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Vaccination efficacy with marrow mesenchymal stem cell against cancer was enhanced under simulated microgravity

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Abstract

Stem cell vaccination can induce consistent and strong anti-tumor immunity against cancer in mice model. The antigenic similarity between tumors and embryos has been appreciated for many years and reflects the expression of embryonic gene products by cancer cells and/or cancer-initiating stem cells. Taking advantage of this similarity, we have tested a prophylactic lung cancer vaccine composed of allogeneic murine MSCs. Based on this conception, we first compared their tumor vaccines intervention effects of adult MSCs and MSCs under simulated microgravity (MSC/SMG). In this study, BALB/c mice were vaccinated with MSCs or MSC/SMG, compared with mice vaccinated with phosphate buffered saline (PBS) as negative controls. We then subcutaneously implanted the A549 human lung cancer cell line into vaccinated mice and monitored tumor growth potential in vivo. The smaller tumor size and less tumor weight were observed in mice vaccinated with MSCs or MSC/SMG, compared with that of the Control group. Particularly, it was much more significant in the group of MSC/SMG than that group of the MSCs. Vaccination with SMG treated MSCs inhibited proliferation and promoted apoptosis of tumor tissue. SMG/MSC vaccination induced both Th1-mediated cytokine response; CD8-dependent cytotoxic response which reduced the proportion of Treg cells. Furthermore, SMG/MSC vaccination significantly increased MHC1 and HSPs proteins expression. In

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