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The effect of Mesenchymal stem cells-derived exosomes on the prostate, bladder, and renal cancer cell lines

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Abstract

Background: Exosomes are nanoscale vesicles generated by cells for intercellular communication. We aimed to elucidate the role of mesenchymal stem cells (MSC-exosomes) on epithelial-to-mesenchymal transition (EMT), angiogenesis and apoptosis genes expressions.

Material and Methods: Four different cell lines were employed including ACHN, 5637, LNCaP and PC3 as the well-known representatives for renal, bladder, hormone-sensitive, and hormone-refractory prostate cancers, respectively. The cell lines were treated with different concentrations of mesenchymal stem cells-derived exosomes to find effective doses and IC50 values. Percentages of apoptotic cells were evaluated by Annexin/P.I. staining. Micro Culture Tetrazolium Test (MTT) assessed the proliferative inhibitory effect; and mRNA levels of prostate biomarker (KLK2), EMT (E-cadherin and Snail), angiogenesis genes (VEGF-A and VEGF-C), apoptosis genes (BAX, BCL2, and P53) and Osteopontin variants (OPNa, b, and c) were investigated by the real-time PCR method.

Results: All 5637, LNCaP, and PC3 following treatment with exosomes illustrated specific responses with changes in the expression of different genes. The increased TP53 and decreased BCL2 expressions were seen in 5637, LNCaP, and PC3. In PC3, OPNb and OPNc have increased more than P53, and in LNCap, the increase was in VEGF-c. In 5637 cells, more than TP53 and BCL2 changes, two other genes, VEGFa and BAX, have decreased, suggesting the anti-apoptotic and anti-angiogenic effects of exosomes. In the kidney tumor cell line, no significant gene expression change of ten targeted genes was seen.

Conclusions: MSC-exosomes therapy has augmented some interesting anti-tumor effects on prostate, bladder, and kidney cancer cell lines. This effect which probably originates from exosomes potency to induce apoptosis and inhibit the proliferation of cancer cells simultaneously, was more substantial in bladder cancer, moderate in prostate cancer, and mild in renal cancer.

Keywords: Exosome, Cancer cells, Apoptosis, Angiogenesis, EMT.

Biography

Fatemeh Khatami an assistant professor at the Tehran University of Medical Sciences. I completed a Ph.D. in Biomedical Sciences at Tehran University of Medical Sciences, Tehran, IRAN, graduating with a GPA of A+. My research area is Biomedical and Molecular Biology, which is the study of biological processes, organisms, or systems to manufacture products, intended to improve the quality of human life. My research is mainly focused on cancer genetics. After graduation, I started working as a faculty member in the Research Deputy of Urology Research Center (URC), Tehran University of Medical Sciences (TUMS).

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