

Glucosinolates in cancer prevention

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Substantial amounts of glucosinolates occur in a wide variety of cruciferous vegetables, broccoli, cabbage, cauliflower, turnip, radish and watercress. When the vegetable is chewed or otherwise damaged, the enzyme myrosinase is released from a separate cellular compartment and hydrolyzes the glucosinolate-producing isothiocyanates, as well as other products. Some isothiocyanates have been found to prevent cancer in laboratory animals treated with carcinogens and to exert from their favorable effects on carcinogen metabolism, by blocking carcinogen metabolic activation and enhancing carcinogen detoxification. Many isothiocyanates have one type of activity or the other, and some have both. More recently, some different effects were demonstrated for isothiocyanates: they exert cytostatic and cytotoxic effects on human colon cancer cells *in vitro*, inhibit cell growth by cell-cycle arrest and remove premalignant and malignant cells through activation of apoptosis in human colon and prostate cancer cells. We investigated the response to different isothiocyanates *in vitro* of T-leukemia cells and individuated some of the molecular pathways that are triggered by them. To help elucidate whether the effects of these compounds are specific for cancer cells, we studied the isothiocyanates also on freshly isolated, non-transformed human peripheral T lymphocytes. We demonstrated that the effects of isothiocyanates are similar in transformed cell lines and consist of derangements in critical points of cell-cycle control through a modulation of the expression and activation of some cyclins and cyclin-dependent kinase. Moreover, they induce apoptosis, associated with an increase of p53 and bax, but not bcl-2, protein expression. The effects of isothiocyanates are completely different on non-transformed human T lymphocytes. In fact, some isothiocyanates [i.e. 4-(methylthio)butylisothiocyanate] are inactive whereas others (i.e. sulforaphane) are able to induce effects similar to those recorded on transformed cell lines. This means that the effects of some isothiocyanates are not selective for tumor cells. Thus, any chemopreventive use of isothiocyanates would have to be very carefully examined, because dietary supplementation with single, putative anticarcinogenic compounds is not warranted without extensive investigation of their possible harmful effects.