

The Systemic Efficacy of Combined Immunotherapy with Oncothermia and Intratumoral Injection of Dendritic Cells

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Purpose: Oncothermia is a significant and definite technical development in the hyperthermia field, using capacitive (impedance) coupling of 13.56MHz amplitude-modulated radiofrequency energy on the tumor site. As a result, turning local apoptosis effect into a systemic anti-tumor immune response is possible. Oncothermia method is capable of turning tumor microenvironment into an immunological more favorable environment. In this study, our aim was to enhance the therapeutic effect of dendritic cells (DCs) immunotherapy after Oncothermia treatment.

Materials & Methods: CT26 murine colorectal cancer model was used in this study. Mice were injected subcutaneously with CT26 cells into the right leg and left flank, respectively. DCs were matured by CT26 specific tumor antigen, AHI. When both tumors were palpable mice were randomly assigned to 4 groups receiving no treatment, DCs alone, Oncothermia in combination with or without DCs. Growth inhibition of the tumor and the systemic anti-tumor immune response were measured. Oncothermia treatment was carried out by an OncothermLabehy device, with an in vivo mouse applicator system, capacitively coupled the 13.56MHz amplitude-modulated RF current to the tumors. During the oncothermia treatment the treated tumor core temperature reached 42°C measured by an intratumoral temperature measurement probe.

Results: Intratumoral injection of DCs after Oncothermia treatment resulted in significant inhibition of CT26 tumor growth in compare to DCs alone or Oncothermia treatment alone. Moreover, an abscopal effect, defined as the inhibition of tumor growth at a distance from the treated site occurred in mice treated with the combination of Oncothermia treatment and intratumoral injected DC. In immune response assay, Oncothermia treatment combined with intratumoral DC injection induced tumor-specific T cell activity (IFN-gamma ELISPOTS) and cytotoxicity T lymphocyte activity (CTL assay).

Conclusion: In this study, we demonstrated that intratumoral injection of DCs after Oncothermia treatment is an attractive and effective immunotherapy protocol.