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Impact of chlorophyllin e6 photodynamic therapy in human bladder cancer cells

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Human non-muscle invasive bladder cancer (NMIBC) frequently relapses after operation due to incomplete resection and chemoresistance, highlighting the need for new therapeutic strategies that mechanistically assist to eradicate residual tumor tissue. Currently, we focused on the anticancer effect of photodynamic therapy (PDT) with the novel photosensitizing agent chlorophyllin e6 and its potential mechanisms. Human bladder cancer (BC) cell lines, T24 and 5637 were cultured under different conditions as using monolayer culture model (two-dimensional, 2D) or multicellular tumor spheroid model (three-dimensional, 3D). Cells with these two types of culture models were treated with chlorophyllin e6-mediated PDT (e6-PDT). The photo-cytotoxicity was detected using the Water-Soluble Tetrazolium salts-1 (WST-1) assay and the CellTiter-Glo Luminescent Cell Viability Assay for 2D and 3D models, respectively. We found that e6-PDT had the significant effect of photo-cytotoxicity in both 2D and 3D models of T24 and 5637 cells. Furthermore, e6-PDT inhibited BC cell migration and invasion. BC cell apoptosis after e6-PDT was measured by DAPI staining, transmission electron microscopy (TEM), flow cytometry and Western blotting. Apoptotic cells with typical morphological changes were observed under DAPI staining and TEM after the e6-PDT. Flow cytometry demonstrated more apoptotic cells at the early stage in an e6-PDT group than in untreated or e6 treated or PDT along group. Moreover, the expression level of caspase3 protein increased and the ratio of Bcl-2/Bax decreased significantly after e6-PDT. We also detected an increase of reactive oxygen species (ROS) in cells after e6-PDT. Thus, e6-PDT exhibits significant photo-cytotoxicity in both 2D and 3D cultured cells, probably by inducing cell apoptosis after the generation of ROS. These data indicate that chlorophyllin e6 is a novel, effective and powerful photosensitizer and e6-PDT may have a therapeutic application for the treatment of NMIBC.

Biography

Gang Chen has completed his PhD at Fudan University. He has been working as a Clinician and Researcher in the field of Bladder and Prostatic Cancers. He is the President of the Jinshan Hospital of Fudan University and serves as a Professor, Mentor of doctoral students and Director of the Department of Urology. He has published more than 50 papers in reputed journals and has been serving as an Editorial Board Member of *Chinese Journal of Medicine*.

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