8 Cancer (general) General heat effects

1. Thermal Combination Therapy with HIFU

Ablation and Whole Body Hyperthermia


AKIRA TAKEUCHI1, HIDEKI GONDO1, JOTARO KOBAYASHI2, YUANTIAN XIA3, AKIRA ITABASHI3 and TAKASHI TAKEUCHI1

Abstract

A new high intensity focused ultrasound (HIFU) apparatus (Sonic CZ901 : Mianyang Sonic Electronic Ltd, China) was installed in our hospital last December. The device has been used 20 times in 12 advanced cancer patients, and some results concerning the use of HIFU ablation and Whole body hyperthermia (WBH) via far-infrared equipment (RHS 7500 : Enthermics Medical Systems, USA) can be reported. The first patient had pharyngeal cancer (20y.o, F) with lung and multiple liver metastases. The lung tumor shrank after WBH (weekly treatments, for a total of 4 treatments) and the liver tumor was clearly reduced by HIFU treatment. A second patient who received the combined treatment had a neck tumor with bone metastasis (65y.o, M). The patient received WBH after HIFU treatment for a 7th rib bone metastasis. After 10 days, the neck tumor developed internal necrosis, and ruptured. CT imaging showed necrotic changes focused in the neck tumor and also the rib bone metastasis.

These results may be a positive indication for HIFU treatment, but there are other positive indications for the primary organ tumour. This new thermal combination therapy appears to have great promise.

2. The effects inhibiting the proliferation of cancer cells by far-infrared radiation (FIR) are controlled by the basal expression level of heat shock protein (HSP) 70A.


Source

Department of Oral and Maxillofacial Anatomy, Medical Science for Oral and Maxillofacial Regeneration, Graduate School of Health Biosciences, University of Tokushima, 3-18-15 Kuramoto, Tokushima 770-8504, Japan.

Abstract

We developed a tissue culture incubator that can continuously irradiate cells with far-infrared radiation (FIR) of wavelengths between 4 and 20 microm with a peak of 7-12 microm, and found that FIR caused different inhibiting effects to five human cancer cell lines, namely A431 (vulva), HSC3 (tongue), Sa3 (gingiva), A549 (lung), and MCF7 (breast). Then, in order to make clear the control system for the effect of FIR, the gene expression concerned to the inhibition effect by FIR were analyzed. In consequence, basal expression level of HSP70A mRNA was higher in A431 and MCF7 cells than in the FIR-sensitive HSC3, Sa3, and A549 cells. Also, the over expression of HSP70 inhibited FIR-induced growth arrest in HSC3 cells, and an HSP70 siRNA inhibited the proliferation of A431 cells by irradiation with FIR. These results indicate that the effect of a body temperature range of FIR suppressing the proliferation of some cancer cells is controlled by the basal expression level of heat shock protein (HSP) 70A. This finding suggested that Far Infrared Rays (FIR) should be very effective medical treatment for some cancer cells which have a low level of HSP70. Still more, if the level of
HSP70 in any cancer of a patient was measured, the effect of medical treatment by FIR can be foreseen for the cancer.