FRAP™ (Ferric Reducing Antioxidant Power) Detection Kit

Catalog No: K043-H1 (2 Plate) **Patent Protected**

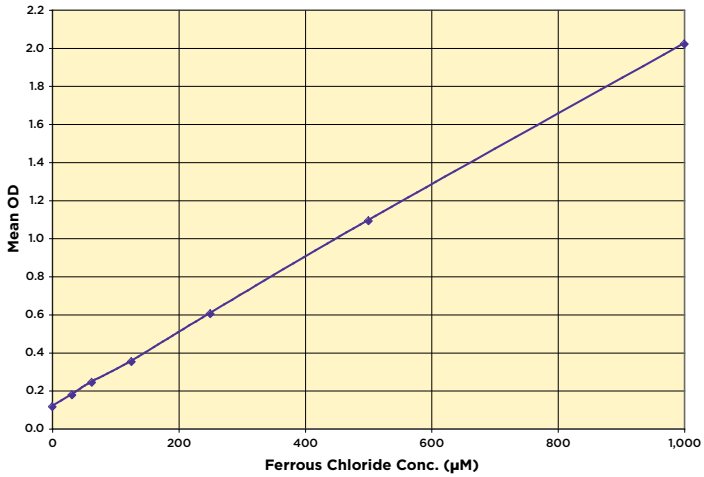
FEATURES

MULTI SPECIES

Use	Measure Ferric Reducing Anti-Oxidant Potential (FRAP)
Sample	Serum, Plasma, Urine, Food, Cosmetics, Additives
Samples/Kit	89 in Duplicate
Stability	Liquid 4°C Stable Reagents
Time to Answer	30 Minutes
Readout	Colorimetric, 560 nm

SCIENTIFIC RELEVANCE

Potentially harmful reactive oxygen species (ROS) are produced as a consequence of normal aerobic metabolism. "Free Radicals" (FR) are usually removed or inactivated *in vivo* by a team of antioxidants. They are chemically stable atoms and molecules, which have one or more free electrons. Almost all biomolecules may be attacked by reactive free radicals. Free radicals are responsible for many pathological processes, or they can be generated as the result of the pathological stage and cause important secondary damage to biological systems and cells. Connections between free radicals and some serious diseases, including Parkinson's and Alzheimer's diseases, atherosclerosis, heart attacks, and chronic fatigue syndrome, have been demonstrated. However, short-term oxidative stress, the unbalance between the formation and scavenging of the reactive oxygen species, may be important in the prevention of aging due to triggering of the process known as mitohormesis. On average, 65 – 70% of the population is excessively impacted by oxidative stress caused by FRs.



Glutathione (GSH) Colorimetric Detection Kit

Catalog No: K006-H1 (4 Plate) K006-H1C-H/L (200 Cuvette)

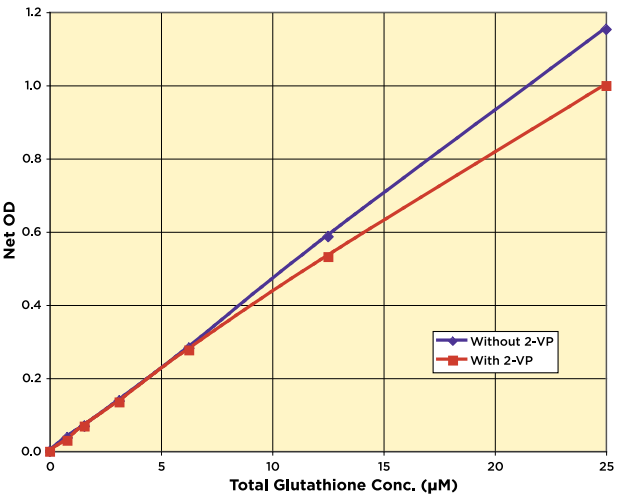
FEATURES

MULTI SPECIES

- Use: Measure GSH/GSSG to Determine Oxidative Stress
- Sample: Cells, RBCs, Serum, Plasma, Urine, and Tissue
- Sensitivity: To 32 pmol/Sample
- Format: 96-well or Cuvette
- Species: Species Independent
- Samples/Kit: 89 (Total and GSSG) in Duplicate
- Stability: Liquid 4°C Stable Reagents
- Readout: Colorimetric, 405 nm

SCIENTIFIC RELEVANCE

Glutathione (L-γ-glutamyl-L-cysteinylglycine; GSH) is the highest concentration non-protein thiol in mammalian cells and is present in concentrations of 0.5 – 10 mM. GSH is a tripeptide that contains an unusual peptide linkage between the amine group of cysteine and the carboxyl group of the glutamate side-chain. It is an antioxidant, preventing damage to important cellular components caused by reactive oxygen species such as free radicals and peroxides. Glutathione reduces disulfide bonds formed within cytoplasmic proteins to cysteines by serving as an electron donor. In the process, glutathione is converted to its oxidized form, glutathione disulfide (GSSG). Glutathione is found mostly in its reduced form, since the enzyme that reverts it from its oxidized form, glutathione reductase, is constitutive and inducible upon oxidative stress. The ratio of reduced glutathione to oxidized glutathione within cells is often used as a measure of cellular toxicity.



Glutathione (GSH) Fluorescent Detection Kits

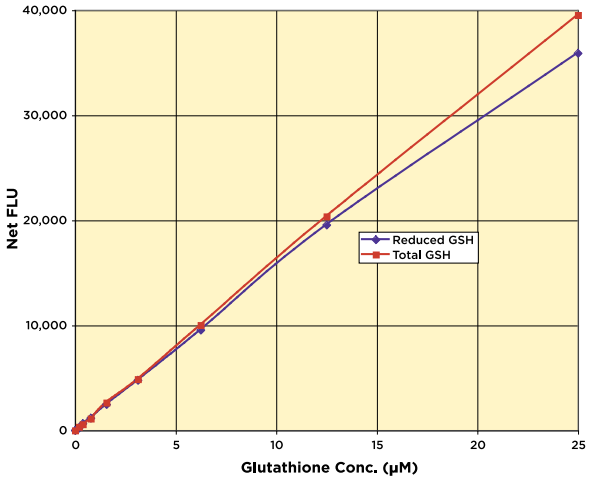
96 Well: Catalog No: K006-F1 (1 Plate) K006-F5 (5 Plate)
384 Well: Catalog No: K006-F1D (2 Plate)

FEATURES

Use	Measure GSH/GSSG
Sample	Cells, RBC's, Serum, Plasma, Urine, and Tissues
Convenient	Measures Free and Total GSH in Same Sample Well
Species	Species Independent
Sensitivity	45 nM Free GSH, 48 nM Total GSH
Samples/Kit	96-well kits: 39 or 231 in Duplicate 384-well kit: 183 in Duplicate
Stability	Liquid 4°C Stable Reagents
Readout	Fluorescent, 510 nm

SCIENTIFIC RELEVANCE

Glutathione (L-γ-glutamyl-L-cysteinylglycine; GSH) is the highest concentration non-protein thiol in mammalian cells and is present in concentrations of 0.5 – 10 mM. GSH is a tripeptide that contains an unusual peptide linkage between the amine group of cysteine and the carboxyl group of the glutamate side-chain. It is an antioxidant, preventing damage to important cellular components caused by reactive oxygen species such as free radicals and peroxides. Glutathione reduces disulfide bonds formed within cytoplasmic proteins to cysteines by serving as an electron donor. In the process, glutathione is converted to its oxidized form, glutathione disulfide (GSSG). Glutathione is found mostly in its reduced form, since the enzyme that reverts it from its oxidized form, glutathione reductase, is constitutive and inducible upon oxidative stress. The ratio of reduced glutathione to oxidized glutathione within cells is often used as a measure of cellular toxicity.



Glutathione Reductase Fluorescent Activity Kit

Catalog No: K009-F1 (1 Plate)

FEATURES

- Use — Measure GR activity
- Sample — RBCs, Serum, Plasma, and Cells
- Convenient — 20 minute End Point or Kinetic Assay
- Sensitivity — 9 µU/mL, World's Most Sensitive
- Species — Species Independent
- Samples/Kit — 41 in Duplicate
- Stability — Liquid 4°C Stable Reagents
- Readout — Fluorescent, 510 nm

SCIENTIFIC RELEVANCE

Glutathione reductase (GR) plays an indirect but essential role in the prevention of oxidative damage within the cell by helping to maintain appropriate levels of intracellular glutathione (GSH). GSH, in conjunction with the enzyme glutathione peroxidase (GP), is the acting reductant responsible for minimizing harmful hydrogen peroxide. The regeneration of GSH is catalyzed by GR. GR is a ubiquitous 100-120 kDa dimeric flavoprotein that catalyzes the reduction of oxidized glutathione (GSSG) to reduced glutathione, using ß-nicotinamide dinucleotide phosphate (NADPH) as the hydrogen donor. NADPH has been suggested to also act as an indirectly operating antioxidant, given its role in the recycling of GSSG to GSH and thus maintaining the antioxidative power of glutathione.

Glutathione S-Transferase Fluorescent Activity Kit

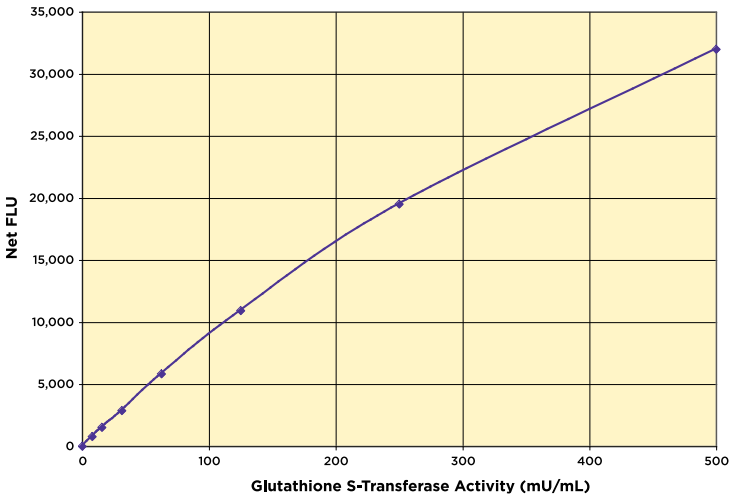
Catalog No: K008-F1 (1 Plate)

FEATURES

▶ Use	Fluorescent Detection of GST Activity
▶ Sample	Serum, Plasma, and Cell Lysates
▶ Samples/Kit	40 in Duplicate
▶ Convenient	30 Minute End Point or Kinetic Assay
▶ Sensitive	< 100 µU of GST Activity
▶ Stability	Liquid 4°C Stable Reagents
▶ Readout	Fluorescent, 460 nm

SCIENTIFIC RELEVANCE

The Glutathione S-Transferase (GST) family of isozymes function to detoxify and neutralize a wide variety of electrophilic molecules by mediating their conjugation with reduced glutathione. Human GSTs are encoded by several gene families, and expressed in almost all tissues. Given its pivotal role in ameliorating oxidative stress/damage, GST activity has been repeatedly investigated as a biomarker for arthritis, asthma, COPD, and multiple forms of cancer, as well as an environmental marker. Examination of GST isoforms and activity in human cancers, tumors and tumor cell lines has revealed the predominance of the acidic pi class. Furthermore, this activity is thought to substantially contribute to the innate or acquired resistance of specific neoplasms to anticancer therapy.



Hydrogen Peroxide Colorimetric & Fluorescent Detection Kits

Colorimetric Catalog No: K034-H1 (2 Plate)
Fluorescent Catalog No: K034-F1 (2 Plate)

FEATURES

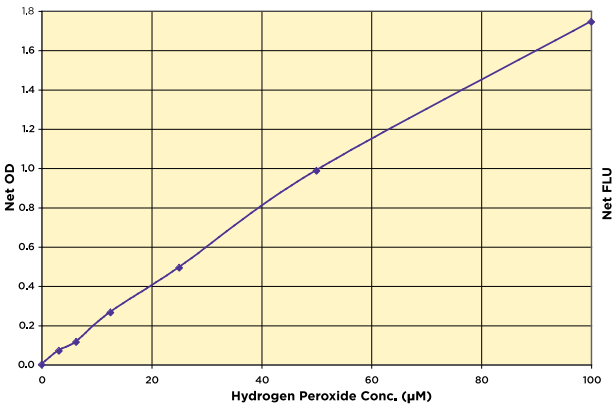
MULTI SPECIES
MOST SENSITIVE

- Use — Measure H_2O_2 in Any Sample
- Time to Answer — 15 Minutes
- Sensitivity — To 2 pmol (65 pg) H_2O_2
- Samples/Kit — Colorimetric: 89 in Duplicate Fluorescent: 88 in Duplicate
- Readout — Colorimetric: 560 nm Fluorescent: 585 nm

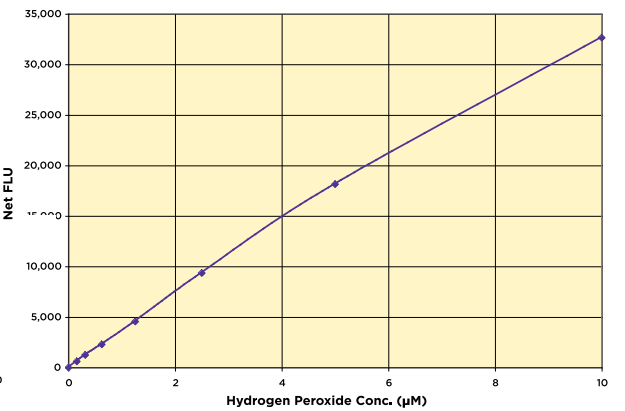
SCIENTIFIC RELEVANCE

In biological systems, incomplete reduction of O_2 during respiration produces superoxide anion ($O_2^{-}\cdot$), which is spontaneously or enzymatically dismutated by superoxide dismutase to H_2O_2. Many cells produce low levels of $O_2^{-}\cdot$ and H_2O_2 in response to a variety of extracellular stimuli, such as cytokines (TGF-ß1, TNF-α, and various interleukins), peptide growth factors (PDGF; EGF, VEGF, bFGF, and insulin), the agonists of heterotrimeric G protein–coupled receptors (GPCR) such as angiotensin II, thrombin, lysophosphatidic acid, sphingosine 1-phosphate, histamine, and bradykinin, or by shear stress. The addition of exogenous H_2O_2, or the intracellular production in response to receptor stimulation, affects the function of various proteins including protein kinases, protein phosphatases, transcription factors, phospholipases, ion channels, and G proteins. In 1894, Fenton described the oxidation of tartaric acid by Fe^{2+} and H_2O_2, in which H_2O_2 and O_2 participate in the production of singlet oxygen and peroxynitrite. The generation of these species may be concurrent with reactions involving iron, and under some circumstances they might be important contributors to H_2O_2 toxicity.

Colorimetric Standard Curve



Fluorescent Standard Curve



Superoxide Dismutase (SOD) Colorimetric Activity Kit

Catalog No: K028-H1 (2 Plate)

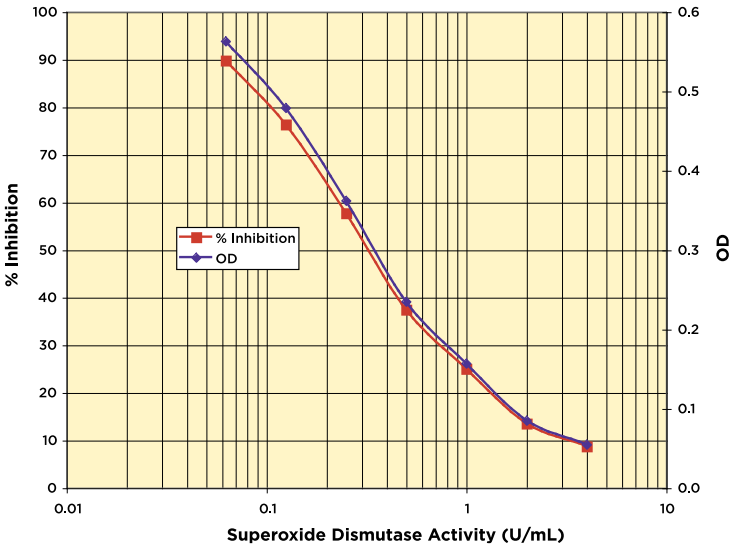
FEATURES

- Use — Oxidative Stress Determination
- Sample — Serum, Plasma, Urine, Cells and Tissue, and RBC
- Species — Human and Other Mammalian Species
- Samples/Kit — 89 in Duplicate
- Time to Answer — 20 Minutes

MULTI SPECIES

SCIENTIFIC RELEVANCE

Short-lived and highly reactive oxygen species (ROS) such as $O_2^{\cdot-}$ (superoxide), $^{\cdot}OH$ (hydroxyl radical), and H_2O_2 (hydrogen peroxide) are continuously generated *in vivo*. The cellular levels of ROS are controlled by antioxidant enzymes and small molecule antioxidants. The major antioxidant enzymes, superoxide dismutases (SODs), including copper-zinc superoxide dismutase (Cu/ZnSOD), manganese superoxide dismutase (MnSOD), and extracellular superoxide dismutase (EC-SOD). All play a critical roles in scavenging $O_2^{\cdot-}$. Decreased SOD activity results in elevated level of superoxide which in turn leads to decreased NO and increased peroxynitrite concentrations. The major intracellular SOD is a 32-kDa copper and zinc containing homodimer (Cu/Zn SOD). The mitochondrial SOD (MnSOD) is a manganese-containing 93-kDa homotetramer that is synthesized in the cytoplasm and translocated to the inner matrix of mitochondria. EC-SOD is the primary extracellular SOD enzyme and is highly expressed in many organs. Increased SOD activity levels are seen in Downs Syndrome, while decreased activity is seen in diabetes, Alzheimer's disease, rheumatoid arthritis, Parkinson's disease, uremic anemia, atherosclerosis, some cancers, and thyroid dysfunction.



Thiol Fluorescent Detection Kit

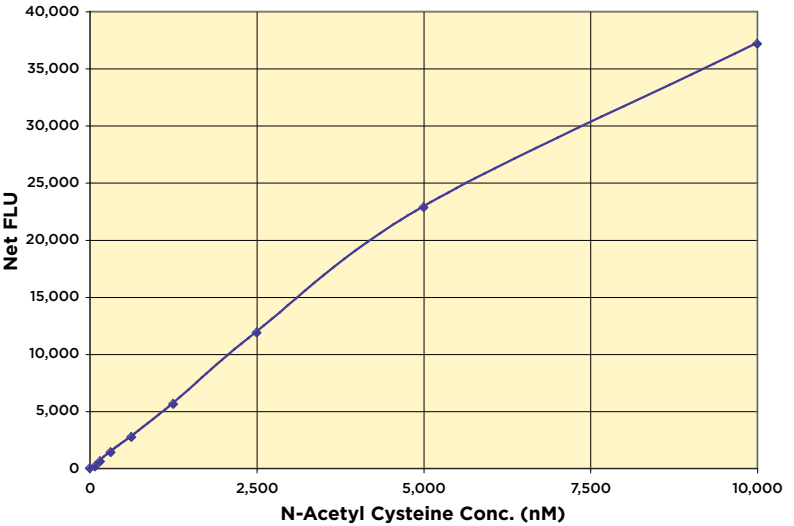
Catalog No: K005-F1 (1 Plate)

FEATURES

Use	Measure Thiol Content of Recombinant Proteins
Adaptable	Measure Protein Thiols (SH) in 6M GuHCl Buffers
Sensitivity	4.62 nM
Time to Answer	30 Minutes
Samples/Kit	39 in Duplicate
Stability	Non-Toxic, Liquid 4°C Stable Reagents
Readout	Fluorescent, 510 nm

SCIENTIFIC RELEVANCE

Free thiols in biological systems have important roles. Oxidatively modified thiol groups of cysteine residues are known to modulate the activity of a growing number of proteins. One of the most pressing problems is to accurately determine the extent of modification of specific amino acids, such as cysteine residues, in a complex protein sample, especially in the presence of chaotropic agents such as guanidine hydrochloride. Typical methods such as using Ellman's reagent have limited sensitivity requiring large quantities of purified recombinant or native protein.



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