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Fullerene C_{60} penetration into leukemic cells and its photoinduced effect on protein phosphotyrosine status

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Pristine fullerene C_{60} is nontoxic, able to accommodate inside hydrophobic regions of membranes [1], possesses photosensitizing potential with ability to produce reactive oxygen species and could be perspective for photodynamic therapy. Yet, still little is known about C_{60} interaction with cells of different types and the ways of its influence on cells signaling systems.

The aim was to study fullerene C_{60} penetration into cancer cells and its photocytotoxic effect against leukemic cells by estimation of protein tyrosine residues phosphorylation, high level of which is the marker of cell transformation.

With the use of fluorescent-labeled fullerene C_{60}–RITC the time-dependent accumulation of nanoparticles in cancer cells was confirmed by confocal microscopy. The decrease of the fluorescent signal of TMRE probe sensitive to the mitochondrial membrane polarization in leukemic cells treated with C_{60} was shown. To maximize the efficiency of fullerene C_{60} photoexcitation by visible light we use light-emitting diode lamp (λ_{max} = 450, 500-600 nm). A comparative study showed that photoexcited C_{60} as well as H_2O_2 (inducer of oxidative apoptosis) or inhibitor of tyrosine proteinkinases staurosporine (STS) decreased the level of proteins tyrosine phosphorylation, but the pattern of dephosphorylated proteins was different. Photoexcitation of fullerene C_{60} was followed by dephosphorylation of proteins, which still conserved high phosphotyrosine level after treatment with H_2O_2 or STS. It is assumed that photoexcited C_{60} could be used for combined treatment with cytotoxic agents to block the elevation of protein phosphotyrosine level in leukemic cells.

1. *Levi N., Hantgan R., Lively M.* C_{60}-Fullerenes: detection of intracellular photoluminescence and lack of cytotoxic effects// J Nanobiotechnology. – 2006. – **4.** – P. 14–25.