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# Aged Garlic Extract Reduces ROS Production and Cell Death Induced by 6-Hydroxydopamine through Activation of the Nrf2-ARE Pathway in SH-SY5Y Cells

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## ABSTRACT

Many degenerative or pathological processes, such as aging, cancer and coronary heart disease, are related to reactive oxygen species (ROS) and radical-mediated reactions. We examined the effectiveness of aged garlic extract (AGE), a garlic preparation rich in water-soluble cysteinyl moieties, for protection of cells from ROS produced by 6-hydroxy-dopamine (6-OHDA) using human neuroblastoma SH-SY5Y cells. Concomitant treatment of cells with AGE (2 and 4 mg/ml) showed the dose-dependent protective effect on the cell death induced by 6-OHDA. In addition, the AGE treatment significantly suppressed the increase of ROS generation by 6-OHDA. Furthermore, the protective effect of AGE was accompanied by activation of the nuclear factor erythroid 2-related factor 2 (Nrf2)-antioxidant response element (ARE) pathway and the increase of mRNAs of heme oxygenase-1 and NAD(P)H quinone oxidoreductase 1. These two enzymes are important in the cellular antioxidant system. These results indicated that AGE protected cells from ROS damage by not only capturing ROS directly but also activating the cellular antioxidant system by stimulating antioxidant gene expression via the Nrf2-ARE pathway. The present study suggested that AGE may be useful for prevention and treatment of cell damage caused by ROS.

## KEYWORDS

Aged Garlic Extract (AGE); 6-OHDA; ROS; Nrf2-ARE Pathway; SH-SY5Y Cells

## Cite this paper

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