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Antioxidative effects of complementary therapy with Salvia miltiorrhiza in ischemic heart disease

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Background: Salvia miltiorrhiza (SM) is a Chinese herb widely used for ischemic heart diseases (IHD), yet little is known about the cellular mechanisms. The aims of this study were to investigate mechanisms of SM.

Methods: The rat A10 cells line, a vascular smooth muscle cells line isolated from rat thoracic embryonic aorta was as a study model. The SM roots aqueous extract , MTT assay, cytotoxicity assay, two-dimensional electrophoresis coupled with MALDI-TOF mass spectrometry , western blot analysis, and biological network analysis were applied for the elucidation of protein changes characterizing the response of the rat A10 cells into the homocysteine(Hcy) -induced oxidative stress.

Results: Our study showed that a low dose (0.015 mg/mL) of the SM significantly inhibited growth (>60%, $p < 0.05$) of the Hcy stimulated rat A10 cells. In addition, concentration of intracellular reactive oxygen species obviously decreased in the rat A10 cells after its incubation with SM in terms of catalase increasing activity. Next, marked down-regulation of protein kinase C beta-1 and phosphorylated mitogen-activated protein kinase expression suggest that observed inhibitory effect of the SM on the Hcy-induced growth of rat A10 cells was realized via the PKC/p44/42 MAPK- dependent pathway. The intensity changes of 10 protein spots in response of the rat A10 cells to the Hcy-induced oxidative damage as alpha-4-tropomyosin, vimentin, F1F0-ATP synthase (beta subunit), glucose regulated protein 75, actin (fragment), prohibitin, capping protein, plakoglobin, endoplasmic reticulum protein 29, and peptidylprolyl isomerase A, were detected with statistical significance ($p < 0.05$). Meanwhile, it was showed that used here SM resist carbonylation of vimentin, alpha-4-tropomyosin and GRP75, respectively, leading to phenotype transformations in the rat A10 cells.

Conclusion: These data suggest that SM may exert its protective effect in IHD through circulating ROS suppression and subsequent modulation of protein carbonylation in rat aortic smooth muscle cells.

Biography

Yu-Chiang Hung grew up in Taiwan and received his Bachelor's degree from the China Medical University in 1990 , another M.D . degree from the National Yang-Ming University in 1992 , and Ph.D. degree from the Chang Gung University in 2010. His PhD thesis was “Functional proteomic study in bioactive compounds of radix Salvia miltiorrhiza”. Dr. Hung had found that Salvia miltiorrhiza could inhibit vascular smooth muscle cell proliferation to treat atherosclerosis. He is an attending and director of Department of Chinese medicine in Kaohsiung Chang Gung Memorial Hospital now. His specialty is Chinese medicine , cardiovascular diseases ,Chinese herbs , and acupuncture. He has published 39 papers in SCI journals and has been serving as an editorial board member of repute.

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