Role of beta-carotene in ameliorating the cadmium-induced oxidative stress in rat brain and testis

The role of oxidative stress in chronic cadmium (Cd) toxicity and its prevention by cotreatment with b-carotene was investigated. Adult male rats were intragastrically administered 2mg CdCl2/kg body weight three times a week intragastrically for 3 and 6 weeks. Brain and testicular thiobarbituric acid reactive substances (TBARS) was elevated after 3 and 6 weeks of Cd administration, indicating increased lipid peroxidation (LPO) and oxidative stress. Cellular damage was indicated by inhibition of adenosine triphosphatase (ATPase) activity and increased lactate dehydrogenase (LDH) activity in brain and testicular tissues. Chronic Cd administration resulted in a decline in glutathione (GSH) content and a decrease of superoxide dismutase (SOD) and glutathione S-transferase (GST) activity in both organs. Administration of b-carotene (250 IU/kg i.g.) concurrent with Cd ameliorated Cd-induced LPO. The brain and testicular antioxidants, SOD, GST, and GSH, decreased by Cd alone, were restored by b-carotene cotreatment. Concurrent treatment with b-carotene also ameliorated the decrease in ATPase activity and the increase in LDH activity in brain and testis of Cd-treated rats, indicating a prophylactic action of b-carotene on Cd toxicity. Therefore, the results indicate that the nutritional antioxidant bcarotene ameliorated oxidative stress and the loss of cellular antioxidants and suggest that b-carotene may control Cd-induced brain and testicular toxicity. 2000 John Wiley & Sons, Inc. J Biochem Toxicol 14:238â€“243, 2000