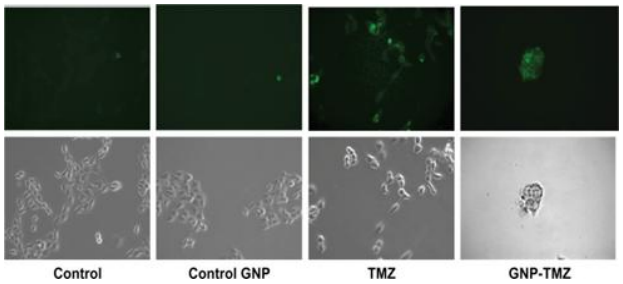
Temozolomide Decorated Gold NanoparticlesVectors for Glioblastoma Multiform Cancer Stem Cells Targeting

Anamaria Orza
Emory University, USA

Abstract

More complex treatments capable of overcoming the ability of cancer stem cells to eliminate anticancer drugs and to reverse their protective functions are urgently needed. For this reason, a combination of traditional treatments and nanotechnology-based approaches offers attractive possibilities. More efficient and less toxic therapeutics that can cross the protective barriers on cancer stem cells are necessary.

We report, the synthesis of a new plates like shape gold nanoparticles vector decorated with temozolomide anticancer drug and targeting transferrin molecules as new potential treatmnet for incurable Glioblastoma Multiform. Apoptosis tests revealed an increase in apoptosis among cells exposed to gold nanoparticlesconjugated with temozolomide. We noticed a dramatic enhancement of late apoptosis in the flow cytometry studies by 78.3%, represents a 1.9-fold increase within 24 hours compared with the rate of apoptosis in cells treated with temozolomide alone (31.1%). (Figure. 1 right panel). Similar results were obtained for the microscopic analysis, with the observation that the apoptotic index of cells treated with temozolomide-conjugated with gold nanoparticles was 3.41 times higher than that of cells treated with temozolomide alone (Figure.1 left panel).



Sample	% early apoptotic cells	% late apoptotic + dead cells	Total
CSC control	0.4	0.4	0.8
CSC control with GNP-L-aspartate	6.6	4.1	10.7
CSC treated with temozolomide	10.8	31.1	41. 9
CSC treated with GNP-L-aspartate-TMZ	4.4	78.3	82. 7

Figure 1. Left Panel - Morphologic aspects of cellular apoptosis studies for Annexin V FITC/propidium iodide staining observed in contrast phase and fluorescent microscopy (magnification 400×). **Right Panel -** Comparison of double staining with Annexin V/propidium iodide obtained by flow cytometry: percentage of early, late, and total apoptotic glioblastoma-derived cancer stem cells

Biography

Anamaria Orza focuses primarily on the area of development of innovative architectural nano composites for biomedical applications. Prior to her arrival at Emory in the fall of 2013, Dr. Orza served as a postdoctoral researcher at the Center for Integrative Nanotechnology Sciences at the University of Arkansas at Little Rock. Dr.Orza has been recognized as a European Union fellow, receiving her PhD in Chemistry from Babes Bolyai University, Romania and working in close collaboration with Liverpool University, United Kingdom. Dr. Orza has authored and co-authored 2 patents and over 32 papers in leading journals and at leading international conferences in the field (with over 170 citations) and 2 book chapters in the fields of Applied Nanotechnology in Cancer Research and Tissue Engineering.