

## Cytoprotective effect of fullerene C60 derivatives with different structures

Tarasova G., Kolganova E., Fazleeva G., Islamova L., Gubskaya V., Rizvanov A., Cherepnev G., Abashev A., Kalacheva N.

*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

---

### Abstract

Transmembrane potential of mitochondria is a sensitive biomarker of metabolic activity of cells. Here, we studied mitochondrial potential  $\Psi_m$  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  $\mu\text{g/ml}$  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  $\Psi_m$ , while 3-phospho-pentafullerene acid evoked a 1,5-fold increase in this subset compared to the stressed cells. Hence, both fullerene derivatives counteract  $\Psi_m$  dissipation in challenged cells.

---

### Keywords

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