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CELL BIOLABS, INC.
Creating Solutions for Life Science Research

Oxidative Stress / Damage

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Measuring Oxidative Stress

Oxidative stress may be measured using one of three primary methods:

- Measure the reactive oxygen species (ROS) directly
- Measure the presence of antioxidants
- Measure the resulting damage to proteins, lipids, DNA or RNA (most reliable)

Use the following table to determine the best oxidative stress assays for your samples.

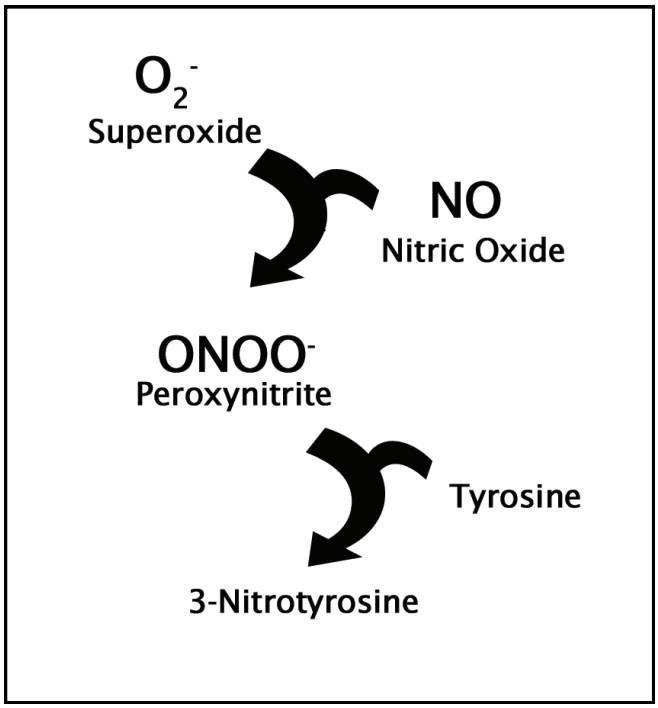
	Marker or Type of Damage	Sample Type				
		Cells	Tissues	Blood	Urine	Other
Protein Damage (p. 2-6)	Protein carbonyl content (PCC)	X	X	X		
	3-Nitrotyrosine	X	X	X		
	BPDE Protein Adduct	X	X	X		
	Advanced Glycation End Products (AGE)	X	X	X		
	Carboxyethyl Lynsine (CEL)	X	X	X		
	Carboxymethyl Lynsine (CML)	X	X	X		
	Methylglyoxal	X	X	X		
	Advanced Oxidation Protein Products (AOPP)	X	X	X		
Lipid Peroxidation (p. 7-10)	4-Hydroxynonenal (4-HNE)	X	X	X		
	Malondialdehyde (MDA)	X	X	X	X	
	8-iso-Prostaglandin F2α (8-Isoprostane)	X	X	X	X	
	Oxidized Low Density Lipoprotein (OxLDL)			X		
DNA / RNA Damage and Repair (p. 11-17)	8-hydroxyguanosine (8-OHG)	X	X	X	X	Cerebrospinal Fluid
	8-hydroxydeoxyguanosine (8-OHdG)	X	X	X	X	
	Abasic (AP) sites	X	X			
	Aldehyde DNA Damage (Etheno adducts)	X	X			
	BPDE DNA Adduct	X	X			
	Comet Assay	X				
	Double-strand DNA breaks	X				
	UV DNA Damage (CPD and 6-4PP)	X				
Reactive Oxygen Species (p. 19-22)	Universal ROS	X	X	X	X	
	Hydrogen Peroxide	X	X	X	X	
	Nitric Oxide	X	X	X	X	Saliva
Antioxidants & Antioxidant Capacity (p. 23-27)	Superoxide Dismutase	X	X	X	X	
	Catalase	X	X	X		
	Glutathione	X	X	X	X	
	Total Antioxidant Capacity (TAC)	X	X	X	X	Food
	Oxygen Radical Antioxidant Capacity (ORAC)	X	X	X		Food
	Hydroxyl Radical Antioxidant Capacity (HORAC)	X	X	X		Food
	Cellular Antioxidant Capacity (CAA)					Antioxidant compounds

Assays and Reagents for Protein Damage

Cellular proteins are subject to damage in the presence of reactive oxygen species (ROS). The resulting protein damage may take the form of nitration or oxidation of various amino acid residues, or may result in formation of advanced glycation end products (AGE) or advanced oxidation protein products (AOPP). We have developed unique assays to detect protein damage with higher sensitivity and more user-friendly protocols.

OxiSelect™ Nitrotyrosine Assay Kits and Antibodies

Our OxiSelect™ Nitrotyrosine Assay Kits provide a simple method to measure the formation of 3-nitrotyrosine in proteins. This assay is available in two formats: a 96-well competitive ELISA and an immunoblot kit. The ELISA format can detect the presence of 3-nitrotyrosine as low as 10 nM. Both kits can detect nitrotyrosine in protein from any species.



Formation of 3-Nitrotyrosine During Oxidative Stress.

Recent Product Citations

1. Toth, P. et al. (2014). Resveratrol treatment rescues neurovascular coupling in aged mice: role of improved cerebromicrovascular endothelial function and downregulation of NADPH oxidase. *Am. J. Physiol. Heart Circ. Physiol*. **306**:H299-H308. (STA-305)
2. Li, F.C. et al. (2013). Transition from oxidative stress to nitrosative stress in rostral ventrolateral medulla underlies fatal intoxication induced by organophosphate mevinphos. *Toxicol. Sci.* **135**:202-217. (STA-305)
3. Medina, J.P. et al. (2013). Angiotensin receptor-mediated oxidative stress is associated with impaired cardiac redox signaling and mitochondrial function in insulin-resistant rats. *Am. J. Physiol. Heart Circ. Physiol.* **305**:H599-H607. (STA-305)
4. Kong, X. et al. (2013). Pioglitazone enhances the blood pressure-lowering effect of losartan via synergistic attenuation of angiotensin II-induced vasoconstriction. *J. Renin Angiotensin Aldosterone Syst.* 10.1177/1470320313489061. (STA-305)
5. Lupachyk, S. et al. (2013). Endoplasmic reticulum stress plays a key role in the pathogenesis of diabetic peripheral neuropathy. *Diabetes* **62**:944-952. (STA-305)
6. Cho, W.K. et al. (2013). IL-13 receptor α2-arginase 2 pathway mediates IL-13-induced pulmonary hypertension. *Am. J. Physiol. Lung Cell Mol. Physiol.* **304**:L112-L124. (STA-305)
7. Montez, P. et al. (2012). Angiotensin receptor blockade recovers hepatic UCP2 expression and aconitase and SDH activities and ameliorates hepatic oxidative damage in insulin resistant rats. *Endocrinology* **153**:5845-5856. (STA-305)
8. Tahrani, A.A. et al. (2012). Obstructive sleep apnea and diabetic neuropathy: a novel association in patients with type 2 diabetes. *Am. J. Respir. Crit. Care Med*. **186**:434-441. (STA-305)
9. Suvakov, S. et al. (2012). Glutathione-S-transferase A1, M1, P1 and T1 null or low-activity genotypes are associated with enhanced oxidative damage among haemodialysis patients. *Nephrol. Dial. Transplant.* 10.1093/ndt/gfs369. (STA-305)
10. Shevalye, H. et al. (2012). Metanx alleviates multiple manifestations of peripheral neuropathy and increases intraepidermal nerve fiber density in Zucker diabetic fatty rats. *Diabetes* **61**:2126-2133. (STA-305)

Product Name	Detection	Size	Catalog Number
Nitrotyrosine ELISA Kit	Colorimetric	96 Assays	STA-305
		5 x 96 Assays	STA-305-5
Nitrotyrosine Immunoblot Kit	Immunoblot/ECL	10 Blots	STA-303
Goat Anti-Nitrotyrosine Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-003
Rabbit Anti-Nitrotyrosine Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-004
Protein Tyrosine Nitration Control (Nitrotyrosine-BSA)	Immunoblot/ECL	10 µg	STA-304

OxiSelect™ Protein Carbonyl Assay Kits

The most common products of protein oxidation in biological samples are the carbonyl derivatives of Pro, Arg, Lys and Thr residues. Such derivatives are chemically stable and serve as markers for oxidative stress in most types of reactive oxygen species.

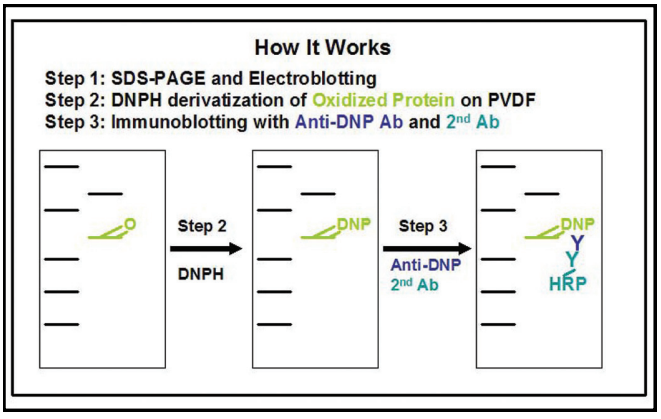
Our OxiSelect™ Protein Carbonyl Assay Kits provide rapid, efficient methods for detection of protein carbonyls. Four assay formats are available: immunoblot, ELISA, fluorometric and spectrophotometric. All formats are suitable for use with purified protein, plasma, serum, or cell lysate samples from any species.

Protein Carbonyl ELISA Kit

- **Sensitive**: Detects samples as low as 10 µg/ml
- **Greater Sample Retention**: No concentration or TCA precipitation steps that contribute to sample loss

Protein Carbonyl Immunoblot Kit

- **No Molecular Weight Shift**: DNPH derivatization after immunoblotting allows direct comparison of oxidized and non-oxidized protein fingerprints



Assay Principle for the OxiSelect™ Protein Oxidation Immunoblot Kit (STA-308).

Recent Product Citations

1. Cui, Z. et al. (2014). Identification of the immunoproteasome as a novel regulator of skeletal muscle differentiation. *Mol. Cell Biol.* **34**:96-109. (STA-308)
2. Pons, D. et al. (2012). Initial activation status of the antioxidant response determines sensitivity to carboplatin/paclitaxel treatment of ovarian cancer. *Anticancer Res.* **32**:4723-4728. (STA-308)
3. Cristovao, A.C. et al. (2012). NADPH oxidase 1 mediates α-synucleinopathy in Parkinsons' Disease. *J. Neurosci*. **32**:14465-14477. (STA-308)
4. Bitar, M. et al. (2012). Decline in DJ-1 and decreased nuclear translocation of Nrf2 in Fuchs endothelial corneal dystrophy. *Invest. Ophthalmol. Vis. Sci.* **53**:5806-5813. (STA-308)
5. Cannizzo, E. et al. (2012). Age-related oxidative stress compromises endosomal proteostasis. *Cell Report* **2(1)**:136-149. (STA-308)
6. Satapati, S. et al. (2012). Elevated TCA cycle function in the pathology of diet-induced hepatic insulin resistance and fatty liver. *J. Lipid Res.* **53**:1080-1092. (STA-308)
7. Vulusevic, B. et al. (2014). Glyoxalase-1 overexpression in bone marrow cells reverses defective neovascularization in STZ-induced diabetic mice. *Cardiovasc. Res.* **101**:306-316. (STA-310)
8. Dai, D.F. et al. (2013). Global proteomics and pathway analysis of pressure-overload-induced heart failure and its attenuation by mitochondrial-targeted peptides. *Circ. Heart Fail.* **6**:1067-1076. (STA-310)
9. Ungvari, Z. et al. (2013). Testing predictions of the oxidative stress hypothesis of aging using a novel invertebrate model of longevity: the giant clam (Tridacna derasa). *J. Gerontol. A Biol. Sci. Med. Sci.* **68**:359-367. (STA-310)
10. Young, K. et al. (2013). Each to their own: skeletal muscles of different function use different biochemical strategies during aestivation at high temperature. *J. Exp. Biol*. **216**:1012-1024. (STA-310)
11. Fishman , J. et al. (2012). Oxidative modification of the intestinal mucus layer is a critical but unrecognized component of trauma hemorrhagic shock-induced gut barrier failure. *Am. J. Physiol. Gastrointest. Liver Physiol.* **304**:G57-G63. (STA-310)
12. Murakami, Y. et al. (2012). Receptor interacting protein kinase mediates necrotic cone but not rod cell death in a mouse model of inherited degeneration. *PNAS* 10.1073/pnas.1206937109. (STA-310)
13. Kang, K.A. et al. (2012). Baicalein inhibits oxidative stress-induced cellular damage via antioxidant effects. *Toxic. And Ind. Health* **28**:412-421. (STA-310)
14. Gannon, A.M. et al. (2012). Cigarette smoke exposure leads to follicle loss via an alternative ovarian cell death pathway in a mouse model. *Toxicol. Sci*. **125**:274-284. (STA-310)
15. Tang, H. et al. (2011). Intrinsic apoptosis in mechanically ventilated human diaphragm: linkage to a novel Fox/FoxO1/Stat3-Bim axis. *FASEB J*. **25**:2921-2936. (STA-310)
16. Robinson, C.K. et al. (2011). A major role for nonenzymatic antioxidant processes in the radioresistance of Halobacterium salinarum. *J. Bacteriol*. **193**:1653-1662. (STA-310)

Product Name	Detection	Size	Catalog Number
OxiSelect™ Protein Carbonyl ELISA Kit	Colorimetric	96 Assays	STA-310
		5 x 96 Assays	STA-310-5
OxiSelect™ Protein Carbonyl Fluorometric Assay	Fluorometric	100 Assays	STA-307
OxiSelect™ Protein Carbonyl Spectrophotometric Assay	Spectrophotometric	40 Assays	STA-315
OxiSelect™ Protein Carbonyl Immunoblot Kit	Immunoblot/ECL	10 Blots	STA-308
Oxidized Protein Immunoblot Control (Carbonyl-BSA)	Immunoblot/ECL	10 µg	STA-309

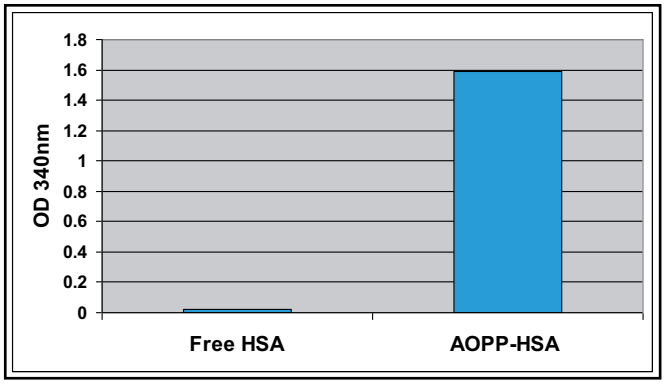
OxiSelect™ AOPP Assay Kit

Advanced oxidation protein products are toxins created during oxidative stress in patients with diabetes mellitus, atherosclerosis, renal complications, and HIV. Our OxiSelect™ AOPP Assay Kit provides a quick, easy method for assessing AOPP levels.

Recent Product Citations

1. Bloomer, R. et al. (2013). Safety profile of caffeine and 1,3-dimethylamylamine supplementation in healthy men. *Human and Exp. Toxicol.* 10.1177/0960327113475680. (STA-318)
2. Park, S.H. et al. (2012). Effects of neutral pH and low-glucose degradation product-containing peritoneal dialysis fluid on systemic markers of inflammation and endothelial dysfunction: a randomized controlled 1-year follow-up study. *Nephrol. Dial. Transp.* **27**:1191-1199. (STA-318)
3. Anderson, D. et al. (2010). Albumin-based microbubbles bind up-regulated scavenger receptors following vascular injury. *J. Biol. Chem.* **285**:40645-40653. (STA-318)

- **Fast**: Obtain results in <30 minutes
- **Sensitive**: Detect concentrations as low as 5 µM



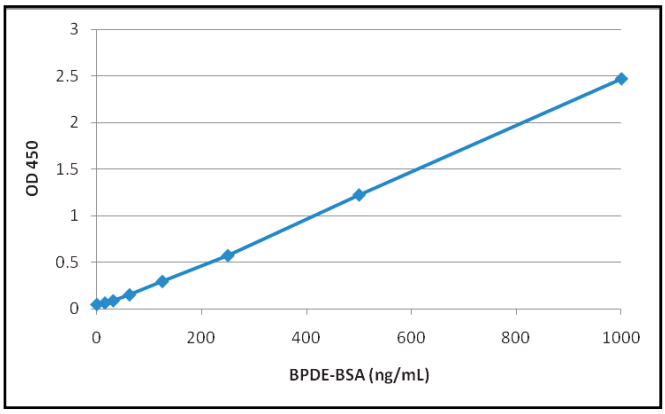
Untreated Human Serum Albumin and AOPP-HSA Positive Control Tested with the OxiSelect™ AOPP Assay Kit.

Product Name	Detection	Size	Catalog Number
OxiSelect™ AOPP Assay Kit	Colorimetric	200 Assays	STA-318
AOPP-Human Serum Albumin	N/A	50 µL	STA-319

OxiSelect™ BPDE Protein Adduct ELISA Kit

Polycyclic aromatic hydrocarbons (PAH) are potent carcinogenic pollutants commonly associated with oil, cigarette smoke, and automotive exhaust. They may also be found in some cooked foods. One PAH, benzo(a)pyrene, was the first chemical carcinogen to be discovered. Through a series of enzymatic reactions, benzo(a)pyrene is converted to benzo(a) pyrene 7,8 diol-9,10 epoxide (BPDE) which attacks both proteins and DNA.

Our OxiSelect™ BPDE Protein Adduct ELISA Kit provides a convenient method to measure the modification of proteins by BPDE.



BPDE-BSA Standard Curve Generated Using the OxiSelect™ BPDE Protein Adduct ELISA Kit.

- **Sensitive**: Detect concentrations as low as 60 ng/mL
- **Convenient**: Quantify on a standard microplate reader
- **Versatile**: Suitable for use with cell lysates, tissue homogenates, plasma or serum

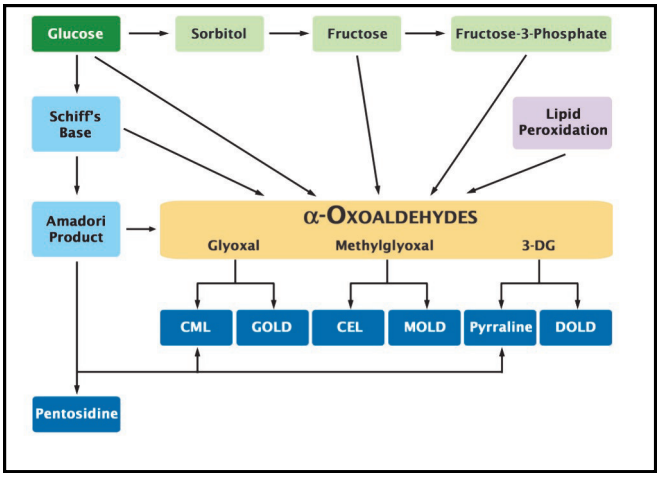
For information on our BPDE DNA Adduct ELISA Kit, please see **page 16.**

Product Name	Detection	Size	Catalog Number
OxiSelect™ BPDE Protein Adduct ELISA Kit	Colorimetric	96 Assays	STA-301

OxiSelect™ Advanced Glycation End Product Kits & Antibodies

Advanced glycation end products (AGE) are formed during the Maillard reaction where reducing carbohydrates react with lysine side chains and N-terminal amino groups of various macromolecules, particularly proteins. These AGE products can adversely affect the function of the affected proteins and play a role in atherosclerosis, diabetes, aging and renal disease.

Our OxiSelect™ Advanced Glycation End Product Kits are designed for the rapid detection of AGE protein adducts. We offer assays to study generic AGE formation or specific AGE strucutres including N^{ε}-(Carboxyethyl) lysine (CEL), N^{ε}-(Carboxymethyl) lysine (CML), and methylglyoxal (MG). All kits will detect AGE structures from protein of any species.



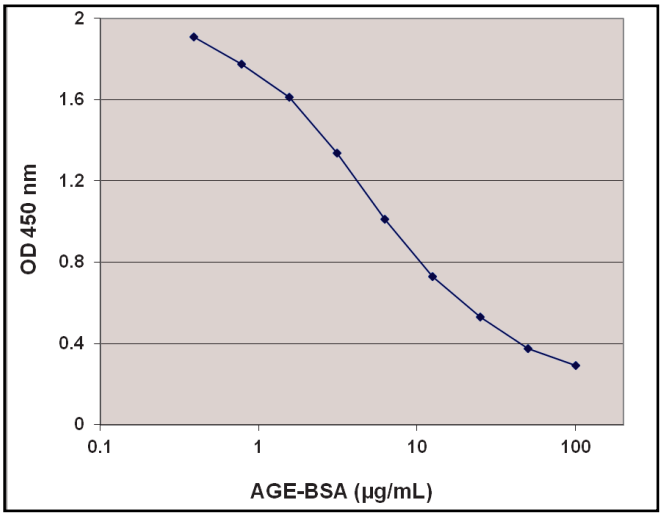
Advanced Glycation End Products (AGE) Pathways.

OxiSelect™ Advanced Glycation End Product (AGE) Competitive ELISA Kit

Our OxiSelect™ Advanced Glycation End Product (AGE) Competitive ELISA Kit detects a variety of AGE structures including CML and pentosidine. It does not detect CEL or methylglyoxal (MG).

Samples are added to a plate coated with an AGE-protein conjugate. AGE-protein adducts in the sample compete with the AGE-coated plate for antibody binding. High AGE adduct content in a sample results in less binding of the antibody to the plate, producing a low signal.

- **Sensitive**: Detect levels as low as 1 µg/mL of AGE-protein adduct
- **Versatile**: Compatible with cell lysates, plasma, serum, or purified proteins



OxiSelect™ AGE Competitive ELISA Kit Standard Curve.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Advanced Glycation End Product (AGE) Competitive ELISA Kit	Colorimetric	96 Assays	STA-817
		5 x 96 Assays	STA-817-5
Glycoaldehyde-AGE-BSA	N/A	100 µg	STA-348

OxiSelect™ N^{ε}-(Carboxyethyl) Lysine (CEL) Competitive ELISA Kit

The OxiSelect™ N^{ε}-(Carboxyethyl) Lysine (CEL) Competitive ELISA Kit detects CEL protein adducts in a variety of samples including cell lysates, blood samples, and other protein sources.

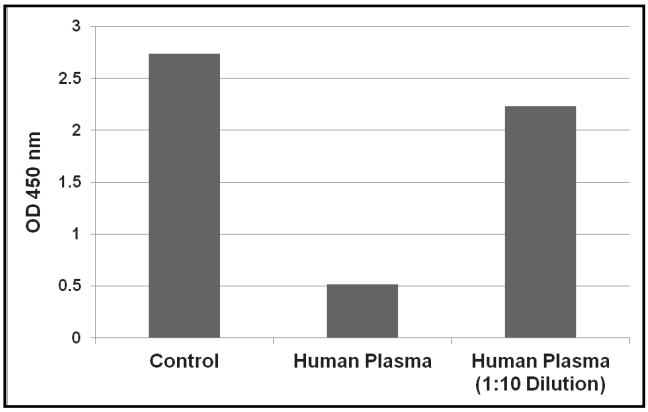
- **Sensitive**: Detect levels as low as 100 ng/mL of CEL-protein adduct
- **Versatile**: Compatible with cell lysates, plasma, serum, or purified proteins

Product Name	Detection	Size	Catalog Number
OxiSelect™ N^{ε}-(Carboxyethyl) Lysine (CEL) Competitive ELISA Kit	Colorimetric	96 Assays	STA-813
CEL-BSA	N/A	100 µg	STA-302

OxiSelect™ N^{ε}-(Carboxymethyl) Lysine (CML) Assays and Antibodies

The OxiSelect™ N^{ε}-(Carboxymethyl) Lysine (CML) Competitive ELISA Kit detects CML protein adducts in a variety of samples including cell lysates, blood samples, and other protein sources.

- **Sensitive**: Detect levels as low as 3 ng/mL of CML-protein adduct with the ELISA kit
- **Versatile**: Compatible with cell lysates, plasma, serum, or purified proteins



CML Protein Adduct Detected in Human Plasma with the OxiSelect™ CML Competitive ELISA Kit.

Product Name	Detection	Size	Catalog Number
OxiSelect™ N^{ε}-(Carboxymethyl) Lysine (CML) Competitive ELISA Kit	Colorimetric	96 Assays	STA-816
		5 x 96 Assays	STA-816-5
OxiSelect™ N^{ε}-(Carboxymethyl) Lysine (CML) Immunoblot Kit	Immunoblot	10 Blots	STA-313
Goat Anti-N^{ε}-CML Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-013
Rabbit Anti-N^{ε}-CML Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-014
CML-BSA Control	N/A	100 µg	STA-314

OxiSelect™ Methylglyoxal (MG) Assays and Antibodies

The OxiSelect™ Methylglyoxal (MG) Competitive ELISA Kit detects MG protein adducts in a variety of samples including cell lysates, blood samples, and other protein sources.

- **Sensitive**: Detect levels as low as 200 ng/mL of MG-protein adduct
- **Versatile**: Compatible with cell lysates, plasma, serum, or purified proteins

Product Name	Detection	Size	Catalog Number
OxiSelect™ Methylglyoxal (MG) Competitive ELISA Kit	Colorimetric	96 Assays	STA-811
		5 x 96 Assays	STA-811-5
Mouse Anti-Methylglyoxal Monoclonal Antibody	Immunoblot/ Immunohistochemistry	100 µg	STA-011
MG-BSA	N/A	100 µg	STA-306

Oxidized / Nitrated Proteins

All proteins are provided at a concentration of 1.0 mg/mL.

Product Name	Size	Catalog Number
Copper (Cu++) Oxidized Human Low Density Lipoprotein (LDL)	100 µg	STA-214
Malondialdehyde (MDA) Modified Human Albumin	100 µg	STA-210
Malondialdehyde (MDA) Modified Human Apolipoprotein B-100	100 µg	STA-211
Malondialdehyde (MDA) Modified Human Low Density Lipoprotein (LDL)	100 µg	STA-212
Nitrated Human Low Density Lipoprotein (LDL)	100 µg	STA-213

Assays and Reagents for Lipid Peroxidation

Lipid peroxidation is a well-defined mechanism of cellular damage in both animals and plants that occurs during aging and in some disease states. Our OxiSelect™ Lipid Peroxidation Assays allow you to quickly and easily quantify the most common markers and by-products of lipid peroxidation.

OxiSelect™ MDA (Malondialdehyde) Assays and Antibodies

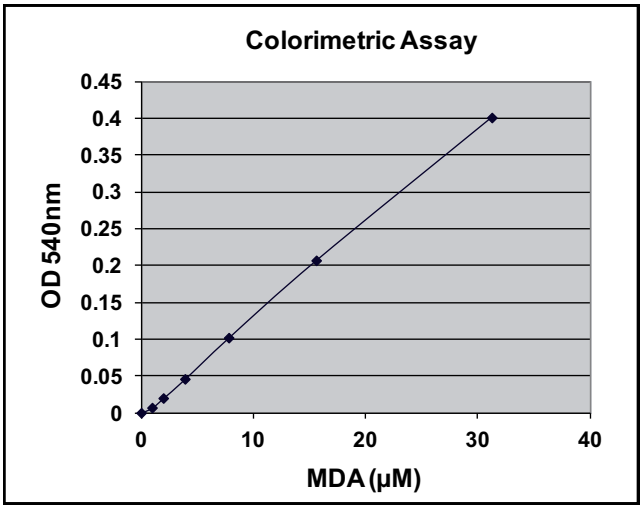
As a common by-product of lipid peroxidation, malondialdehyde (MDA) is a well-accepted marker of oxidative stress. Modification of proteins by MDA can cause structural and functional changes in oxidized proteins. We offer assays and antibodies to measure MDA in a variety of formats. Kits are available to measure total MDA as well as MDA protein adducts specifically.

***Note**: MDA is most reliably detected in fresh samples, or in samples that have been frozen for a maximum of 1-2 months. For samples stored for longer periods, consider testing other markers of lipid peroxidation such as 4-HNE or 8-isoprostane.*

OxiSelect™ TBARS Assay Kit

The TBARS assay is a well-established method for screening and monitoring lipid peroxidation via the by-product malondialdehyde (MDA). MDA forms a 1:2 adduct with thiobarbituric acid.

Our OxiSelect™ TBARS Assay Kit provides a more user-friendly protocol for quantitation of the MDA-TBA adduct compared to other commercial assays. This assay detects total MDA, both free and in protein adducts, in a variety of samples including cell and tissue lysates, plasma, and urine.



MDA-TBA Standard Curve Using a Standard Plate Reader.

- **Fast**: Obtain results in 30 minutes
- **Sensitive**: Smaller reaction volumes require less sample; detect as little as 2 µM
- **Convenient**: 96-well format; no glass tubes are required

Recent Product Citations

1. Chang, Q. et al. (2014). Cytochrome P450 2C epoxygenases mediate photochemical stress-induced death of photoreceptors. *J. Biol. Chem.* **289**:8337-8352.
2. Song, J. et al. (2013). Nicotinamide phosphoribosyltransferase is required for the calorie restriction-mediated improvements in oxidative stress, mitochondrial biogenesis, and metabolic adaptation. *J. Gerontol. A Biol. Sci. Med. Sci.* 10.1093/gerona/glt122.
3. Fu, L. et al. (2012). Ethyl pyruvate reduces ventilation-induced neutrophil infiltration and oxidative stress. *J. Lipid Res.* **53**:1080-1092.
4. Brindeiro, C.M. et al. (2012). Tempol prevents altered K+ channel regulation of afferent arteriolar tone in diabetic rat kidney. *Hypertension* **59**:657-664.
5. Joshi, S.G. et al. (2011). Nonthermal dielectric-barrier discharge plasma-induced inactivation involves oxidative DNA damage and membrane lipid peroxidation in *Escherichia coli*. *Antimicrob. Agents Chemother.* **55**:1053-1062.
6. Kasaikina, M.V. et al. (2011). Roles of the 15-kDa Selenoprotein (Sep15) in redox homeostasis and cataract development revealed by the analysis of Sep15 knockout mice. *J. Biol. Chem.* **286**:33203-33212.
7. Fedeles, B.I. et al. (2011). Chemical genetics analysis of an aniline mustard anticancer reveals complex I of the electron transport chain as a target. *J. Biol. Chem.* **286**:33910-33920.
8. Wojciechowski, P. et al. (2010). Resveratrol arrests and regresses the development of pressure overload- but not volume overload-induced cardiac hypertrophy in rats. *J. Nutr.* **140**:962-968.

Product Name	Detection	Size	Catalog Number
OxiSelect™ TBARS Assay Kit (MDA Quantitation)	Colorimetric or Fluorometric	200 Assays	STA-330
		5 x 200 Assays	STA-330-5

OxiSelect™ MDA Adduct Assay Kits

Our MDA Adduct Assay Kits provide simple methods to measuring these protein adducts in a variety of sample types.

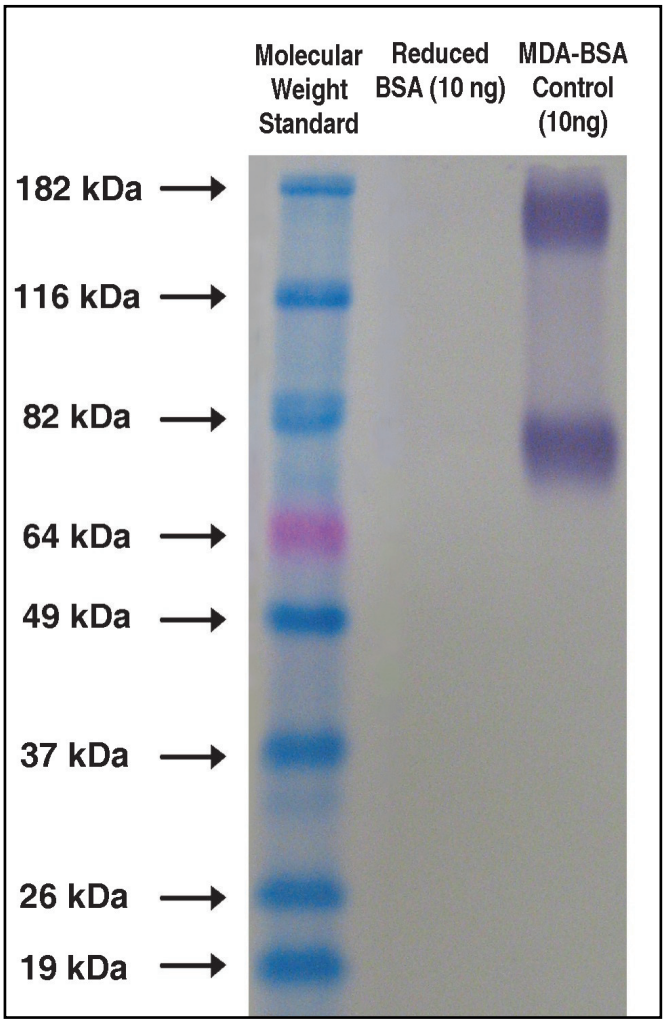
The MDA Adduct Competitive ELISA Kit is a sensitive method for the quantitation of MDA in proteins from cells, tissues, or blood. Samples are added to a malondialdehyde protein conjugate-coated plate. The MDA in the sample competes with the MDA on the plate for binding to the primary anti-MDA antibody. A high concentration of MDA in the sample results in little to no antibody binding to the plate, producing a low signal.

Our MDA Immunoblot is a convenient method for qualitative measurement of MDA protein adducts.

- **Sensitive**: ELISA kit detects MDA protein adducts as low as 6 pmol/mL
- **Versatile**: Suitable for use with serum, plasma, cell lysates or tissue homogenates

Recent Product Citations

1. Montez, P. et al. (2012). Angiotensin receptor blockade recovers hepatic UCP2 expression and aconitase and SDH activities and ameliorates hepatic oxidative damage in insulin resistant rats. *Endocrinology* **153**:5845-5856. (STA-331)
2. Lazrak, A. et al. (2011). Regulation of alveolar epithelial Na+ channels by ERK1/2 in chlorine breathing mice. *Am. J. Respir. Cell Mol. Biol.* 10.1165/rcmb.2011-0309OC. (STA-331)
3. Zarogiannis, S.G. et al. (2011). Ascorbate and deferoxamine administration post chlorine exposure decrease mortality and lung injury in mice. *Am. J. Respir. Cell Mol. Biol.* **45**:386-392. (STA-331)
4. Hall, J.A. et al. (2010). Absence of thyroid hormone activation during development underlies a permanent defect in adaptive thermogenesis. *Endrocrinology* **151**:4573-4582. (STA-331)
5. Barabutis, N. et al. (2008). Antioxidant activity of growth hormone-releasing hormone antagonists in LNCaP human prostate cancer cell line. *PNAS* **105**:20470-20475. (STA-331)



Immunoblot of MDA-BSA Control Using the OxiSelect™ MDA Immunoblot Kit. Immunoblot control was electroblotted onto a nitrocellulose membrane, followed by detection with the provided anti-MDA antibody.

Product Name	Detection	Size	Catalog Number
OxiSelect™ MDA Immunoblot Kit	Immunoblot	10 Blots	STA-331
OxiSelect™ MDA Adduct Competitive ELISA Kit	Colorimetric	96 Assays	STA-832
		5 x 96 Assays	STA-832-5
MDA-BSA	N/A	100 µg	STA-333

OxiSelect™ MDA Polyclonal Antibodies

Product Name	Detection	Size	Catalog Number
Goat Anti-Malondialdehyde (MDA) Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-031
Rabbit Anti-Malondialdehyde (MDA) Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-032

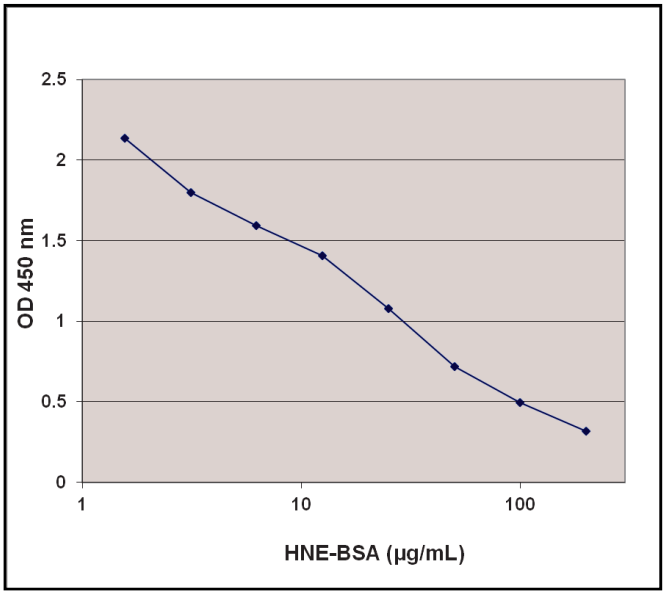
OxiSelect™ HNE ELISA Kits and Antibodies

4-hydroxynonenal (4-HNE) is a well-known by-product of lipid peroxidation and is widely accepted as a stable marker for oxidative stress. HNE protein adducts are typically stable when frozen for up to 6 months or more.

Our OxiSelect™ HNE Adduct Competitive ELISA Kit provides a simple, user-friendly way to assess HNE adduct formation on lysine, histidine and/or cysteine.

Our polyclonal antibodies against HNE recognize HNE adducts to lysine, histidine, and/or cysteine and are suitable for use with Western Blot or ELISA applications.

- **Sensitive**: ELISA kit detects protein adducts as low as 2 µg/mL
- **Versatile**: Suitable for use with serum, plasma, cell lysates or tissue homogenates



Standard Curve Generated with the OxiSelect™ HNE Adduct Competitive ELISA Kit.

Product Name	Detection	Size	Catalog Number
OxiSelect™ HNE Adduct Competitive ELISA Kit	Colorimetric	96 Assays	STA-838
		5 x 96 Assays	STA-838-5
Goat Anti-4-Hydroxynonenal (HNE) Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-034
Rabbit Anti-4-Hydroxynonenal (HNE) Polyclonal Antibody	Immunoblot/ELISA	100 µg	STA-035
HNE-BSA	N/A	100 µg	STA-335

OxiSelect™ 8-iso-Prostaglandin F2α ELISA Kit (8-isoprostane)

8-iso-Prostaglandin F2α is produced in membrane phospholipids and has been implicated in atherogenesis, rheumatoid arthritis and carcinogenesis.

The OxiSelect™ 8-iso-Prostaglandin F2α ELISA Kit provides rapid, sensitive detection of 8-iso-PGF2α as low as 50 pg/mL. The assay is suitable for quantitation of 8-isoprostane in a variety of sample types including cell and tissue lysates, plasma, serum, and urine.

Recent Product Citations

1. Dugas, T.R. et al. (2014). Hydrogen sulfide cytoprotective signaling is endothelial nitric oxide synthase-nitric oxide dependent. *PNAS* **111**:3182-3187.
2. Karakus, E. et al. (2013). Agomelatine: an antidepressant with new potent hepatoprotective effects on paracetamol-induced liver damage in rats. *Human and Experimental Toxicol.* 10.0177/0960327112472994.
3. Mollo, R. et al. (2012). Effect of α-lipoic acid on platelet reactivity in type 1 diabetic patients. *Diabetes Care* **35**:196-197.
4. Thompson, C.M. et al. (2012). Comparison of the effects of hexavalent chromium in the alimentary canal of F344 rats and B6C3F1 mice following exposure in drinking water: implications for carcinogenic modes of action. *Toxicol. Sci.* **125**:79-90.

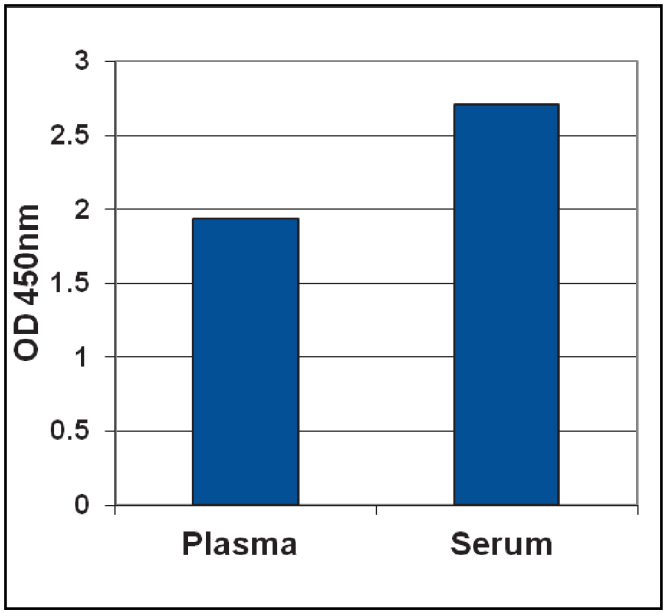
Product Name	Detection	Size	Catalog Number
OxiSelect™ 8-iso-Prostaglandin F2α ELISA Kit	Colorimetric	96 Assays	STA-337
		5 x 96 Assays	STA-337-5

OxiSelect™ Human Oxidized LDL ELISA Kits

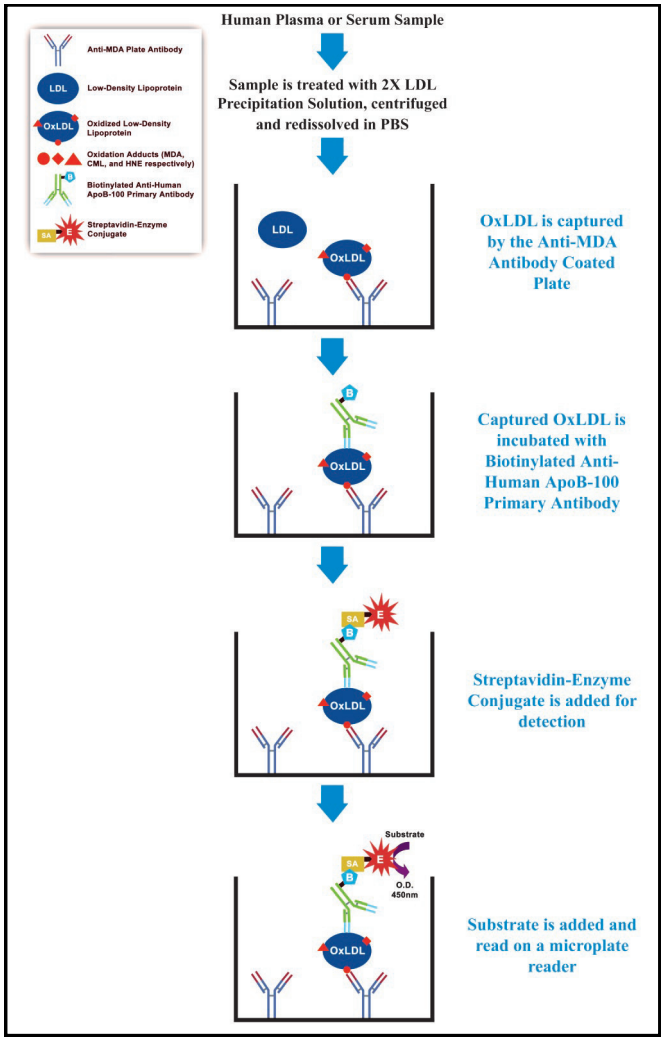
LDL contains a hydrophobic core of various lipids surrounded by one molecule of Apolipoprotein B-100 (ApoB-100), which promotes solubility of the LDL in blood. LDL, often described as "bad" cholesterol, is even more dangerous when it becomes oxidized. Oxidized LDL (OxLDL) is more reactive with surrounding tissues and can collect within the inner lining of arteries.

Our OxiSelect™ Human Oxidized LDL ELISA Kits are designed for the detection and quantitation of modified LDL in human plasma or serum. Kits are available to detect MDA-LDL, CML-LDL, or HNE-LDL in either the protein or lipid component of LDL. Our OxPL-LDL kit specifically detects oxidation in the phospholipid component of LDL.

- **Sensitive**: Detect as little as 50 ng/mL of MDA-LDL, 150 ng/mL of CML-LDL, 150 ng/mL of HNE-LDL, or 100 ng/mL of OxPL-LDL
- **Quantitative**: Compare unknown samples with provided copper oxidized LDL standard



Quantitation of MDA-LDL in Serum and Plasma Samples. Serum and plasma samples were treated with LDL Precipitation Solution. Precipitated LDL pellets were resuspended in 1.6 mL of PBS before further diluting 1:160 in Assay Diluent according to the Assay Protocol.



OxiSelect™ Human Oxidized LDL ELISA Assay Principle.

MDA is the most commonly found damage marker in oxidized LDL, but it can degrade in frozen samples after 1-2 months. CML and HNE, while less commonly found in OxLDL, may be more reliably detectable in samples that have been frozen for several months.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Human Oxidized LDL ELISA Kit (CML-LDL Quantitation)	Colorimetric	96 Assays	STA-388
OxiSelect™ Human Oxidized LDL ELISA Kit (HNE-LDL Quantitation)	Colorimetric	96 Assays	STA-389
OxiSelect™ Human Oxidized LDL ELISA Kit (MDA-LDL Quantitation)	Colorimetric	96 Assays	STA-369
OxiSelect™ Human Oxidized LDL ELISA Kit (OxPL-LDL Quantitation)	Colorimetric	96 Assays	STA-358

Assays for DNA & RNA Damage and Repair

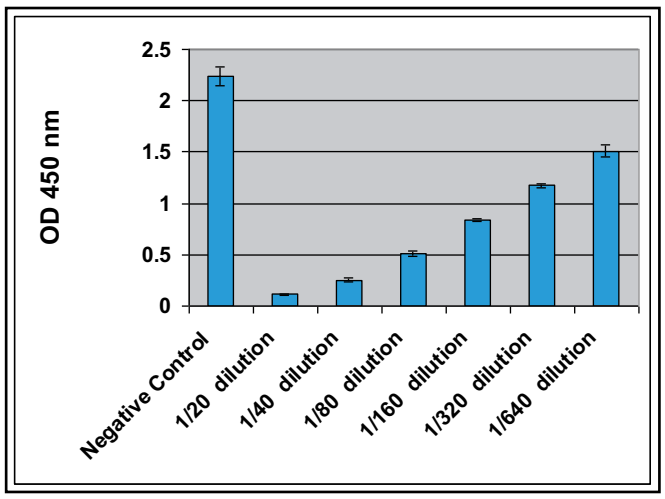
DNA is arguably the most biologically significant target of oxidative and cellular stress. Continuous DNA damage has been implicated in age-related development of various cancers. More recently, RNA damage has been described in conjunction with various neurological diseases including Alzheimer's and Parkinson's diseases. We offer a wide range of assays to measure the most common types of DNA and RNA damage in cells.

OxiSelect™ Oxidative DNA Damage ELISA Kit (8-OHdG Quantitation)

Among the various types of oxidative DNA damage, 8-hydroxydeoxyguanosine (8-OHdG) is a ubiquitous marker of oxidative stress. 8-OHdG, one of the by-products of DNA oxidative damage, is physiologically formed and enhanced by chemical carcinogens.

Our OxiSelect™ Oxidative DNA Damage ELISA Kit provides a powerful method for rapid quantitation of 8-OHdG in DNA samples. 8-OHdG is easily detectable directly in serum and urine samples, after it is excised and secreted during the DNA repair process. It also may be detected in DNA extracted from cells or tissues of any species, following full DNA digestion into single bases.

- **Highly Sensitive**: Detect as little as 100 pg/mL of 8-OHdG
- **Versatile**: Suitable for use with urine, serum, and DNA extracted from cells or tissues



8-OHdG Levels in a Human Urine Sample.

Recent Product Citations

1. Moore, J. et al. (2013). Protection of corneal epithelial stem cells prevents ultraviolet A damage during corneal collagen cross-linking treatment for keratoconus. *Br. J. Ophthalmol*. 10.1136/bjophthalmol-2013-303816.
2. Kalghatgi, S. et al. (2013). Disruption of cell-cell junctions and induction of pathological cytokines in the retinal pigment epithelium of light-exposed mice. *Sci. Transl. Med*. **5**:192ra85.
3. James, M.L. et al. (2013). VARA attenuates hyperoxia-induced impaired alveolar development and lung function in newborn mice. *Am. J. Physiol. Lung Cell Mol. Physiol*. **304**:L803-L812.
4. Ravikumar, P. et al. (2013). Klotho protects lung epithelial cells against oxidative DNA damage. *FASEB J*. **27**:722-723.
5. Singh, B. et al. (2013). MicroRNA-93 regulates NRF2 expression and is associated with breast carcinogenesis. *Carcinogenesis* 10.1093-carcin/bgt026.
6. Singh, B. et al. (2012). Superoxide dismutase 3 is induced by antioxidants, inhibits oxidative DNA damage and is associated with inhibition of estrogen-induced breast cancer. *Carcinogenesis* **33**:2601.2610.
7. Mercer, J.R. et al. (2012). The methyl xanthine caffeine inhibits DNA damage signaling and reactive species and reduces atherosclerosis in ApoE-/- mice. *Arterioscler. Thromb. Vasc. Biol.* **32**:2461-2467.
8. Schutt, F. et al. (2012). Moderately reduced ATP levels promote oxidative stress and debilitate autophagic and phagocytic capacities in human RPE cells. *Invest. Ophthalmol. Vis. Sci.* **53**:5354-5361.
9. Tanabe, K. et al. (2012). Nicorandil as a novel therapy for advanced diabetic nephrophathy in the eNOS-deficient mouse. *Am. J. Physiol. Renal Physiol.* **302**:F1151-F1160.
10. Tzortzaki, E.G. et al. (2012). Oxidative DNA damage and somatic mutations: a link to the molecular pathogenesis of chronic inflammatory airway diseases. *Chest* **141**:1243-1250.
11. Xu, X. et al. (2012). Reactive oxygen species-triggered trophoblast apoptosis is initiated by endoplasmic reticulum stress via activation of caspase-12, CHOP, and the JNK pathway in *Toxoplasma gondii* infection in mice. *Infect. Immun*. **80**:2121-2132.
12. Burnham, E. L. (2012). Protandim does not influence alveolar epithelial permeability or intrapulmonary oxidative stress in human subjects with alcohol use disorders. *Am. J. Physiol. Lung Cell Mol. Physiol*. **302**:L688-L699.
13. Pialoux, V. et al. (2011). Losartan abolishes oxidative stress induced by intermittent hypoxia in humans. *J. Physiol*. **589**:5529-5537.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Oxidative DNA Damage ELISA Kit (8-OHdG Quantitation)	Colorimetric	96 Assays	STA-320
		5 x 96 Assays	STA-320-5

OxiSelect™ Oxidative RNA Damage ELISA Kit (8-OHG Quantitation)

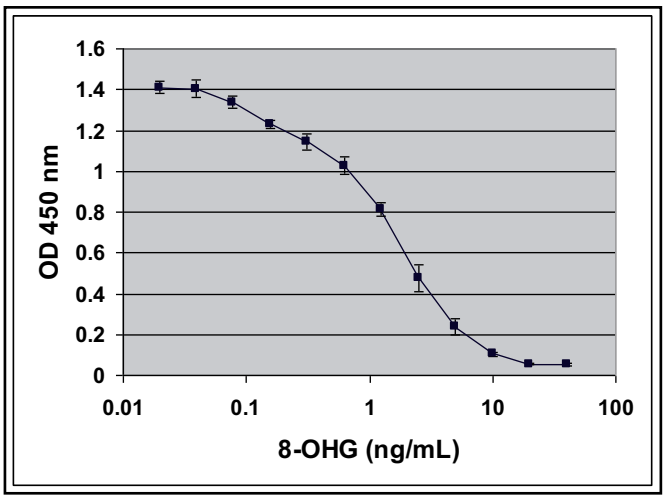
Similarly to 8-hydroxydeoxyguanosine (8-OHdG) forming during DNA oxidation, RNA can become oxidized resulting in 8-hydroxyguanosine (8-OHG). Oxidation of RNA has been implicated in a number of neurological diseases including Alzheimer's and Parkinson's diseases.

Our OxiSelect™ Oxidative RNA Damage ELISA Kit provides a powerful method for rapid quantitation of 8-OHG in urine, serum or cerebrospinal fluid. It also may be used to detect 8-OHG in RNA extracted from cells or tissues of any species.

Recent Product Citations

1. Kannan, S. et al. (2012). Dendrimer-based postnatal therapy for neuroinflammation and cerebral palsy in a rabbit model. *Sci. Transl. Med*. **4**:130ra46.
2. Bazin, J. et al. (2011). Targeted mRNA oxidation regulates sunflower seed dormancy alleviation during dry after-ripening. *Plant Cell* **23**:2196-2208.

- **Highly Sensitive**: Detect as little as 150 pg/mL of 8-OHG
- **Versatile**: Suitable for use with urine, serum, cerebrospinal fluid, and DNA extracted from cells or tissues



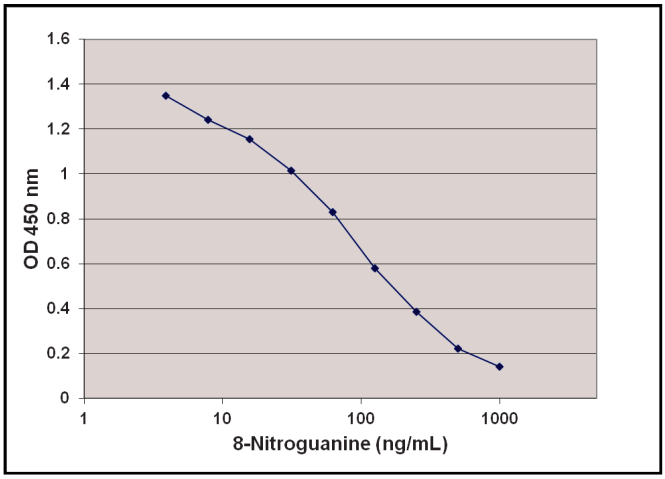
Standard Curve Generated with the OxiSelect™ Oxidative RNA Damage ELISA Kit (8-OHG).

Product Name	Detection	Size	Catalog Number
OxiSelect™ Oxidative RNA Damage ELISA Kit (8-OHG Quantitation)	Colorimetric	96 Assays	STA-325
		5 x 96 Assays	STA-325-5

OxiSelect™ Nitrosative DNA/RNA Damage ELISA Kit (8-Nitroguanine Quantitation)

Various reactive nitrogen species (RNS) including peroxynitrite and nitrogen oxides can form during pathophysiological conditions. These RNS can nitrate guanine bases to form 8-nitroguanine in both DNA and RNA. Nitrosative damage to DNA and RNA is a significant contributor to the age-related development of major inflammation-related diseases as well as colon, breast, and prostate cancers.

Our OxiSelect™ Nitrosative DNA/RNA Damage ELISA Kit provides a simple method for rapid quantitation of 8-nitroguanine in urine, serum or plasma samples. The assay measures total 8-nitroguanine from both DNA and RNA combined.



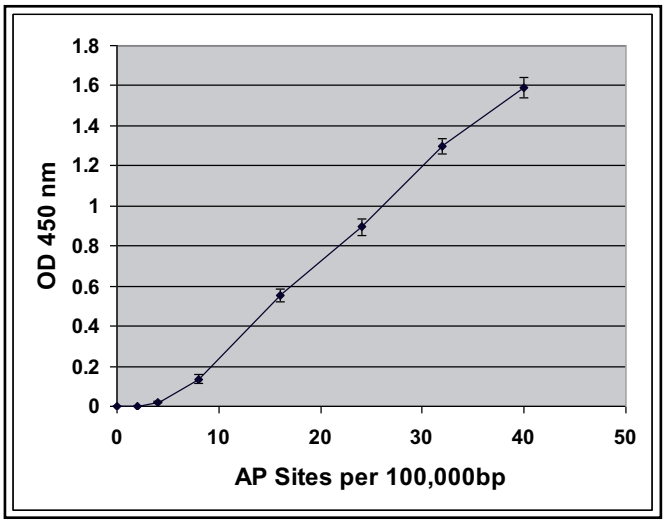
Standard Curve Generated with the OxiSelect™ Nitrosative DNA/RNA Damage ELISA Kit (8-Nitroguanine).

Product Name	Detection	Size	Catalog Number
OxiSelect™ Nitrosative DNA/RNA Damage ELISA Kit (8-Nitroguanine Quantitation)	Colorimetric	96 Assays	STA-825
		5 x 96 Assays	STA-825-5

OxiSelect™ Oxidative DNA Damage Quantitation Kit (AP Sites)

Oxidative DNA Damage can manifest in the formation of apurinic or apyrimidinic (AP) sites, also known as loss of bases. Spontaneous base loss, if unrepaired, can inhibit transcription and may be mutagenic.

Our OxiSelect™ Oxidative DNA Damage Quantitation Kit provides a simple, user-friendly method for measuring AP sites in DNA. The assay uses an aldehyde reactive probe (ARP) which specifically reacts with an aldehyde group on the open ring of the AP site, followed by labeling with Biotin and subsequent detection by Streptavidin-enzyme conjugate.



Standard Curve Generated with the OxiSelect™ Oxidative DNA Damage Quantitation Kit (STA-324).

- **Highly Sensitive**: Detect as few as 4-40 AP sites in 10^5 bp of DNA
- **Versatile**: Suitable for use with genomic DNA from cells or tissues
- **Quantitative**: Kit includes both oxidized and reduced DNA standards for absolute quantitation

Recent Product Citations

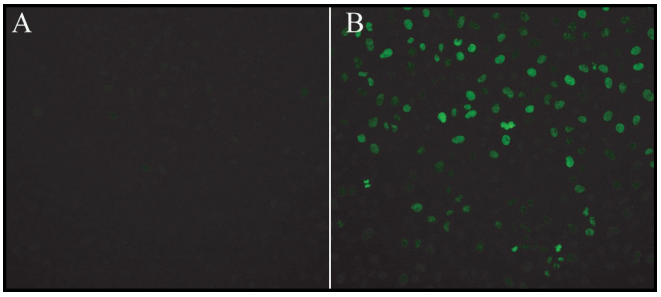
1. Messaoudi, N. et al. (2013). Global stress response in a prokaryotic model of DJ-1-associated Parkinsonism. *J. Bacteriol.* **195**:1167-1178.
2. Zaika, E. et al. (2011). P73 protein regulates DNA damage repair. *FASEB J.* **25**:4406-4414.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Oxidative DNA Damage Quantitation Kit (AP Sites)	Colorimetric	50 Assays	STA-324

OxiSelect™ DNA Double-Strand Break Assay

Double-strand breaks (DSB) are among the most dangerous types of DNA damage within cells. An early cellular response is phosphorylation of the histone variant H2AX at the site of the DSB. This triggers a cascade of events and appears to play a role in recruitment of repair factors to the damaged sites.

Our OxiSelect™ DNA Double-Strand Break Staining Kit provides an easy-to-use method for detecting DNA breaks. The kit utilizes simple immunofluorescence staining of the phosphorylated histone H2AX.



DNA Double-Strand Break Formation in A549 Cells. A549 cells were seeded at 50,000 cells/well overnight. Immunofluorescence staining was then performed according to the assay protocol. (A) Untreated cells. (B) Cells treated with 100 µM etoposide for one hour.

- **Fast**: See staining results in about 3 hours
- **Positive Control**: DNA Double-strand break inducer included in kit

Product Name	Detection	Size	Catalog Number
OxiSelect™ DNA Double-Strand Break Staining Kit	Immuno-fluorescence	100 Assays	STA-321

OxiSelect™ Comet Assays (Single Cell Gel Electrophoresis)

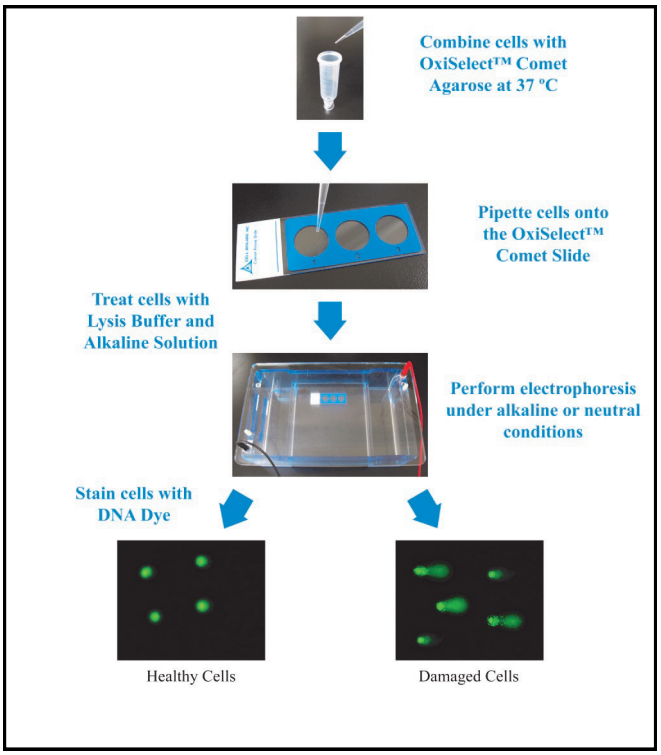
DNA damage can result from a variety of intracellular and extracellular stimuli, and can manifest in a variety of mutations to the DNA including base modifications, missing bases and single-stranded or double-stranded breaks.

Traditionally the comet assay, or single cell gel electrophoresis (SCGE), has been used as a well-published, high-level screening tool to measure DNA damage in single cells.

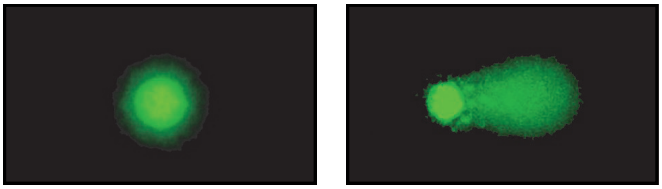
Our OxiSelect™ Comet Assay Kits provide a quick, easy method to screen for DNA damage at a macro level. Our OxiSelect™ Comet Assay Slides have been specially treated for adhesion of low-melting agarose used in the assay. Damaged DNA moves farther in electrophoresis than intact DNA, causing a "tail" to form upon visualization under a fluorescence microscope.

Recent Product Citations

1. Luo, Y. et al. (2013). SMC1-mediated intra-S-phase arrest facilitates bocavirus DNA replication. *J. Virol.* **87**:4017-4032. (STA-350, STA-351)
2. Li, Y.J. et al. (2012). Gold nanoparticles as a platform for creating a multivalent poly-SUMO chain inhibitor that also augments ionizing radiation. *PNAS* **109**:4092-4097. (STA-350, STA-351)
3. Robin, T.P. et al. (2012). EWS/FLI1 regulates EYA3 in Ewing Sarcoma via modulation of miRNA-708, resulting in increased cell survival and chemoresistance. *Mol. Cancer Res.* 10:1098-1108. (STA-350, STA-351)
4. Choi, S.K. et al. (2012). Poly(ADP-ribose) polymerase 1 inhibition improves coronary arteriole function in type 2 diabetes mellitus. *Hypertension* **59**:1060-1068. (STA-350, STA-351)
5. Tyagi, A. et al. (2011). Resveratrol selectively induces DNA damage, independent of Smad4 expression, in its efficacy against human head and neck squamous cell carcinoma. *Clin. Cancer Res.* **17**:5402-5411. (STA-355)



Assay Principle for the OxiSelect™ Comet Assay Kit.



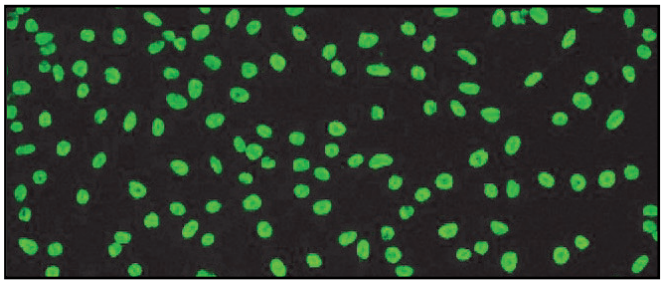
Etoposide Treatment of Jurkat Cells. Jurkat cells were either untreated (left) or treated with etoposide (right) prior to performing the OxiSelect™ Comet Assay.

Product Name	Detection	Size	Catalog Number
OxiSelect™ 3-Well Comet Assay Kit	Light Microscopy	15 Wells	STA-350
		75 Wells	STA-351
		5 x 75 Wells	STA-351-5
OxiSelect™ 3-Well Comet Assay Slides	Light Microscopy	5 Slides	STA-352
		25 Slides	STA-353
		125 Slides	STA-353-5
OxiSelect™ 96-Well Comet Assay Kit	Light Microscopy	96 Wells	STA-355
		5 x 96 Wells	STA-355-5
OxiSelect™ 96-Well Comet Assay Slides	Light Microscopy	1 Slide	STA-356
		5 Slides	STA-356-5
OxiSelect™ Comet Assay Control Cells (includes positive and negative controls)	N/A	1 Set	STA-354

OxiSelect™ UV-Induced DNA Damage Assays

Absorption of ultraviolet radiation can damage DNA by the formation of pyrimidine dimers. The two most common forms of pyrimidine dimers are cyclobutane pyrimidine dimers (CPD) and pyrimidine (6-4) pyrimidone photoproducts (6-4PP).

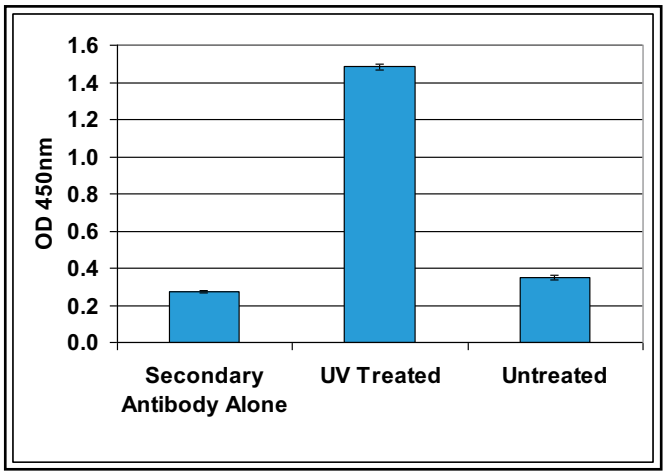
Our OxiSelect™ UV-Induced DNA Damage Assays conveniently measure the formation of either CPD or 6-4PP in intact cells. Kits for each marker are available in three formats: an ELISA for DNA extracted from cells or tissues, a Cell-Based ELISA, and a Cellular Immunostaining kit.



UV-Induced DNA Damage in HeLa Cells Treated with Ultraviolet Light for 30 Minutes and Visualized with the OxiSelect™ Cellular UV-Induced DNA Damage Staining Kit (CPD).

Recent Product Citations

1. Zirkin, S. et al. (2013). The PIM-2 kinase is an essential component of the ultraviolet damage response that acts upstream to E2F-1 and ATM. *J. Biol. Chem.* **288**:21770-21789. (STA-322)
2. Burgess, H.M. et al. (2011). Nuclear relocalisation of cytoplasmic poly(A)-binding proteins PABP1 and PABP4 in response to UV irradiation reveals mRNA-dependent export of metazoan PABPs. *J. Cell Sci.* **124**:3344-3355. (STA-322)



UV-Induced DNA Damage in HeLa Cells as Detected with the OxiSelect™ Cellular UV-Induced DNA Damage ELISA (CPD).

OxiSelect™ UV-Induced DNA Damage ELISA Kits, for extracted DNA

Product Name	Detection	Size	Catalog Number
OxiSelect™ UV-Induced DNA Damage ELISA Combo Kit (CPD/6-4PP)	Colorimetric	96 Assays	STA-322-C
OxiSelect™ UV-Induced DNA Damage ELISA Kit (CPD Quantitation)	Colorimetric	96 Assays	STA-322
		5 x 96 Assays	STA-322-5
OxiSelect™ UV-Induced DNA Damage ELISA Kit (6-4PP Quantitation)	Colorimetric	96 Assays	STA-323
		5 x 96 Assays	STA-323-5

OxiSelect™ Cellular UV-Induced DNA Damage Staining Kits, for intact cells

Product Name	Detection	Size	Catalog Number
OxiSelect™ Cellular UV-Induced DNA Damage ELISA Kit (CPD)	Colorimetric	96 Assays	STA-326
		5 x 96 Assays	STA-326-5
OxiSelect™ Cellular UV-Induced DNA Damage ELISA Kit (6-4PP)	Colorimetric	96 Assays	STA-328

OxiSelect™ Cellular UV-Induced DNA Damage ELISA Kits, for intact cells

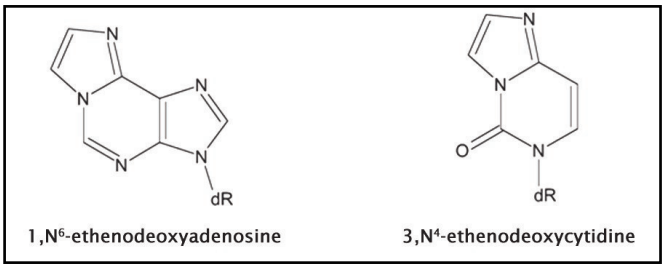
Product Name	Detection	Size	Catalog Number
OxiSelect™ Cellular UV-Induced DNA Damage Staining Kit (CPD)	Fluorescence Microscopy	96 Assays	STA-327
OxiSelect™ Cellular UV-Induced DNA Damage Staining Kit (6-4PP)	Fluorescence Microscopy	96 Assays	STA-329

OxiSelect™ Aldehyde-Induced DNA Damage Assays (Etheno Adducts)

Oxidation of phospholipids can lead to the formation of lipid hydroperoxides. These resulting short-lived hydroperoxides can either be converted to inert fatty acid alcohols, or can react with metals to form aldehydes such as malondialdehyde (MDA), 4-hydroxynonenal (HNE), acrolein, and crotonaldehyde. These aldehydes (which can also be formed through exposure to carcinogenic substances such as urethane or vinyl chloride) can damage DNA resulting in the formation of various etheno adducts, including 1,N^6-ethenodeoxyadenosine and 3,N^4-ethenodeoxycytidine. The presence of these bases can lead to base pair substitution mutations.

Our OxiSelect™ Aldehyde-Induced DNA Damage Assays conveniently measure the formation of either 1,N^6-ethenodeoxyadenosine (ethenoadenosine) or 3,N^4-ethenodeoxycytidine (ethenocytidine) in DNA extracted from cells or tissues.

In addition, we offer a convenient combination kit that can measure both etheno bases in separate wells of the same plate.



Etheno Base Structures that Form Adducts with DNA During Oxidative Stress.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Aldehyde-Induced DNA Damage ELISA Combo Kit (Ethenoadenosine / Ethenocytidine Quantitation)	Colorimetric	96 Assays	STA-820-C
OxiSelect™ Aldehyde-Induced DNA Damage ELISA Kit (Ethenoadenosine Quantitation)	Colorimetric	96 Assays	STA-820
OxiSelect™ Aldehyde-Induced DNA Damage ELISA Kit (Ethenocytidine Quantitation)	Colorimetric	96 Assays	STA-821

OxiSelect™ BPDE DNA Adduct ELISA Kit

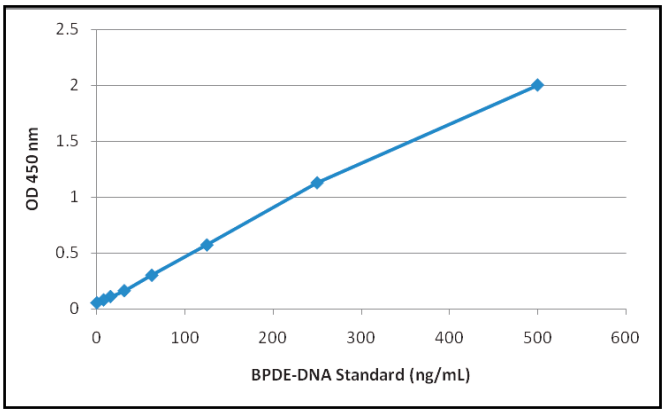
Polycyclic aromatic hydrocarbons (PAH) are potent carcinogenic pollutants commonly associated with oil, cigarette smoke, and automotive exhaust. One PAH, benzo(a)pyrene, was the first chemical carcinogen to be discovered. Through a series of enzymatic reactions, benzo(a)pyrene is converted to benzo(a)pyrene 7,8 diol-9,10 epoxide (BPDE) which attacks both proteins and DNA.

Our OxiSelect™ BPDE DNA Adduct ELISA Kit provides a convenient method to measure BPDE adducts in DNA extracted from cells or tissues.

- **Sensitive**: Detect concentrations as low as 30 ng/mL
- **Convenient**: Quantify on a standard microplate reader

Recent Product Citation

Chiu, C.Y. et al. (2014). Low-dose benzo(a)pyrene and its epoxide metabolite inhibit myogenic differentiation in human skeletal muscle-derived progenitor cells. *Toxicol. Sci.* 10.1093/toxsci/kfu003.



BPDE-DNA Standard Curve Generated Using the OxiSelect™ BPDE DNA Adduct ELISA Kit.

For information on our BPDE Protein Adduct ELISA Kit, please see **page 4.**

Product Name	Detection	Size	Catalog Number
OxiSelect™ BPDE DNA Adduct ELISA Kit	Colorimetric	96 Assays	STA-357

Checkpoint Kinase Activity Assays

Checkpoint kinases, specifically CHK1 and CHK2, are activated in response to DNA damage to subsequently phosphorylate Cdc25C prior to mitosis, which prompts cell cycle arrest. Mutation of these checkpoint kinases can ultimately lead to decreased DNA repair.

Our Checkpoint Kinase Activity Assays allow you to conveniently measure the activity of CHK1 and CHK2. The assays use recombinant Cdc25C as a checkpoint kinase substrate. Phosphorylated Cdc25C (Ser216) is detected using a phospho-specific antibody. Checkpoint Kinase Activitiy Assays are available in two formats: a Western blot assay and a 96-well plate-based activity assay.

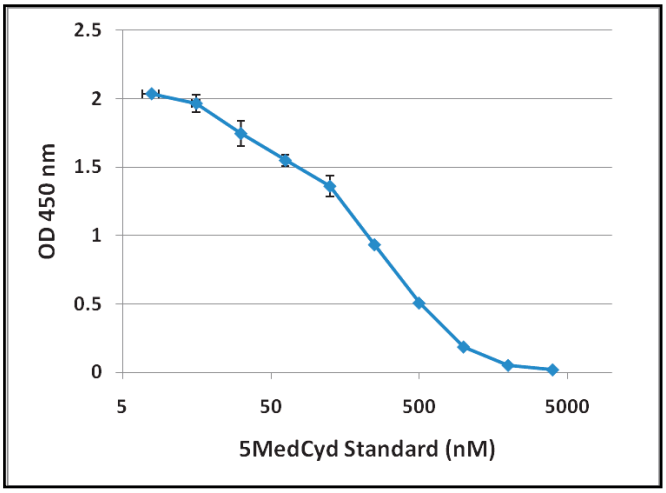
Product Name	Detection	Size	Catalog Number
Checkpoint Kinase Activity Immunoblot Kit	Immunoblot	20 Assays	STA-413
96-Well Checkpoint Kinase Activity Assay Kit	Colorimetric	96 Assays	STA-414
		5 x 96 Assays	STA-414-5

Global DNA Methylation ELISA Kit

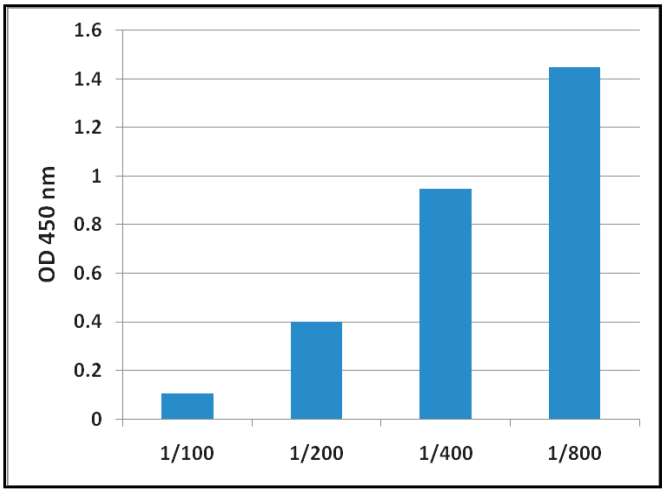
DNA methylation is an epigenetic change shown to be associated with nearly every biological process. In mammalian cells, DNA methylation is found predominantly at CpG dinucleotides; however, in certain cases such as embryonic stem cells it may also be found in non-CpG contexts. Due to the important role of DNA methylation in maintaining genomic stability, deregulation of DNA methylation is associated with various diseases including cancer.

Our Global DNA Methylation and Hydroxymethylation Assays provide a convenient, accurate way to quantify 5'-methyl-2'-deoxycytidine (5MedCyd) and 5-hydroxymethylcytosine respectively. Unknown samples are compared with a standard provided with each kit.

- **Sensitive**: Detect as little as 15 nM of 5MedCyd
- **Versatile**: Suitable for use with any isolated DNA as well as urine samples
- **Convenient**: Quantify on a standard microplate reader



Methylated DNA Standard Curve Generated with the Global DNA Methylation ELISA Kit.



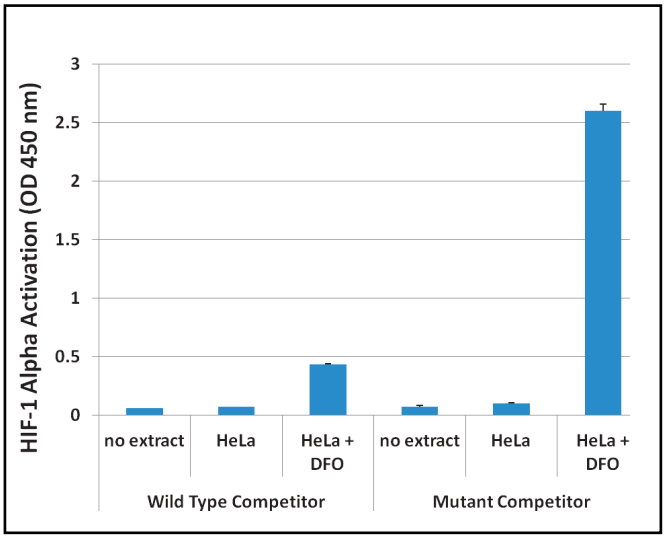
5MedCyd Levels in Human Urine Sample as Measured with the Global DNA Methylation ELISA Kit.

Product Name	Detection	Size	Catalog Number
Global DNA Methylation ELISA Kit (5'-methyl-2'-deoxycytidine Quantitation)	Colorimetric	96 Assays	STA-380
		5 x 96 Assays	STA-380-5

HIF-1 Alpha DNA Binding Activity Assay Kit

Cell hypoxia, or low oxygen condition, is a normal physiological response to certain body stressors such as high altitudes, but it also can be a symptom of pathological conditions. In some cases hypoxia may contribute to the inducement of oxidative stress. In response to hypoxic conditions, the hypoxia-inducible factor 1 transcriptional activator complex (HIF-1) plays a role in activating several hypoxia-responsive genes such as erythropoietin and VEGF. During hypoxia, the alpha subunit of HIF-1 accumulates and translocates from the cytosol to the nucleus, where it dimerizes with the beta subunit and becomes transcriptionally active. It then binds transcriptional coactivators to induce gene expression.

The HIF-1 Alpha DNA Binding Activity Assay Kit is an ELISA-based assay to detect activated HIF-1. Active HIF-1 complex is captured on a double-stranded oligo containing a hypoxic response element (HRE) that is attached to the plate. Detection is then performed with a primary antibody followed by an HRP-conjugated secondary antibody. The assay will detect HIF-1 complexes from human, mouse or rat samples.



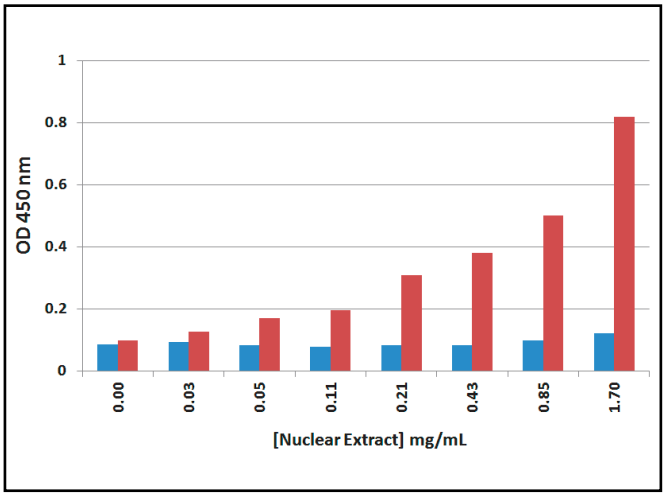
Detection Specificity of HIF-1 Alpha. HeLa cells were incubated in the presence or absence of 0.2 mM deferoxamine mesylate (DFO) for 4 hours at 37ºC. Nuclear extracts were prepared using the Nuclear/Cytosolic Fractionation Kit (#AKR-171). 100 pmol of non-biotinylated wild type or mutated HRE double stranded competitor oligos were added to the Complete DNA Binding Buffer just prior to inclusion in the assay.

Product Name	Detection	Size	Catalog Number
HIF-1 Alpha DNA Binding Activity Assay Kit	Colorimetric	96 Assays	CBA-282

HIF-1 Alpha ELISA Kits

Our HIF-1 Alpha ELISA Kits provide a convenient method for detection and quantitation of human, mouse, or rat HIF-1 Alpha in cells or tissues. Two ELISA kit formats are available:

- The HIF-1 Alpha Sandwich ELISA Kit detects HIF -1 Alpha in any protein sample including tissue homogenates, whole cell lysates, or nuclear extracts. Samples are added to an anti-HIF-1 Alpha antibody coated plate. Quantitation of unknown samples is performed by comparison of the OD values to those of a known standard.
- The HIF-1 Alpha Cell Based ELISA Kit allows the detection of HIF-1 Alpha levels in intact cells. Cells are seeded in a tissue culture treated plate suitable for reading in a 96-well plate-based luminometer. Cells are fixed and permeabilized to allow detection with the anti-HIF-1 antibody. Detection is performed by chemiluminescence.



Detection of Nuclear HIF-1 Alpha. HeLa cells were incubated in the presence or absence of 0.2 mM DFO for 4 hours at 37ºC. Nuclear extracts were prepared using the Nuclear/Cytosolic Fractionation Kit. HIF-1 Alpha levels were measured in untreated (blue bars) and treated (red bars) extracts according to the Assay Protocol.

Product Name	Detection	Size	Catalog Number
HIF-1 Alpha Sandwich ELISA Kit	Colorimetric	96 Assays	CBA-280
HIF-1 Alpha Cell Based ELISA Kit	Chemiluminescent	96 Assays	CBA-281

Reactive Oxygen Species Assays

Reactive oxygen species (ROS) such as superoxide and hydrogen peroxide are continually produced during metabolic processes. Excess ROS can lead to cellular injury in the form of damaged DNA, lipids and proteins. We offer assays for quantitation of various reactive oxygen species, in both *in vitro* and intracellular formats.

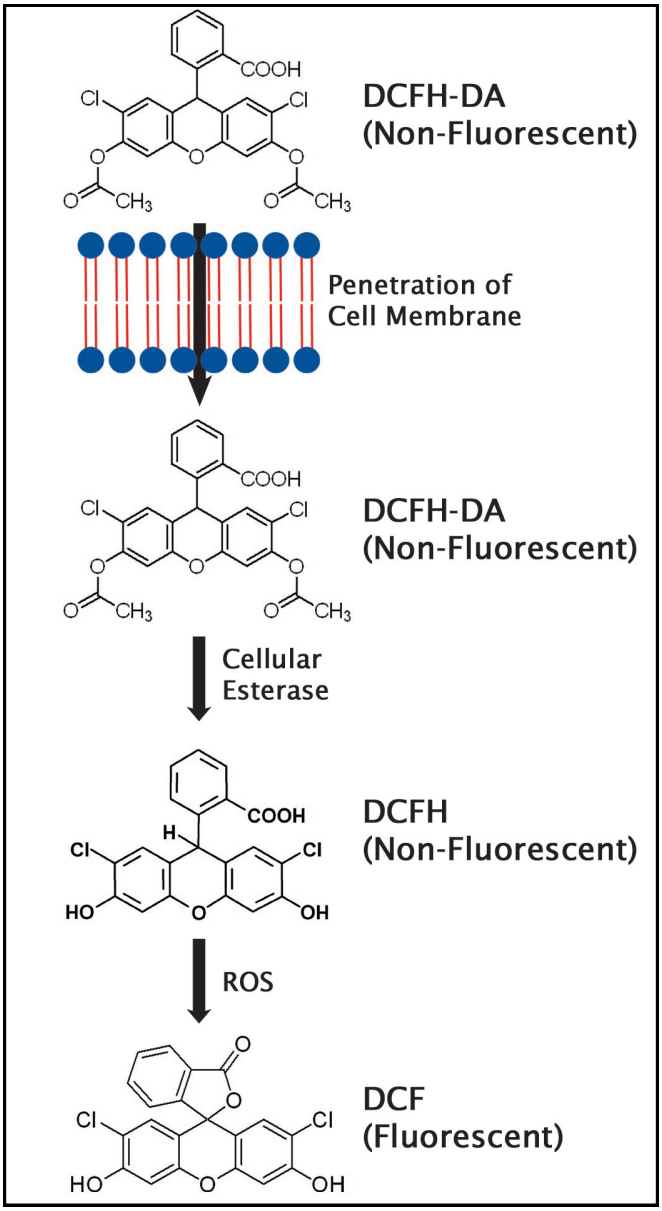
OxiSelect™ Intracellular ROS Assay Kit

The OxiSelect™ Intracellular ROS Assay Kit measures the activity of hydroxyl, peroxyl, and other reactive oxygen species. The assay uses the cell-permeable fluorogenic probe DCFH-DA, which diffuses into cells and is deacetylated into the non-fluorescent DCFH. In the presence of ROS, the DCFH is oxidized into highly fluorescent DCF. Fluorescence is quantified on a fluorometric plate reader.

- **Sensitive**: Detect concentrations as little as 10 pM
- **Fast**: Entire protocol takes about one hour

Recent Product Citations

1. Koontz, J. et al. (2014). Competition through dimerization between antiapoptotic and proapoptotic HS-1-associated protein X-1 (Hax-1). *J. Biol. Chem.* **289**:3468-3477.
2. Kim, E.Y. et al. (2013). NOX2 interacts with podocyte TRPC6 channels and contributes to their activation by diacylglycerol: essential role of podocin in formation of this complex. *Am. J. Physiol. Cell Physiol.* **305**:C960-C971.
3. Abe, Y. et al. (2013). TGF-ß1 stimulates mitochondrial oxidative phosphorylation and generation of reactive oxygen species in cultured mouse podocytes, mediated in part by the mTOR pathway. *Am. J. Phyisol. Renal Physiol.* **305**:F1477-F1490.
4. He, Q. et al. (2013). Tafazzin knockdown interrupts cell cycle progression in cultured neonatal ventricular fibroblasts. *Am. J. Physiol. Heart Circ. Physiol.* **305**:H1332-H1343.
5. Kokkinaki, M. et al. (2013). Klotho regulates retinal pigment epithelial functions and protects against oxidative stress. *J. Neurosci.* **33**: 16346-16359.
6. Hagan, C. et al. (2013). A common docking domain in progesterone receptor-B links DUSP6 and CK2 signaling to proliferative transcriptional programs in breast cancer cells. *Nucleic Acids Res.* 10.1093/nar/gkt706.
7. Teng, H. et al. (2013). Oxygen-sensitive mitochondrial accumulation of cystathione ß-synthase mediated by lon protease. *PNAS* **110**:12679-12684.
8. Wang, H. et al. (2012). p53-induced gene 3 mediates cell death induced by glutathione peroxidase 3. *J. Biol. Chem.* **287**:16890-16902.
9. Druz, A. et al. (2012). Glucose depletion activates MMU-mir-466h-5p expression through oxidative stress and inhibition of histone deacetylation. *Nucleic Acids Res.* 10.1093/nar/gks452.
10. Montalvo-Ortiz, B.L. et al. (2012). Characterization of EHOP-016, novel small molecule inhibitor of Rac GTPase. *J. Biol. Chem.* **287**:13228-13238.



Assay Principle for the OxiSelect™ Intracellular ROS Assay.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Intracellular ROS Assay Kit	Fluorometric	96 Assays	STA-342
		5 x 96 Assays	STA-342-5

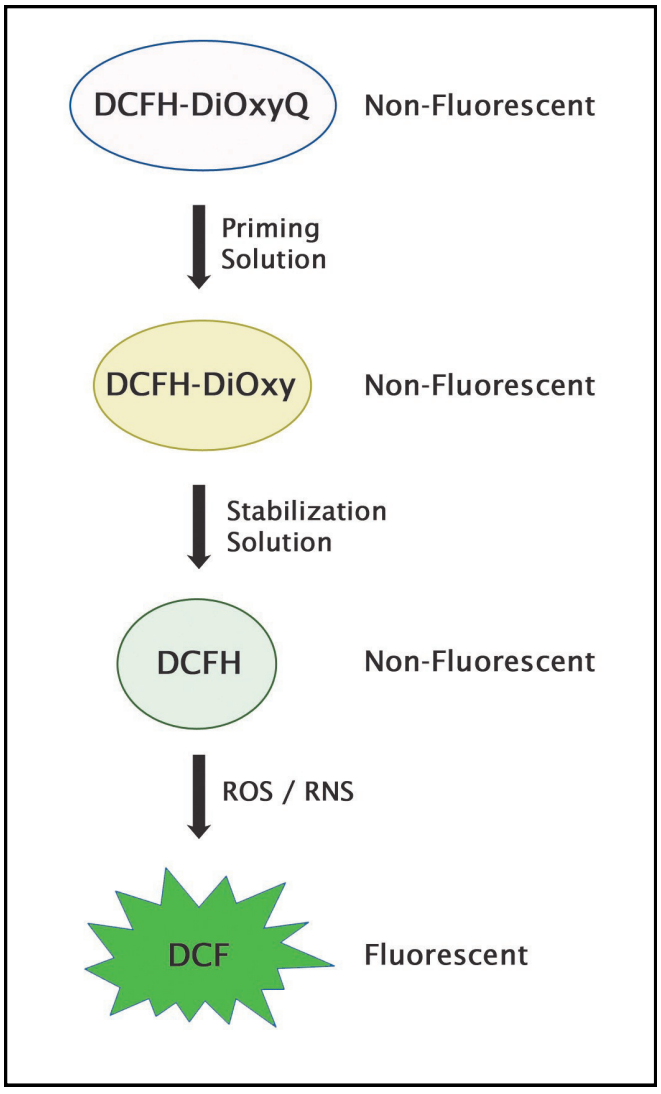
OxiSelect™ In Vitro ROS/RNS Assay Kit

Free radicals and related reactive oxygen species (ROS) and reactive nitrogen species (RNS) can appear in the body both inside and outside the cell. Until recently it has been difficult to detect ROS and RNS outside of intact cells.

The OxiSelect™ In Vitro ROS/RNS Assay Kit allows you to measure ROS and RNS formation in various body fluids including urine, serum and plasma. It is also useful for testing cell lysates, tissue homogenates, and cell culture supernatants.

The assay universally measures reactive oxygen and reactive nitrogen species that may include hydrogen peroxide, nitric oxide, peroxynitrite, peroxyl radicals, and others. The assay principle is similar to our Intracellular ROS Assay (previous page), except that the chemistry is modified to allow detection of ROS outside the cell. Fluorescence is quantified on a fluorometric plate reader.

- **Sensitive**: Detect concentrations as little as 10 pM for DCF or 40 nM for hydrogen peroxide
- **Fast**: Entire protocol takes about one hour
- **Versatile**: Suitable for a wide variety of sample types including urine, serum, plasma, cell lysates, tissue homogenates and cell culture supernatants



Assay Principle for the OxiSelect™ In Vitro ROS/RNS Assay.

Recent Product Citations

1. Liu, X. et al. (2013). Epoxyeicosatrienoic acids prevent cisplatin-induced renal apoptosis through a p38 mitogen-activated protein kinase-regulated mitochondrial pathway. *Mol. Pharmacol.* **84**:925-934.
2. Song, J. et al. (2013). Nicotinamide phosphoribosyltransferase is required for the calorie restriction-mediated improvements in oxidative stress, mitochondrial biogenesis, and metabolic adaptation. *J. Gerontol. A Biol. Sci. Med. Sci.* 10.1093/gerona/glt122.
3. Xiao, D. et al. (2013). Estrogen normalizes perinatal nicotine-induced hypertensive responses in adult female rat offspring. *Hypertension* **61**:1246-1252.
4. Wang, W. et al. (2012). Mono-(2-ethylhexyl) phthalate induces oxidative stress and inhibits growth of mouse ovarian antral follicles. *Biol. Reprod.* **87**:152.
5. Ju, D. J. et al. (2012). Ethyl pyruvate ameliorates albuminuria and glomerular injury in the animal model of diabetic nephropathy. *Am. J. Phyisol. Renal Physiol*. **302**:F606-F613.
6. Momi, S. et al. (2012). Nitric oxide enhances the anti-inflammatory and anti-atherogenic activity of atorvastatin in a mouse model of accelerated atherosclerosis. *Cardiovasc. Res.* 10.1093/cvr/cvs100.
7. Patterson, A.J. et al. (2011). Hypoxia-derived oxidative stress mediates epigenetic repression of PKC epsilon gene in foetal rat hearts. *Cardiovasc. Res*. 10.1093/cvr/cvr322.
8. Rathnasamy, G. et al. (2011). Iron and iron regulatory proteins in amoeboid microglial cells are linked to oligodendrocyte death in hypoxic neonatal rat periventricular white matter through production of proinflammatory cytokines and reactive oxygen/nitrogen species. *J. Neurosci.* **31**:17982-17995.

Product Name	Detection	Size	Catalog Number
OxiSelect™ In Vitro ROS/RNS Assay Kit	Fluorometric	96 Assays	STA-347
		5 x 96 Assays	STA-347-5

OxiSelect™ Hydrogen Peroxide Assay, Colorimetric

Hydrogen peroxide is one of the most prevalent and most stable of the various reactive oxygen species. The half-life of hydrogen peroxide is significantly longer than that of most ROS, making it easier to detect in many sample types.

Our OxiSelect™ Hydrogen Peroxide Assay Kit provides a simple method for quantitation of hydrogen peroxide. This colorimetric assay measures the oxidation of ferrous (Fe^{2+}) ions to ferric (Fe^{3+}) ions in the presence of peroxides. The ferric ions form a complex with a provided dye which may be read on a standard microplate reader. The assay may be run with either aqueous phase or lipid phase samples.

- **Sensitive**: Detect as little as 1 µM
- **Fast**: Easy 30-90 minute incubation, depending on sample type
- **Versatile**: Suitable for plasma, serum, urine, and cell culture supernatants*

**For the testing of hydrogen peroxide in cells and tissues, please see our OxiSelect™ Hydrogen Peroxide / Peroxidase Assay Kit below.*

Product Name	Detection	Size	Catalog Number
OxiSelect™ Hydrogen Peroxide Assay Kit	Colorimetric	500 Assays	STA-343

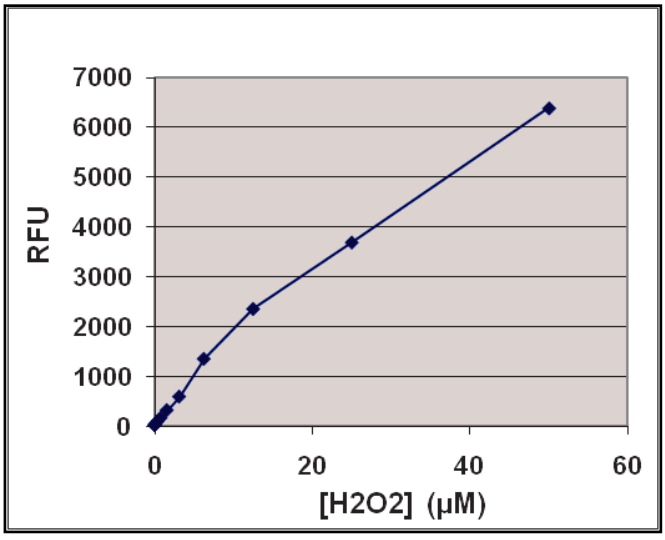
OxiSelect™ Hydrogen Peroxide / Peroxidase Assay, Fluorometric

Our OxiSelect™ Hydrogen Peroxide / Peroxidase Assay Kit provides a convenient plate-based method for quantitation of hydrogen peroxide or peroxidases in a wide variety of sample types.

This fluorometric assay uses a fluorogenic probe which is converted from a non-fluorescent to a fluorescent state in the presence of peroxides and is catalyzed by peroxidases.

The kit includes both a hydrogen peroxide standard and a peroxidase standard for quantitative results with either target.

- **Sensitive**: Detect as little as 50 nM
- **Fast**: Easy 30 minute incubation
- **Versatile**: Measure either hydrogen peroxide or peroxidase in plasma, serum, urine, cell culture supernatants, cell lysates and tissue homogenates



Standard Curve Generated with the OxiSelect™ Hydrogen Peroxide/Peroxidase Assay (Fluorometric).

Recent Product Citations

1. Kim, E.Y. et al. (2012). Sustained activation of N-methyl-D-aspartate receptors in podocytes leads to oxidative stress, mobilization of transient receptor potential canonical 6 channels, nuclear factor of activated T cells activation, and apoptotic cell death. *Mol. Pharmacol.* **82**:728-737.
2. Kim, E.Y. et al. (2012). Insulin increases surface expression of TRPC6 channels in podocytes: role of NADPH oxidases and reactive oxygen species. *Am. J. Phyisol. Renal Physiol.* **302**:F298-F307.

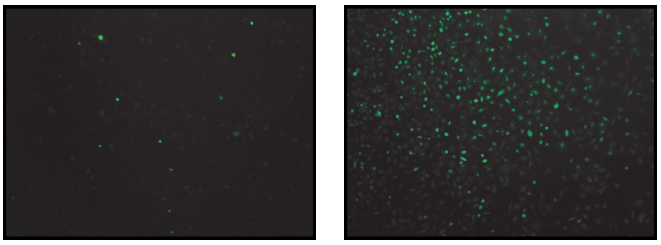
Product Name	Detection	Size	Catalog Number
OxiSelect™ Hydrogen Peroxide/Peroxidase Assay Kit	Fluorometric	500 Assays	STA-344

OxiSelect™ Intracellular Nitric Oxide Assay Kit

Nitric oxide (NO) is a progenitor of various reactive nitrogen species (RNS) in conjunction with superoxide anions via nitric oxide synthase (NOS). It plays a role in vascular diseases, diabetes, atherosclerosis, inflammatory diseases and cancer. Because of its short half-life, nitric oxide is often difficult to detect directly.

The OxiSelect™ Intracellular Nitric Oxide Assay Kit allows direct detection of NO in intact cells. A cell-permeable fluorogenic probe is added to cells; upon treatment to induce oxidative stress, nitric oxide that is generated within the cell binds to the probe producing a bright fluorescent signal. Results may be visualized under a fluorescence microscope or quantified in a 96-well fluorescence plate reader.

- **Direct detection**: Probe binds directly to nitric oxide, not to by-products such as nitrate and nitrite
- **Sensitive**: Detect as little as 3 nM
- **Versatile**: Read results as endpoint or time course (kinetic) in a fluorescence plate reader, or visualize under a fluorescence microscope



Induction of NOS in RAW 264.7 Cells. Cells were seeded in a 96-well plate at 100,000 cells/well. Cells were uninduced (left) or induced with 50 ng/mL LPS and 10 ng/mL IFNγ (right) for 20 hours at 37ºC.

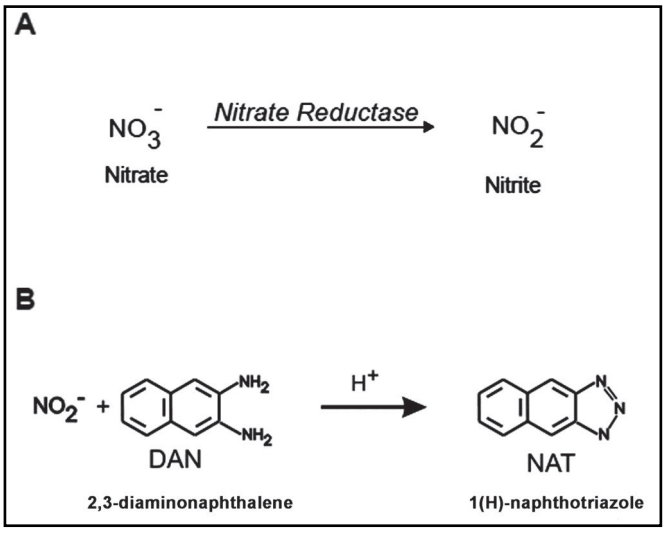
Product Name	Detection	Size	Catalog Number
OxiSelect™ Intracellular Nitric Oxide (NO) Assay Kit	Fluorometric	96 Assays	STA-800
		5 x 96 Assays	STA-800-5

OxiSelect™ In Vitro Nitric Oxide Assay Kits

Nitric oxide (NO) is difficult to detect directly in vitro due to its short half-life. It is therefore common to measure nitric oxide formation by detection of its final oxidized products, nitrate and nitrite.

The OxiSelect™ In Vitro Nitric Oxide Assay Kits provide a convenient plate-based method for the quantitation of nitrate and nitrite in a variety of sample types. First, nitrate is reduced to nitrite. Then total nitrite is measured by the addition of a Griess Reagent (for colorimetric detection) or a fluorometric probe (for fluorescence detection). Results are then quantified in a 96-well plate reader.

OxiSelect™ In Vitro Nitric Oxide Assay Kits are suitable for use with serum, plasma, urine, saliva, cell lysates, and culture media.



Assay Principle for the OxiSelect™ In Vitro Nitric Oxide (Nitite / Nitrate) Assay, Fluorometric Format.

Product Name	Detection	Size	Catalog Number
OxiSelect™ In Vitro Nitric Oxide (Nitrite / Nitrate) Assay Kit	Colorimetric	100 Assays	STA-802
		5 x 100 Assays	STA-802-5
	Fluorometric	100 Assays	STA-801
		5 x 100 Assays	STA-801-5

Antioxidant Assays

ROS generation is normally counterbalanced by the action of antioxidant enzymes and other redox molecules. We offer two types of assays for antioxidant quantitation:

- Assays to quantify the presence or activity of antioxidant molecules
- Assays to determine the antioxidant capacity of biomolecules

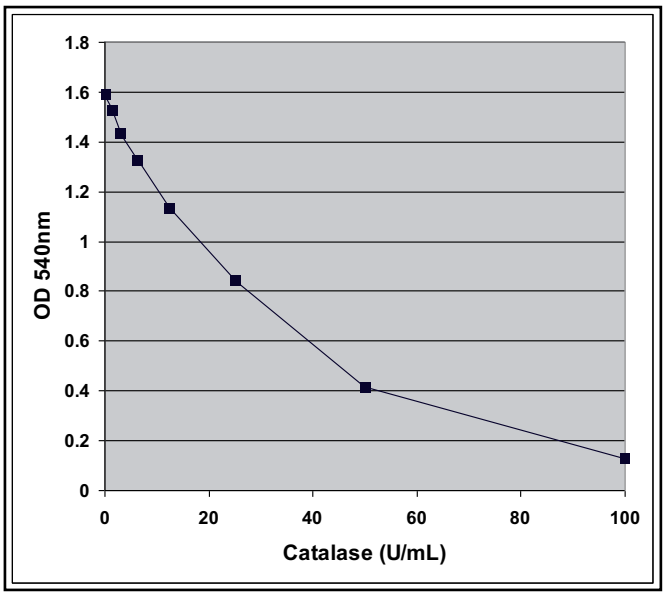
OxiSelect™ Catalase Activity Assay Kits

Catalase is a ubiquitous enzyme that destroys hydrogen peroxides formed during oxidative stress. Since hydrogen peroxides have a longer half-life than most free radicals and can make up a large portion of all reactive oxygen species, the ability to remove hydrogen peroxides can be extremely important at combating oxidative stress.

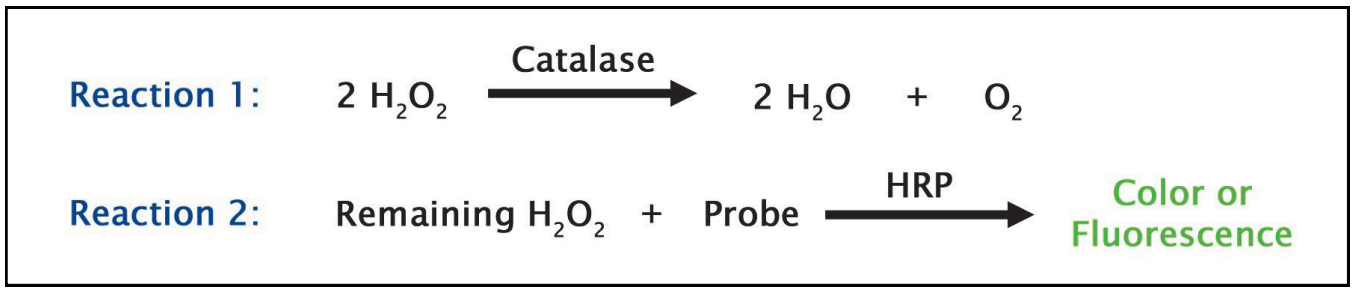
Our OxiSelect™ Catalase Activity Assay Kits provide a quick, user-friendly protocol to monitor catalase activity from a variety of sample types. Kits are available with either colorimetric or fluorometric detection.

- **Sensitive**: Detect as little as 1.25 units/mL (colorimetric) or 50 mU/mL (fluorometric)
- **Fast**: Obtain results in less than 30 minutes
- **Versatile**: Suitable for use with whole blood, plasma, serum, cell lysates or tissue homogenates
- **High Throughput**: 96-well format

Recent Product Citation
Costantini, D. et al. (2013). Loss of integration is associated with reduced resistance to oxidative stress. *J. Exp. Biol.* **216**:2213-2220. (STA-341)



Standard Curve Generated with the OxiSelect™ Catalase Activity Assay Kit (Colorimetric).



Assay Principle for the OxiSelect™ Catalase Acitivity Assays. Catalase present in samples converts hydrogen peroxide into water and oxygen (Reaction 1). Any remaining hydrogen peroxide that is not converted reacts with a colorimetric or fluorometric probe in the presence of horseradish peroxidase (Reaction 2) to produce a color or fluorescence which is measured in a plate reader.

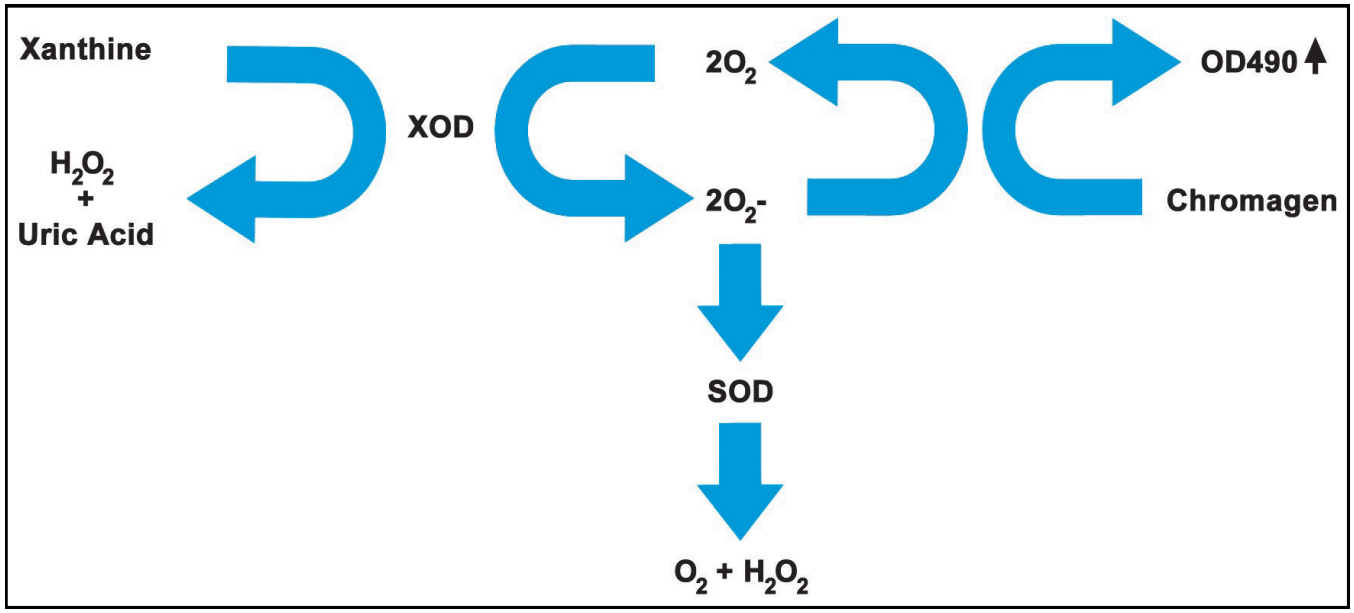
Product Name	Detection	Size	Catalog Number
OxiSelect™ Catalase Activity Assay Kit	Colorimetric	96 Assays	STA-341
	Fluorometric	96 Assays	STA-339

OxiSelect™ Superoxide Dismutase Activity Assay

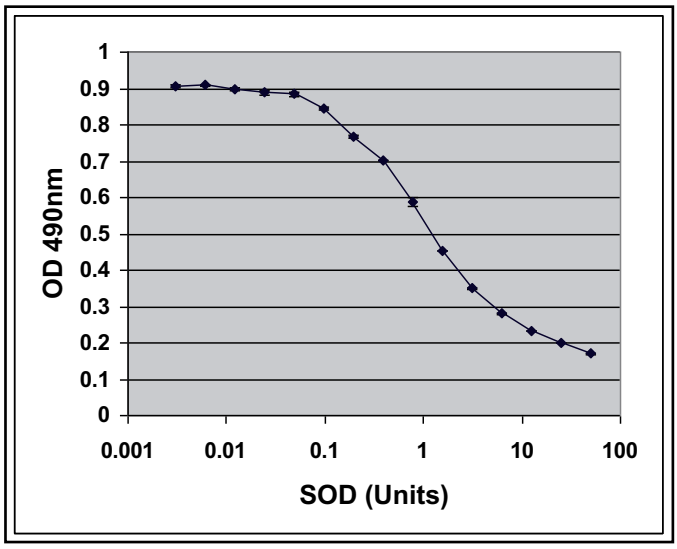
Superoxide dismutase (SOD), which catalyzes the dismutation of the superoxide anion into hydrogen peroxide and molecular oxygen, is one of the most important antioxidant enzymes.

The OxiSelect™ Superoxide Dismutase Activity Assay uses a xanthine/xanthine oxidase (XOD) system to generate superoxide anions and a chromagen to produce a water-soluble dye upon reduction by the superoxide anions.

- **Sensitive**: Detect as little as 0.6 units/mL
- **Fast**: Obtain results in about 2 hours
- **Versatile**: Suitable for use with urine, serum, cells or tissue samples



OxiSelect™ Superoxide Dismutase Activity Assay Principle. Superoxide anions generated by a Xanthine/Xanthine Oxidase system are detected with the provided chromagen. SOD reduces superoxide concentrations, so higher SOD concentrations result in a decreased signal.



Standard Curve Using the OxiSelect™ Superoxide Dismutase Activity Assay.

Recent Product Citations

1. Wysocki, J. et al. (2014). ACE2 deficiency increases NADPH-mediated oxidative stress in teh kidney. *PHY2* **2**:e00264.
2. Yin, J. et al. (2014). Development of an antioxidant system after early weaning in piglets. *J. Anim. Sci.* **92**:612-619.
3. Gong, E.J. et al. (2013). Low-dose-rate radiation exposure leads to testicular damage with decreases in DNMT1 and HDAC1 in the murine testis. *J. Radiat. Res.* 10.1093/jrr/rrt090.
4. Song, J. et al. (2013). Nicotinamide phosphoribosyltransferase is required for the calorie restriction-mediated improvements in oxidative stress, mitochondrial biogenesis, and metabolic adaptation. *J. Gerontol. A Biol. Sci. Med. Sci.* 10.1093/gerona/glt122.
5. Paneni, F. et al. (2013). Deletion of the activated protein-1 transcription factor JunD induces oxidative stress and accelerates age-related endothelial dysfunction. *Circulation* **127**:1229-1240.
6. Connell, B.J. et al. (2012). UPEI-100, a conjugate of lipoic acid and apocynin, mediates neuroprotection in a rat model of ischemia/reperfusion. *Am. J. Physiol. Regulatory Integrative Comp. Physiol.* **302**:R866-R895.
7. Zhang, Z. et al. (2012). TRPM2 Ca2+ channel regulates energy balance and glucose metabolism. *Am. J. Phyisol. Endocrin. Metab.* **302**:E807-E816.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Superoxide Dismutase Activity Assay	Colorimetric	100 Assays	STA-340

OxiSelect™ Total Glutathione (GSSG/GSH) Assay Kit

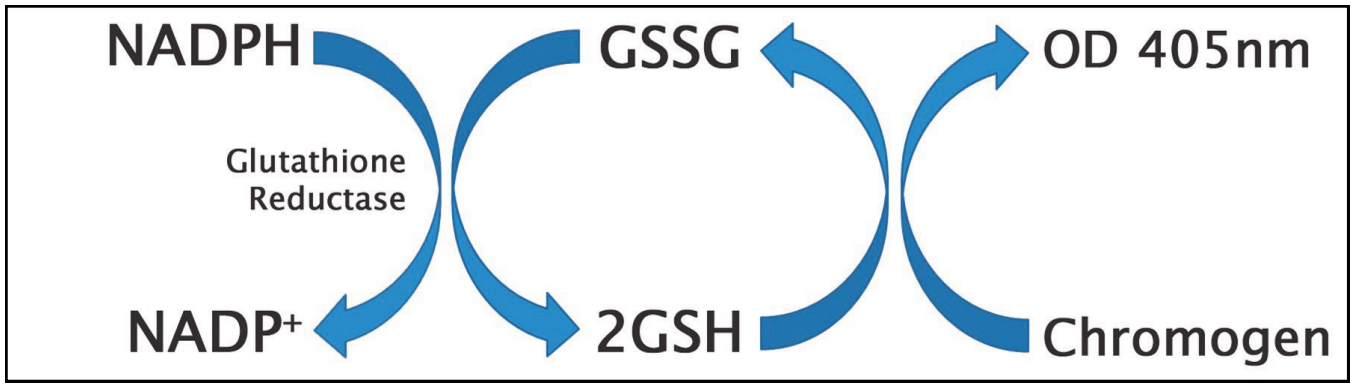
Glutathione is an intracellular tripeptide thiol that protects cells from free radicals by acting as an antioxidant. Glutathione exists within cells in both reduced (GSH) and oxidized (GSSG) forms; it is involved in the breakdown of peroxides and also helps maintain exogenous antioxidants such as vitamins C and E.

The OxiSelect™ Total Glutathione Assay Kit is a quantitative assay for measuring total combined GSH and GSSG content in a variety of sample types. Oxidized glutathione is enzymatically reduced, followed by colorimetric detection in a microplate reader.

- **Sensitive**: Detect as little as 8 nM total glutathione
- **Fast**: Obtain results in less than 30 minutes
- **Versatile**: Suitable for use with saliva, urine, serum, plasma, and cell or tissue lysates

Recent Product Citations

1. Mani, S. et al. (2013). Decreased endogenous production of hydrogen sulfide accclerates atherosclerosis. *Circulation* **127**:2523-2534.
2. Karakus, E. et al. (2013). Agomelatine: an antidepressant with new potent hepatoprotective effects on paracetamol-induced liver damage in rats. *Human and Exp. Toxicol.* 10.01177/0960327112472994.



Assay Principle for the OxiSelect™ Total Glutathione Assay Kit. In the presence of NADPH, glutathione reductase (provided) converts all glutathione into reduced form (GSH). The reduced glutathione then reacts with the provided chromogen to yield a color detectable at 405 nm.

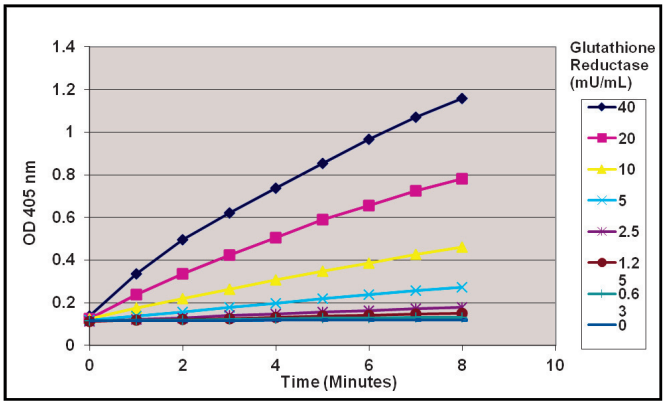
Product Name	Detection	Size	Catalog Number
OxiSelect™ Total Glutathione (GSSG/GSH) Assay Kit	Colorimetric	100 Assays	STA-312

OxiSelect™ Glutathione Reductase Assay Kit

The OxiSelect™ Glutathione Reductase Assay Kit is a quantitative assay for measuring the activity levels of glutathione reductase in a variety of sample types.

The assay principle is similar to that of our Total Glutathione Assay Kit above, except that endogenous levels of glutathione reductase drive the reduction of oxidized glutathione (GSSG) to reduced glutathione (GSH).

- **Sensitive**: Detect activity levels as low as 0.6 mU/mL
- **Fast**: Obtain results in less than 30 minutes
- **Versatile**: Suitable for use with erythrocytes, plasma, cell lysates, or tissue extracts



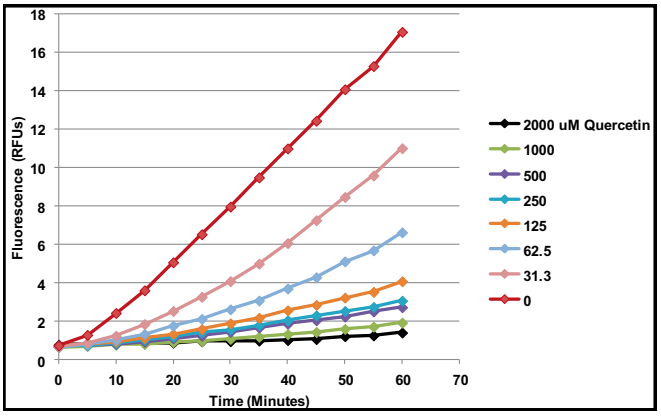
Standard Curve Generated with the OxiSelect™ Glutathione Reductase Assay Kit. Various concentrations of glutathione reductase standard were tested according to the Assay Protocol. OD values were read at 1 minute increments at 405 nm.

Product Name	Detection	Size	Catalog Number
OxiSelect™ Glutathione Reductase Assay Kit	Colorimetric	100 Assays	STA-812

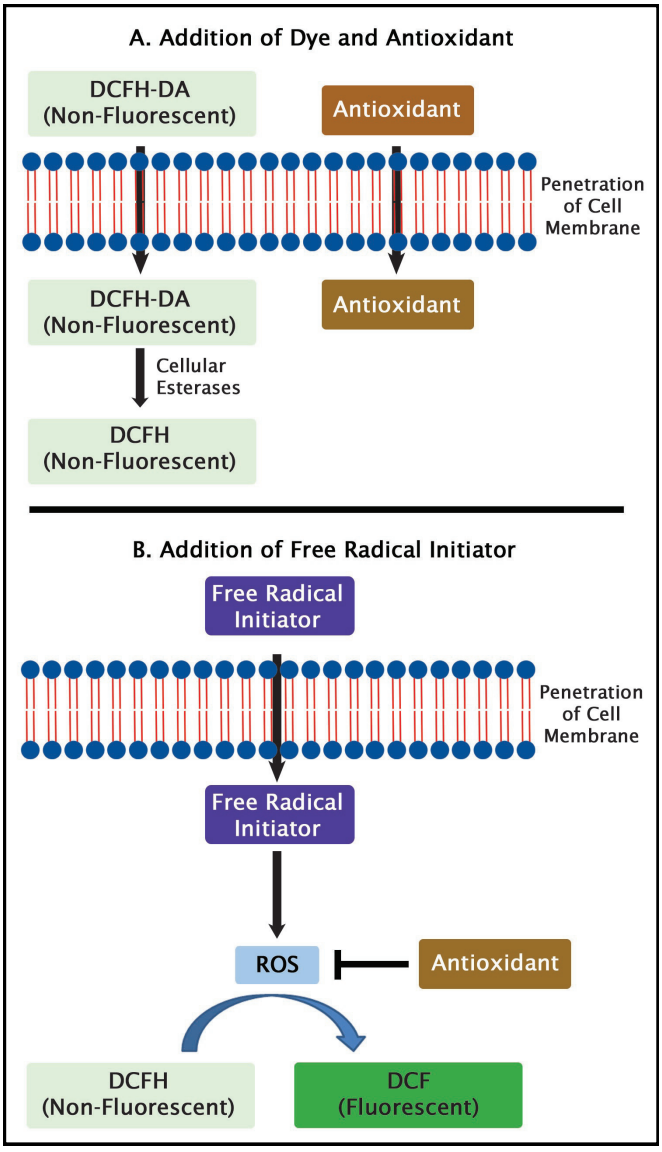
OxiSelect™ Cellular Antioxidant Assay Kit, for *in vivo* Evaluation of Exogenous Antioxidants

Measuring the effects of antioxidant compounds in an in vitro assay may not accurately reflect their efficacy because such assays do not account for physiological conditions such as pH, temperature, uptake, metabolism, or the bioavailability or efficacy of an antioxidant compound.

The OxiSelect™ Cellular Antioxidant Activity Assay Kit provides a mechanism to test exogenous antioxidants in a cell-based environment, delivering a more accurate measurement of the compound's true physiological efficacy. A cell-permeable fluorometric dye is added to intact cells; when free radicals are generated, they bind to the dye producing a bright fluorescent signal. When the exogenous antioxidant is added, it eliminates the free radicals resulting in decreased fluorescence.



Cellular Antioxidant Activity of Quercetin in HeLa Cells. 60,000 HeLa cells were seeded and cultured in a 96-well plate until confluent. Cells were then pretreated with DCFH-DA and Quercetin for 60 minutes at 37ºC. Free Radical Initiator was then added to the cells to begin the assay. Fluorescence readings were taken every 5 minutes for one hour at 37ºC.



Assay Principle for the OxiSelect™ Cellular Antioxidant Activity Assay Kit. An exogenous antioxidant compound is added to cells along with DCFH-DA dye. Upon entry into the cell, the DCFH-DA is cleaved to DCFH which can bind reactive oxygen species (ROS) generated within the cell by the addition of a free radical initiator. Binding of DCFH to ROS yields DCF which produces a bright fluorescence. The presence of the exogenous antioxidant compound reduces the ROS available to the DCFH dye, yielding a lower fluorescent signal.

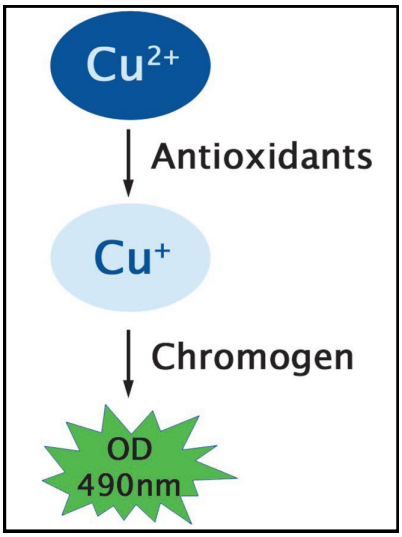
Product Name	Detection	Size	Catalog Number
OxiSelect™ Cellular Antioxidant Activity Assay Kit	Fluorometric	192 Assays	STA-349

OxiSelect™ Total Antioxidant Capacity (TAC) Assay Kit

The OxiSelect™ Total Antioxidant Capacity (TAC) Assay Kit measures the total antioxidant capacity of biomolecules from a variety of sample types via a Single Electron Transfer (SET) mechanism. The assay works with a variety of antioxidants and is suitable for testing plasma, serum, urine, cell lysates, tissue homogenates and food extracts.

Recent Product Citations

1. Stark, M. et al. (2013). Differential effects of docosahexaenoic acid on preterm and term placental pro-oxidant/antioxidant balance. *Reproduction* **146**:243-251.
2. Bakalova, R. et al. (2013). Tissue redox activity as a hallmark of carcinogenesis: from early to terminal stages of cancer. *Clin. Cancer Res.* **19**:2503-2517.
3. Wang, Y. et al. (2013). Therapeutic effect of MG-132 on diabetic cardiomyopathy is associated with its suppression of proteasomal activities: roles of Nrf2 and NF-kB. *Am. J. Physiol. Heart Circ. Physiol.* **304**:H567-H578.



OxiSelect™ Total Antioxidant Capacity Assay Principle.

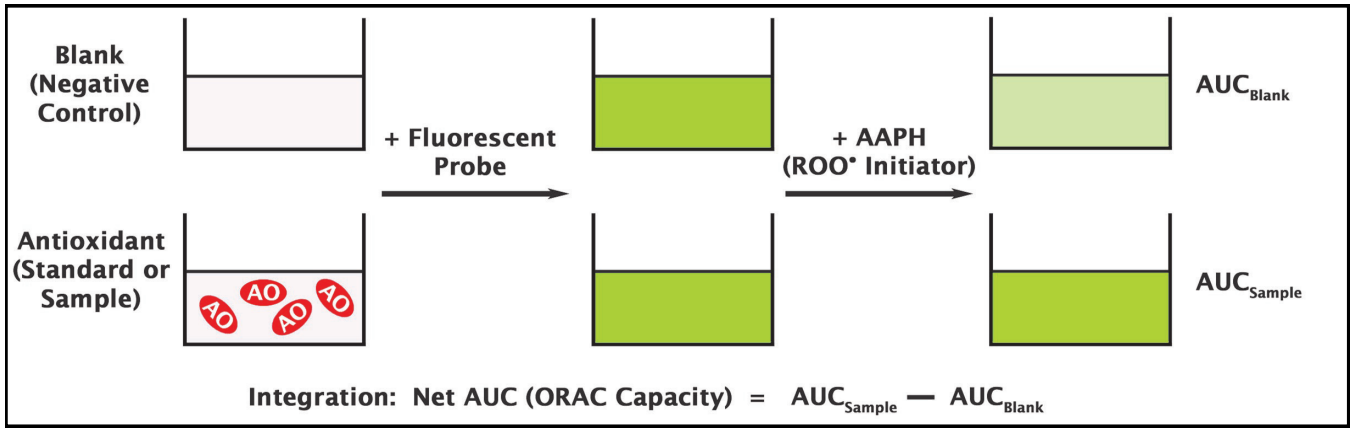
Product Name	Detection	Size	Catalog Number
OxiSelect™ Total Antioxidant Capacity (TAC) Assay Kit	Colorimetric	200 Assays	STA-360

OxiSelect™ ORAC and HORAC Activity Assay Kits

The ORAC (Oxygen Radical Antioxidant Capacity) and HORAC (Hydroxyl Radical Antioxidant Capacity) assays measure the antioxidant capacity of biomolecules against peroxyl radicals and hydroxyl radicals, respectively. The assays are suitable for plasma, cell fractions, and tissue lysates, as well as solid and aqueous nutrition samples.

Recent Product Citations

1. Ungvari, Z. et al. (2013). Testing predictions of the oxidative stress hypothesis of aging using a novel invertebrate model of longevity: the giant clam (*Tridacna derasa*). *J. Gerontol. A. Biol. Sci. Med. Sci.* **68**:359-367.
2. Bailey-Downs, L.C. et al. (2011). Liver-specific knockdown of IGF-1 decreases vascular oxidative stress resistance by impairing the Nrf2-dependent antioxidant response: a novel model of vascular aging. *J. Gerontol. A. Biol. Sci. Med. Sci.* 10.1093/gerona/glr164.



Assay Principle for the OxiSelect™ Oxygen Radical Antioxidant Capacity (ORAC) Assay.

Product Name	Detection	Size	Catalog Number
OxiSelect™ ORAC Activity Assay Kit	Fluorometric	192 Assays	STA-345
		5 x 192 Assays	STA-345-5
OxiSelect™ HORAC Activity Assay Kit	Fluorometric	192 Assays	STA-346
		5 x 192 Assays	STA-346-5

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