

Supplementary Information:

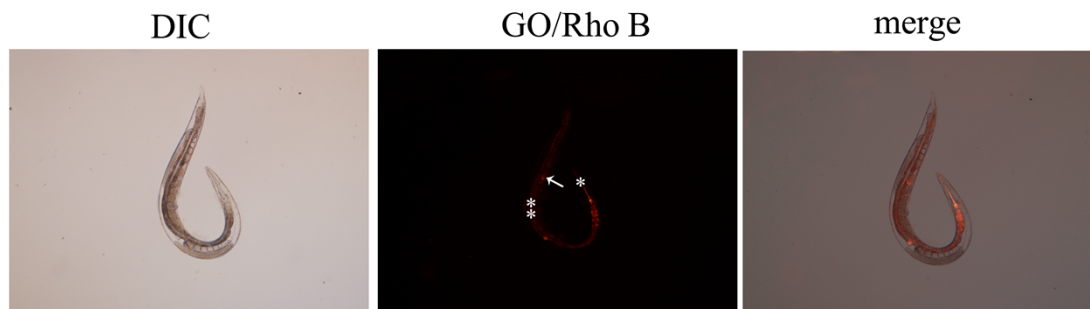


Fig. S1 Distribution and translocation of GO in progeny of exposed nematodes. Prolonged exposure was performed from L1-larvae to adult day-1. Exposure concentration for GO was 100 mg L⁻¹. The arrowhead indicates the gonad. The pharynx (*) and the intestine (**) were also indicated.

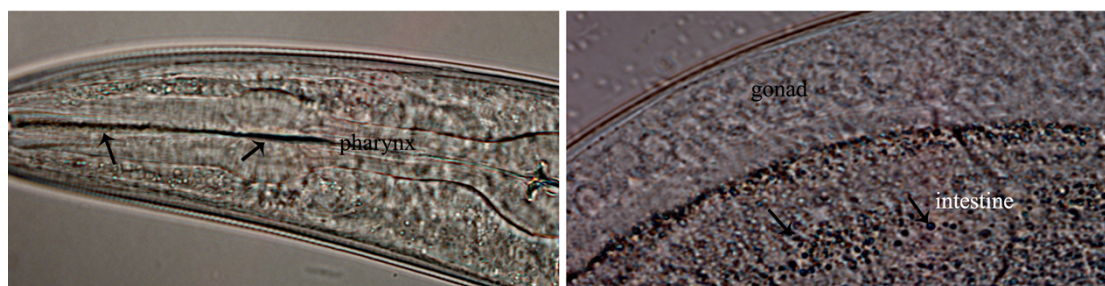


Fig. S2 Distribution and translocation of G-COOH in exposed nematodes. Prolonged exposure was performed from L1-larvae to adult day-1. Exposure concentration for G-COOH was 100 mg L⁻¹. Arrowheads indicate the G-COOH distribution.

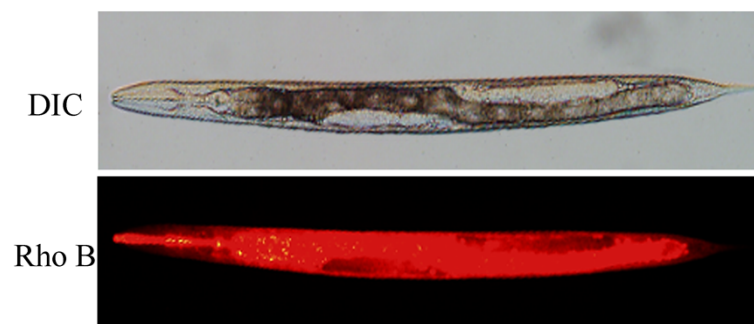


Fig. S3 Distribution of Rho B in nematodes.

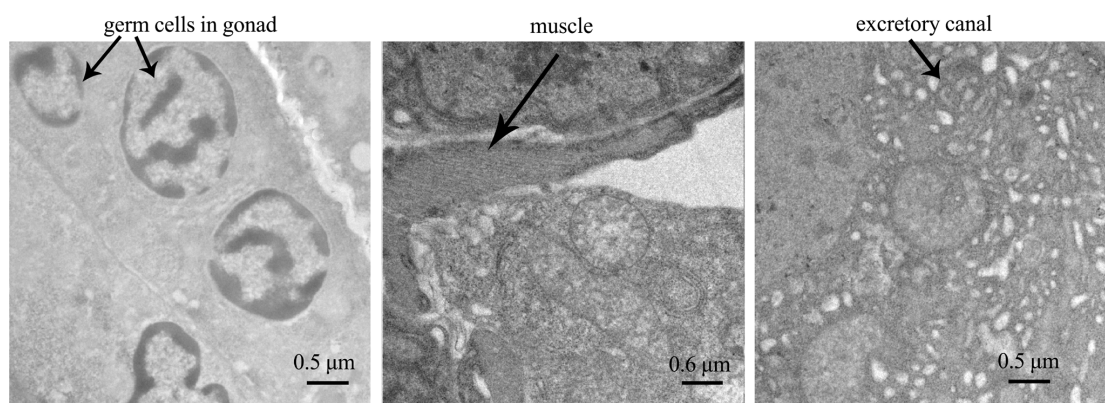


Fig. S4 TEM assay of G-COOH distribution in germ cells in gonad, muscle, and excretory canal.

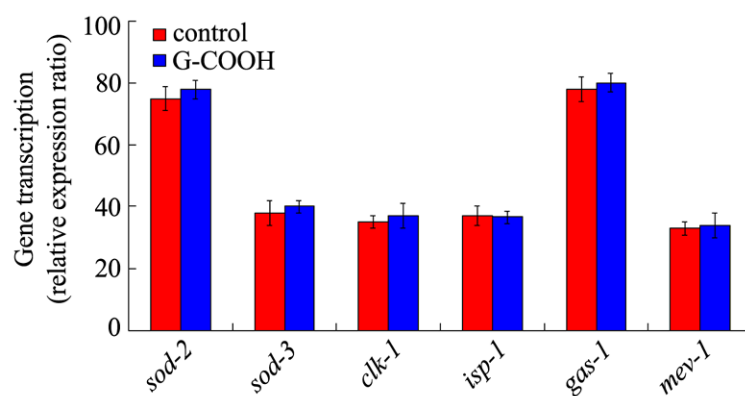


Fig. S5 Expression patterns of genes required for control of oxidative stress in G-COOH exposed nematodes. Exposure concentration for G-COOH was 100 mg L⁻¹. Prolonged exposure was performed from L1-larvae to adult day-1.

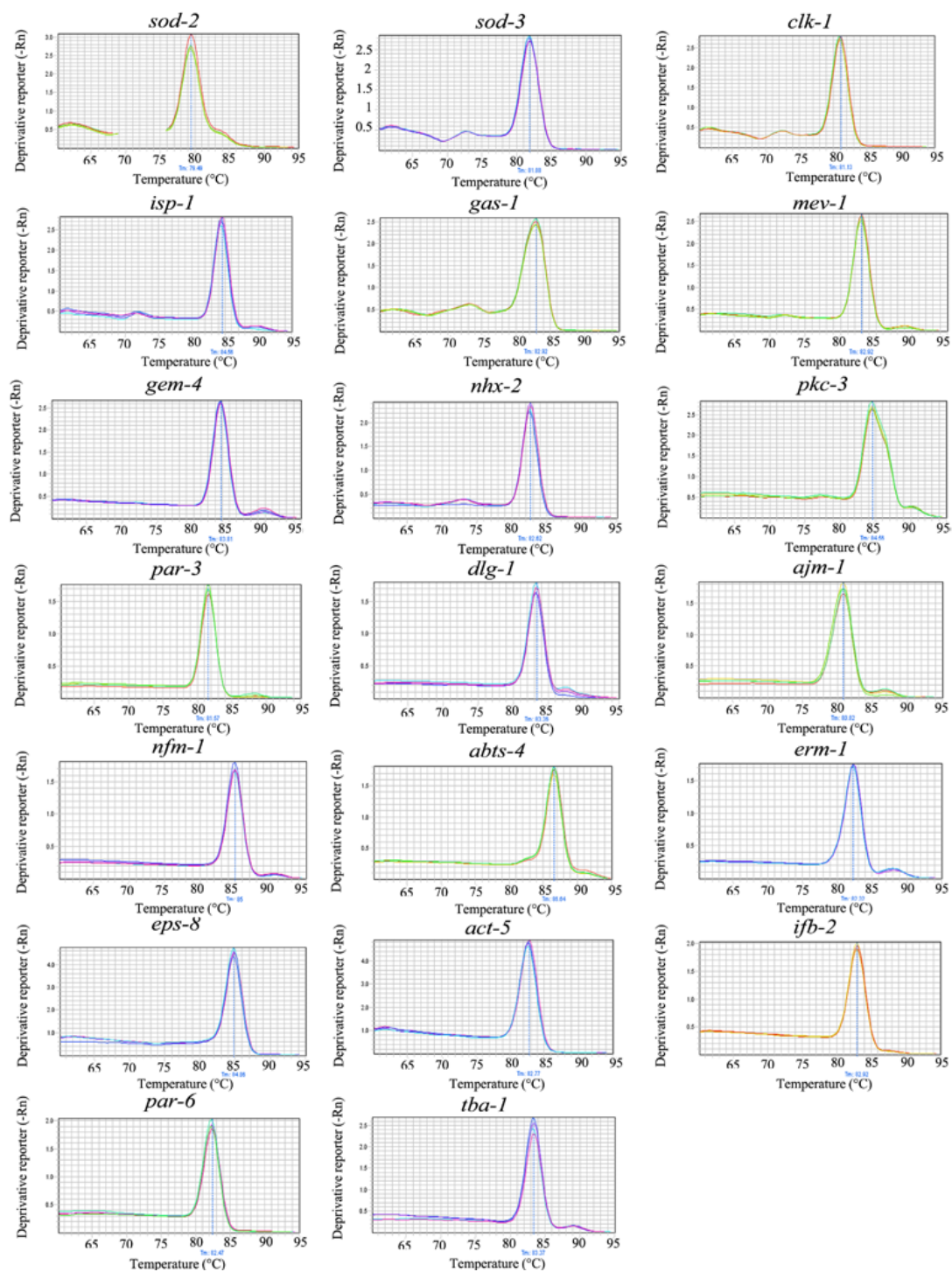


Fig. S6 Melt curves for the examined genes in qRT-PCR assay.

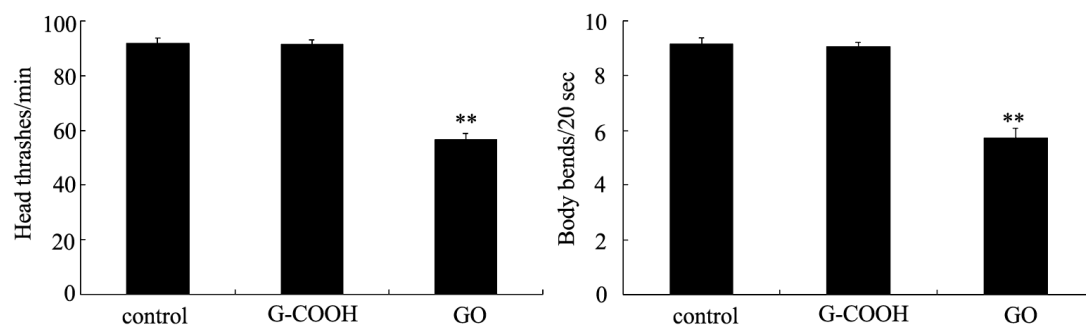


Fig. S7 Effects of chronic exposure to G-COOH or GO on locomotion behavior in nematodes.

Chronic exposure was performed from L1-larvae to adult day-10. Exposure concentration for G-COOH was 100 mg L⁻¹. Exposure concentration for GO was 1 mg L⁻¹. Bars represent means $\pm$ SEM. ** $P < 0.01$.

Table S1The related information for qRT-PCR assay.

Gene	Control						G-COOH					
	CT1	CT2	CT3	Mean	2 ^{-ΔCT}	2 ^{-ΔΔCT}	CT1	CT2	CT3	Mean	2 ^{-ΔCT}	2 ^{-ΔΔCT}
<i>tba-1</i>	19.742	19.670	19.708	19.707			19.669	19.940	19.820	19.810	1.000	
<i>gem-4</i>	23.002	23.040	23.109	23.050	0.098	0.487	22.669	22.940	22.820	22.809	0.125	0.508
<i>nhx-2</i>	22.983	22.474	22.729	22.729	0.123	0.609	22.646	22.448	22.553	22.549	0.149	0.609
<i>pkc-3</i>	22.231	22.537	22.346	22.371	0.158	0.780	22.098	22.157	22.241	22.165	0.195	0.794
<i>par-3</i>	23.258	23.159	23.289	23.236	0.087	0.429	23.004	23.016	23.209	23.076	0.103	0.422
<i>dlg-1</i>	23.247	23.351	23.300	23.299	0.083	0.410	23.152	23.152	23.159	23.154	0.098	0.400
<i>ajm-1</i>	23.113	22.889	22.963	22.988	0.103	0.509	22.737	22.763	22.968	22.822	0.123	0.504
<i>nfm-1</i>	22.239	22.554	22.249	22.347	0.160	0.793	22.137	22.136	22.142	22.138	0.198	0.809
<i>abts-4</i>	23.877	23.974	24.220	24.024	0.050	0.248	23.956	23.876	23.922	23.918	0.058	0.236
<i>erm-1</i>	23.068	22.984	22.963	23.005	0.102	0.503	22.825	22.821	22.782	22.809	0.125	0.508
<i>eps-8</i>	22.654	22.762	22.765	22.727	0.123	0.610	22.493	22.649	22.545	22.563	0.148	0.603
<i>act-5</i>	22.006	21.993	22.031	22.010	0.202	1.002	21.828	21.834	21.837	21.833	0.245	1.000
<i>ifb-2</i>	22.643	22.726	22.736	22.702	0.125	0.621	22.543	22.534	22.496	22.524	0.152	0.619
<i>par-6</i>	22.763	22.641	22.698	22.701	0.125	0.621	22.483	22.513	22.603	22.533	0.151	0.616
<i>sod-2</i>	22.417	22.345	22.354	22.372	0.158	0.780	22.126	22.124	22.321	22.190	0.191	0.781
<i>sod-3</i>	23.300	23.304	23.279	23.294	0.083	0.412	23.070	23.055	23.143	23.089	0.103	0.419
<i>clk-1</i>	23.423	23.415	23.477	23.438	0.075	0.372	23.234	23.160	23.211	23.202	0.095	0.387
<i>isp-1</i>	23.218	23.322	23.321	23.287	0.084	0.414	23.130	23.031	23.189	23.117	0.101	0.411
<i>gas-1</i>	22.272	22.585	22.282	22.380	0.157	0.776	22.131	22.123	22.235	22.163	0.195	0.796
<i>mev-1</i>	23.582	23.584	23.587	23.584	0.068	0.337	23.396	23.397	23.398	23.397	0.083	0.338

Table S2 Information on genes required for intestinal development in *C. elegans*

Gene	Products of the genes
<i>gem-4</i>	Ca ²⁺ -dependent phosphatidylserine binding protein
<i>nhx-2</i>	sodium/proton exchanger
<i>pkc-3</i>	atypical protein kinase
<i>par-3</i>	PDZ domain-containing protein orthologous
<i>erm-1</i>	ortholog of the ERM family of cytoskeletal linkers
<i>eps-8</i>	homolog of mouse epidermal growth factor receptor kinase substrate
<i>act-5</i>	ortholog of human cytoplasmic actin
<i>ifb-2</i>	nonessential intermediate filament protein
<i>dlg-1</i>	MAGUK protein
<i>ajm-1</i>	member of the apical junction molecule class
<i>nfm-1</i>	homolog of human merlin/schwannomin (NF2)
<i>abts-4</i>	anion transporter

Table S3 Data analysis of the C1s XPS of G-COOH and GO

Chemical bonds	GO		G-COOH	
	BE(eV)	AC(at.%)	BE(eV)	AC(at.%)
C=C/C-C	284.6	43.63	284.6	47.25
C-O	286.7	50.35	286.7	51.35
C=O	287.9	3.88	/	/
O-C=O	288.8	2.13	288.6	1.41

BE: binding energy; AC: content in total carbon.

Table S4 Information for the used strains

Strain	Genotype	Description
N2	Wild-type	
EG1285	<i>lin-15B(n765)oxIs12</i> [<i>Punc-47::GFP</i> + <i>lin-15(+)</i>]	Expression of GFP in GABAergic neurons
SJ4143	<i>zcls17[ges-1::GFP(mit)]</i>	Expression of GFP in mitochondria of intestinal cells
SJ4144	<i>zcls18[ges-1::GFP(cyt)]</i>	Expression of GFP in cytosol of intestinal cells
VS15	<i>hils8[Pges-1::GFP-PTS1]</i>	Expression of GFP in peroxisomes of intestinal cells
VS17	<i>hils9[Pges-1-glo-1::GFP</i> + <i>unc-119(+)</i>]	Expression of GFP in lysosomes of intestinal cells

Table S5 Primers used for quantitative real-time polymerase chain reaction (PCR)

Gene	Forward primer	Reverse primer
<i>tba-1</i>	TCAACACTGCCATCGCCGCC	TCCAAGCGAGACCAGGCTTCAG
<i>gem-4</i>	CACGGTGGTCAACAGTAT	TTGTATTTGGCACCTTTC
<i>nhx-2</i>	GGAGCAGAATGTGAAGAA	GTGGCGGAAGTAGATAAA
<i>pkc-3</i>	CGTCTCCGACATCATTAG	CAACTCGGCTTCTTGACT
<i>par-3</i>	AAGCGTAACTGTCAACCA	CCGTCTATAACATCCTCC
<i>par-6</i>	ATTCTGCGTCTGGTGTCT	TTCCCTTCCATCGTTTAT
<i>erm-1</i>	TCCACGACTCCGTATCAA	TCCTGCTCGGCAATCTTA
<i>eps-8</i>	ACGCAGTGACGGTAGAAG	AGCGGATACACGGATACA
<i>act-5</i>	GGGAGTGATGGTCGGTAT	CGGTAAGGAGAACTGGGT
<i>ifb-2</i>	TCAAGGCTGAATACGACA	TCCAAAGCAGAGTTACGG
<i>dlg-1</i>	TTGAAACGGCGTAAAGAT	CGTGATGAACTGGTGGTG
<i>ajm-1</i>	GTCAATCAGTTCGTCCCG	ACTCGTCCGATGGTGTCT
<i>nfm-1</i>	ATTACGGAGGATCTGGTA	TCATCGTCGTGAACTTAT
<i>abts-4</i>	CTCAGACTACAGGGATGG	GTGCCTGACTCACAAGAC
<i>sod-2</i>	GGCATCAACTGTCGCTGT	ACAAGTCCAGTTGTTGCC
<i>sod-3</i>	TGACATCACTATTGCGGT	GGGACCATTCTTCCAAA
<i>gas-1</i>	CTTGGTCTTTGGCTGTTGA	CTTGGTCTTTGGCTGTTGA
<i>isp-1</i>	GCAGAAAGATGAATGGTCC	CAGAAGCGTCGTAGTGAGA
<i>mev-1</i>	GGAATTCGCTTCTTAGGAT	GCAGTCTTGTTGCTCTTGT
<i>clk-1</i>	CACATACTGCTGCTTCTCGT	TGAACCAACAGATGAACCTT