

β -Carotene and canthaxanthin alter the pro-oxidation and antioxidation balance in rats fed a high-cholesterol and high-fat diet

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Abstract

This study investigated the effects of beta-carotene and canthaxanthin on lipid peroxidation and antioxidative enzyme activities in rats fed a high-cholesterol, high-fat diet. Wistar rats were divided into six groups. Negative control group (group NC) received a high-fat (150 g/kg) diet; cholesterol control group (group CC) received a high-cholesterol (10 g/kg), high-fat diet. The other four groups were fed a high-cholesterol, high-fat diet supplemented with crystal beta-carotene (group BC), beta-carotene beadlet (group BB), canthaxanthin beadlet (group CX) or alpha-tocopherol (group AT). Blood and livers were collected for analysis after 6 weeks of feeding. Group BB had significantly lower hepatic thiobarbituric acid reactive substance (TBARS) and conjugated diene concentrations, whereas group CX had a significantly lower plasma TBARS concentration than did group CC. In erythrocytes, glutathione peroxidase activities were significantly greater in groups BC, BB and CX than in group CC. Moreover, compared with group CC, catalase activities were significantly greater in groups BB and CX, and superoxide dismutase (SOD) activity was significantly greater in group BB. In livers, SOD activities were significantly greater in groups BC, BB and CX, and glutathione reductase activities were significantly greater in groups BB and CX than in group CC. Compared with group CC, hepatic retinol and alpha-tocopherol concentrations were significantly greater in groups BC, BB and CX, whereas plasma and hepatic cholesterol concentrations were significantly lower in group BC. These findings suggest that beta-carotene and canthaxanthin altered the pro-oxidation and antioxidation balance and suppressed cholesterol-induced oxidative stress via modulation of antioxidant system and cholesterol metabolism.