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Modulation of Glutathione S-Transferase by a Vegetable-Derived Carbazole in Murine Hepatoma Cells

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ABSTRACT

The purpose of the present study was to examine the role of indolo[3,2-*b*]carbazole (ICZ), an indole derived from cruciferous vegetables, on the regulation of glutathione S-transferase (GST) in 2 hepatoma cell lines, murine Hepa-1 and human HepG2. The results indicate that cellular total GST activities increased with increasing concentrations of ICZ in Hepa-1 cells. Western blot analyses showed that the corresponding isoenzyme GST-α protein tended to increase with increasing ICZ concentrations in Hepa-1 cells, whereas the isoenzyme proteins, GST-μ and GST-π, seemed to be suppressed by ICZ treatment. Therefore, increased levels of the GST-α protein may contribute to augmentation of total GST activities in Hepa-1 cells. On the contrary, no such induction of total GST activities was observed in HepG2 cells. Thus, the Hepa-1 cell line seems to be a better model to study the regulation of the GST by ICZ. The increased GST activity may explain, at least in part, the anticarcinogenic effect of cruciferous vegetables. (N. Taipei J. Med. 2001; 3:262-269)

INTRODUCTION

There is accumulating evidence which indicates that increased consumption of fruits and vegetables may provide protection against many cancers.[1] The anticarcinogenic effects of these plant foods are due not only to their abundant nutrients, but also to the plentiful phytochemicals, a group of non-nutritive components that possess health-promoting activity.[2,3] It has been reported that modification of xenobiotic-metabolizing enzymes is closely associated with their anticarcinogenic effect.[4] Two phases of xenobiotic-metabolizing enzymes, phase I and phase II, are involved in the biotransformation of lipophilic xenobiotics, including carcinogens, into more polar metabolites for their excretion. Phase I enzymes consisting of cytochrome P450 (CYP)-dependent monooxygenases introduce a functional group such as -OH into the substrate. Phase II enzymes such as glutathione S-transferase (GST) mediate conjugation or synthetic reactions to make phase I metabolites more water soluble, thus facilitating the elimination of lip-

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