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Anthocyanin and prevention of atherosclerosis

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It has been accepted that dietary phytochemicals have various beneficial influence on human health. Among phytochemicals, anthocyanin is an important one existing in plant foods. In the recent few years, we have taken series of studies investigating the roles of anthocyanins on atherogenesis. We first observed the anti-atherosclerotic role of black rice rich in anthocyanins in animal models. Black rice supplementation (30%) for 10 weeks resulted in reduction of high dietary fat induced-formation of atherosclerotic plaques of aortas from rabbits. We then have made anthocyanin extracts (43% and 99% purity) from black rice, and examined their impacts of the extracts on atherosclerosis. Supplementation anthocyanin resulted in a remarkable inhibition of the atherosclerotic lesion in animal models. Next, we examined the effect of pure anthocyanin extract from black berry on lipid metabolism in subjects with dyslipidemia. The supplementation of anthocyanin in the dyslipidemia subjects significantly increase serum HDL-C and decrease LDL, promote the cellular cholesterol efflux to serum, and improve endothelial function and insulin resistance. Anthocyanin, Cy-3-G and Pn-3-G could *in vitro* promote cholesterol efflux from macrophages in dose-dependent manner. The action is closely related to the PPAR γ -LXR α -ABCA1 signaling pathway. Inflammation is a main essential characteristic of atherosclerosis. Cy-3-G and Pn-3-G can also inhibit the inflammatory factors. The bioavailability of anthocyanin is very low, we examined whether anthocyanin metabolites by gut microbiota could involved in anthocyanin's activities. We found that protocatechuic acid (PCA) is a major metabolite of anthocyanin of intestinal bacteria. Further studies found that PCA contribute greatly to the reduced artery lesions in ApoE $^{-/-}$ mice treated by anthocyanin. The mechanism underlying the actions is via miRNA 10b pathway which up-regulates ABCA1 expression resulting in the increase of macrophage cholesterol efflux. Collectively, all of these findings demonstrate that anthocyanin compounds possess great potential in prevention and treatment of atherosclerosis.

Biography

Wenhua Ling is current Dean of School of Public Health, Sun Yat-sen University (SYSU), China. He obtained PhD degree in University of Eastern Finland in 1993. After then, he spent a few years (1993-1997) to be as a Post-doctoral fellow in McGill University and British Columbia University of Canada. He returned to China and has been working at the Department of Nutritional Science, School of Public Health in SYSU from March 1997 till present. Now, he is Chairman of Nutrition Association of Guangdong Province, and the Vice Chairman of Preventive Medicine Association of Guangdong Province. His research is focusing on preventive role of nutrients, phytochemical against chronic diseases including obesity, atherosclerosis, diabetes and hepatic steatosis. He chaired more than 20 national grants including state key project from Ministry of Science and Technology, a key project from NSFC (National natural sciences fund of China), 973 project, etc. He has published 87 papers in international journals such as J Clin Invest, Circulation Res, Clin Chem, ATVB, *Am J Clin Nutr and JBC*. He was a tutor of 100 excellent doctoral thesis national wide in 2008. The research achievements from his group on the effect of dietary phytochemicals on atherosclerotic cardiovascular disease has won them the first award of Science and Technology of Guangdong Province and the first award of Natural Science of Education Ministry, China in 2009, respectively. Also, he is awarded with the National Excellent Teacher award in 2009.

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