

嘉南藥理科技大學專題研究計畫成果報告

餵食青蔥對自發性高血壓鼠肝臟抗氧化力影響之研究

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一、Abstract

In our previous study, Welsh onion (*Allium fistulosum* L., Alliaceae), an important flavoring vegetable in Asian dishes, has been shown the effect of lowering blood pressure, modulating aortic vascular tone and inhibiting platelet aggregation. There is no previous report concerning if Welsh onion can modulate antioxidant enzyme activities or GSH level. In this study, spontaneously hypertensive (SHR) and normotensive (WKY) rats were fed with Welsh onion extract for 28 days, and the body weight, blood pressure, the level of hepatic oxidative damage and antioxidant enzyme activities were compared between the fed and control animals. Our results showed that (1) lipid peroxidation was decreased in both SHR and WKY rats (19% and 25%, respectively). (2) The amount of GSH is not significantly changed in SHR but is increased 34% in WKY rats.

Keywords: hypertensive, Welsh onion, lipid peroxidation

二、Introduction

Under physiological conditions, there is a continuous production of reactive oxygen species (ROS), inactivated by an elaborate cellular and extracellular antioxidant defense system. Cellular antioxidants, such as glutathione (GSH), and enzymes, such as superoxide dismutase (SOD) and glutathione reductase, and food-derived antioxidants such as flavonoids and β -carotene are considered to protect tissue from oxidative free radicals. There is increasing recognition that impaired antioxidant status and increased levels of lipid peroxidation are associated with the development of hypertension and atherosclerosis.

Several recent reports have provided convincing evidence of enhanced ROS accumulation in patients with various hypertensive disorders. And, it has been suggested that increased ROS activity in rats with lead or cyclosporine-induced

hypertension. On the other hand, induction of chronic oxidative stress by GSH depletion also has been shown to cause hypertension in normal rats. Alternatively, clinical studies have shown that intravenous infusion of vitamin C or other antioxidants significantly reduced blood pressure. Hong et al. indicated that pyrrolidine dithiocarbamate and aminoguanidine ameliorated hypertension and mitigated the up-regulation of inducible nitric oxide (iNOS) in SHR. Moreover, Vaziri et al. also supported the role of oxidative stress in the genesis and compensatory regulation of the expression of iNOS in SHR. This was accompanied by and perhaps in part due to inactivation of oxidative stress by intracellular antioxidants.

On the other hand, numerous studies have indicated that garlic and onion, members of *Allium* family, may be used as anti-microbial, anti-thrombotic, anti-hypertensive, anti-hyperlipemic agent. We have reported that Welsh onion (*Allium fistulosum* L., Alliaceae), an important flavoring vegetable in Asian dishes, can lower blood pressure, modulate aortic vascular tone and inhibit platelet aggregation. However, no previous reports have appeared concerning whether Welsh onion can modulate antioxidant enzyme activities or GSH levels. For the experiments described in this paper, spontaneous hypertensive (SHR) and normotensive (WKY) rats were fed with Welsh onion extract for 28 days, and the level of hepatic oxidative damage and antioxidant enzyme activities in the treated animals were then compared with those levels and activities in untreated animals.

三、Results

After 28 days, the final body weight gain and systolic blood pressures for WKY and SHR rats fed Welsh onion extract are measured. No significant differences were found between the body weights of untreated and Welsh onion extract-fed rats at the end of the experimental period, and all of the animals in each group showed no obvious health abnormalities. Alternatively, Welsh onion extract cause blood pressure to be

lowered significantly ($p < 0.05$) in both WKY (129 ± 4 mmHg vs. 109 ± 3 mmHg) and SHR (173 ± 12 mmHg vs. 125 ± 7 mmHg) rats.

Although baseline TBARS production was higher in the SHR groups than in the WKY groups, liver TBARS levels were found to be decreasing in both WKY and SHR rats after Welsh onion extract treatment (to 75 and 81 %, respectively, of respectively control levels). The effects of Welsh onion extract on liver glutathione (GSH), reported as levels of acid-soluble sulfhydryl groups. Liver tissue from WKY exhibited a greater increase of GSH levels to 134 % of control levels after Welsh onion extract fed. In contrast, Welsh onion extract did not affect liver GSH contents significantly in SHR.

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