



# Oxidative Stress

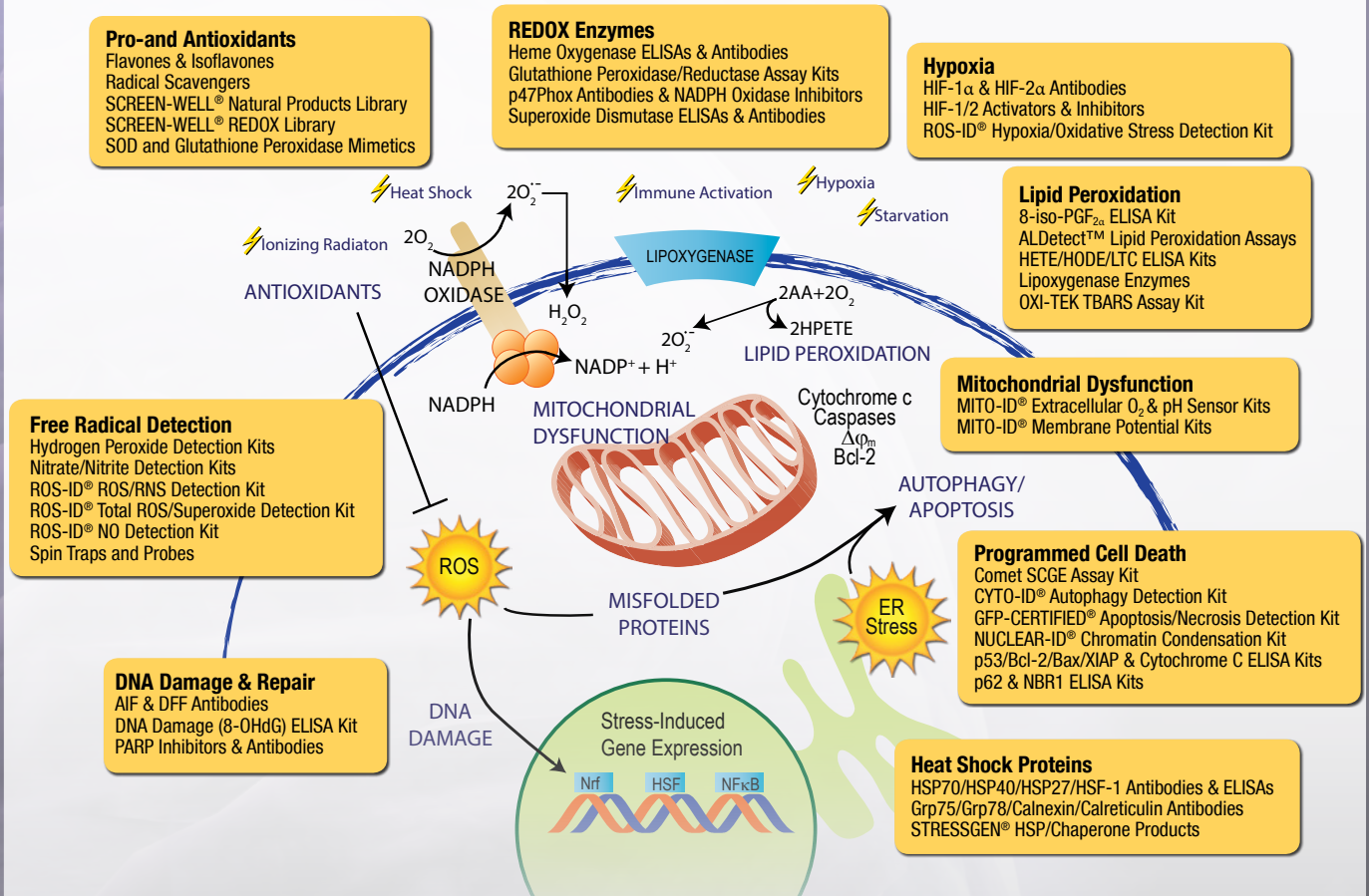
Comprehensive Tools for Quantifying  
Cellular Responses to Oxidative Damage



# ALLEVIATE THE STRESS OF OXIDATIVE STRESS RESEARCH

## MONITOR MOLECULAR ORIGINS AND CONSEQUENCES OF OXIDATIVE STRESS

The term oxidative stress reflects an imbalance in free radical formation within a cell or organism, most commonly in the form of reactive oxygen or nitrogen species (ROS/RNS). ROS/RNS such as superoxide anions, hydroxyl radicals, hydrogen peroxide, nitric oxide, and peroxynitrite originate from a variety of sources including changes in aerobic metabolism, immune activation, UV radiation, heme accumulation, and hypoxia. Failure of the cell's defense mechanisms to compensate for accumulating insults such as mitochondrial dysfunction, DNA damage, misfolded proteins, and lipid peroxidation can trigger programmed cell death pathways, and has been linked to clinically relevant diseases including cancer, cardiovascular disease, asthma, ischemia, diabetes, and neurodegenerative disease.



### Live Cell Analysis

Enzo's expertise in fluorescent probe chemistry and cellular analysis combine to provide high-sensitivity fluorescent probes for profiling free radical production and the cellular consequences of their accumulation under conditions of oxidative stress. Our unique fluorescent probe-based assays and widely cited antibodies enable multiplex detection of ROS/RNS, superoxide, hypoxia, as well as sensitive assays for mitochondrial function, apoptosis, and autophagy.

### Immunoassays & Antibodies

As a trusted manufacturer of thousands of widely cited and thoroughly validated ELISA kits and antibodies, we understand quality means delivering sensitivity, specificity, and consistency. Over 300 immunoassays and 3,000 antibodies enable sensitive and specific detection of protein and small molecule biomarkers of oxidative stress. Our assay kits and reagents are some of the most widely cited products for quantification of critical stress-regulating metabolic enzymes and stress-responsive pathways.

### Small Molecule Chemistry

More than 3,000 biologically characterized small molecules and the industry's most diverse collection of compound libraries enables the modulation of oxidative stress pathways. Our catalog includes hundreds of REDOX compounds, natural products, and bioactive lipids available as ready-to-screen SCREEN-WELL® libraries or as individual and bulk compounds. Over 50 spin traps and probes facilitate molecular characterization of free radical production.

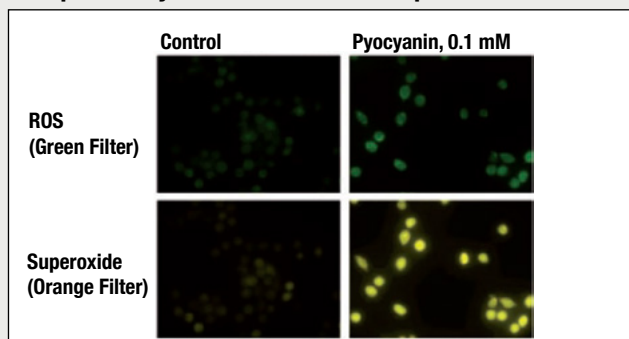
# LIVE CELL, MULTIPLEX ANALYSIS KITS

## Accurately Profile Total ROS and Superoxide with Dual-readout Assay

### ROS-ID® Total ROS/Superoxide Detection Kit

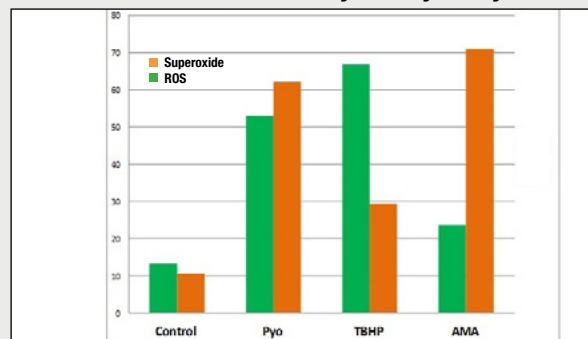
- Non-invasive fluorescent probes allow simultaneous discrimination of total ROS and superoxide in live cells
- Distinguish between hydrogen peroxide, peroxyxynitrite and hydroxyl radicals using included inhibitors
- Dyes compatible with major components of tissue culture media (phenol red, FBS and BSA) for microscopy and flow cytometry
- Red dye for detection of nitric oxide also available (ENZ-51013/ENZ-51001)

### Multiplex Analysis of Total ROS and Superoxide



Data represents treatment of HeLa cells with Pyocyanin (ROS/SO inducer). Total ROS dye fluoresces green in the presence of ROS, while the SO-specific dye fluoresces yellow/orange (bottom right).

### Convenient Quantifiable Flow Cytometry Assay



Data represents % of positive HeLa cells following treatment with Pyocyanin (ROS/SO inducer), TBHP (ROS Inducer), or AMA (Superoxide inducer).

PRODUCT NAME	PRODUCT #	EX/EM	APPLICATION
ROS-ID® Total ROS/Superoxide Detection Kit	ENZ-51010	Oxidative Stress 504/524 • Superoxide 530/590 •	
ROS-ID® ROS/RNS Detection Kit	ENZ-51001	Oxidative Stress 504/524 • Superoxide 530/590 • NO 648/666 •	
ROS-ID® Total ROS Detection Kit	ENZ-51011	504/524 •	
ROS-ID® Superoxide Detection Kit	ENZ-51012	530/590 •	
ROS-ID® NO Detection Kit	ENZ-51013	648/666 •	

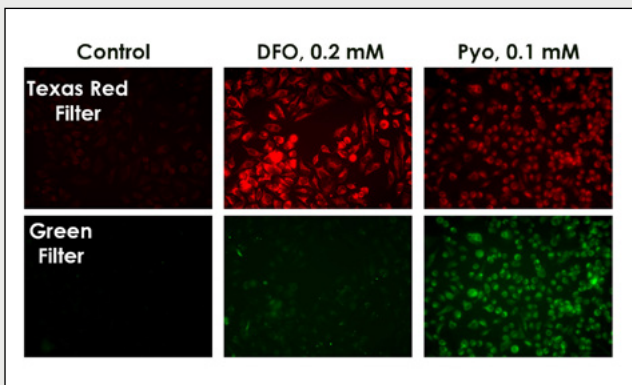
Microscopy Flow Cytometry Microplate

## Multiplex, Real-time Analysis of Hypoxia and ROS in Live Cells

### ROS-ID® Hypoxia/Oxidative Stress Detection Kit (ENZ-51042)

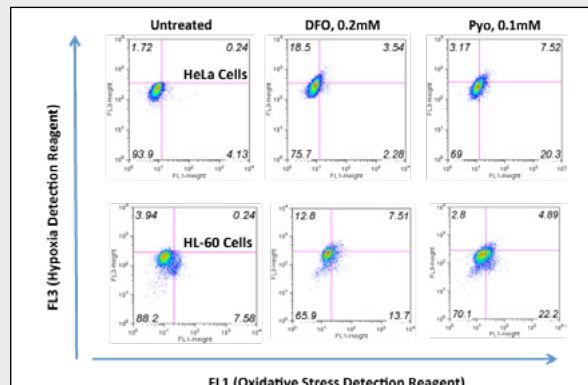
- Sensitive hypoxia dye fluoresces red when converted by nitroreductases
- Total ROS dye enables simultaneous detection of hypoxia (red) and ROS (green)
- Non-toxic, cell-permeable dyes optimized to avoid artifactual fluorescence
- Suitable for microscopic or flow cytometric analysis of adherent or suspension cells

### Simultaneously Monitor Hypoxic Status and ROS Formation



Bright red fluorescence of the Hypoxia probe is observed following its conversion by cellular nitroreductases under hypoxic conditions such as those induced chemically by treatment with the hypoxia-mimetic Deferoxamine (DFO). The assay facilitates simultaneous quantification of hypoxic status (FL3/red) and presence of ROS (FL1/green) by flow cytometry.

### Quantitative Multiparametric Assay for Flow Cytometry



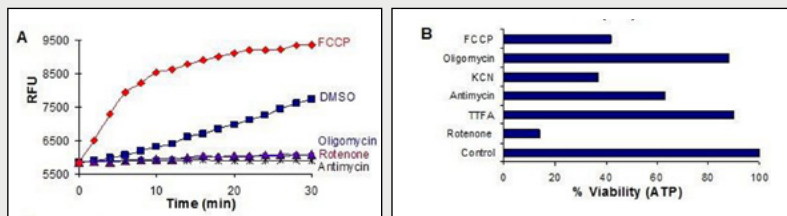
# HIGH-THROUGHPUT ASSAYS FOR MITOCHONDRIAL FUNCTION

## MITO-ID® Extracellular O<sub>2</sub> Sensor Kits

This oxygen-sensitive phosphorescent probe can be used to assess O<sub>2</sub> consumption by cultured cells, isolated mitochondria, microorganisms, tissues, and enzymes.

- Phosphorescent probe increases in signal intensity with O<sub>2</sub> consumption (↓ O<sub>2</sub> levels)
- Amenable to 96- and 384-well microplates for high-throughput analysis on standard fluorescence plate readers (Ex/Em 380/650 nm)
- Cell-permeable probe also available for tracing intracellular O<sub>2</sub> levels
- Multiplex with MITO-ID® pH Sensor Probe to confirm mitochondrial toxicity

### Detect Mitochondrial Dysfunction Within Minutes of Treatment



Assessment of mitochondrial function with MITO-ID® Extracellular O<sub>2</sub> Sensor Kit (A) or traditional ATP assay (B) following treatment with mitochondrial inhibitors (Oligomycin, Rotenone, Antimycin), uncoupling agent (FCCP), or control (DMSO). Results illustrate that drug-induced mitochondrial dysfunction is evident immediately post-treatment (A) despite varying levels of viability at 24 hours by ATP assay (B).

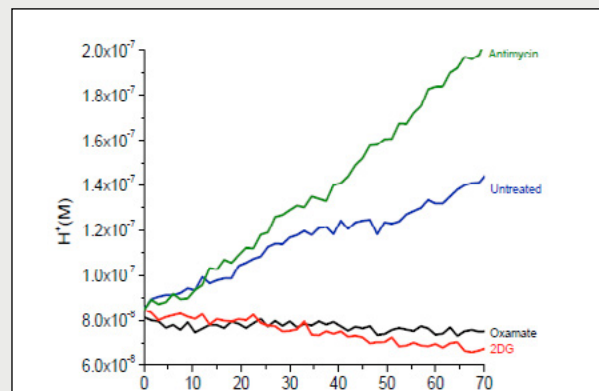
PRODUCT NAME	PRODUCT #
MITO-ID® Extracellular O <sub>2</sub> Sensor Kit	ENZ-51044
MITO-ID® Extracellular O <sub>2</sub> Sensor Kit (High Sensitivity)	ENZ-51045
MITO-ID® Intracellular O <sub>2</sub> Sensor Probe	ENZ-51046
MITO-ID® Extracellular O <sub>2</sub> Sensor Probe	ENZ-51047

## MITO-ID® Extracellular pH Sensor Probe

This pH-sensitive phosphorescent probe can be used to monitor cellular acid extrusion, the result of increased glycolytic flux associated with mitotoxicity.

- pH-sensitive probe increases in signal intensity with increasing acidity
- Simple mix-and-read protocol for 96-well microplates
- Amenable to standard fluorescence plate readers (Ex/Em 340/615 nm)

### Efficiently Monitor Glycolytic Activity



Acidification profiles of HepG2 cells treated with glucose transport inhibitors (2DG, Oxamate) or mitochondrial inhibitor (Antimycin) relative to control.

PRODUCT NAME	PRODUCT #
MITO-ID® Extracellular pH Sensor Probe	ENZ-51048

# QUANTIFY LOSS OF MMP IN LIVE CELLS

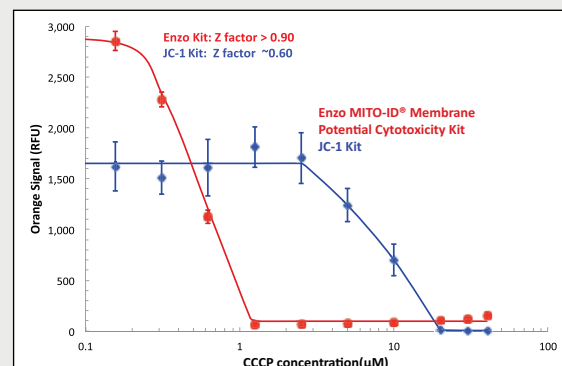
## MITO-ID® Membrane Potential Cytotoxicity Assay Kit

A real-time mitochondrial membrane potential assay with superior sensitivity

- 10X more sensitive than JC-1 with superior aqueous solubility
- Photostable dual-emission dye
- No-wash/no-medium removal
- Separate MITO-ID® Red/Green assays available for detection of mitochondrial mass
- Suitable for high-throughput applications

PRODUCT NAME	PRODUCT #
MITO-ID® Membrane Potential Cytotoxicity Assay Kit	ENZ-51019

### Detect MMP Perturbations with 10X More Sensitivity than JC-1



HeLa cells were treated with increasing CCCP concentration and stained with JC-1 or MITO-ID®. Improved aqueous solubility of the MITO-ID® dye and no-wash protocol minimizes variability, leading to a higher Z-factor (> 0.9) than that obtained with JC-1.

# DETECT & QUANTIFY BIOMARKERS OF OXIDATIVE STRESS

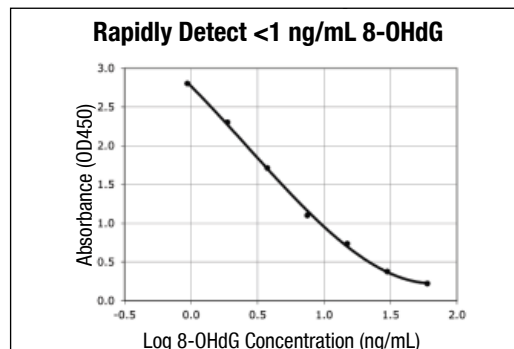
## High-sensitivity ELISA & Detection Kits

PRODUCT NAME	PRODUCT #	SIZE	READOUT
12(S)-HETE ELISA Kit	ADI-900-050	1 x 96 Wells	Colorimetric
ALDetect™ Lipid Peroxidation Assay Kit	BML-AK170	100 Assays	Colorimetric
Cu/Zn-Superoxide Dismutase ELISA Kit	ALX-850-033	1 x 96 Wells	Colorimetric
Cytochrome C (H) ELISA Kit	ADI-900-141	1 x 96 Wells	Colorimetric
Direct 8-iso-PGF <sub>2α</sub> ELISA Kit	ADI-900-091	1 x 96 Wells	Colorimetric
Glutathione (total) Detection Kit	ADI-900-160	4 x 96 Wells	Colorimetric
HO-1 (human), ELISA Kit	ADI-EKS-800	1 x 96 Wells	Colorimetric
IMMUNOSETS® HO-1 (mouse)	ADI-960-071	5 x 96 Wells	Colorimetric
HO-1 (rat), ELISA Kit	ADI-EKS-810A	1 x 96 Wells	Colorimetric
Hydrogen Peroxide Detection Kit	ADI-907-015	1 x 96 Wells	Colorimetric
Myeloperoxidase (human), ELISA Kit	ADI-900-115	1 x 96 Wells	Colorimetric
Nitric Oxide (Total) Detection Kit	ADI-917-020	2 x 96 Wells	Colorimetric
OXI-TEK TBARS Assay Kit	ALX-850-287	160 Tests	Fluorometric
Protein Carbonyl ELISA Kit	ALX-850-312	1 x 96 Wells	Colorimetric
Red Hydrogen Peroxide Assay Kit	ENZ-51004	5 x 96 Wells	Fluorometric

## PRODUCT HIGHLIGHT

### DNA Damage (8-OHdG) ELISA Kit – ADI-EKS-350

- Quantify levels < 1 ng/mL
- Rapid results in < 2.5 hours
- Tested in a variety of biofluids (urine, serum, saliva)
- Convenient colorimetric 96-well plate format



PRODUCT NAME	PRODUCT #
DNA Damage (8-OHdG) ELISA Kit	ADI-EKS-350

## Widely-cited Antibodies



PRODUCT NAME	PRODUCT #	SPECIES	PRODUCT NAME	PRODUCT #	SPECIES
Biliverdin Reductase, pAb	ADI-OSA-400	Human +	HIF-1α, mAb (Hα111a)	ADI-OSA-602	Human
Calnexin, pAb	ADI-SPA-860	Human +	HO-1, mAb (HO-1-1)	ADI-OSA-110	Human +
Calreticulin, mAb (FMC 75)	ADI-SPA-601	Human +	HO-1, mAb (HO-1-2)	ADI-OSA-111	Human +
Calreticulin, pAb	ADI-SPA-600	Human +	HO-1, pAb	ADI-SPA-895	Human +
Cu/Zn SOD, pAb	ADI-SOD-100	Human +	iNOS, pAb	ADI-KAS-N0001	Human +
eNOS, pAb	ADI-905-386	Human +	Metallothionein, mAb (UC1MT)	ADI-SPA-550	Human +
Grp94, mAb (9G10)	ADI-SPA-850	Human +	PDI mAb (1D3)	ADI-SPA-891	Human +

# MODULATE WITH PRO- AND ANTI-OXIDANT COMPOUNDS

## SCREEN-WELL® REDOX Compound Library (BML-2835)

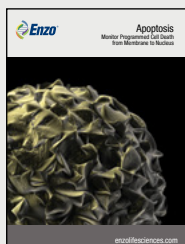
The SCREEN-WELL® REDOX Library contains 83 ready-to-screen compounds with defined prooxidant or antioxidant activity. All compounds come pre-dissolved in DMSO and are available in bulk quantities for resupply.

- Glutathione peroxidase inhibitors
- Hydroperoxides
- Lazaroids
- Metal chelators
- Polyphenolics
- Radical scavengers
- SOD mimetics
- Thiols
- Thiol traps

## SELECT SMALL MOLECULE MODULATORS

COMPOUND	PRODUCT #	ACTIVITY
Buthionine sulfoximine	BML-FR117	γ-Glutamyl transpeptidase inhibitor
Carnosic Acid	ALX-270-264	Antioxidant
Eicosapentaenoic acid	BML-FA001	Inhibits PGE <sub>2</sub> formation
L-Ergothioneine	BML-FR111	Antioxidant
Resveratrol	BML-FR104	Antioxidant

**You may also be interested in:**



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**Put our experience to work for you!**  
Our broad range of scientific expertise and manufacturing capabilities enables us to provide a comprehensive set of solutions for oxidative stress.