Synergism Between IL-2 and/or Anti-Regulatory T Cell Antibody Injection and Hyperthermic Treatment Using Nano-Scale Magnetite Conjugated Cationic Liposome Effect Cancer Immune Therapy

Introduction and Objectives: Interstitial hyperthermia induced by combination of alternative magnetic field and nano-scale magnetite conjugated cationic liposome (Magnetic Cationic Liposome: MCL) generate Heat Shock Proteins (HSPs). And HSPs activate a specific immune system for malignant tumor. In general, IL-2 activates an immune system by stimulating cytotoxic T cell. Contrary to immune activation, regulatory T cells suppress an immune system, which causes immune suppression of cancer patients. This preliminary study aimed to determine whether synergism between IL-2 and/or anti-regulatory T cell antibody injection and this interstitial hyperthermia effect cancer immune therapy.
Materials and Methods: PCai1, which are produced as rat prostate cancer, were examined in this preliminary study. PCai1 cells ($1.0*10^6$) were injected into subcutaneous of F344 male rats. One week after PCai1 cells injection, tumor grew 6mm in diameter. Then, anti-regulatory T cell antibody: anti CTLA-4 antibody (60ug) were given to these rats. On the next day, 100ul of MCL were injected into the tumor and mice were irradiated by alternative magnetic field. Interstitial hyperthermia were performed for thirty minutes containing 43 degree Centigrade. And on the next day, $5*10^4$ U of IL-2 were administrated.
Results: In the group of a simple interstitial hyperthermia, tumor size gradually grew large. In the group of a combination of interstitial hyperthermia and anti CTLA-4 antibody, tumor size gradually grew large same as those of simple interstitial hyperthermia group. On the one hand, in the group of a combination of interstitial hyperthermia, anti CTLA-4 antibody and IL-2, tumor growth were suppressed.
Conclusion: Synergism between IL-2 and /or anti-regulatory T cell antibody injection and hyperthermia treatment using liposome containing nano-scale magnetite demonstrated effectiveness of cancer immune therapy.