Oncothermia basic research at in vivo level
The first results in Japan

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Background: Oncothermia method (OTM) is in a long time (since 1995) applied method in oncology (1) with great clinical success (2). Oncothermia research group conducts investigations to reveal the basic mechanism of action of this tumor treatment method in basic research level performing a huge number of in vivo studies. The tumor destruction efficacy and the role of temperature independent effects of the OTM was proven earlier and presented elsewhere (3)(4), as well as the recent in vivo results (5)(6). In this presentation we summarize the first results we have achieved in Tottori University, Japan.

Methods

Study I.
In the first study we examine the effect of oncothermia treatment in a mouse tumor model.
Animal model: C57Bl/6 (mouse derived carcinoma cell line derived subcutaneous mouse tumor model with double tumors. Every animal had two tumors on the femoral region, the right side (R) was treated, the left side (L) was individual control.

Experimental setup and treatment:
A single shot 30 min oncothermia treatment was done, reaching maximum 41-42°C intra-tumor temperature, using the LABEST system (Oncothermia Ltd.), under pressure temperature control using fluroscent temperature measurement system (Lumasense m330).

Study design: Time course study was performed. After a single shot oncothermia treatment animals were sacrificed at 0, 13h, 24h, 72h, and 125h later and tumors were removed. All time-group there were 3 treated animals and 1 untreated control animal.

Tumor sample processing:
All the removed tumors were cut accurately at their centers. After a standard histological process the samples were stained with HE and TUNEL reaction and Ki-67 detection were performed. Samples were evaluated using complex histomorphological methods.

Study II.
In the second study we examined the effects of OTM to tumor oxygenation using a rat tumor model.
Animal model: 9L (rat glioma) cell line derived, histologically rat tumor model with double tumors in both femoral region. Tumor tissue oxygenation was measured in the tumor on the right side.

Oxygen level measurement: pO2 sensitive electrode system (EkoLab Kogakus Ltd 1500 model)

Study design:
In 11 rats, tumor tissue oxygenation level was measured using a pO2 electrode sensitive system right before the treatment. Then a single shot 30 min oncothermia treatment was performed reaching maximum 42°C intra-tumor temperature. Right after the treatment the tumor oxygenation level was measured again.

Results

Study I.
1. A. Histomorphological changes in a qualitative and a quantitative way:

Drastic and selective tumor destruction was detected after a single shot OTM. The tumor destruction was not immediate, it had a time-lag. Samples marked with a red rectangle are evaluated in details.

References:

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