

NANOPARTICLES C₆₀ FULLERENE MODULATE APOPTOSIS AND PROLIFERATION OF GLIOBLASTOMA U-373 CELLS

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Background: Glioblastoma is the most aggressive types of astrocytoma, resistant chemo- and radio-therapy and apoptosis cell death. The agents that can switch the pathways to cell death are potentially anticancer chemicals. Nanoparticles C₆₀ fullerene are the power antioxidant and demonstrate anticancer activity. In contrast to many chemotherapy agents, this fullerene absolutely non-toxic in wide range of concentrations. Pristine C₆₀ fullerene is a promising candidate for many biomedical applications. The molecular mechanism which C₆₀ fullerene can inhibit cancer cell proliferation remain understood. The goal of this study was to elucidate the effect of C₆₀ fullerene on cell cycle regulation, autophagy pathway and autophagy-induced apoptosis cell death.

Material & methods: Glioblastoma U-373 cells were treated with 0.5, 1 and 2 μM C₆₀ fullerene for 24 hours. The cell proliferation assay and western blot for markers anticancer defense, autophagy and apoptosis were developed.

Result: Results of MTT assay showed that C₆₀ fullerene inhibit cell proliferation in glioblastoma U373 cells about 26 %. The treatment U-373 cells with C₆₀ fullerene 24 hours in all used concentration have been similar effect for proliferation range. Surprisingly, all doses C₆₀ induced significant decreasing of p53 content more 6 5%. The expression of p21 and caspase-9 was inhibited with C₆₀ fullerene more slightly 24 % and 20 % respectively. Thus, C₆₀ fullerene may regulates proliferative signals pathways associated with p53 regulation. Observed effects of C₆₀ fullerene on transcriptional regulator and programmed cell death pathways can be explained cooperative effect related to both power antioxidant ability and differentially antiproliferative effect for normal and cancer transformed cells. Moreover, stressed with H₂O₂ glioma cells were observed dramatic GFAP and NF-kB downexpression on 45 % and 60 % accordingly. The preincubation glioma cells with C₆₀ fullerene ameliorates the reduction of glial intermediate filament and NF-kB expression.

Conclusion: These results illustrate that water soluble C₆₀ fullerene provides protection against the system disturbance induced oxidative stress, especially ameliorates expression of cytoskeleton marker GFAP and key regulator for main pathways of cell response NF-kB. Along with antioxidant effect this nanoparticles C₆₀ fullerene have an ability to inhibit the proliferation of malignant glioma U373 cells.