

Fig. S1 Low concentrations of AgNPs and AgNO₃ have no toxic effects. Flies were treated with AgNPs or AgNO₃ at low concentrations (0, 1 and 5 µg/ml); (a) pupation rate and (b) eclosion rates were calculated. All results were determined from three independent experiments with 50 flies per group. (c) The flies were dissected and stained with an antibody against cleaved caspase 3 (green) at wandering 3rd instar. Quantification of cleaved caspase 3 signals in (d) brain and (e) gut. n.s. indicates no statistically significant difference between control (0 µg/ml) and AgNP or AgNO₃ exposure groups. The immunostaining assay was performed with 3-6 flies per group. All results were determined from three independent experiments. AgNPs, silver nanoparticles; AgNO₃, silver nitrate; n.s., not significant.

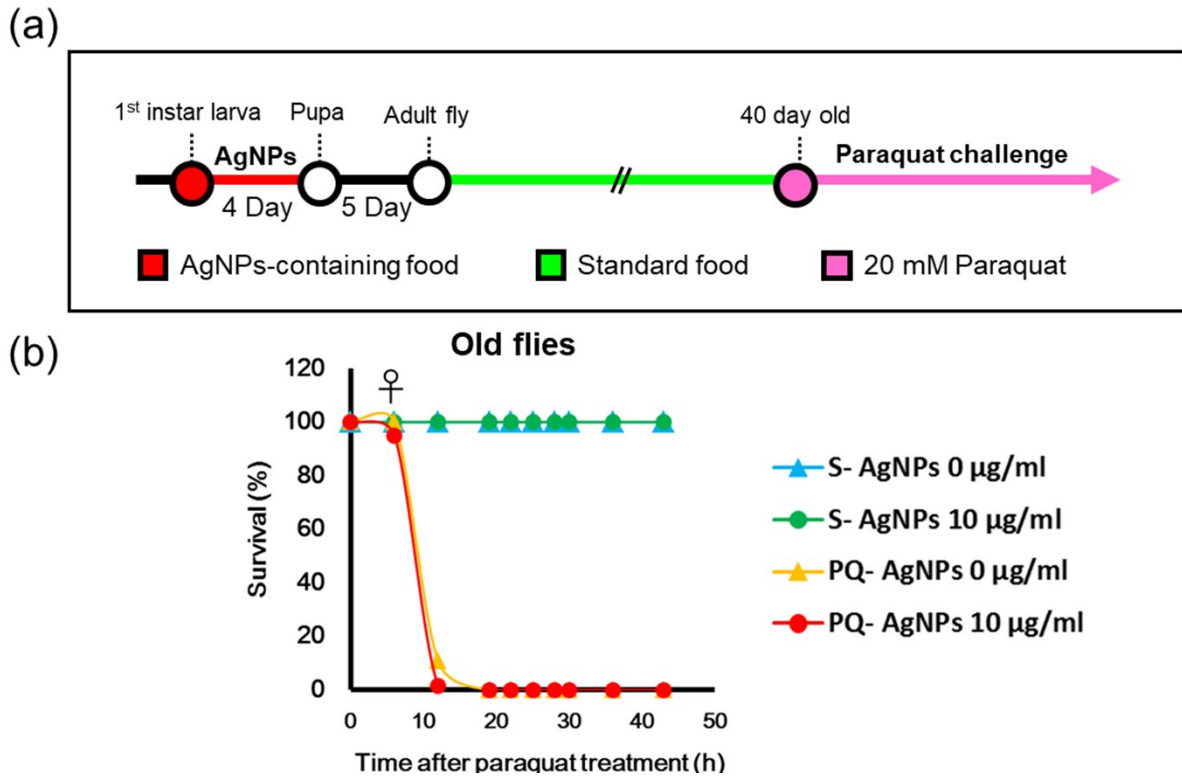


Fig. S2 Old animals are vulnerable to acute ROS stress. Experimental design (a) and results (b) of paraquat challenge assay in old female flies (6 weeks) with or without AgNP treatment; $n=100-120$ flies/group. S represents 5% sucrose; PQ represents 20 mM paraquat in 5% sucrose. AgNP, silver nanoparticle; ROS, reactive oxygen species.

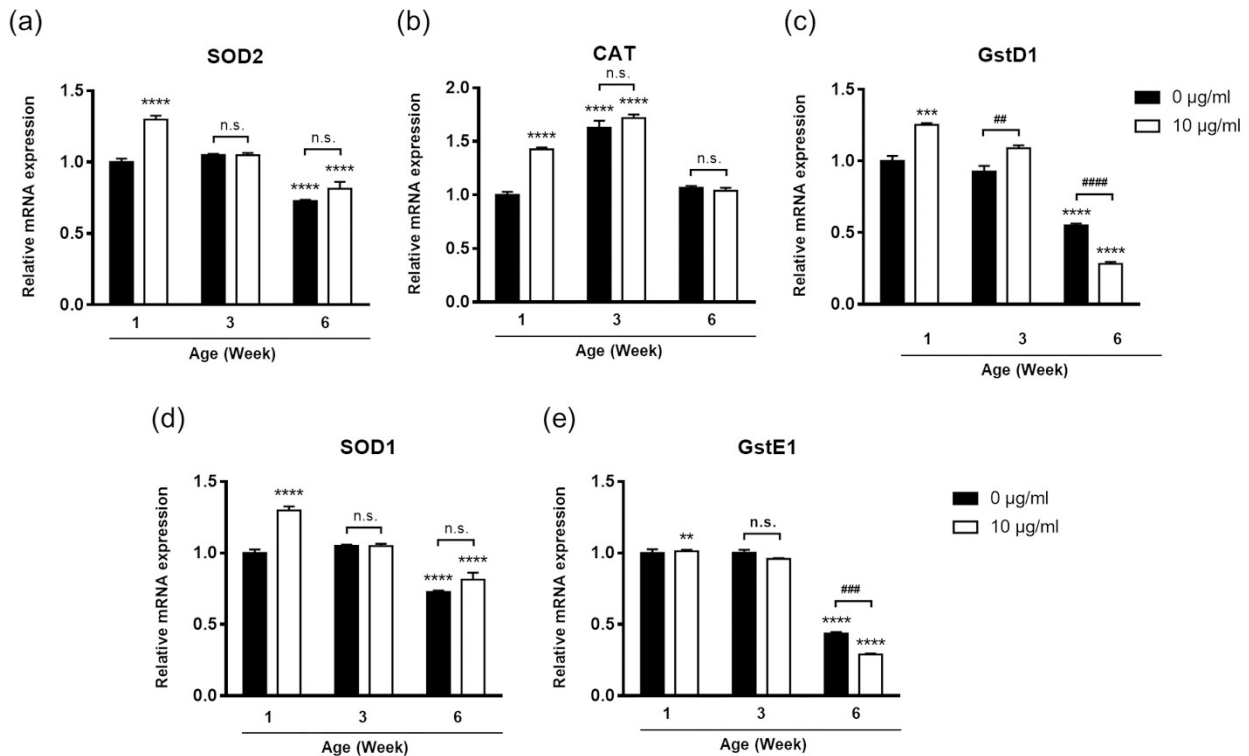
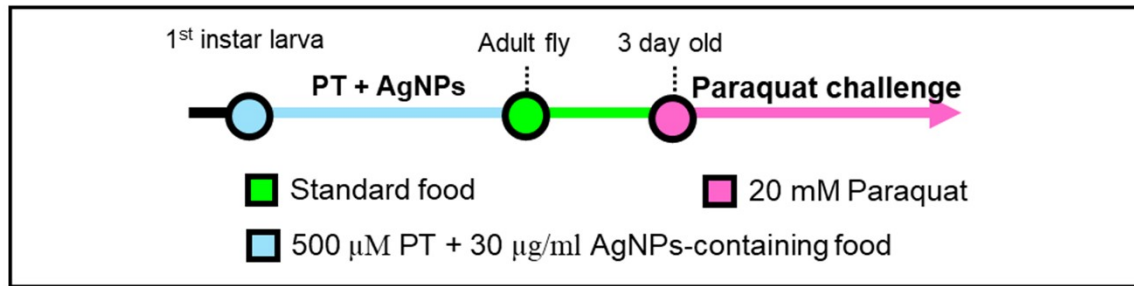


Fig. S3 Antioxidant gene expression in AgNP-treated female flies during aging. (a-e) Antioxidant gene mRNA expression in female flies at weeks 1, 3, and 6, $n=10$ flies/group. All results represent data from three independent experiments. ** $P<0.01$, *** $P<0.001$, and **** $P<0.0001$ indicate statistically significant differences between the week 1 control group and other groups. ### $P<0.01$, #### $P<0.001$, and ##### $P<0.0001$ indicate statistically significant differences between the 0 $\mu\text{g/ml}$ control and AgNP exposure groups at weeks 3 or 6. n.s. indicates no statistical significance. CAT, catalase; GstD1, glutathione S transferase D1; GstE1, glutathione S transferase E1; SOD1, superoxide dismutase 1; SOD2, superoxide dismutase 2.

(a)



(b)

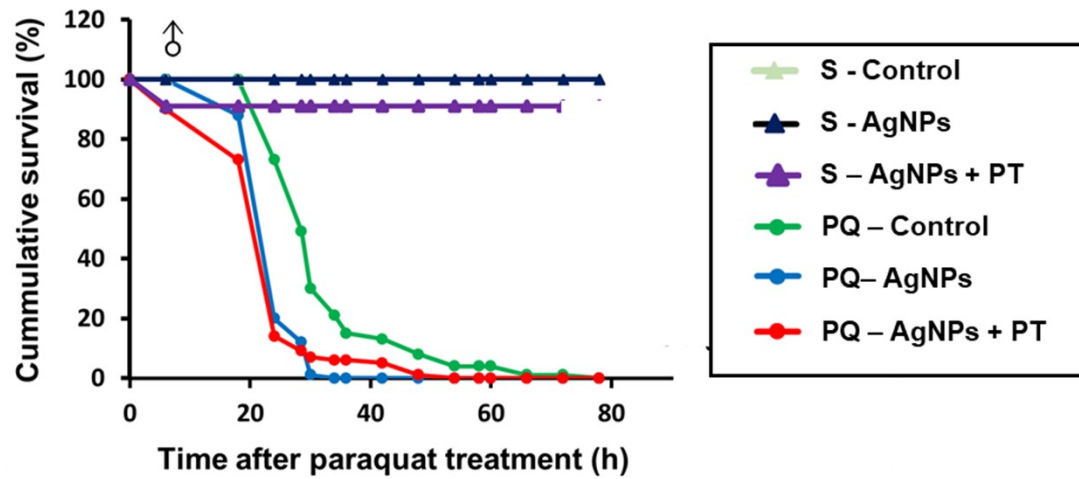


Fig. S4 The effects of PT on ROS resistance of AgNP-treated male flies. (a-b) Male flies were exposed to 30 μ g/ml AgNPs, with or without 500 μ M PT, $n=100-120$ flies/group. ROS resistance was measured via the paraquat challenge assay. All results represent data from three independent experiments. S represents 5% sucrose; PQ represents 20 mM paraquat in 5% sucrose. AgNPs, silver nanoparticles; PT, pterostilbene; ROS, reactive oxygen species.

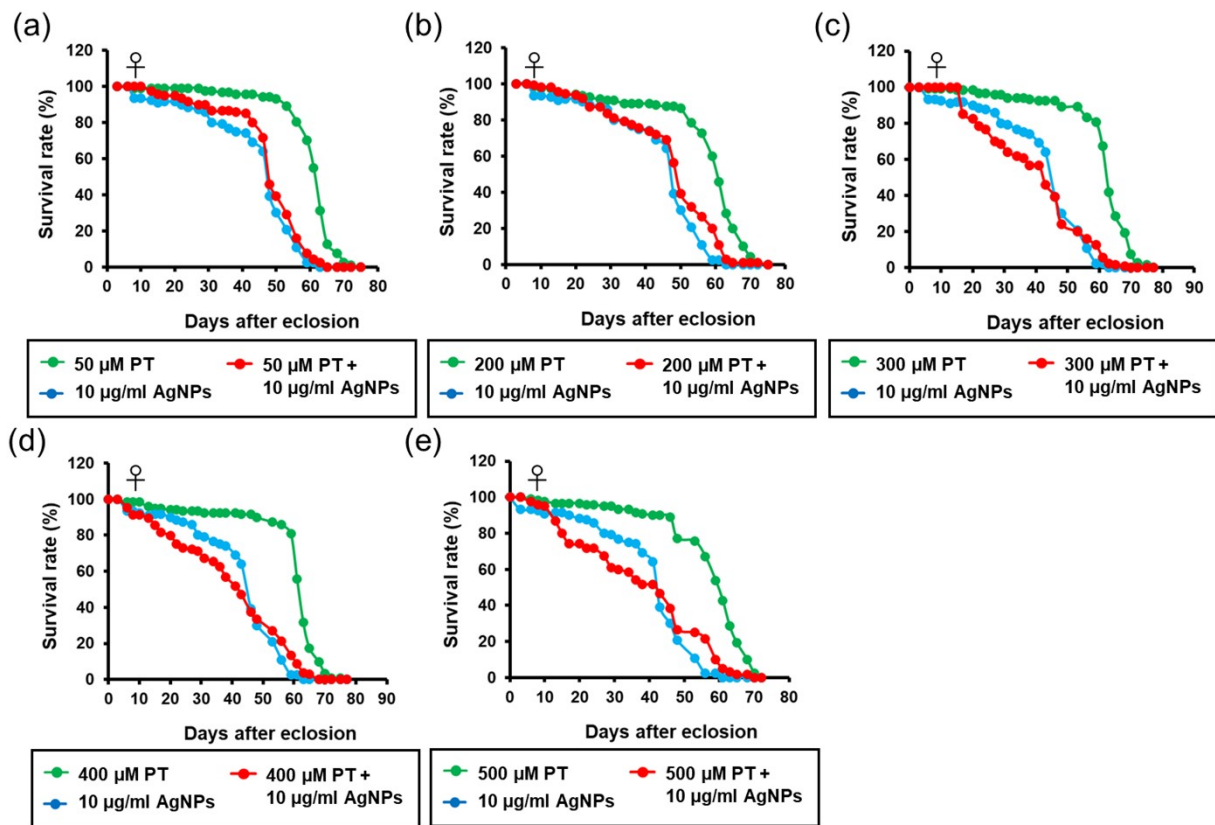


Fig. S5 PT at optimal concentration alleviates AgNP-induced lifespan reduction. Survival rates of flies treated with (a) 50, (b) 200, (c) 300, (d) 400, or (e) 500 μM PT, with or without 10 $\mu\text{g/ml}$ AgNPs. $n=100-120$ flies/group. All results were determined from three independent experiments. AgNPs, silver nanoparticles; PT, pterostilbene.