CDK12/CyclinK Kinase Assay Kit

#78298
96 reactions

Description

The CDK12/CyclinK Kinase Assay Kit is designed to measure CDK12 (cyclin dependent kinase 12)/CyclinK kinase activity for screening and profiling applications using Kinase-Glo™ Max as a detection reagent. The assay kit comes in a convenient 96-well format, with enough purified recombinant CDK12 (amino acids 696-1082)/CyclinK complex, kinase substrate, ATP, and kinase assay buffer for 100 enzyme reactions.

Background

The CDK12/CyclinK complex comprises human CDK12 (Cyclin dependent kinase 12) and human cyclinK. CDK12 is ubiquitously expressed, being present at high levels in the reproductive tissues, endocrine tissues, bone marrow and lymph nodes, being found predominantly in the nucleus of cells. CDK12 is involved in gene expression, transcription elongation and genome stability. CDK12 binds only to cyclinK, and the formation of this complex seems important to maintain cyclinK stability. This complex regulates phosphorylation of serine 2 in the C-terminal domain of RNA polymerase II, which is responsible for transcriptional elongation and synthesis of full-length mature mRNAs. However, lack of CDK12 seems to only affect about 5% or less of the total transcription, indicating a selective role in the transcription of certain genes. The use of inhibitors, such as THZ531, indicated that the genes being selectively regulated by CDK12/cyclinK are the core DDR (DNA damage and repair) genes. CDK12 plays a role in cancer development such as in breast and prostate cancer. The use of CDK12/cyclinK inhibitors in combination with PARP (poly-(ADP-ribose) protein) inhibitors can increase the response of cells to PARP inhibition and cell death in cases of drug resistance. The development of CDK12 inhibitors, to be used alone or in combination therapy, is a promising field of research in cancer therapy.

Applications

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

Supplied Materials

Catalog #	Name	Amount	Storage
100998	CDK12 (696-1082)/CyclinK, GST-Tags*	50 µg	-80°C
79334	5x Kinase Buffer 1	1.5 ml	-20°C
79686	500 µM ATP	100 µl	-20°C
	0.5M DTT	200 µl	-20°C
78299	CDK12/CyclinK Substrate (10 mg/ml)	200 µl	-20°C
79696	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
Kinase-Glo™ MAX	Promega #V6973
DTT (Dithiothreitol), 1M, optional	
Microplate reader capable of reading luminescence	
Adjustable micropipettor and sterile tips	
30°C incubator	

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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.

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 THZ531 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.

1. Thaw **5x Kinase Assay Buffer 1**, **500 µM ATP, 0.5M DTT** and **CDK12/CyckinK Substrate (10 mg/ml).**

2. Prepare 5x Kinase Assay Buffer 1 with 10 mM DTT.

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

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

4. Prepare a **Master Mix** (25 µl/well): N wells x (6 µl of 5x Kinase Assay Buffer 1 with DTT + 1 µl of 500 µM ATP + 2 µl of CDK12/Cyclin K Substrate (10 mg/ml) + 16 µl of distilled water).

5. Add 25 µl of Master Mix to every well.

6. Prepare the **Test Inhibitor** (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 50 µl.

   6.1 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

6.2 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%.

7. Add 5 µl of Test Inhibitor to each well labeled “Test Inhibitor”.

8. Add 5 µl of Diluent Solution to the “Positive Control" and “Blank” wells.

9. Add 20 µl of 1x Kinase Assay Buffer 1 to the "Blank" wells.

10. Thaw **CDK12/CyclinK Kinase** on ice. Briefly spin the tube to recover its full content.

11. Dilute the protein kinase (20 µl/well) to 25 ng/µl with **1x Kinase Assay Buffer 1**.

12. Initiate the reaction by adding 20 µl of diluted kinase to the wells designated “Positive Control” and "Test Inhibitor".

Component	**Blank**	**Positive Control**	**Test Inhibitor**
Master Mix	25 µl	25 µl	25 µl
Test Inhibitor	-	-	5 µl
Diluent Solution	5 µl	5 µl	-
1x Kinase Assay Buffer 1	20 µl	-	-
Diluted CDK12/CyclinK (25 ng/µl)	-	20 µl	20 µl
Total	**50 µl**	**50 µl**	**50 µl**

13. Incubate at 30°C for 90 minutes.

14. Thaw the Kinase-Glo™ MAX reagent.

15. At the end of the 90-minute reaction, add 50 µl of ADP-Glo™ reagent to each well.

16. Cover the plate with aluminum foil and incubate at Room Temperature (RT) for 15 minutes.

17. Immediately read in a luminometer or a microplate reader capable of reading luminescence.

18. 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).

Example Results

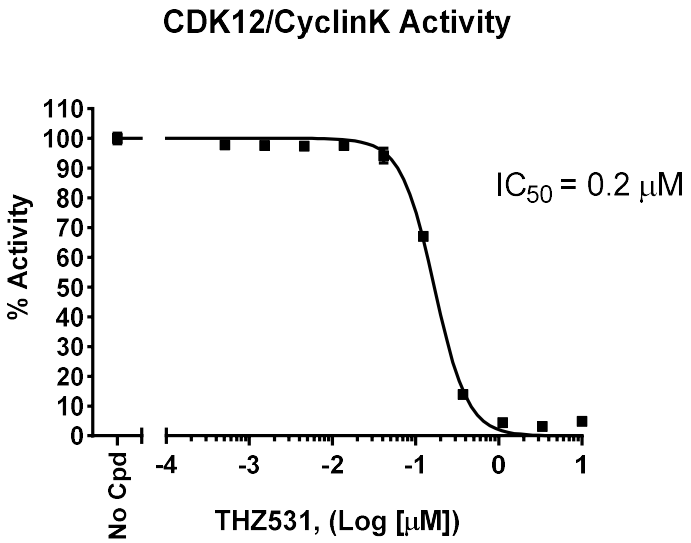

Figure 1: Inhibition of CDK12/CyclinK kinase activity by THZ531.
CDK12/CyclinK kinase activity was measured in the presence of increasing concentrations of THZ531 (SelleckChem S6595). The "Blank" value was subtracted from all other values. Results are expressed as the percent of control (kinase activity 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

Zhang T., *et al.,* 2016 *Nat Chem Biol* 12, 876–884.
Bösken C.A., et al., 2014 *Nat Commun. Mar* 24;5:3505.
Choi S., *et al.*, 2020 *Experimental & Molecular Medicine* 52:762-771.

Related Products

Products	*Catalog #*	*Size*
CDK12/CyclinK, GST-Tags Recombinant	101235	10 µg
Chemi-Verse™ CDK16/CyclinY Kinase Assay Kit	78887	96 reactions
Chemi-Verse™ CDK18/CyclinY Kinase Assay Kit	78888	96 reactions
Chemi-Verse™ CDK14/CyclinY Kinase Assay Kit	78889	96 reactions
Chemi-Verse™ CDK8/Cyclin C Kinase Assay Kit	78886	96 reactions

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