Chemi-Verse™ ULK1 Kinase Assay Kit

#82598
96 reactions

Description

The Chemi-Verse™ ULK1 Kinase Assay Kit is designed to measure ULK1 (Unc-51-like autophagy-activating kinase 1) serine/threonine kinase activity for screening and profiling applications using ADP-Glo™ as a detection reagent. The assay kit comes in a convenient 96-well format, with enough purified ULK1, kinase substrate, ATP, and kinase assay buffer for 100 enzyme reactions.

Background

ULK1 (unc-51 like autophagy activating kinase 1) is a serine/threonine protein kinase that plays a critical role during the initial stages of autophagy in response to nutrient starvation. The conserved C-terminal domain of ULK1 controls the function and the localization of the protein. Knockdown of ULK1 inhibits the autophagic response and prevents rapamycin-induced autophagy, consistent with a role downstream of mTOR (mammalian target of rapamycin). ULK1 forms a complex with FIP200 (focal adhesion kinase family interacting protein of 200 kDa) and ATG13 (autophagy-related protein 13) and this complex is essential for starvation-induced autophagy. Both FIP200 and ATG13 are critical for correct localization of ULK1 to the pre-autophagosome and stability of the ULK1 protein. ULK1 is phosphorylated upon activation of the mTOR pathway in a starvation-regulated manner. Alterations in ULK signaling pathways may be involved in the formation of autophagy-regulated Lewi bodies, which have been associated with Parkinson's disease. A deeper understanding of the roles of this protein and development of therapeutical strategies around it may benefit patients suffering from ULK1 related disorders.

Applications

Study enzyme kinetics and screen small molecule inhibitors for drug discovery and high throughput screening (HTS) applications.

Supplied Materials

Catalog #	Name	Amount	Storage
40099	ULK1, FLAG-Tag*	10 µg	-80°C
79334	5x Kinase Buffer 1	1.5 ml	-20°C
79686	500 µM ATP	50 µl	-20°C
78514	Myelin basic protein (MBP) (5 mg/ml)	100 µl	-20°C
82545	White 96-well plate	1	Room Temperature

**The concentration of the protein is lot-specific and will be indicated on the tube.*

Materials Required but Not Supplied

Name	Ordering Information
ADP-Glo™ Kinase Assay	Promega #V6930
DTT (Dithiothreitol), 1M, optional	
Microplate reader capable of reading luminescence	
Adjustable micropipettor and sterile tips	
30°C incubator	

Our products are for research use only, not for diagnostic or therapeutic use

BPS Bioscience
● bpsbioscience.com ● 858-202-1401 ● support@bpsbioscience.com

Storage Conditions

This assay kit will perform optimally for up to **6 months** from date of receipt when the materials are stored as directed.

Safety

This product is for research purposes only and not for human or therapeutic use. This product should be considered hazardous and is harmful by inhalation, in contact with skin, eyes, clothing, and if swallowed. If contact occurs, wash thoroughly.

Assay Principle

The **ADP-Glo™ Kinase Assay (Promega #V6930)** quantifies the amount of ADP produced by a kinase upon phosphorylation of a substrate. First, addition of the ADP-Glo™ reagent terminates the reaction and quenches the remaining ATP. Second, the addition of the Kinase Detection reagent converts the produced ADP to ATP. The newly generated ATP is quantified by a luciferase reaction. The luminescent signal correlates with the amount of ADP generated by the kinase and is linear to 1 mM ATP.

Contraindications

The final concentration of DMSO in the assay should not exceed 1%.

Assay Protocol

- All samples and controls should be tested in duplicate.
- The assay should include "Blank", "Positive Control" and "Test Inhibitor" conditions.
- We recommend maintaining the diluted protein on ice during use.
- For detailed information on protein handling please refer to Protein FAQs (bpsbioscience.com).
- We recommend using MRT68921 (#82604) or Staurosporine (#27002) as internal control. If not running a dose response curve for the control inhibitor, we recommend running the control inhibitor at 0.1X, 1X and 10X the IC_{50} value shown in the validation data below.
- For instructions on how to prepare reagent dilutions please refer to Serial Dilution Protocol (bpsbioscience.com).

1. Thaw **5x Kinase Assay Buffer 1**, **500 µM ATP,** and **MBP (5 mg/ml).**

   *Optional: If desired, make **5x Kinase Assay Buffer 1** with 10 mM DTT.*

2. Prepare 3 ml of **1x Kinase Assay Buffer 1** by mixing 600 µl of **5x Kinase Assay Buffer 1** with 2,400 µl of distilled water.

   *Note: Three (3 ml) of **1x Kinase Assay Buffer 1** is sufficient for 100 reactions.*

3. Prepare a **Master Mix** (12.5 µl/well): N wells x (6 µl of 5x Kinase Assay Buffer 1 + 0.5 µl of 500 µM ATP + 1 µl of MBP (5 mg/ml) + 5 µl of distilled water).

4. Add 12.5 µl of Master Mix to every well.

Our products are for research use only, not for diagnostic or therapeutic use
BPS Bioscience ● bpsbioscience.com ● 858-202-1401 ● support@bpsbioscience.com

5. Prepare the **Test Inhibitor** (2.5 µl/well): for a titration prepare serial dilutions at concentrations 10-fold higher than the desired final concentrations. The final volume of the reaction is 25 µl.

   5.1 If the Test Inhibitor is water-soluble: Prepare serial dilutions in 1x Kinase Assay Buffer 1, 10-fold more concentrated than the desired final concentrations.

   For the positive and negative controls, use 1x Kinase Assay Buffer 1 (Diluent Solution).

   OR

   5.2 If the Test inhibitor is soluble in DMSO: Prepare the test inhibitor at 100-fold the highest desired concentration in 100% DMSO, then dilute the inhibitor 10-fold in 1x Kinase Assay Buffer 1 to prepare the highest concentration of the 10-fold intermediate dilutions. The concentration of DMSO is now 10%.

   Prepare serial dilutions of the Test Inhibitor at 10-fold the desired final concentrations using 10% DMSO in 1x Kinase Assay Buffer 1 to keep the concentration of DMSO constant.

   For positive and negative controls, prepare 10% DMSO in 1x Kinase Assay Buffer 1 (vol/vol) so that all wells contain the same amount of DMSO (Diluent Solution).

   Note: The final concentration of DMSO should not exceed 1%.

6. Add 2.5 µl of Test Inhibitor to each well labeled “Test Inhibitor”.

7. Add 2.5 µl of Diluent Solution to the “Positive Control" and “Blank” wells.

8. Add 10 µl of 1x Kinase Assay Buffer 1 to the "Blank" wells.

9. Thaw **ULK1 Kinase** on ice. Briefly spin the tube to recover its full content.

10. Dilute the protein kinase (10 µl/well) to 10 ng/µl with **1x Kinase Assay Buffer 1**.

11. Initiate the reaction by adding 10 µl of diluted kinase to the wells designated “Positive Control” and "Test Inhibitor".

Component	Blank	Positive Control	Test Inhibitor
Master Mix	12.5 µl	12.5 µl	12.5 µl
Test Inhibitor	-	-	2.5 µl
Diluent Solution	2.5 µl	2.5 µl	-
1x Kinase Assay Buffer 1	10 µl	-	-
Diluted ULK1 (10 ng/µl)	-	10 µl	10 µl
Total	**25 µl**	**25 µl**	**25 µl**

Our products are for research use only, not for diagnostic or therapeutic use
● bpsbioscience.com ● 858-202-1401 ● support@bpsbioscience.com

12. Incubate at 30°C for 45 minutes.
13. Thaw the ADP-Glo™ reagent.
14. At the end of the 45-minute reaction, add 25 µl of ADP-Glo™ reagent to each well.
15. Cover the plate with aluminum foil and incubate at Room Temperature (RT) for 45 minutes.
16. Thaw the Kinase Detection Reagent.
17. Add 50 µl of Kinase Detection reagent to each well.
18. Cover the plate with aluminum foil and incubate at RT for another 45 minutes.
19. Immediately read in a luminometer or a microplate reader capable of reading luminescence.
20. The “Blank” value is subtracted from all other readings.

Reading Luminescence

Luminescence is the emission of light resulting from a chemical reaction. The detection of luminescence requires no wavelength selection because the method used is emission photometry and not emission spectrophotometry.

To properly read luminescence, make sure the plate reader is set for LUMINESCENCE mode. Typical integration time is 1 second, delay after plate movement is 100 msec. Do not use a filter when measuring light emission. Typical settings for the Synergy 2 BioTek plate reader: use the “hole” position on the filter wheel; Optics position: Top; Read type: endpoint. Sensitivity may be adjusted based on the luminescence of a control assay without enzyme (typically we set this value as 100).

Our products are for research use only, not for diagnostic or therapeutic use
BPS Bioscience ● bpsbioscience.com ● 858-202-1401 ● support@bpsbioscience.com

Example Results

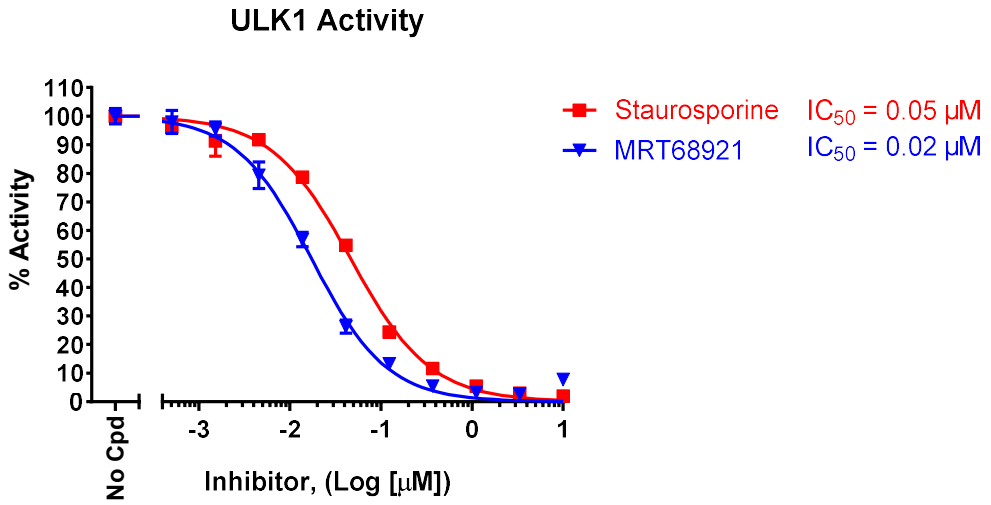

Figure 1: Inhibition of ULK1 kinase activity by the inhibitors MRT68921 or Staurosporine.
ULK1 kinase activity was measured in the presence of increasing concentrations of MRT68921 (#82604) and Staurosporine (#27002). The "Blank" value was subtracted from all other values. Results are expressed as the percent of control (kinase activity in the absence of inhibitor, set at 100%).

Data shown is representative. For lot-specific information, please contact BPS Bioscience, Inc. at support@bpsbioscience.com.

Troubleshooting Guide

Visit bpsbioscience.com/assay-kits-faq for detailed troubleshooting instructions. For all further questions, please email support@bpsbioscience.com

References

Ganley I.G., *et al.*, 2009 *J. Biol. Chem.* 284 (18): 12297-12305.
Chan E.Y., *et al.*, 2009 *Mol. Cell. Biol.* 29 (1): 157-171.
Miki Y., *et al.*, 2016 *Brain Pathol.* 26: 359-70.

Related Products

Products	*Catalog #*	*Size*
ULK2 Kinase Assay Kit	78367	96 reactions
ULK2, GST-Tag Recombinant	40294	96 reactions
ULK3, His-tag Recombinant	40295	10 µg
Rapamycin	27062	50 mg
mTOR/MLST8/RPTOR Complex Recombinant	102073	10 µg

Version 070324

Our products are for research use only, not for diagnostic or therapeutic use
● bpsbioscience.com ● 858-202-1401 ● support@bpsbioscience.com