N-Allylsecoboldine as a novel antioxidant against peroxidative damage

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摘要

Abstract

N-Allylsecoboldine was evaluated for antioxidant properties by studying its ability to react with relevant reactive oxygen species, and its protective effect on human erythrocytes under oxidative stress. Using brain homogenates, we found that N-allylsecoboldine dose dependently inhibited lipid peroxidation (ICSO=4.80±0.16 μM) and markedly scavenged stable nitrogen-centered radicals. N-Allylsecoboldine was a very efficient scavenger for inhibiting peroxyl radical-mediated destruction of B-phycoerythrin, with a stoichiometry factor of 4.40±0.59. It also trapped the hydroxyl radicals with a second-order rate constant of 6.92±0.86X109 M-1 S-1. Additionally, human erythrocyte oxidative hemolysis induced by aqueous peroxyl radical or hydrogen peroxide was suppressed by N-allylsecoboldine. It not only attenuated the extent of lipid peroxidation but also decreased the formation of the high-molecular weight proteins and degradation of the band 6 protein in radical-treated erythrocytes. It also inhibited the shortening of Russell's viper venom-clotting time mediated by prelytic radical-treated erythrocytes. In the presence of exogenous oxidative stress, hemolysis and lipid peroxidation were significantly enhanced in β-thalassemic erythrocytes, as compared to the normal control. These elevated detrimental effects could be prevented by N-allylsecoboldine. It is concluded that N-allylsecoboldine may act as an effective antioxidant and protect cells against oxidative damage.