

Effect of Zn and Zn/Se Interaction on Antioxidant Selenoproteins in CHO-K1 Wild Type and CHO-K1 Twenty Type Cell Lines

In-Sook Kwun^{*}, John Beattie[§], John Arthur[§]. Dept. of Food and Nutrition, Andong National University, Andong, South Korea^{*}, Cellular Integrity Division, Rowett Research Institute, Aberdeen, Scotland, United Kingdom[§]

Both zinc(Zn) and selenium(Se) have been recognized as antioxidant micronutrients which can prevent the cells from oxidative damage. Se can prevent from oxidative damage to the endothelium through the expression of intracellular selenoproteins, such as cytoplasmic glutathione peroxidase (cGPX), phospholipid glutathione hydroperoxidase (PHGPX), and thioredoxin reductase etc. As Zn being an antioxidant, we hypothesized Zn may affect and Zn/Se interaction would be synergistic on the expression of antioxidant selenoproteins. Since metallothioneine(MT) is also known as an antioxidant, two different cell types in MT expression were chosen for the study; CHO-K1, a Chinese hamster ovary cell line, wild type which has little endogenous metallothionein(MT) and CHO-K1 twenty type which expresses MT about 150 times more comparing to CHO-K1 wild type. At confluence, the cells were treated with each one of four treatments, Zn⁺, Zn⁻, Zn⁺/Se⁺ and control, and then harvested the cells after 3 days. The cells were lysed and the activity of cGPX and PHGPX were measured. Also cytosol thioredoxin reductase(cTR) expression was identified by Western blotting. Both in CHO-K1 wild type and twenty type cell lines, protein concentration was higher in the Zn⁺/Se⁺ group (11.77±0.59 mg/ml for CHO-K1 wild type and 10.69±0.48 mg/ml for CHO-K1 twenty type, p<0.05). cGPX and PHGPX activities are also higher in Zn⁺/Se⁺ group in both cell lines (0.14±0.01 units/mg protein and 4.72±0.22 units/mg protein for CHO-K1 wild type and 0.15±0.01 units/mg protein and 3.79±0.23 units/mg protein for CHO-K1 twenty type, p<0.05). There is no significance between Zn⁺ and Zn⁻ group on the activity of cGPX and PHGPX both in CHO-K1 wild type and twenty type cell lines. The expression of cytosol thioredoxin reductase couldn't show any discrepancy among the Zn⁺, Zn⁻, and Zn⁺/Se⁺ groups at this experiment.