PRODUCT INFORMATION

Glutaredoxin 2 (human, recombinant)

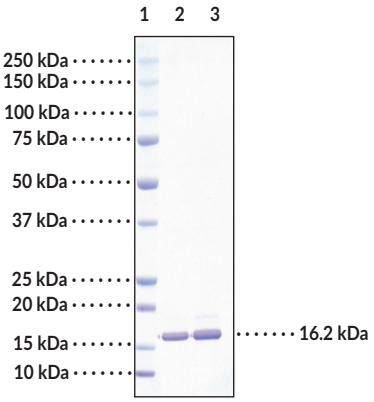
Item No. 32572

Overview and Properties

Synonyms:	Glrx2, Grx2, Thioltransferease 2, TTF2
Source:	Active recombinant human N-terminal His-tagged Grx2 expressed in *E. coli*
Amino Acids:	41-164
Uniprot No.:	Q9NS18
Molecular Weight:	16.2 kDa
Storage:	-80°C (as supplied)
Stability:	≥1 year
Purity:	***batch specific*** (≥95% estimated by SDS-PAGE)
Supplied in:	50 mM Tris-HCl, pH 7.8, with 150 mM sodium chloride, 1 mM EDTA, 10% glycerol, and 0.1 mM DTT
Protein Concentration:	***batch specific*** mg/ml
Activity:	***batch specific*** U/ml
Specific Activity:	***batch specific*** U/mg
Unit Definition:	One unit is defined as the amount of enzyme required to produce 1 nmol of eosin-GSH per minute at 25°C in 0.1 M potassium phosphate, pH 7.5, containing 1 mM EDTA, 1 U/ml glutathione reductase, 0.5 mM GSH, 0.25 mM NADPH, 0.75 µM alkylated BSA, and 20 µM eosin-GSH-BSA.

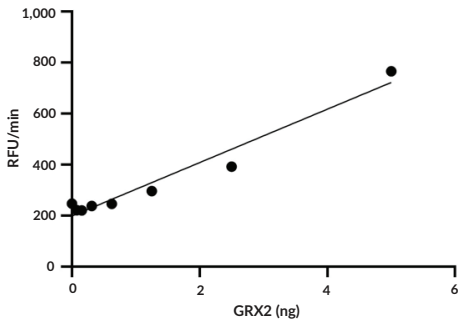
Information represents the product specifications. Batch specific analytical results are provided on each certificate of analysis.

Images



Lane 1: MW Markers
Lane 2: Glutaredoxin 2

SDS-PAGE Analysis of Glutaredoxin 2.



Glutaredoxin 2 activity was determined using Cayman's Glutaredoxin Fluorescent Activity Assay Kit (Item No. 11536) with 20 µM eosin-GSH-BSA substrate.

CAYMAN CHEMICAL
1180 EAST ELLSWORTH RD
ANN ARBOR, MI 48108 · USA
PHONE: [800] 364-9897
[734] 971-3335
FAX: [734] 971-3640
CUSTSERV@CAYMANCHEM.COM
WWW.CAYMANCHEM.COM

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Description

Glutaredoxin 2 (Grx2) is a thiol-disulfide oxidoreductase and member of the thioredoxin family encoded by *GLRX2* with a role in the maintenance of cellular thiol redox homeostasis.[1,2] Alternative splicing of *GLRX2* produces three ubiquitously expressed isoforms, Grx2a, Grx2b, and Grx2c, with Grx2a localized to the mitochondria and Grx2b and Grx2c in the cytoplasm and nucleus. It is a dithiol Grx that contains two active site cysteine residues and catalyzes the glutathione-dependent reduction of disulfides, acting as an electron donor for ribonucleotide or sulfate reduction, and regulating protein levels of glutathione mixed disulfides.[2] In its inactive state, Grx2 is a homodimer linked by a single [2Fe-2S] cluster, which acts as a redox sensor that drives monomerization and activation of Grx2 under conditions of oxidative stress, such as free radical formation or oxidation of the glutathione (GSH) pool.[2-4] The oxidized active site in Grx2 is reduced by GSH and, unlike other eukaryotic Grxs, is also a substrate for thioredoxin reductase (TrxR). Grx2 catalyzes the reversible glutathionylation of mitochondrial complex I to regulate superoxide production and facilitates the reduction of protein disulfides, glutathionylated proteins, and other low molecular weight substrates under conditions of oxidative stress.[6] Knockdown or overexpression of *GLRX2* enhances and reduces, respectively, oxidative stress-induced apoptosis in HeLa cells. *Glrx2* knockdown increases high-fat diet-induced insulin resistance, hippocampal inflammation, increases in body weight, and cognitive dysfunction in mice.[5] Cayman's Glutaredoxin 2 (human, recombinant) protein can be used for enzyme activity assays.

References

1. Hanschmann, E.-M., Godoy, J.R., Berndt, C., *et al*. Thioredoxins, glutaredoxins, and peroxiredoxins—molecular mechanisms and health significance: From cofactors to antioxidants to redox signaling. *Antioxid. Redox Signal.* **19(13)**, 1539-1605 (2013).
2. Lillig, C.H., Berndt, C., Vergnolle, O., *et al*. Characterization of human glutaredoxin 2 as iron-sulfur protein: A possible role as redox sensor. *Proc. Natl. Acad. Sci. USA* **102(23)**, 8168-8173 (2005).
3. Beer, S.M., Taylor, E.R., Brown, S.E., *et al*. Glutaredoxin 2 catalyzes the reversible oxidation and glutathionylation of mitochondrial membrane thiol proteins: Implications for mitochondrial redox regulation and antioxidant defense. *J. Biol. Chem.* **279(46)**, 47939-47951 (2004).
4. Berndt, C., Hudemann, C., Hanschmann, E.-M., *et al*. How does iron-sulfur cluster coordination regulate the activity of human glutaredoxin 2? *Antioxid. Redox Signal.* **9(1)**, 151-157 (2007).
5. Wohua, Z. and Weiming, X. Glutaredoxin 2 (GRX2) deficiency exacerbates high fat diet (HFD)-induced insulin resistance, inflammation and mitochondrial dysfunction in brain injury: A mechanism involving GSK-3β. *Biomed. Pharmacother.* **118**, 108940 (2019).
6. Berndt, C., Lillig, C.H., and Holmgren, A. Thiol-based mechanisms of the thioredoxin and glutaredoxin systems: Implications for diseases in the cardiovascular system. *Am. J. Physiol. Heart Circ. Physiol.* **292(3)**, H1227-H1236 (2007).

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