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Data Sheet

Keap1:Nrf2 Inhibitor Screening Assay Kit

Catalog #72020

DESCRIPTION: The Keap1:Nrf2 Inhibitor Screening Assay Kit is designed for identification of inhibitors of Keap1:Nrf2 binding using fluorescence polarization. The kit comes in a convenient 96-well format, with purified Keap1 protein, a fluorescently labeled Nrf2 peptide containing the ETGE motif, and assay buffer for 100 protein reactions. Using this kit, only one simple step on a microtiter plate is required for Keap1:Nrf2 inhibitor screening reactions. The Keap1 protein and fluorescently labeled Nrf2 peptide are incubated with a sample containing testing inhibitors for 30 minutes. The change in fluorescent polarization can then be measured using a fluorescence reader.

BACKGROUND: The nuclear factor erythroid 2-related factor (Nrf2) is a transcription factor that induces the expression of antioxidant and phase II proteins by binding to the ARE (antioxidant response element) region of the gene promoter. Under basal conditions, Nrf2 is retained in the cytosol by binding to the cytoskeletal protein Keap1. Upon exposure to oxidative stress and other ARE activators, Nrf2 is released from Keap1. It then translocates to the nucleus, where it can bind to the ARE and activate expression of antioxidant and phase II proteins that protect the cell from oxidative damage. Because Nrf2 activation leads to a coordinated antioxidant and anti-inflammatory response, and Keap1 represses Nrf2 activation, Keap1 has become a very attractive drug target.

COMPONENTS:

Catalog #	Component	Amount	Storage	Warnings
70040	Keap1, human recombinant	30 µg	-80°C	Avoid freeze/thaw cycles. Protect FAM-Nrf2 from light.
79112	FAM-Nrf2 peptide (10 µM)	10 µl	-80°C	
79113	Keap1-Nrf2 Assay Buffer	50 ml	-20°C	
	BSA, 10 mg/ml	100 µl	-80°C	
	96-well black plate	1	+4°C	

APPLICATIONS: Great for screening small molecular inhibitors for drug discovery and HTS applications.

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MATERIALS REQUIRED BUT NOT SUPPLIED:

Plate reader capable of fluorescence polarization measurements, λ_{ex} = 475-495 nm, λ_{em} = 518-538 nm.

Adjustable micropipettor and sterile tips

REFERENCE: Inoyama, D., *et al.* 2012. *J. Biomol. Screening* **17(4)**: 435-447.

ASSAY PROTOCOL:

All samples and controls should be tested in duplicate or triplicate.

- 1) Thaw **Nrf2 peptide** on ice. Upon first thaw, briefly spin tube containing protein to recover the full contents of the tube. Aliquot **Nrf2 peptide** into single-use aliquots. Store remaining undiluted **Nrf2 peptide** in aliquots at -80°C immediately.
- 2) Dilute Nrf2 peptide 1:10 in **Assay Buffer**. Keep diluted peptide on ice.
- 3) Prepare the master mixture: N wells \times (24 μl **Assay Buffer** + 0.5 μl **BSA (10 mg/ml)** + 0.5 μl diluted **Nrf2 peptide**). Add 25 μl to each well labeled "Test Inhibitor", "Nrf2 Positive Binding Control", and "Nrf2 Negative Binding Control". For the wells labeled "Blank", add 45 μl of **Assay Buffer**.
- 4) Add 5 μl of inhibitor solution to each well designated "Test Inhibitor". Add 5 μl of the same solution without inhibitor (inhibitor buffer) to the wells labeled "Nrf2 Positive Binding Control", "Nrf2 Negative Binding Control", and "Blank".

	"Blank" Negative Control	Nrf2 Negative Binding Control	Nrf2 Positive Binding Control	Test Inhibitor
Binding assay buffer	45 μl	44 μl	24 μl	24 μl
BSA (10 mg/ml)	–	0.5 μl	0.5 μl	0.5 μl
Nrf2 peptide (1 μM)	–	0.5 μl	0.5 μl	0.5 μl
Inhibitor	–	–	–	5 μl
Inhibitor buffer (no inhibitor)	5 μl	5 μl	5 μl	–
Keap1 (15 ng/ μl)	–	–	20 μl	20 μl
Total	50 μl	50 μl	50 μl	50 μl

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- 5) Thaw **Keap1** protein on ice. Upon first thaw, briefly spin tube containing protein to recover the full contents of the tube. Aliquot **Keap1** into single-use aliquots. Store remaining undiluted **Keap1** in aliquots at -80°C immediately. *Note: **Keap1** is very sensitive to freeze/thaw cycles. Do not re-use thawed aliquots or diluted protein.*
- 6) Dilute **Keap1** in assay buffer to $15\text{ ng}/\mu\text{l}$ ($300\text{ ng}/\text{reaction}$)*. Keep diluted protein on ice. Discard any remaining diluted protein after use. **Note: optimal protein concentration may vary.*
- 7) Add $20\ \mu\text{l}$ of **Assay Buffer** to each well designated "Nrf2 Negative Binding Control".
- 8) Initiate binding reaction by adding $20\ \mu\text{l}$ of diluted **Keap1** to wells designated "Nrf2 Positive Binding Control" and "Test Inhibitor." Incubate at room temperature for 30 minutes.
- 9) Read the fluorescent polarization of the sample in a microtiter-plate reader capable of excitation at wavelengths ranging from 475-495 nm and detection of emitted light ranging from 518-538 nm. Blank value is subtracted from all other values.

CALCULATING RESULTS:

Definition of Fluorescence Polarization:

$$P = \frac{I_{\parallel} - I_{\perp}}{I_{\parallel} + I_{\perp}}$$

where I_{\parallel} = Intensity with polarizers parallel and I_{\perp} = Intensity with polarizers perpendicular. Most instruments display fluorescence polarization in units of mP.

$$mP = \left(\frac{I_{\parallel} - I_{\perp}}{I_{\parallel} + I_{\perp}} \right) \times 1000$$

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The equation above assumes that light is transmitted equally well through both parallel and perpendicular oriented polarizers. In practice, this is generally not true and a correction must be made to measure the absolute polarization state of the molecule. This correction factor is called the "G Factor".

$$mP = \left(\frac{I_{II} - G(I_{\perp})}{I_{II} + G(I_{\perp})} \right) \times 1000 \quad \text{OR} \quad mP = \left(\frac{G(I_{II}) - I_{\perp}}{G(I_{II}) + I_{\perp}} \right) \times 1000$$

The G-factor is instrument-dependent and may vary slightly depending upon instrument and conditions. Please check the manual of your instrument to obtain the information about the establishment of the G-factor.

EXAMPLE OF ASSAY RESULTS:

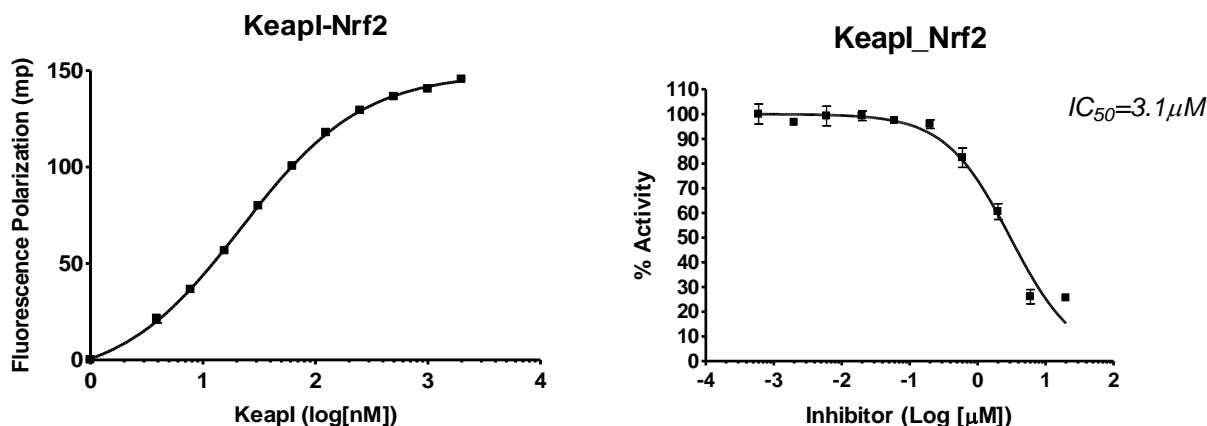


Figure Legend: Binding of Keap1 to Nrf2 (left) and inhibition of Keap1:Nrf2 binding by Nrf2 peptide inhibitor (right), measured using the Keap1:Nrf2 Inhibitor Screening Assay Kit, BPS Bioscience # 72020. Fluorescence was measured at λ_{ex} 485nm, λ_{em} 530 nm using a Bio-Tek fluorescent microplate reader. Data shown is lot-specific. For lot-specific information, please contact BPS Bioscience, Inc. at info@bpsbioscience.com

RELATED PRODUCTS:

Product	Cat. #	Size
ARE Reporter Kit (Nrf2 Antioxidant Pathway)	60514	500 reactions
ARE reporter cell line (Nrf2 Antioxidant pathway)	60513	2 vials

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Keap1 protein

70040

100 µg

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