

Oncothermia: Complex therapy by EM and fractal physiology

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1. Introduction

Hyperthermia was the very first oncotherapy in human medicine. Despite of its long history it has no breakthrough in clinical practices. The discovery of electromagnetism had given new hopes a century ago, however some controversies blocked its wide application. Our approach, oncothermia [1] is a renewal, applying the synergy of the bioelectromagnetism with fractal physiology. I intend to show the principles and the results of this method.

2. Method

The method uses capacitive impedance matching at 13.56 MHz carrier frequency, applying definite time-fractal amplitude modulation with special template of its construction. Tumor-cells are selectively targeted by the EM energy, pointing the membrane of the malignant cells

- by their metabolic activity referred by the conductivity in the neighbouring electrolyte [2],
- by their definite changes of dielectric permittivity in neighbourhood [3]
- by the beta/delta dispersion at their membrane [4] and
- by the fractal (space and time) changes in their pattern [5].

The surface power-density of the signal is limited to 0.5 W/cm^2 . The skin at the treated area is controlled by its biological conditions. This makes it possible to use the precisely matched and measured energy as control parameter; no intensive cooling modifies the energy-intake.

3. Results

Numerous proven advantages of oncothermia were recognized, [5]. The new technology allows using as much overall energy as necessary for the cellular heating, having no lost energy by the heated non-cancerous volumes. The energy is selectively absorbed in nano-range of the membrane of malignant cells. The 1/10th of the usually applied energy in similar devices is eligible to reach high quality results in preclinical and clinical use, mainly in survival time and quality of life. The process induces special synergy of EM by temperature [7]. The cell-destruction is governed by apoptosis [8], and damage associated molecular pattern (DAMP); and following these immunogenic cell-death (ICD) [9] is created. This immune-activation is eligible to cause abscopal effect [10], an overall tumor-destruction in the body despite the local application.

4. Conclusion

Oncothermia is a new hyperthermia method solving the old-problems in oncology: it is a controlled, reproducible and reliable treatment.

5. References

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