

Different cytotoxic effect from different hyperthermia devices. Comparison of the Oncotherm-Labehy and the Thermotron RF-8 in an in vitro model

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Purpose: Deep heating electro-hyperthermia methods are a promising cancer treatment modalities used to enhance conventional treatment. This could be achieved through radiofrequency field on 8 and 13.56 MHz by Thermotron RF-8 and Oncotherm-Labehy, respectively. However, the difference cytotoxic effect between different hyperthermia devices has never been evaluated.

Materials and Methods: HepG2, a human hepatoma cell line was treated by water bath, Oncotherm-Labehy or RF-8 for 30 min at 42°C. Cell proliferation, apoptotic cell and cell cycle distribution were assayed at 24, 48 and 72 hours after treatment. The membrane expression of adherens junction proteins on cell membrane, E-cadherin and β -catenin, were investigated by immunocytochemistry. The expression and releasing of heat-shock proteins (HSPs) after various treatments were evaluated. We further analyzed the effect of 5-Aminolevulinic acid hydrochloride (ALA) as thermosensitizer on different hyperthermia devices.

Result: Both of Oncotherm-Labehy and RF-8 inhibited cell proliferation on HepG2 cells. Oncothermia could significantly induce apoptosis on HepG2 48h after treatment. Both effects were not observed by water bath control. The expression of E-cadherin and β -catenin on cell membrane were increased after Oncothermia treatment but not with RF-8 and water bath. The expression and releasing of HSP70 were significantly increased after Oncothermia treatment. On the other hand, RF-8 significantly increased the intracellular expression of HSPs. ALA could sensitize both Oncothermia and RF-8 effect on the inhibition of cell proliferation and releasing of HSP70.

Conclusion: In this report, we found that different hyperthermia devices may induce different mechanisms on their cytotoxic effects and cell responses to heat. These results may provide significant insight on future clinical application of electro-hyperthermia on different type of cancers.

Key words: Hyperthermia, Oncotherm, Thermotron RF-8