

# P-03 – Dr. Nora Szasz, et al - Are we able igniting natural processes to kill cancer cells?



## Are we able igniting natural processes to kill cancer cells?

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### Objective

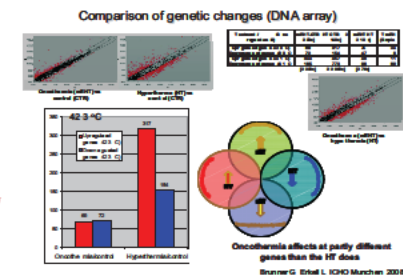
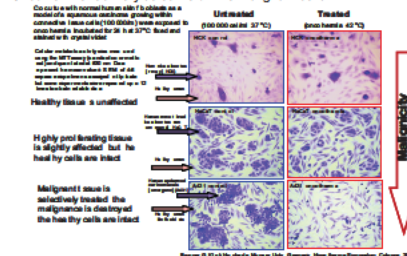
Long time living ancient paradigm is eliminating the tumor cells by drastic, artificial effects (resection and necrosis) in the actual lesions. Original idea of the very first interventions in oncology had favored the necrosis by elevated temperatures in the local area. The original hyperthermia (HT) concept used the consequences of the definite high temperature in the tissue and in the physiology reactions. Oncothermia method (OTM) is a modern heir of this ancient thinking. However it changed the paradigm, emphasized more the natural physiological and biophysical chemical processes instead of the temperature which anyway has many complications in local applications. OTM uses well controlled modulated radiofrequency (RF) current flow through the target tumor [1]. Temperature dosing has problems on the control and the selection of the malignancy [2], so OTM definitely uses special non temperature dependent effects [3] avoid the normal temperature spreading promoting undesired blood flow by the time, as well as selectively and effectively acting to eliminate the tumor [4]. OTM applies electric field to modify the natural processes, which is a well established research area, [5]. Our present article summarizes the possible explanations of the natural OTM mechanisms, focusing on the way to proof the actual hypotheses.

### Method

We performed various experiments studying the natural factors of the cell distortion effects by OTM. A highly specialized experimental setup (EHY110, Oncotherm, Germany) was used for in vitro and in vivo experiments, having single shot treatments in every cases. Effects were studied histomorphologically (HM) and immunohistochemically (IHC-H) by various antibodies with digital microscopy system (MiraxView, 3D Histech).

The polarization conditions are effectively approached in frame of  $\beta$  dispersion of the aqueous electrolytes. The dose is measurable on the ignited chemical effects [4] instead of the temperature. This makes possible the membrane excitation, which allows to choose apoptotic pathways.

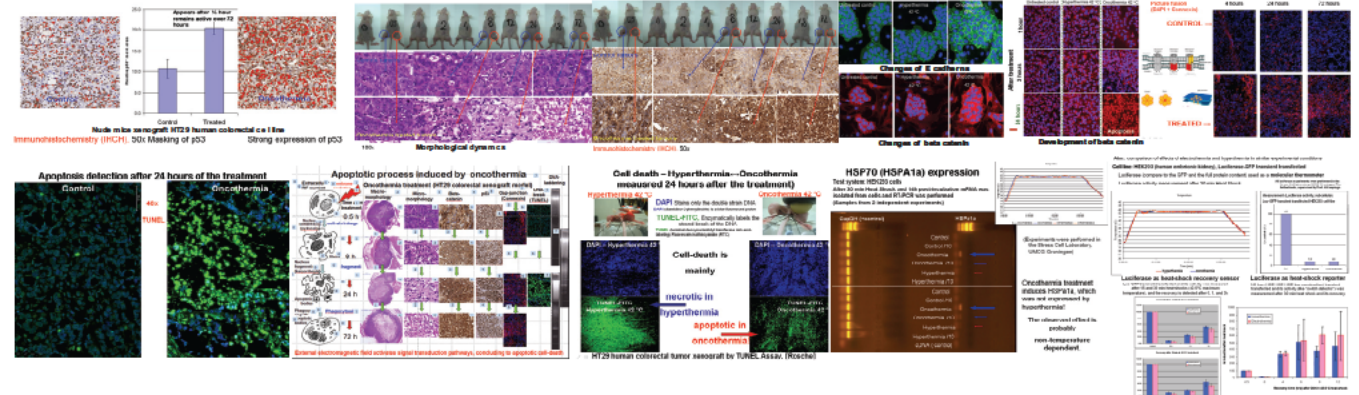
Oncotherm effect very selective on the malignant cells



### Results

Experiments show a definite time delay of tumor destruction. The effect of OTM immediately after single shot is weak by both the HM and IHC-H experiments. However, the elapsed time shows accelerated development of the cell killing. This not immediate effect suggests the action of natural processes, which we measured. Reestablishing the adherent connections (E. cadherin) and its signal pathways (beta catenin, p120 catenin) can be measured by IHC-H, and cells start to shrink (instead of swelling expected by necrosis). Appear a definitely enhanced expression of p53 protein. After longer time in vivo (4-24 h) observable the expression of connexins (gap junctions), and nuclear reorganization of beta catenin starts, which is finished after 72 hours of the treatment. During this development apoptotic bodies could be observed.

Tumor suppressor p53 is strongly expressed by oncothermia, and the morphological and immuno histochemical changes have time delay, as well as the adherent connections and gap junctions are restructured and reestablished.



### Conclusion

Oncothermia is the only process, where the synergy of the most modern biophysics (fractal physiology [6, 7, 8, 9]) is used, and applied to gain the natural processes with the hyperthermia (thermal conditions). Oncothermia is the only process which uses the synergy of the electric field and thermal processes. Oncothermia solves such technical problems, which were blocking the stable applications. This rigorous approach could be only the basic of the wide acceptance and the reimbursement from the Krankenkasse. Oncotherm focuses by automatism (see below) not necessary to change the sizes of the electrodes to have focusing (which is anyway a rough volume emphasis, and not a real focus).

Oncothermia solves the selective deep action on cellular resolution [10]. The main idea is connected to the electric field effect of cancer, worked out by the Karolinska Institute, Sweden [11]. The effect of electric field is a hot topic in science, [12, 13, 14, 15, 16], used in other treatment modalities also [17]. Oncotherm company was one of the firsts who constructed treatment unit, and shown it to the medical community, [18]. The results were amazing, [19]. Oncothermia development was a non invasive application of the electric field. The method was rapidly developing and clearly proven [20]. The electric field effect is widely applied on lower frequencies also [21, 22, 23] and a clinical trials of other electric field methods are also in progress [24, 25].

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