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INTERACTIONS BETWEEN ISOTHIOCYANATE AND SELENIUM IN THE UP-REGULATION OF ANTIOXIDANT ENZYMES

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Selenium (Se) is an essential trace element for humans. There are at least 25 seleno proteins in the human body that play fundamental roles in anti oxidation, anti inflammation and homeostasis. Selenoproteins, such as thioredoxin reductase 1 (TrxR-1) and glutathione peroxidase 2 (GPX2), have antioxidant responsive elements (ARE) in their gene promoters. Nuclear factor E2 - related factor 2 (Nrf2) binds to the ARE and consequently upregulates the expression of more than 100 genes and most of them possess antioxidant properties. Dietary isothiocyanates (ITCs) are potent activators of the Nrf2-ARE pathway. When human hepatocytes are exposed to ITCs such as sulforaphane (SFN) derived from dietary glucosinolates found in broccoli and cauliflower, TrxR-1 and GPX2 are up-regulated at the mRNA level, whereas co treatment of cells with SFN and Se results in synergistic effects on the expression of these seleno proteins at the mRNA, protein and activity levels. Having identified the synergy between SFN and Se, their beneficial effects were investigated in relation to protection against free radical and toxic nanoparticle mediated cell death in various cell types, as well as against Coxsackie virus induced myocardopathy in a mouse model. A potential health benefit from the dietary combination of SFN and Se is that Se can be

effective at lower concentrations. This eliminates the need for high doses of Se, which have been associated with increased risks of type II diabetes in adequate Se intake populations. The benefits and risks of isothiocyanate intake will also be discussed since the relationship between dose and response is often J- or U-shaped. We believe that the potential benefits of dietary isothiocyanates are determined not only by their dose, but also by their interactions with other nutrients.

Biography

Yongping Bao is a Reader in Nutritional Biochemistry at the Norwich Medical School, University of East Anglia (UEA). His research interests centre on the bioactivity of dietary phytochemicals with particular emphasis on the mechanisms of isothiocyanates for cancer prevention and interactions between these compounds and minerals. Before joining the Norwich Medical School, UEA in 2005, he was a Senior Scientist (Team Leader) at the Institute of Food Research, Norwich. He was awarded PhD in Biochemistry from UEA in 1996, after originally graduating from the Harbin Medical University in China with a M B in Preventative Medicine (1983). He has published >80 papers with total citations >3000 times. He is also a Fellow of the Royal Society of Chemistry (FRSC) since 2009.

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