

Electronic Supplementary Information

**Ginsenoside extract from ginseng extends lifespan and health span in
*Caenorhabditis elegans***

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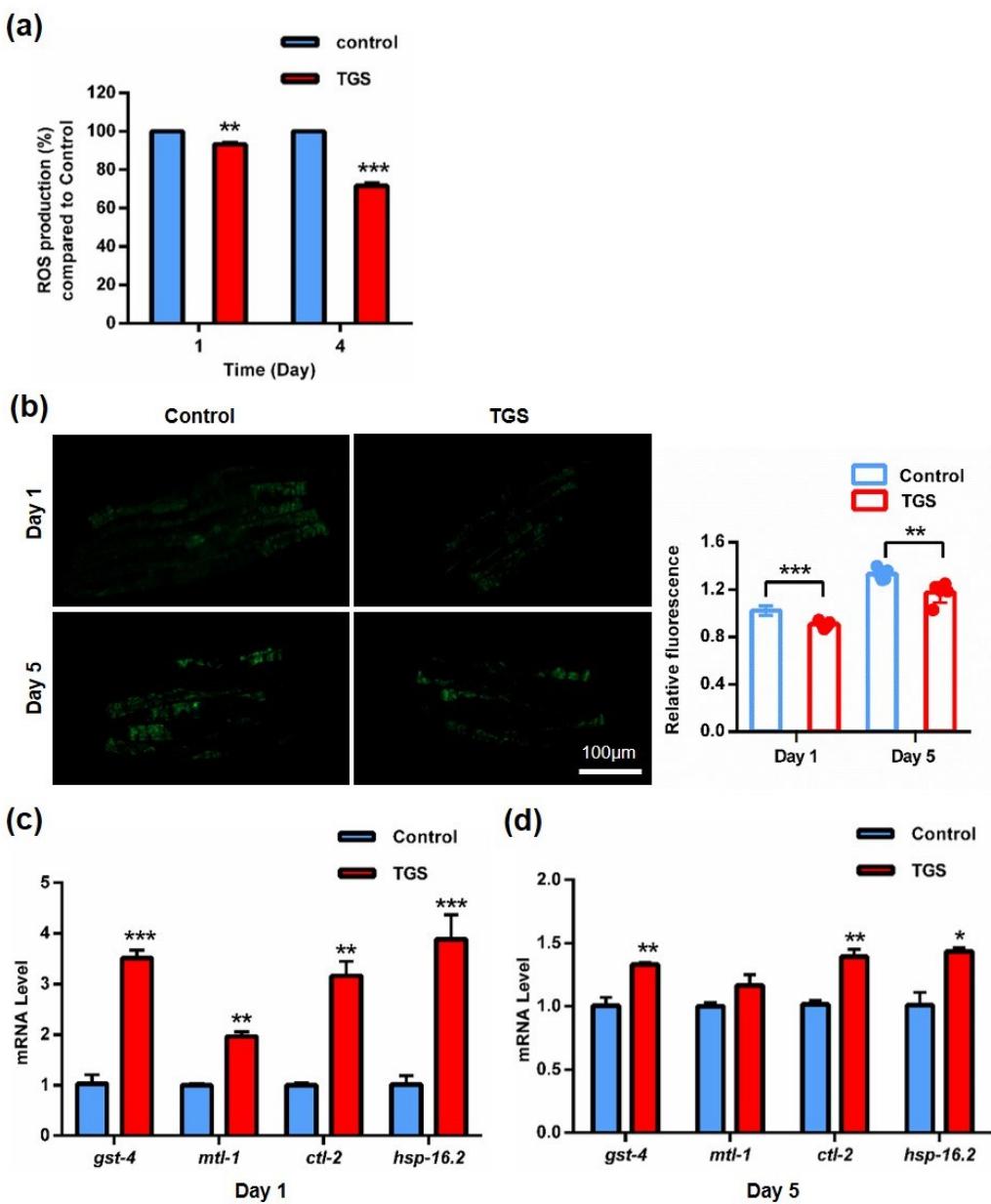
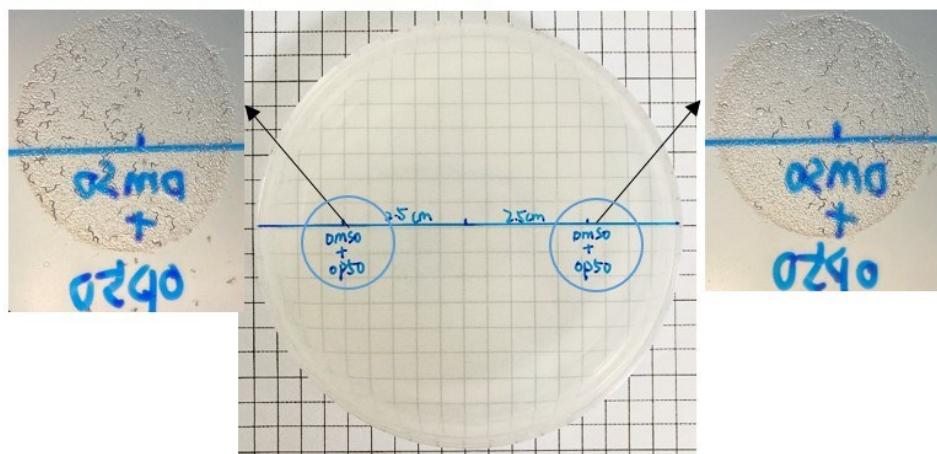
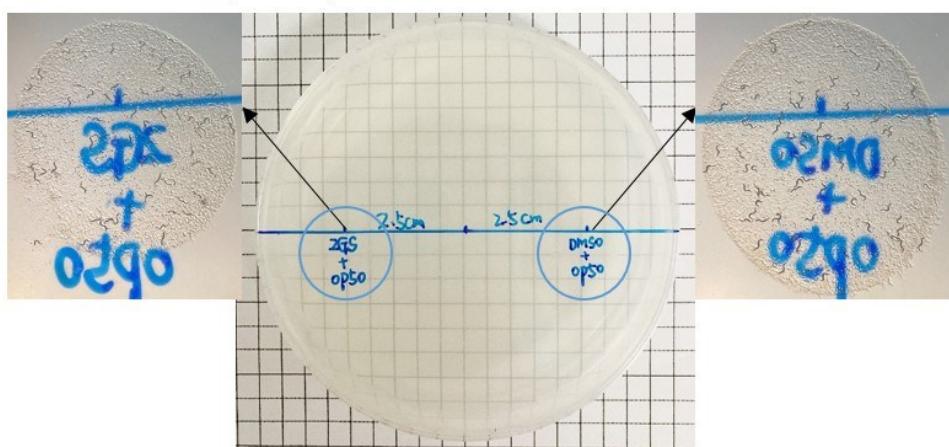


Figure S1. TGS enhanced antioxidant effect without time limitation. **(a, b)** The ROS levels in lysed and living worms were reduced by TGS treatment for 24 h from L4 or day 4 of adulthood, scale bar=100 μ m, mean \pm SD, ** p < 0.01, *** p < 0.001, Student's *t* test; **(c, d)** the mRNA levels of target antioxidative genes, such as *gst-4*, *mtl-1*, *ctl-2*, and *hsp-16.2* were significantly induced when worms treated with TGS (0.2 mg/mL) for 24 h from L4 or day 4 of adulthood, compared with the control, mean \pm SD, * p < 0.05, ** p < 0.01, *** p < 0.001, Student's *t* test. Control: DMSO.

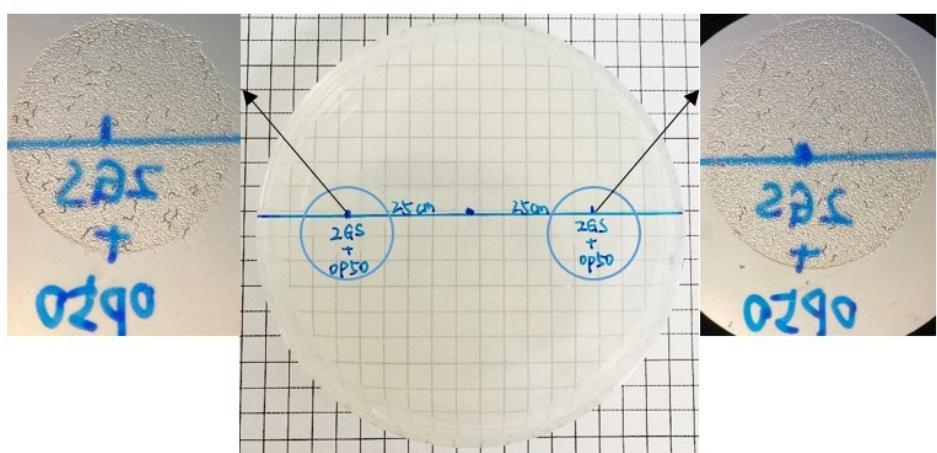
(a) Control (DMSO) vs Control (DMSO)



(b) TGS vs Control (DMSO)



(c) TGS vs TGS



Figur

e S2. Actual images of worm distribution on the plate in different conditions, including Control (DMSO) vs Control (DMSO), TGS vs Control (DMSO), and TGS vs TGS.

Table S1 Effect of TGS on the lifespan of wild-type *C. elegans* (N2) at different stage

Culture conditions	Mean ±SD (days)	Maximum Lifespan (days)	Changes (%)	P-values	Number
Egg to end					
DMSO	21.46 ± 0.43	30			181
TGS 0.1mg/mL	21.67 ± 0.39	30	0.98%	n.s.	163
L4 to end					
DMSO	20.20 ± 0.91	29			165
TGS 0.1mg/mL	21.06 ± 0.89	31	4.3%	n. s.	200
Day 4 to end					
DMSO	21.46 ± 0.43	30			181
TGS 0.1mg/mL	22.74 ± 0.49	34	5.96%	0.038*	178
Day 8 to end					
DMSO	20.20 ± 0.91	29			165
TGS 0.1mg/mL	21.32 ± 1.03	30	5.5%	n. s.	196
Day 4 to end					
DMSO	19.9 ± 0.89	27			190
TGS 0.1 mg/mL	21.18 ± 0.81	29	6.45%	0.035*	162
TGS 0.2 mg/mL	22.69 ± 0.82	33	14.02%	0.023*	216
TGS 0.4 mg/mL	22.05 ± 0.86	32	10.8%	0.044*	210

n. s.: no significance.

Table S2 Survival rate of worms under oxidative stress tBHP 7 mM

Culture conditions	Mean ±SD (hours)	Changes (%)	P-values	Number
DMSO	6.623 ± 0.16			118
TGS 0.2 mg/mL	8.492 ± 0.26	28.22%	< 0.001***	121

Table S3 Effect of TGS on the lifespan of mutant *C. elegans* from day 4 until death

Strains and culture conditions	Mean ±SD (days)	Maximum Lifespan (day)	Changes (%)	P-values	Number
<i>skn-1(zu67)</i>					
DMSO	15.37 ± 0.65	23			104
TGS-0.2 mg/mL	17.4 ± 0.57	24	13.2%	0.02*	127
<i>skn-1(zu135)</i>					
DMSO	17.54 ± 0.83	24			108
TGS-0.2 mg/mL	16.74 ± 0.61	24	-0.046%	n. s.	138
<i>sir-2.1(ok434)</i>					
DMSO	23.45 ± 0.68	34			107
TGS-0.2 mg/mL	24.06 ± 0.66	36	2.6%	n. s.	95
<i>daf-16(mu86)</i>					
DMSO	19.2 ± 0.43	27			143
TGS-0.2 mg/mL	19.25 ± 0.41	27	0.26%	n. s.	130

n.s.: no significance.

Table S4 Worm primer sequences for quantitative real-time PCR analysis

Gene name	Primer sequences
<i>gst-4</i>	Forward primer-TGCTCTTGCTGAGCCAATCCGT
<i>gst-4</i>	Reverse primer-CCAGCGAGTCAAATTCTTGCCA
<i>sir-2.1</i>	Forward primer-TTCTTGTTGACTGGCGCT
<i>sir-2.1</i>	Reverse primer-GTCCTGGAAAGATTCTCTCG
<i>hsp-6</i>	Forward primer-GGATGCTGGACAAATCTG
<i>hsp-6</i>	Reverse primer-ACAGCGATGATCTTATCTCA
<i>hsp-60</i>	Forward primer-AAGGATATGGGAATTGCGACGGGA
<i>hsp-60</i>	Reverse primer-TGTGCTCGATTGCTTCTCGATCT
<i>sod-3</i>	Forward primer-CTAAGGATGGTGAACCTTCA
<i>sod-3</i>	Reverse primer-CGCGCTTAATAGTGTCCATCAG
<i>mtl-1</i>	Forward primer-ATGGCTTGCAAGTGTGACTGAAAAACAAGC
<i>mtl-1</i>	Reverse primer-TTAATGAGCCGCAGCAGTCCCTGGTGTGATGGG
<i>rgs-10</i>	Forward primer-TAGTGATTCTGGAGCGTGTG
<i>rgs-10</i>	Reverse primer-TGGACGGAAGTTCAATTAGAGC
<i>ctl-1</i>	Forward primer-GACGTATCAAAACCCAAAGTG
<i>ctl-1</i>	Reverse primer-TTGGCATGAACGACACGCTC
<i>ctl-2</i>	Forward primer-TTCCGATCGAGGACTCCAG
<i>ctl-2</i>	Reverse primer-CTTCACTCCTTGAGTTGGCTTG
<i>ctl-3</i>	Forward primer-CCCACATGGTCAATCTAACGGT
<i>ctl-3</i>	Reverse primer-GGAGCTCCATTGGATGTGGT
<i>hsp-16.2</i>	Forward primer-CTGCAGAATCTCTCCATCTGAGTC
<i>hsp-16.2</i>	Reverse primer-AGATTGAAAGCAACTGCACC
<i>nd-1</i>	Forward primer-AGCGTCATTATTGGGAAGAAGAC
<i>nd-1</i>	Reverse primer-AAGCTTGTGCTAATCCATAATGT
<i>act-3</i>	Forward primer-TGCGACATTGATATCCGTAAAGG
<i>act-3</i>	Reverse primer-GGTGGTTCTCCGGAAAGAA
<i>MTCE.26</i>	Forward primer-GGTGGTTCTCCGGAAAGAA
<i>MTCE.26</i>	Reverse primer-CAGGGTGCCCCATTGTTCTT
<i>act-1</i>	Forward primer-CTACGAACCTCCTGACGGACAAG
<i>act-1</i>	Reverse primer-CCGGCGGACTCCATACC
<i>Y45F10D.4</i>	Forward primer-GTCGCTTCAAATCAGTTCAAGC
<i>Y45F10D.4</i>	Reverse primer-GTTCTTGTCAAGTGTGATCCGACA

Table S5 Survival rate of worms under oxidative stress tBHP 7 mM

Culture conditions	Mean ± SD (hours)	Changes (%)	P-values	Number
DMSO	6.723 ± 0.16			118
TGS 200 µg/mL	8.682 ± 0.26	29.14%	< 0.001***	121
Rg2 41 µg/mL	6.835 ± 0.51	1.67%	n.s.	109
Rg1 34.0 µg/mL	7.632 ± 0.39	13.5%	< 0.05*	113
Re 24.5 µg/mL	7.483 ± 0.20	11.30%	< 0.05*	123
Rb1 20.0 µg/mL	7.571 ± 0.33	12.61%	< 0.05*	105
Rh2 3.0 µg/mL	6.962 ± 0.42	3.55%	n.s.	100
Rd 2.5 µg/mL	6.959 ± 0.79	3.51%	n.s.	102
Rc 2.0 µg/mL	7.082 ± 0.19	5.34%	n.s.	129
Rh1 0.5 µg/mL	6.983 ± 0.67	3.86%	n.s.	115

n.s.: no significance.