, 5%	SB 3-10, 0.1%	Urea 4M
Glycine, 0.1M	SDS, 0.025%	

- ***Wavelength.*** You can use any wavelength between 580 nm and 610 nm. However, the maximum sensitivity of the assay is reached at 595 nm.

- ***Molecular weight***. The lower limit of detection for the Bradford method is 3,000-5,000 Da.

- ***Data analysis***. Subtract the average blank value from the standard and the unknown sample values. Create a standard curve by plotting the 595 nm values (y-axis) versus the concentration of protein in µg/mL (x-axis). Determine the unknown sample concentration using that curve. If the samples assayed were diluted, adjust the final concentration by multiplying by the dilution factor.

3. Protocols

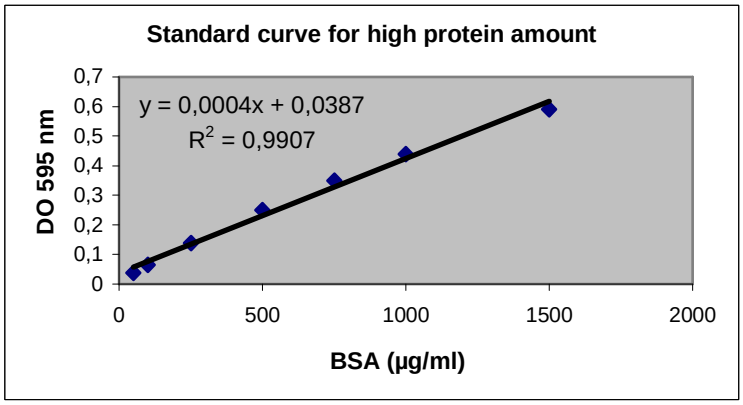
We have developed three specific protocols for different microassays: high protein concentration, low protein concentration and cell lysates. In addition, these protocols can be adapted to macroassay by just multiplying the reagent quantity by five or six. Please refer to the appropriate procedure for your particular application.

3.1. Standard 96-well plate assay

3.1.1. High protein amount microplate assay

This assay is designed to measure protein concentration in solution from 50 to 1500 µg/mL.

1) **BSA standard curve**: Add 10 µL of each pre-diluted BSA standard vials in 7 different wells of a 96-well plate. In this way, you will have the following standard curve: 1500, 1000, 750, 500, 250, 100, 50 µg/mL. For the negative control (blank, 0 µg/mL) add 10 µl of water, buffer or saline solution (PBS, HBS, etc...) to a well.



2) Put 10 µL of your protein(s) in an empty well. Serial dilution of the protein to be assayed can also be performed.

3) Add 140 µL / well of the Bradford reagent and mix the solution by pipetting or with a microplate mixer.

4) Incubate 5 min at room temperature. Do not incubate more than 1 hour at room temperature.

5) Read the absorbance at 595 nm with a microplate reader.

3.1.2. Low protein amount microplate assay

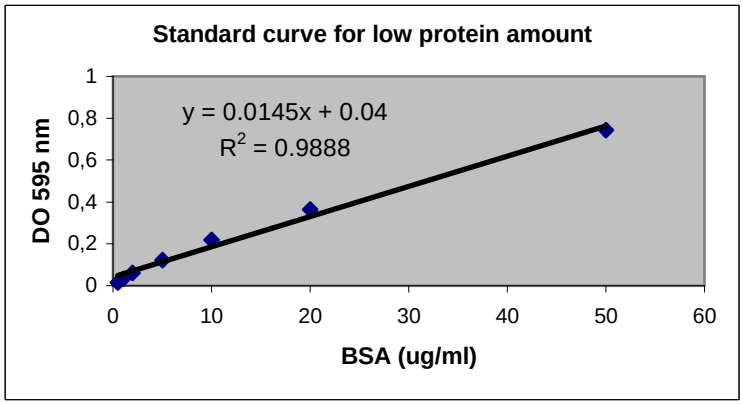
This assay is designed to measure protein concentration in solution from 0.5 to 50 µg/mL.

1) Prepare a serial dilution of the protein standard (BSA) as suggested in the table 2.

Table 2: Preparation of BSA standard dilution curve for low protein amount detection.

Protein standard (BSA) volume	Buffer added	µg of BSA / mL
8 µL of the 1500 µg/mL stock solution (red color)	232 µL	50
100 µL of the 50 µg/mL solution	150 µL	20
125 µL of the 20 µg/mL solution	125 µL	10
125 µL of the 10 µg/mL solution	125 µL	5
125 µL of the 5 µg/mL solution	125 µL	2.5
125 µL of the 2.5 µg/mL solution	125 µL	1.25
125 µL of the 1.25 µg/mL solution	125 µL	0.625

2) Add 100 µL of each standard dilution vials in 7 different wells of a 96-well plate. In this way you will have the following standard curve: 50, 20, 10, 5, 2, 1, 0.5 µg/mL. For the negative control (blank) add 100 µl of water, buffer or saline solution (PBS, HBS, etc...) to a well.



3) Put 100 µL of your protein(s) in an empty well. Serial dilution of the protein to be assayed can also be performed.

4) Add 100 µL / well of the Bradford reagent and mix the solution by pipetting or with a microplate mixer.

5) Incubate 5 min at room temperature. Do not incubate more than 1 hour at room temperature.

6) Read the absorbance at 595 nm with a microplate reader.

3.1.3. Cell lysate microplate assay

This assay is intended for measuring the protein concentration in whole cell lysates. The calculated concentration corresponds to the total amount of cellular protein. This assay can be used for your transfection experiments normalization.

1) Aspirate the growth medium from your cell culture dish, for instance, 24-72 h post-transfection.

2) Wash your cells twice with PBS as serum containing proteins interfere highly with the assay.

3) Lyse your cells with a lysis buffer. Refer to table 3 for the volume of lysis buffer to use.
Suggested lysis buffer composition: 250mM Tris pH7.4 and 0.1% Triton X-100

Table 3: Volume of Lysis Buffer in function of culture dish.

Type of culture dish	Volume of Lysis buffer (µL/well)
96-well plate*	50*
24-well plate	250
12-well plate	500
6-well plate	1000
60 mm dish	2500
100 mm dish	5000

* For 96-well plate transfection experiments where protein and reporter gene assays will be used to normalize the results, lysed the cells in 50 µL of lysis buffer and add 50 µL of dilution buffer. Then, use 50 µL for protein assay and 50 µL for reporter gene assay. One of the two assays can be performed directly into the 96-well plate used for cell culture. If you are using 96-well plate format for your cell cultures, you can lyse the cells in 25 µL of lysis buffer, then add 25 µL of dilution buffer and perform the protein assay kit directly into the same plate.

4) Incubate your cell lysates 10-15 min at room temperature. A fast freeze/thaw cycle can also be done to achieve a good lysis.

5) Add 1 volume of dilution buffer to your cell lysates in order to reduce the amount of detergent (0.05 % Triton X-100 final concentration). Cell lysates can be centrifuged 2-3 min to pellet the insoluble material.
Suggested dilution buffer: 250mM Tris pH7.4

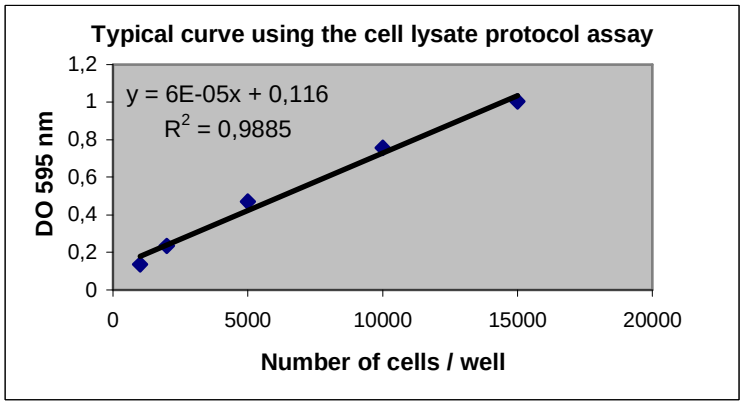
6) Transfer 50 µL of each diluted cell lysates to empty wells of a 96-well plate (flat bottom). The remaining cell lysate can be used to monitor reporter gene assay.

7) Prepare the BSA standard curve as follow.

Table 4: Preparation of BSA standard dilution curve for cell lysate protein assay.

Protein standard (BSA) volume	Lysis buffer*	Dilution buffer*	µg of BSA / mL
10 µL of the 1500 µg/mL stock solution (red cap)	70 µL	70 µL	100
60 µL of the 100 µg/mL solution	30 µL	30 µL	50
60 µL of the 50 µg/mL solution	30 µL	30 µL	25
60 µL of the 25 µg/mL solution	30 µL	30 µL	12.5
60 µL of the 12.5 µg/mL solution	30 µL	30 µL	6.25
60 µL of the 6.25 µg/mL solution	30 µL	30 µL	3.12
60 µL of the 3.12 µg/mL solution	30 µL	30 µL	1.56
Blank	30 µL	30 µL	0

* Instead of using a lysis buffer and a dilution buffer you can directly prepare and use 0.05 % Triton X-100 containing buffer. Add 60 µL of that buffer instead of 30 µL of lysis buffer plus 30 µL of dilution buffer.



8) Transfer 50 µL of each BSA standard dilution to empty wells of the 96-well plate.

9) Add 150 µL of the 1X Bradford reagent in each well and mix the solution by pipetting or with a microplate mixer

10) Incubate 5 min at room temperature. Do not incubate more than 1 hour at room temperature.

11) Read the absorbance at 595 nm with a microplate reader.

3.2. Macro Protein Assay

The Bradford Protein Assay can also be performed in 1 mL cuvette assay. The procedure is as simple:

- For high protein amount assay, just multiply by six the amounts indicated for microplate procedures.
- For Low protein amount assay, just multiply by five the amounts indicated for microplate procedures.

4. Appendix

Guidelines for preparing your own standard curve with 2 mg/mL BSA or Gamma-Globulin stock solution.

High protein amount standard curve:

Protein standard (BSA) volume	Buffer added*	µg of BSA / mL
30 µL of the stock solution	10 µL	1500
20 µL of the stock solution	20 µL	1000
20 µL of the 1500 µg/mL solution	20 µL	750
20 µL of the 1000 µg/mL solution	20 µL	500
20 µL of the 500 µg/mL solution	20 µL	250
20 µL of the 250 µg/mL solution	30 µL	100
20 µL of the 100 µg/mL solution	20 µL	50

Low protein amount standard curve:

Protein standard (BSA) volume	Buffer added*	µg of BSA / mL
10 µL of the stock solution	390 µL	50
4 µL of the stock solution	396 µL	20
200 µL of the 20 µg/mL solution	200 µL	10
200 µL of the 10 µg/mL solution	200 µL	5
200 µL of the 5 µg/mL solution	200 µL	2.5
200 µL of the 2.5 µg/mL solution	200 µL	1.25
200 µL of the 1.25 µg/mL solution	200 µL	0.625

Our dedicated and specialized technical support team will be pleased to answer any of your requests and to help you with your transfection experiments and reporter gene assays at tech@ozbiosciences.com. In addition, do not hesitate to visit our website www.ozbiosciences.com and the FAQ section.

5. FAQs and Troubleshooting

Buffer compatibility: The buffer that is used is not in the list of compatible reagents.
If your buffer is not listed, and in order to know if the buffer will interfere with the Bradford- Protein Assay, run two standard curves: one with the same buffer as your sample and one with protein in water. It is recommended to treat identically the protein standards and the sample. Do not use strong alkaline buffer since it will raise the pH of formulations and may impact greatly the accuracy of the assay. If the two standard curves have identical slopes, the buffer does not interfere. Partial buffer interference can be compensated by using the same buffer for the standard and the analyzed protein.

The sample contains a detergent concentration that is not compatible with the Bradford Protein Assay Kit.
If the protein concentration is high enough, a sample with detergent can be diluted so that the concentration of detergent is reduced to 0.1 % or less.

Absorbance of protein standard and samples is very low.
The 1X Bradford reagent may be too cold, warm it to room temperature before use. Replace it if it is over 1 year old.

Absorbance of standard is correct, but absorbance of samples is very low:
The sample may contain a substance that impedes with the reaction such as basic solutions or detergent. Check the Table 1 for the concentrations of various reagents compatible with the Bradford protein assay. Dilute the sample and make sure that the standards are diluted in the same buffer as the samples. The molecular weight of the sample protein may be under 3,000-5,000 Da.

Requirement for sample preparation.
Usually, no sample preparation is required except that the protein must be solubilized.

Precipitation of the samples.
This can occur when the samples contain a detergent in the buffer (> 1%). To solve this problem, dilute your sample to reduce the amount of detergent or dialyze it.

Wavelength
You can use any wavelength between 580 nm and 610 nm. However, the maximum sensitivity of the assay is reached at 595 nm.

Molecular weight.
The lower limit of detection for the Bradford method is 3,000-5,000 Da.

6. Related products

Our dedicated and specialized technical support group will be pleased to answer any of your request and to assist you in your experiments.

Description
MAGNETOFECTION TECHNOLOGY
Super Magnetic Plate *(standard size for all cell culture support)* Mega Magnetic plate *(mega size to hold 4 culture dishes at one time)*
Transfection reagents:
PolyMag Neo (*for all nucleic acids*)
Magnetofectamine™ (*for all nucleic acids*)
NeuroMag *(dedicated for neurons)*
SilenceMag *(for siRNA application)*
Transfection enhancer:
CombiMag *(to improve any transfection reagent efficiency)*
Viral Transduction enhancers:
ViroMag (*to optimize viral transduction*)
ViroMag R/L *(specific for Retrovirus and Lentivirus)*
AdenoMag *(for Adenoviruses)*
LIPOFECTION TECHNOLOGY (LIPID-BASED)
Lullaby (*siRNA transfection reagent)*
DreamFect Gold *(Transfection reagent for all types of nucleic acids)*
VeroFect *(for Vero cells)*
FlyFectin *(for Insect cells)*
i-MICST TECHNOLOGY
Viro-MICST (*to transduce directly on magnetic cell purification columns)*
3D TRANSFECTION TECHNOLOGY
3Dfect *(for scaffolds culture)* / 3DfectIN *(for hydrogels culture)*
RECOMBINANT PROTEIN PRODUCTION
HYPE-5 Transfection Kit (*for **H**igh **Y**ield **P**rotein **E**xpression)*
PROTEIN DELIVERY SYSTEMS
Ab-DeliverIN *(delivery reagent for antibodies)* Pro-DeliverIN *(delivery reagent for protein in vivo and in vitro)*
PLASMIDS PVECTOZ
pVectOZ-LacZ / pVectOZ-SEAP / pVectOZ-GFP / pVectOZ-Luciferase
ASSAY KITS
Bradford – Protein Assay Kit MTT cell proliferation kit β-Galactosidase assay kits (CPRG/ONPG)
BIOCHEMICALS
D-Luciferin, K^+ and Na^+ 1g X-Gal powder 1g / G-418, Sulfate 1g

Do not hesitate to contact us for all complementary information and remember to visit our website in order to stay inform on our last breakthrough technologies and updated on our complete product list on : www.ozbiosciences.com

Purchaser Notification

Limited License

The purchase of Bradford - Protein Assay Kit grants the purchaser a non-transferable, non-exclusive license to use the kit and/or its separate and included components (as listed in section 1, Kit Contents). This reagent is intended **for in-house research only** by the buyer. Such use is limited to the utilization described in the product manual. In addition, research only use means that this kit and all of its contents are excluded, without limitation, from resale, repackaging, or use for the making or selling of any commercial product or service without the written approval of OZ Biosciences.

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The Bradford - Protein Assay Kit and all of its components are developed, designed, intended, and sold for research use only. They are not to be used for human diagnostic or included/used in any drug intended for human use. All care and attention should be exercised in the use of the kit components by following proper research laboratory practices.

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Director of Business Development
OZ Biosciences SAS
Parc Scientifique et Technologique de Luminy
Bâtiment Grand Luminy Technopole
Zone entreprise case 922
13288 Marseille Cedex 9, France
Ph: +33 (0)4.86.94.85.16
Fax: +33 (0)4.86.94.85.15
E-mail: contact@ozbiosciences.com

www.ozbiosciences.com

CONTACTS

OZ Biosciences SAS
163 avenue de Luminy
Case 922, zone entreprise
13288 Marseille cedex 09
FRANCE

Ph: +33 (0) 486 948 516
Fax: +33 (0) 486 948 515

contact@ozbiosciences.com
order@ozbiosciences.com
tech@ozbiosciences.com

OZ Biosciences INC
4901 Morena Blvd,
Suite 501
San Diego CA 92117
USA

Ph : + 1-858-246-7840
Fax : + 1-855-631-0626

contactUSA@ozbiosciences.com
orderUSA@ozbiosciences.com
techUSA@ozbiosciences.com

www.ozbiosciences.com

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