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Antitumor effect of Interferon-beta cDNA engineered human bone marrow mesenchymal stem cells to prostate cancer *in vitro*

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Our purposeis to investigate the effect of human interferon-beta (huIFN-β) gene cDNA engineered human bone marrow mesenchymal stem cells (hMSCs) inhibit the growth of prostate cancer cell line PC-3 (PC-3) *in vitro*, and investigate a therapeutic strategy about the local production of biological agents in prostate cancer by gene-manipulated hMSCs. The pCDNA3.1-IFN-β vector containing huIFN-β gene was constructed and transfected into hMSCs by lipofectamine. Effects of the hMSCs which was transfected by pCDNA3.1-IFN-β (IFN-β-hMSCs) on survival of the human prostate cancer cell line PC-3 based on *in vitro* Transwell experiments. PC-3 cells were trypsinized and viable cells were counted respectively at 1, 3, and 5 days using a hemocytometer after trypan blue staining. The expression of IFN-β in the medium of hMSCs-IFN-β was detected by ELISA. IFN-b-hMSCs resulted in a significant decrease in PC-3 cells survival as compared with control group [5 days after plating, the count of PC-3 cells which co-culture with IFN-b-hMSCs significantly decreased from 0.5×10^6 to $(0.42\pm0.032) \times 10^6$, and the number of PC-3 cells in control group increased in different level]. Flow cytometry analysis showed that the IFN-β-hMSCs induced effectively the apoptosis of tumor cells (40.29%). Medium was collected and assayed using a quantitative ELISA assay for IFN-β, IFN-β-hMSCs produced $3\sim4 \times 10^3$ IU of IFN-β per 10^5 hMSCs during the first 24 h after infection. However, there was no detectable content of IFN-β in control group. We conclude that hMSCs can integrate into prostate cancer microenviroment *in vivo*. The hMSCs can express IFN-β successfully after huIFN-βgene transfection and IFN-β-hMSCs cells inhibit the prostate cancer cells growth significantly as compared with control group *in vitro*, which may develop a new investigative strategy about gene therapy to prostate cancer.

***Keywords*:** prostate cancer, interferon β, mesenchymal stem cell, gene therapy

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