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Chemopreventive activity of glucosinolates

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Glucosinolates are a major class of phytochemicals encountered in substantial amounts in cruciferous vegetables, and are believed to be responsible for the chemopreventive activity associated with the intake of these vegetables. When the vegetable is disturbed, as for example during mastication, the enzyme myrosinase comes into contact with the glucosinolates converting them to isothiocyanates that are believed to mediate their chemopreventive activity. Indeed, laboratory studies in animal models of cancer have revealed that isothiocyanates can antagonise the carcinogenicity of chemicals and suppress tumorigenicity in many tissues. A principal mechanism of action of isothiocyanates is to prevent DNA damage by limiting the levels of reactive intermediates of chemical carcinogens, primarily through increasing their detoxication by enzymes such as glutathione S-transferase, quinone reductase and glucuronosyl transferase. The realisation that glucosinolates can reach the systemic circulation intact (i.e. unmetabolised) led us to investigate, utilising precision-cut tissue slices, whether they also possess biological activity. The glucosinolate glucoraphanin could modulate cytochromes P450 and phase II enzyme systems, in particular epoxide hydrolase, in both liver and lung, but in most cases it was generally less effective when compared with sulforaphane, its corresponding isothiocyanate. Pharmacokinetic studies in rats established that sulforaphane was well absorbed and achieved high bioavailability; however, its pharmacokinetic behaviour was dose-dependent. Similarly in human volunteers, sulforaphane was rapidly absorbed following the intake of uncooked liquidised broccoli, with maximum concentrations being achieved in about an hour. Repeated intake of broccoli had no impact on the pharmacokinetic behaviour of sulforaphane.

Biography

Costas Ioannides was awarded a PhD degree from the University of Surrey, UK and a DSc degree from the University of Liverpool, UK. He is currently Professor of Mechanistic Toxicology at the University of Surrey. He has published more than 300 papers and reviews in peer-reviewed journals and has edited/co-edited 10 books in the areas of drug and xenobiotic metabolism and how these are modulated by nutrition. He is currently the Editor-in-Chief of the journal '*Xenobiotica*'.

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