Supplementary Material

1. Supplementary Tables and Figures

Table S1

Table S2

Table S3

Figure S1

Figure S2

2. Supplementary Methods

Table S1. PD and non-PD (Control) cases used for Western blotting analysis of postmortem brain samples.

Diagnosis	Age	Sex
PD	77	M
PD	51	M
PD	86	F
PD	83	F
PD	75	M
PD	71	M
PD	73	M
PD	79	M
Control	51	M
Control	89	M
Control	86	F
Control	63	M
Control	73	M
Control	69	M
Control	77	F
Control	19	N/A
Control	42	F

N/A: not available

Table S2. PD and non-PD (Control) cases used for immunohistochemistry of postmortem brain samples.

Diagnosis	Age	Sex
PD	70	F
PD	53	F
PD	N/A	N/A
PD	77	M
PD	79	F
Control	90	F
Control	48	F
Control	60	F
Control	86	F

N/A: not available

Table S3. *C. elegans* Grxs and their homology to human Grxs.

C. elegans		**Human**		**Percent**	**BLAST**
Gene	**Protein**	**Gene**	**Protein**	**Identity**	**e-values**
glrx-10	GLRX-10	*GLRX*	Grx1	44	1.8e-19
glrx-21	GLRX-21	*GLRX2*	Grx2	40	1.1e-14
glrx-3	GLRX-3	*GLRX3*	Grx3	48	8.4e-77
glrx-5	GLRX-5	*GLRX5*	Grx5	42	6.5e-31

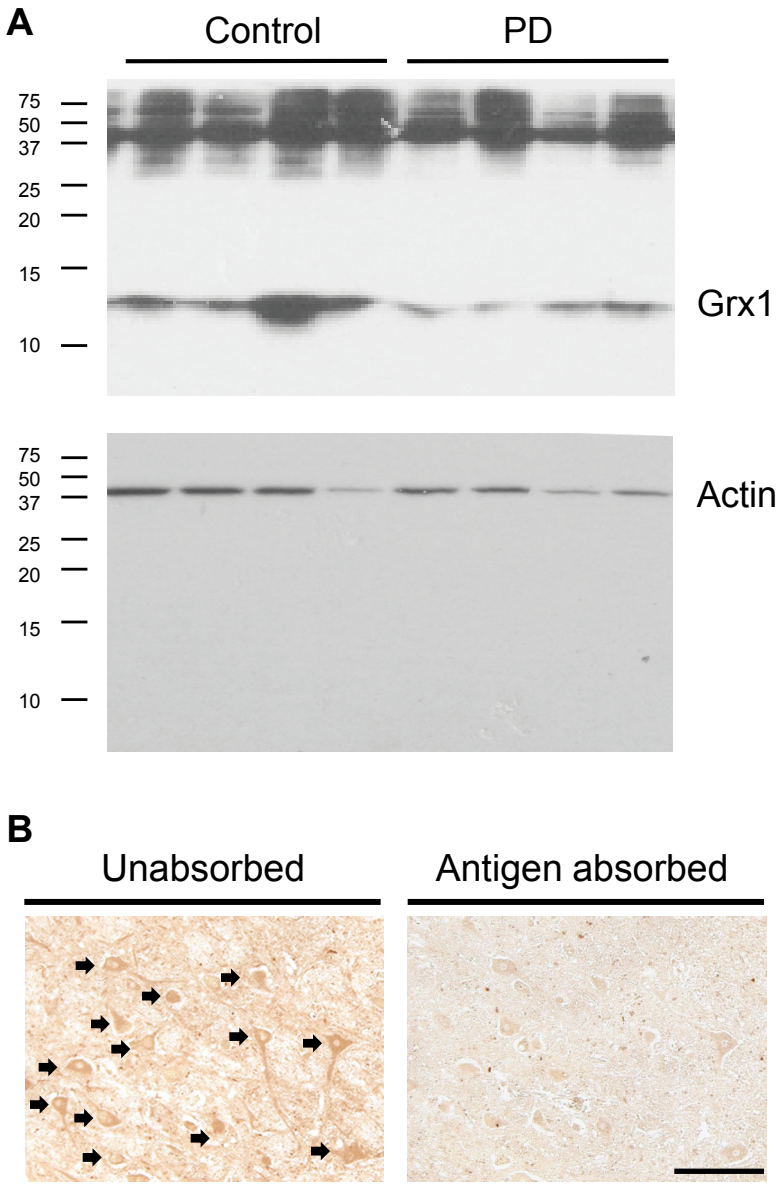

Figure S1. Immunoreactivity of anti-Grx1 toward human brain samples. (**A**) Whole blot of Figure 1A. (**B**) Specificity of anti-Grx1 antibody on tissue sections of postmortem midbrain. Immunohistochemical staining was performed on adjacent serial sections using anti-Grx1 antibody that was either untreated (unabsorbed) or pre-incubated with recombinant human Grx1 protein (antigen absorbed). Arrows indicate neurons immunostained by unabsorbed anti-Grx1 antibody. Scale bar=100 μm.

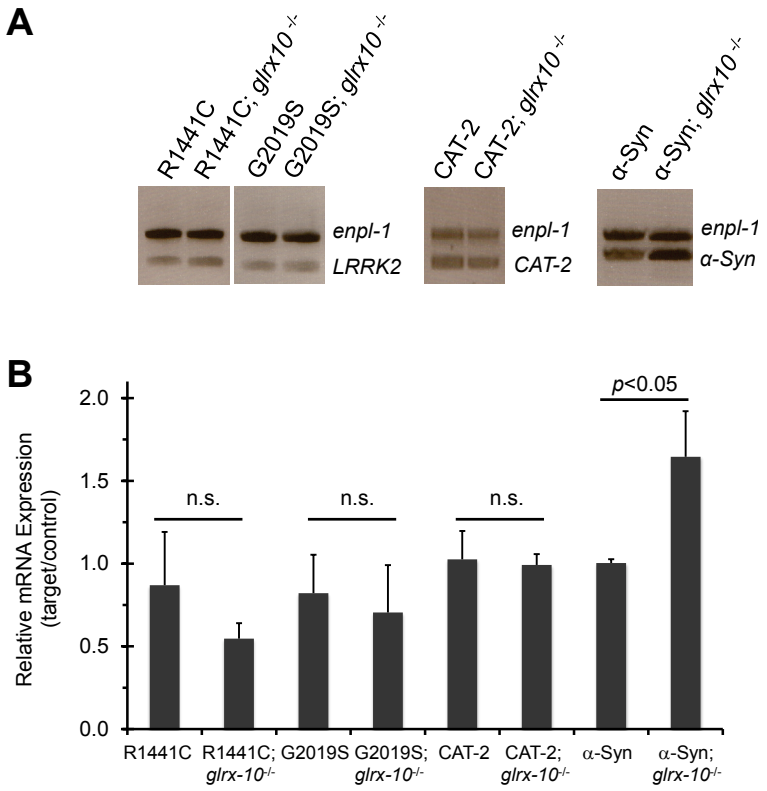

Figure S2. Effect of GLRX-10 deficiency on mRNA expression of LRRK2, CAT-2, and α-synuclein. (**A**) Representative semi-quantitative RT-PCR indicating relative levels of *enpl-1* (control, ~500 bp) and target (~300 bp) cDNAs in *C. elegans* lines expressing LRRK2 mutants (R1441C or G2019S), CAT-2, or α-synuclein (α-Syn) in both WT and *glrx-10*$^{-/-}$ backgrounds. (**B**) Quantification of relative cDNA levels in the respective *C. elegans* lines. $p<0.05$ via Student's T-test. n=3 independent biological replicates.

SUPPLEMENTARY METHODS

Analysis of specificity of anti-Grx1 antibody for immunohistochemistry

Immunohistochemical staining of adjacent serial sections of postmortem midbrain was performed using anti-Grx1 antibody either untreated or absorbed with antigen. Antigen absorption was done by incubation of 100 µl of diluted anti-Grx1 antibody (at 1:400 in TBS containing 10% NGS) with 15 µg of recombinant human Grx1 protein for 8 hrs on ice. Immunostaining was completed as described in **MATERIALS AND METHODS**. The intensities of immunostaining with and without antigen absorption were compared.

Analysis of mRNA expression using semi-quantitative RT-PCR

C. elegans RNA was extracted using Trizol following manufacturer's instructions (Life Technologies). Briefly, bacteria were removed by washing the worms 3 times in M9 buffer. One ml of Trizol was added to approximately 100 µl of settled worms and incubated at room temperature for 5 min. Then 200 µl of chloroform (Fisher) was added to the mixture, vigorously shaken for 15 sec, and incubated at room temperature for 5 min. Samples were spun at 12,000g for 15 min at 4 °C. The upper aqueous phase was transferred to a tube containing 0.5 ml isopropanol (Fisher), shaken by hand for 30 sec, and incubated at room temperature for 10 min. Following centrifugation at 12,000g for 15 min at 4°C, the supernatant was removed. The pellet was washed in 75% RNase-free ethanol (Fisher) and centrifuged at 7,500g for 5 min at 4°C. The ethanol was removed from the tube and the pellet was air dried for 10 min on ice. The pellet containing extracted RNA was resuspended in 100µl DEPC-treated water. cDNA synthesis was completed using SuperScript II reverse transcriptase with 1 µg of RNA as template following manufacturer's instructions (Life Technologies). PCR reactions were completed using OneTaq polymerase following manufacturer's instructions (New England BioLabs). An aliquot of synthesized cDNA was used as template along with exon-spanning primers for the HSP-90 family member enpl-1 as a control, and primers for LRRK2, CAT-2, or α-synuclein. An aliquot

of each PCR reaction was run on a 1.2 % agarose gel and band intensities for LRRK2, CAT-2, or α-synuclein were normalized to that of *enpl-1*. Quantification was performed using ImageJ software. Primers for semi-quantitative PCR are listed as the following:

enpl-1: forward 5'-CTTCATTCCAAATGTCTACGC-3'; reverse 5'-TTGGTGGTTACGACAACACG-3'

LRRK2: forward 5'-TGAGTGGCAATGTCAGGTGT-3'; reverse 5'-TCCCCCTCATCATCATTCTC-3'

CAT-2: forward 5'-TCTCCAACAACTGAACGACGA-3'; reverse 5'-TCTTGGCGAAAATCGAGAAT-3'

α-Synuclein: forward 5'-TGTAGCAGAAGCAGCAGGAA-3'; reverse 5'-TGTCAGGATCCACAGGCATA-3'