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Cytoprotective effect of fullerene C60 derivatives with different structures

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Abstract

Transmembrane potential of mitochondria is a sensitive biomarker of metabolic activity of cells. Here, we studied mitochondrial potential Ψm in Yarrowia lipolytica yeast cells treated with two fullerene C60 derivatives: bis-nitroxide methanofullerene and 3-phospho-pentafullerene acid. Transmembrane mitochondrial potential was measured by vital ratiometric cationic fluorochrome JC-1 using flow cytometry. The fullerene C60 derivatives tested in a concentration of 10 μg/ml developed cytoprotective effect in the yeast cells challenged either with non-ionic detergent tween-80, or Tris-buffer, pH 9.0. Treatment with bis-nitroxide methanofullerene resulted in a 6-fold increase in proportion of cells with high Ψm, while 3-phospho-pentafullerene acid evoked a 1,5-fold increase in this subset compared to the stressed cells. Hence, both fullerene derivatives counteract Ψm dissipation in challenged cells.

Keywords

Bis-nitroxide methanofullerenes,3-phospho-pentafullerene acid, Cytoprotective effect, Flow cytometry, Mitochondrial potential