

Description

The PARP1 Chemiluminescent Assay Kit is designed to measure the activity of PARP1 (poly-(ADP-ribose) polymerase 1) for screening and profiling applications. The PARP1 assay kit comes in a convenient 384-well format, with enough recombinant purified PARP1 enzyme, reaction substrates, and PARP assay buffer for 400 enzyme reactions.

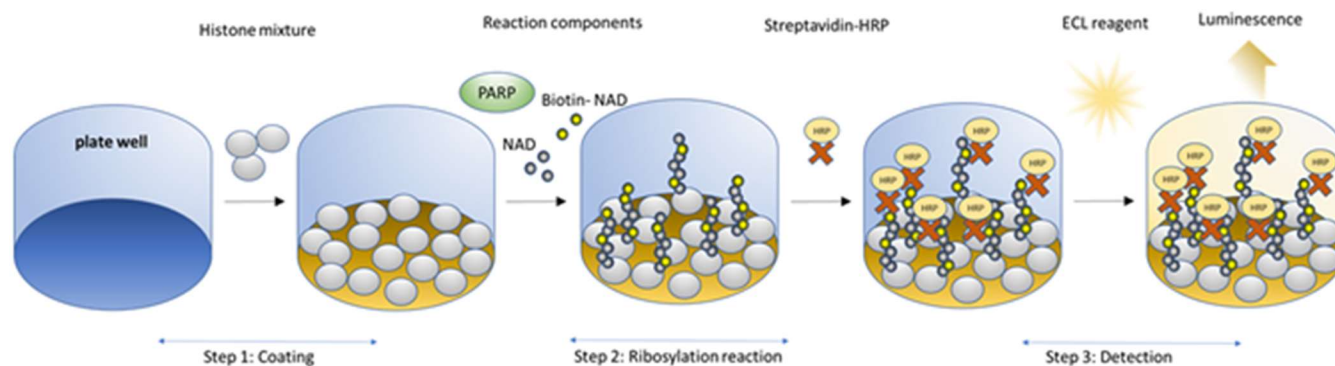


Figure 1. PARP1 Chemiluminescent Assay Kit schematic.

Histone proteins are coated on a 384-well plate. Next, a biotinylated NAD⁺ mix (termed PARP Substrate Mixture) is incubated with the PARP1 enzyme and an activated DNA template in an optimized assay buffer. The plate is then treated with streptavidin-HRP followed by addition of the ELISA ECL substrate to produce chemiluminescence that can be measured using a chemiluminescence reader. The chemiluminescence signal is proportional to PARP1 activity.

Background

PARP1, also known as poly-(ADP-ribose) polymerase 1 or NAD⁺ ADP-ribosyltransferase 1, is part of the PARP family, and it is the most abundant member. ADP ribosylation, which is the addition of an ADP-ribose to a protein, is a reversible post-translational modification of proteins mostly involved in the DNA Damage Response (DDR) pathway. Poly-ADP-ribosylation (termed PARylation) is the addition of linear or branched chains of ADP-ribose. PARP1 participates in DNA repair by non-homologous end joining (NHEJ), homologous recombination (HR), microhomology-mediated end-joining (MMEJ) and nucleotide excision repair. Dysfunction of DDR pathways can lead to oncogenesis. Overexpression of PARP1 has been found in breast and colon cancer, neuroblastoma, and others. This overexpression can lead to increasing MMEJ, an error-prone DNA repair mechanism, and genome instability leading to cancer. In addition to being involved in DDR, PARP1 is also linked to inflammation and type I diabetes. PARP1 inhibitors have been used in cancer treatment with success. In addition to reducing MMEJ, the use of PARP1 inhibitors can lead to synthetic lethality when homologous recombination repair (HRR) mechanisms are already defective, as in the case of BRCA1 (breast cancer susceptibility protein type 1) and BRCA2 deficient cells. Further understanding of the molecular pathways involving PARP1, and this contribution to disease, will continue to pave the way for new therapies for PARP1-linked diseases.

Applications

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

Supplied Materials

Catalog #	Name	Amount	Storage
80501	PARP1, GST-Tag*	2 x 1 µg	-80°C
52029	5x Histone Mixture	2 x 1 ml	-80°C
78366	PARP Substrate Mixture 1	2 x 250 µl	-80°C
80602	10x PARP Assay Buffer	2 x 1 ml	-20°C
79743	Blocking Buffer 3	2 x 25 ml	+4°C
80605	Activated DNA	2 x 20 µl	-80°C
	0.5 M DTT	2 x 200 µl	-20°C
80611	Streptavidin-HRP	2 x 100 µl	+4°C
79670	ELISA ECL Substrate A (translucent bottle)	2 x 6 ml	Room Temp
	ELISA ECL Substrate B (brown bottle)	2 x 6 ml	Room Temp
78188	384-well white plate	1	Room Temp

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

Materials Required but Not Supplied

- 1x PBS (Phosphate Buffer Saline) Buffer
- PBST Buffer (1x PBS, containing 0.05% Tween-20)
- Luminometer or microplate reader capable of reading chemiluminescence
- Adjustable micropipettor and sterile tips
- Rotating or rocker platform

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 PARP1 Chemiluminescent Assay Kit is compatible with up to 1% final DMSO concentration.

Assay Protocol

- All samples and controls should be performed 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 \(bpsbioscience.com\)](https://www.bpsbioscience.com).
- We recommend using Olaparib (#78318 or #27003) or AZD-5305 (#78318) 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 IC₅₀ value shown in the validation data below.

Step 1: Coat 96-well module

1. Dilute 5x Histone Mixture 5-fold with PBS. This makes 1x Histone Mixture (25 µl/well).
2. Add 25 µl of 1x Histone Mixture to each well.
3. Incubate at 4°C overnight.
4. Wash the plate three times using 100 µl of PBST Buffer per well.
5. Tap the plate onto clean paper towel to remove the liquid.
6. Block the wells by adding 100 µl of Blocking Buffer 3 to every well.
7. Incubate at Room Temperature (RT) for at least 90 minutes.
8. Wash the plate three times with 100 µl of PBST Buffer per well.
9. Tap the plate onto clean paper towel to remove the liquid.

Step 2: Ribosylation reaction

1. Dilute Activated DNA 32-fold with PBS.
2. Dilute 0.5 M DTT 50-fold with distilled water. This makes a 10 mM DTT solution.
3. Prepare a Master Mix (12.5 µl/well): N wells x (1.25 µl of 10x PARP Assay Buffer + 1.25 µl of PARP Substrate Mixture 1 + 2.5 µl of diluted Activated DNA + 6.25 µl of distilled water + 1.25 µl of 10 mM DTT solution).
4. Add 12.5 µl of Master Mix to every well.
5. Prepare 1x PARP Assay Buffer by adding 1 volume of 10x PARP Assay Buffer and 1 volume of 10 mM DTT solution to 8 volumes of distilled water.
6. 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.

6.1 If the Test Inhibitor is soluble in water, prepare a solution of the compound that is 10-fold higher than the final desired concentration in 1x PARP Assay Buffer.

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

OR

6.2 If the Test Inhibitor is dissolved in DMSO, prepare a solution of the compound in 100% DMSO that is 100-fold higher than the highest concentration of the serial dilution. Then dilute 10-fold with 1x PARP Assay Buffer (at this step the compound concentration is 10-fold higher than the desired final concentration). The concentration of DMSO in the dilution is now 10%.

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

For positive and negative controls, prepare 10% DMSO in 1x PARP Assay Buffer (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 2.5 μ l of Test Inhibitor to each well labeled as "Test Inhibitor".
8. Add 2.5 μ l of Diluent Solution to the "Positive Control" and "Blank" wells.
9. Thaw **PARP1** enzyme on ice. Briefly spin the tube containing the enzyme to recover its full content.
10. Dilute PARP1 enzyme to **0.33 ng/ μ l** with 1x PARP Assay Buffer (10 μ l/well).
11. Initiate the reaction by adding 10 μ l of diluted PARP1 enzyme to the wells designated "Positive Control" and "Test Inhibitor."
12. Add 10 μ l of 1x PARP Assay Buffer to the "Blank" wells.
13. Incubate at RT for 1 hour.

	Blank	Positive Control	Test Inhibitor
Master Mix	12.5 μ l	12.5 μ l	12.5 μ l
Test Inhibitor	-	-	2.5 μ l
Diluent Solution	2.5 μ l	2.5 μ l	-
1x PARP Assay Buffer	10 μ l	-	-
Diluted PARP1 (0.33 ng/ μ l)	-	10 μ l	10 μ l
Total	25 μl	25 μl	25 μl

14. Wash the plate three times with 100 μ l of PBST Buffer per well and tap the plate onto clean paper towel.

Step 3: Detection

1. Dilute Streptavidin-HRP 50-fold in Blocking Buffer 3 (25 μ l/well).
2. Add 25 μ l of diluted Streptavidin-HRP to each well.
3. Incubate for 30 minutes at RT.
4. Wash the plate three times with 100 μ l of PBST buffer per well and tap the plate onto clean paper towel.
5. Just before use, mix 1 volume of ELISA ECL Substrate A and 1 volume of ELISA ECL Substrate B (50 μ l of mix/well).
6. Add 50 μ l of mix per well.
7. Immediately read the plate in a luminometer or microtiter-plate reader capable of reading chemiluminescence.
8. The “Blank” value should be subtracted from all other values.

Reading Chemiluminescence

Chemiluminescence is the emission of light (luminescence) which results from a chemical reaction. The detection of chemiluminescence requires no wavelength selection because the method used is emission photometry and is not emission spectrophotometry.

To properly read chemiluminescence, 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 are: 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

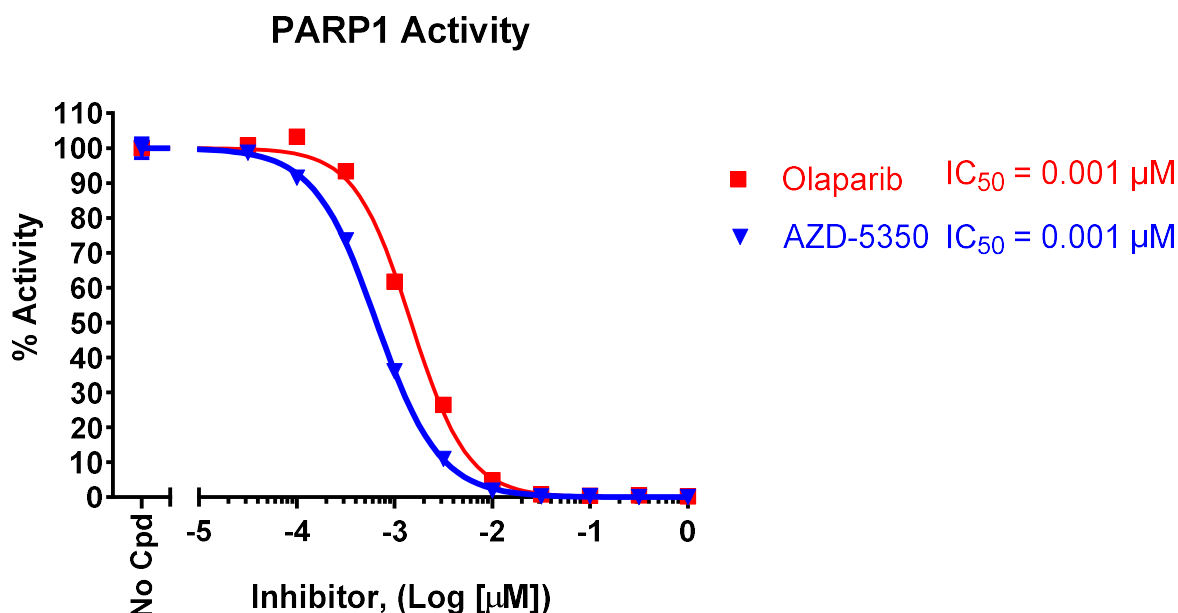


Figure 2: Inhibition of PARP1 activity by Olaparib and AZD5305.

PARP1 was incubated with increasing concentrations of Olaparib (#78318 or #27003) and AZD-5305 (#78318). Luminescence was measured using a Bio-Tek microplate reader.

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

References

Marques M., et al., 2019 *Oncogene* 38 (12): 2177-2191.

Troubleshooting Guide

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

Related Products

Products	Catalog #	Size
PARP1 Homogeneous Assay Kit	78438	384 reactions
PARP1 Colorimetric Assay Kit	80580	96 reactions
PARPtrap™ Assay Kit for PARP1	80560	96 reactions
PARP2 Chemiluminescent Assay Kit	80552	96 reactions
PARP3 Chemiluminescent Assay Kit	80553	96 reactions/384 reactions
TNKS2 (PARP5B) Chemiluminescent Assay Kit	78406	96 reactions

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