Esculetin Protects SH-SY5Y cells Against Amyloid-Beta Induced Toxicity

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Oxidative stress due to generation of reactive oxygen species is implicated in dysfunction or death of neuronal cells and progression of Alzheimer's diseases (AD) (Jie Li et al., 2013). Recent studies have reported that natural compounds with antioxidant actions may represent treatment avenues for neurodegenerative diseases including AD. In particular, natural coumarins such as umbelliferone and esculetin shows interesting ability to cross the blood–brain barrier and to prevent dopaminergic neuronal death in a Mouse Model of Parkinson's Disease (Sudhakar R. Subramaniam and Elizabeth M. Ellis, 2013). In this study, we found that pre-treatment and cotreatment of human neuroblastoma (SH-SY5Y) cells with esculetin (6,7-dihydroxycoumarin, ESC) showed a dose-dependent inhibitory effects of *tert*-butyl hydroperoxide and amyloid beta peptide (1-42) induced cytotoxicity, in terms of intracellular reactive oxygen species formation and neuronal viability loss. Interestingly, after SH-SY5Y cell treatment with ESC we recorded the translocation of Nrf2 into the nucleus and the subsequent increase of both antioxidant activity and glutathione levels at cytosolic level. These results demonstrate that ESC may also prevent the neurotoxicity induced by oxidative stress through activation of the Nrf2 pathway. In conclusion, these results encourage further research in Alzheimer animal models to explore the potential profile of ESC as novel neuroprotective agent. *Supported by MIUR-FIRB project RBAP11HSZS (2011) and Fondazione del Monte di Bologna e Ravenna (Italy)*

Jie Li et al. (2013), International Journal of molecular sciences, 14, 24438–24475.
Sudhakar R. Subramaniam and Elizabeth M. Ellis (2013), Journal of Neuroscience Research 91, 453-461.