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Immunotherapy of tumors with human telomerase reverse transcriptase immortalized human umbilical vein endothelial cells

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Human umbilical endothelial cells (HUVECs) have been proven to be effective in tumor anti-angiogenesis but the mechanism remained to be further demonstrated. The restricted ability of HUVECs to proliferate *in vitro* also limits their application on a large scale. In the present study, we immortalized HUVECs with hTERT genes by lentiviral infection and explored the antitumor immunity of hTERT-expressing HUVECs (HUVEC-TERTs). Results showed that HUVEC-TERTs presented high telomerase activity at both mRNA and protein levels by RT-PCR and TRAP-ELISA. They were proliferative after 70 PDs and expressed endothelial markers of CD31, VE-Cadherin, and VEGFR-II and integrin α5. They formed vascular tubes on matrigel at passage 30 without showing signs of senescence. Mice vaccinated with HUVEC-TERTs or HUVECs suffered smaller tumor volumes and survived longer than NS group both protectively and therapeutically. Compared with NS group; both groups revealed lower densities of CD34+ micro vessels in tumors, decreased concentrations of immune suppressors of TGF-β and VEGF in sera and elevated tilters of HUVECs-neutralizing IgG. Cellular immunity was enhanced as specific CTL response against HUVECs was presented and larger percentages of CD8+CD69+ and CD8+IFN-γ^+ spleen T cells were detected by flow cytometry. In tumor microenvironment, the infiltration of CD4+ and CD8+ T cells were increased while MDSCs and Tregs were diminished in tumor tissues of both groups. In conclusion, this study was the first to confirm the anti-tumor immunity of irradiated hTERT-immortalized HUVECs. It might be a new strategy to allow HUVECs to be applied on a large scale as a cancer vaccine.

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