Identification of three selenoprotein T paralogs in goldfish (Carassius auratus) and expression analysis in response to environmental stressors.

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Abstract

Selenoproteins, which contain the selenocysteine (Sec), play crucial roles in antioxidant protection. In the present study, we have identified and characterized three selenoprotein T paralogs (designated as gfSelT1a, gfSelT1b and gfSelT2) in goldfish, Carassius auratus. The SECIS element was found in the 3'-UTRs of gfSelT1a, gfSelT1b and gfSelT2 mRNA. Sequence analysis showed that they all possess the CxxU motif (where U represents Sec) in the N-terminal. Constitutive expressions of gfSelT1a, gfSelT1b and gfSelT2 were observed in all tissues studied. In liver, gfSelT1a, gfSelT1b and gfSelT2 mRNA expression levels significantly decreased when fasting and increased after re-feeding. The expressions of gfSelT1a, gfSelT1b and gfSelT2 were all inducible by cadmium exposure and H2O2-mediated oxidative stress, except the transcripts of gfSelT1b decreasing with H2O2 stimulation in brain. Furthermore, the expressions of gfSelT1a, gfSelT1b and gfSelT2 consistently increased in spleen but decreased in brain in response to heat stress. However, in liver only gfSelT1a mRNA expression significantly increased. In a word, this is the first report of the presence of three SelT genes in goldfish and their distinct expression patterns in response to environmental stressors. Our results suggest a potential involvement of gfSelT1a, gfSelT1b and gfSelT2 in host protection against environmental stressors including heavy mental, oxidative stress and heat stress in goldfish.

Keywords: Cadmium; Carassius auratus; Heat stress; Oxidative stress; Selenoprotein T; mRNA expression