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Effect of Vitamin E on Superoxide Dismutase Gene Expression in Cultured Rat Astrocytes Differs from that on Pheochromocytoma Cells

ABSTRACT

Supplementation of antioxidants such as vitamins E and C as health promotion foods is a popular phenomenon worldwide in recent years. Epidemiological studies support the beneficial effect of these antioxidants because oxygen free radicals have been linked to the process of atherosclerotic diseases and aging. The present study evaluates the effect of α -tocopherol (vitamin E) on changes of superoxide dismutase (SOD) in cultured rat astrocytes (RBA-1) and pheochromocytoma cells (PC-12) after short-term (2 days) and long-term (7 days) incubation. Incubation of RBA-1 with vitamin E at a concentration of 50 μ M for 2 days caused an increase of both the activity and mRNA level of SOD. At higher concentrations, such as 100 or 200 μ M, vitamin E failed to enhance SOD as effectively. This phenomenon was not observed in PC-12, implying a differential effect of vitamin E in normal cells and tumor cells. After incubation for 7 days, vitamin E decreased both the activity and mRNA level of SOD in a concentration-dependent manner. The obtained results suggest that vitamin E can increase the effect of SOD resulting in the beneficial influence of this antioxidant only at low concentrations under short-term supplementation because of the down-regulation of SOD observed in cells receiving long-term incubation. Whether this phenomenon is beneficial to humans needs further evaluation.

INTRODUCTION

Ischemic injury to the brain resulting from stroke or cardiac arrest, when followed by reperfusion, is associated with an accelerated rate of free radical production,

which may overwhelm the endogenous antioxidant defenses. There is now a rapidly growing body of evidence which indicates that oxygen-derived free radicals (OFRs) play a major role in producing the vascular and parenchymal damage associated with the reperfu-

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