Reversal of oxidative-stress-induced mitochondrial dysfunction and apoptosis in human peripheral blood lymphocytes by Antia, a naturally-derived anti-oxidant.

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Abstract

Background: Many neurodegenerative diseases such as Alzheimer's disease are associated with oxidative stress. Oxidative stress can lead to cell demise by altering mitochondrial membrane integrity and triggering an internal pathway of apoptosis. Therefore, antioxidant therapy has been suggested for the prevention and treatment of neurodegenerative diseases. In particular, oxidative-stress-induced apoptosis in lymphocytes has been used as an in vitro model to evaluate potential anti-Alzheimer's preventive agents. In this study, we investigate the ability of the anti-oxidant Antia to reverse oxidative-stress-induced mitochondrial dysfuntion and apoptosis. Antia is a natural product that is extracted from edible yamabushitake mushroom and the gotsukora plant after treatment with MRN-100 (an iron-based fluid).

Methods: Human peripheral blood lymphocytes (PBL) were cultured for 24 hrs in the presence or absence of Antia and subsequently exposed to the oxidative stressor Thimerosal. Mitochondrial membrane potential and the production of reactive oxygen species (ROS) were monitored by flowcytometry using TMRE and DHR 123 dyes, respectively. Apoptosis was assessed by PI staining and flow cytometry.

Results: Exposure of PBL from healthy subjects to the oxidative stressor Thimerosal led to mitochondrial dysfunction, as indicated by increased production of ROS, decreased mitochondrial membrane potential, and cell death. Pre-treatment of lymphocytes with Antia resulted in a significantly reduced level of oxidative stress-induced apoptosis, which was associated with decreased ROS production and inhibition of mitochondrial membrane depolarization.

Conclusion: Antia shows the ability to reverse oxidative-stress-induced mitochondrial dysfuntion and apoptosis, suggesting that dietary supplementation with Antia may improve cognitive function in Alzheimer's patients.

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