Selenite-Induced Expression of a *Caenorhabditis elegans* Pro-Aging Factor and Ortholog of Human Selenium-Binding Protein 1

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Background: The essential trace element and micronutrient selenium exerts most of its biological actions through incorporation into selenoproteins as selenocysteine. Two further types of Se-containing proteins exist, including those that have selenomethionine incorporated instead of methionine, and the group of selenium-binding proteins. We previously described an ortholog of selenium-binding protein 1 (SELENBP1) in the nematode *Caenorhabditis elegans*, Y37A1B.5, and demonstrated that it confers resistance to toxic selenite concentrations while impairing general stress resistance and life expectancy of *C. elegans*.

Objective: We tested for the effect of selenite on *Y37A1B.5* expression, and we analyzed whether *Y37A1B.5* also shows a lifespan-modulating effect when the nematodes are deficient in the selenoenzyme thioredoxin reductase-1 (TRXR-1).

Methods: *C. elegans* expressing a translational reporter construct encoding GFP-tagged Y37A1B.5 under the control of the *Y37A1B.5* promoter were exposed to selenite, followed by fluorescence microscopic analysis of GFP levels. Lifespan analyses and RNA interference experiments were performed in *trxr-1*-deficient worms.

Results: We here demonstrate that selenite at toxic concentrations stimulates the expression of the translational *Y37A1B.5* reporter. The lifespan-extending effect of *Y37A1B.5* deficiency was preserved upon the deletion of the only selenoprotein in *C. elegans*, TRXR-1.

Conclusion: These data suggest that (1) Y37A1B.5 may serve as a selenite-responsive buffer against high environmental selenium concentrations and that (2) lifespan extension elicited by *Y37A1B.5* knockdown does not require functional TRXR-1.

Keywords: Selenium-binding protein, selenite, stress signaling, *Caenorhabditis elegans*, lifespan, thioredoxin reductase.