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Sulforaphane-mediated Induction of Heme Oxygenase-1 in PC12 Cells is Independent of Nuclear Factor E2-related Factor 2-mediated Antioxidant Response Element Activation

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Sulforaphane (SF), an isothiocyanate ingredient of cruciferous vegetables including broccoli, has been shown to possess strong phase I enzyme-inhibitory and phase II enzyme-inducing properties. The purpose of this investigation was to examine the ability of sulforaphane to up-regulate heme oxygenase-1 (HO-1) gene expression and the involvement of transcription factor nuclear factor E2-related factor 2 (Nrf2) in induction of HO-1 in PC12 cells. Exposure of PC12 cells to SF led to the induction of HO-1 in a concentration- and time-dependent manner with maximum increase at 7.5 μM and 8 hour. To better understand the signaling events involved in the up-regulation of HO-1 by SF, ARE activity was assessed by the electrophoretic mobility shift assay (EMSA), and Nrf2 and HO-1 protein levels were detected after transient transfection of PC12 cells with a mutant form of Nrf2. SF failed to increase ARE activity but could still induce HO-1 expression in both dominant-negative Nrf2-and control pEF vector-transfected cells. Taken together, our results indicate that up-regulation of HO-1 expression by SF treatment in PC12 cells is mediated by Nrf2/ARE independent mechanism and suggest the involvement of other transcription factors.

Keyword : Sulforaphane, Heme oxygenase-1, Nrf-2, PC12 cells