Protective Effects of Caffeic Acid Phenethyl Ester Against Oxidative Stress-Induced Cytotoxicity in Human Neuroblastoma Cells

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A common characteristic of neurodegenerative diseases, such as Parkinson's disease and Alzheimer's disease, is considerable evidence of oxidative stress, which might be responsible for the dysfunction or death of neuronal cells contributing to disease pathogenesis. Recent studies have demonstrated the efficacy of antioxidant phytochemicals, including polyphenols and isothiocyanates, in reducing the neuronal death occurring in neurodenegerative diseases. In particular, the overexpression of Nuclear factor E2-related factor 2 (Nrf2), a transcription factor known to control the expression of redox status, detoxification and cytoprotective genes, by phytochemicals has become a potential therapeutic avenue for various neurodegenerative diseases (Ma et al., 2012). Among phytochemicals, caffeic acid phenethyl ester (CAPE), a phenolic acid found in propolis and various vegetables, has recently gained attention as a potential neuroprotective compound (Fontanilla et al., 2011; Kurauchi et al., 2012). In this study, we found that pre-treatment and co-treatment of human neuroblastoma (SH-SY5Y) cells with CAPE showed a dose-dependent inhibitory effects of *tert*-butyl hydroperoxide-induced cytotoxicity, in terms of intracellular reactive oxygen species formation and mitochondrial activity loss. Interestingly, after SH-SY5Y cell pre-treatment with CAPE we also recorded the translocation of Nrf2 into the nucleus and the subsequent increase of both total antioxidant activity and glutathione levels at cytosolic level. These results demonstrate that CAPE may prevent the neurotoxicity induced by oxidative stress through activation of the Nrf2 pathway.
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