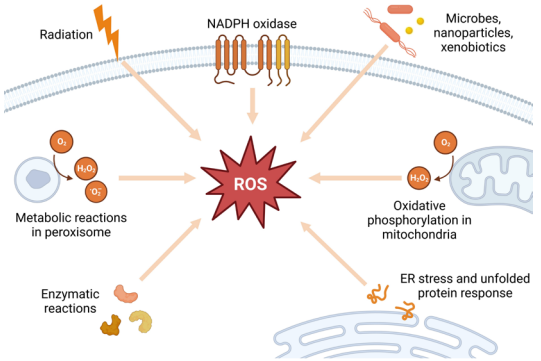
Tools for Research on Oxidative Stress

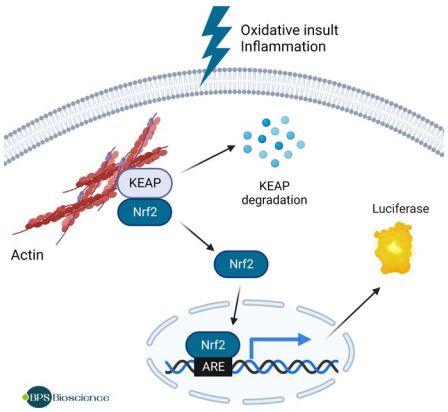
Cellular oxidative stress results from an imbalance between the production of reactive oxygen species (ROS) and the cell's ability to detoxify, and leads to damage in lipids, proteins, and DNA. ROS are highly reactive molecules generated during cellular metabolism. Toxins, chemicals, radiation, and inflammation increase oxidative stress, contributing to various diseases and to aging. To counteract ROS production, cells have developed an intricate antioxidant response system, which includes enzymes such as superoxide dismutase, catalase, and glutathione peroxidase. These enzymes play important functions in diseases linked to the immune or neurological systems, in aging, and in cancer.

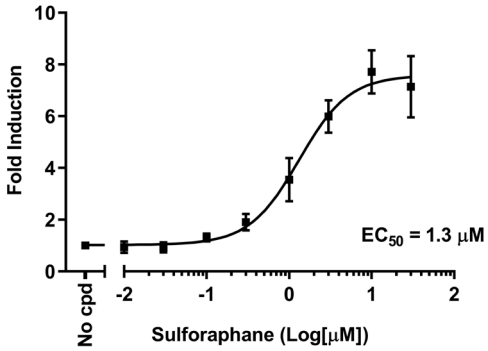
Illustration created with BioRender.com



Keap-Nrf2 antioxidant pathway

Nrf2 (Nuclear factor erythroid 2-related factor 2) is a transcription factor activated in response to oxidative insults. Under normal conditions, Nrf2 is retained in the cytosol through its binding to the cytoskeletal protein Kelch-like ECH-associated protein 1 (Keap1). It is released from Keap1 upon activation and translocates to the nucleus, where it binds to the ARE promoter region of genes involved in drug detoxification and genes encoding antioxidant enzymes.



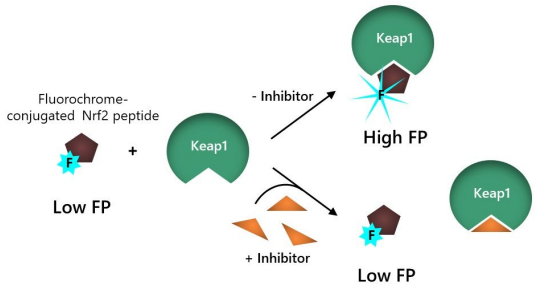


Left: The antioxidant response element (ARE) Luciferase Reporter HepG2 cell line contains a firefly luciferase gene under the control of ARE, which is recognized by transcription factor Nrf2 (#60513). Right: Luciferase expression correlates with activation of Nrf2 by sulforaphane.

Illustration created with BioRender.com

Keap1-Nrf2 Inhibitor Screening Assay Kit

This ultra-simple and fast assay was designed to test inhibitors of Keap1:Nrf2 binding using fluorescence polarization (FP). Briefly, Keap1 protein and fluorescent Nrf2 peptide are incubated with or without the test inhibitor for 30 minutes. Changes in size of the Nrf2 peptide dependant on complex formation are measured immediately using a plate reader capable of FP.



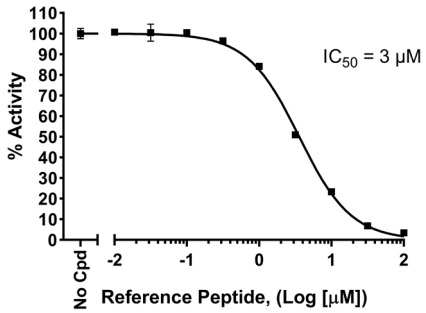


Illustration: Principle of the assay. Left graph: Binding of Keap1 to Nrf2. Right graph: Inhibition of Keap1:Nrf2 binding by increasing concentrations of Nrf2 inhibitor KI696. Fluorescence polarization was measured at λex 485 nm, λem 530 nm (#72020).

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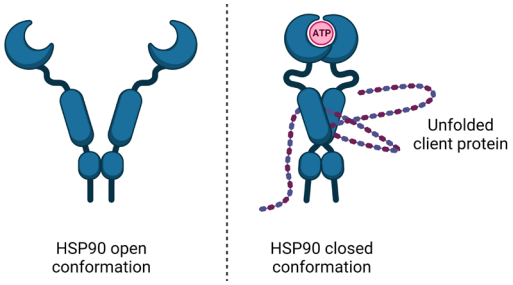
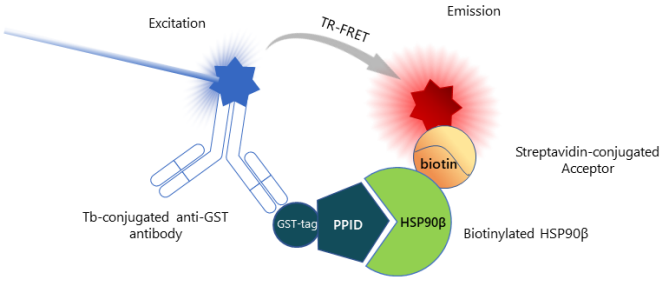
Tools for Research on Oxidative Stress

Heat Shock Protein Assay Kits

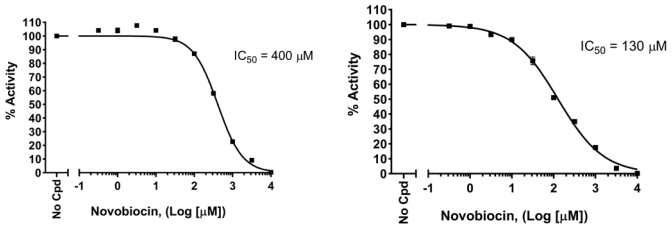




The HSP70 and HSP90 chaperones process hundreds of proteins involved in a myriad of cellular processes, including cell cycle control, cell signaling, cell survival, and apoptosis. They provide critical support for tumorigenic proteins, such as protein kinases, transcription factors, epigenetic regulators, and metabolic enzymes. Thus, HSP70 and HSP90 inhibitors show promise as therapeutic targets in oncology and neurodegenerative diseases.

Homeostasis
- Proper folding
- Cell signaling
- Cytoskeleton arrangement
- DNA & RNA processing
- Cell cycle regulation

Cell Stress or Cancer
- Uncontrolled cell cycling
- Metabolism reprogramming
- Evasion of apoptosis
- Immune evasion



Top: Illustration of the assay principle. Bottom: Inhibition of the binding between PPID ligand and the C-Terminal domains of HSP90α (left) and HSP90β (right). Assay was done according to TR-FRET Assay Kits (#50262 and #50289).

Screening & Profiling Services

Our HSP90α and HSP90β screening and profiling services enable identification of N-terminal or C-terminal specific inhibitors, while our HSP70 screening service identifies inhibitors of ATP hydrolysis. All of our assays are available as a service. Alternatively, we will develop a new custom assay to meet your specifications.

- Screening for activity across your compound library
- Determination of IC_{50}
- Project guidance and questions answered in a timely manner
- Detailed project reports

Purified Recombinant Proteins

SOD

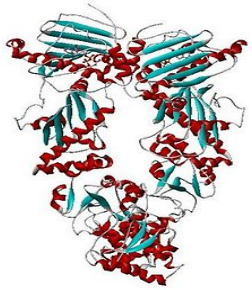
Superoxide Dismutase	#90240

GPx

Glutathione peroxidase 4	#100543

PRx

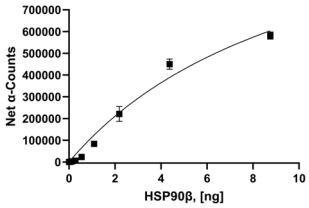
Peroxiredoxin I	#70010
Peroxiredoxin I (K197Q)	#70020
Peroxiredoxin I (K197R)	#70021
Peroxiredoxin II	#70011



HSP90

Heat Shock Proteins

HSP90α	#50290
HSP90α (C-terminal), Biotin-labeled	#50316
HSP90β (C-terminal), Biotin-labeled	#50313
HSP70	#50287
HSP40	#50285
GRP78	#101210



Graph shows the activity of HSP90β, Biotin-labeled (#50313) measured with HSP90β Inhibitor Screening Kit (#50314).

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