Effect of long term selenium yeast intervention on activity and gene expression of antioxidant and xenobiotic metabolising enzymes in healthy elderly volunteers from the Danish Prevention of Cancer by Intervention by Selenium (PRECISE) Pilot Study - DTU Orbit (18/03/2019)

Numerous mechanisms have been proposed to explain the anti-carcinogenic effects of Se, among them altered carcinogen metabolism. We investigated the effect of Se supplementation on activities of glutathione peroxidase (GPX), glutathione reductase (GR) and glutathione S-transferase (GST) in different blood compartments, and expression of selected phase 1 and phase 2 genes in leucocytes (GPX1, gamma-glutamylcysteine ligase catalytic subunit (GCLC), AP-1 transcription factor Fos-related antigen 1 (Fra1), NAD(P)H:quinone oxidoreductase (NQO1), and aryl hydrocarbon receptor repressor (AhRR)). Healthy elderly Danes (n 105; age 71.3 (SD 4.26) years; 36% reporting use of multivitamin/mineral supplements) participated and were supplemented daily for 5 years with placebo, 100 μg, 200 μg or 300 μg Se as Se-enriched yeast (SelenoPrecise (R)). Blood samples were collected after 5 years of intervention. When all four groups were compared we found no effect of Se supplementation on plasma GPX or GR, on erythrocyte GPX, GR or GST, or on thrombocyte GR or GST. We found increased thrombocyte GPX activity at the two highest dosage levels in women only, but not in men. No effects on GPX1, NQO1 or AhRR gene expression were found. When all Se-supplemented groups were pooled we found significant down regulation of the expression of some phase 2 genes (GCLC, Fra1). A significant increase in AhRR gene expression with smoking was found but was independent of Se supplementation. Down regulation of phase 2 genes could increase the risk of cancer. However, further studies are needed to establish whether the observed effect in leucocytes reflects a similar expression pattern in target tissues.