



Institute for Hyperthermia and Immunotherapy IWIT, Vienna 14 Years Experience in locoregional and whole body hyperthermia



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BACKGROUND

The IWIT is the leading Institute for Hyperthermia in Austria

- > 17.000 h of whole body hyperthermia
- > 5.000 Treatments with locoregional Hyperthermia
- Largest center to successfully combine oncological and non-oncological treatments

Conditions treated

- Autoimmune diseases, Allergies
- Chronic Infections
- Chronic Fatigue Syndrome, Burn Out, SAD
- Pain Syndromes
- Cancer

PURPOSE AND HYPOTHESIS

Whole Body Hyperthermia

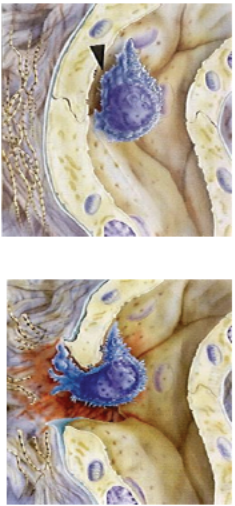
Whole Body Hyperthermia – the carefully monitored creation of artificial fever – is one of the most promising therapeutic strategies in physical medicine in use today. The central mechanisms of hyperthermia are the regulation of the matrix reaching deeply into the body's core and the modulation of the immune system. Healthy individuals benefit from increased stress resistance levels and deep regeneration effects.

Locoregional Hyperthermia in cancer therapy is combined with cytotoxic, radiation or immunotherapy. Cytostatics whose effect will be amplified by the produced heat are especially apt for treatment. Amongst others Cis-Platin, Mitomycin, Bleomycin and Epirubicin are known to have this effect. Also a combination with radiation seems to be reasonable. The radiation therapy affects all cells that are well-supplied with oxygen, while hyperthermia increases oxygen partial pressure in tumor cells.



MATERIALS AND METHODS

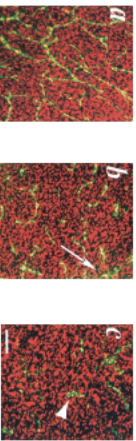
Pleiotropic & Complex Effects of Hyperthermia
- Immunological Effects - at fever-range Temperature



- Emigration & Migration (Expression: ICAM-1, L-Selectin ↑; ELAM-1 ↓)
- Chemotaxis ↑
- Cytokine-Induction (IL-1, -2, -6, -12, TNFα, NO, CSF)
- Activation of Effector Cells (NK, MO, DC, CTL)
- HSP-Expression (chaperones, HSP-1AA-complex)

Anti-angiogenic effect of heat

- Large control tumor
- Hyperthermia (44°C, 60 min) disrupted 25-50% of the blood vessels in the small tumor
- The anti-vascular activity was more potent (is more distinct) in larger tumors

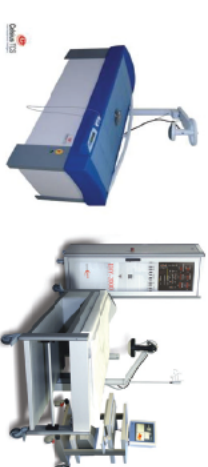


Eikelsdal, HP et al Int J Hyperthermia 2002; 18 141-152

RESULTS

Locoregional Hyperthermia

In locoregional hyperthermia the application of hyperthermia with external plate electrodes is employed with radio short waves 13-56 MHz which invade about 12cm into biological tissue. There is a distinction between direct and indirect effect. The direct effect relates to the tumor cell itself. It has an influence on protein metabolism, energy metabolism as well as on the structure of the cell membrane. The indirect effect relates to the attached tumor cells as a whole, i.e. disturbances of the micro circulation.



CONCLUSIONS

Summary of Basic Research in HT

- Increased blood perfusion at mild and moderate T
- Immunological effects at fever-range T
- Synergism with radiation, antineoplastic agents, antihormones, and immunomodulators
- Induction of apoptoses at T > 40°C
- Antiangiogenic, molecular and genetic effects
- Reduction of drug-resistance
- Induction of necrosis at T > 45°C

BIBLIOGRAPHY

- Kleef R: Die mild und moderate Ganzkörperhyperthermie. Karger Academic, Springer, Langhans, Spiez
- Niederwieser A, Rugeleberg J 2006
- Kleef R, Kekić S, Hadžić D, Rigler W, Pecher O: Hyperthermia in der Onkologie. Gustav Fischer Verlag, Stuttgart, 2006
- Kleef R, Jovan V, Rugeleberg W, Storzinger F: Cancer incidence and prognostic markers. Neoplasma 2006; 53:255-64
- Kleef R: Molecular characterization of cancer in the Oncology. Biotechnology Advances 2002; 20: 124-131
- Kleef R: Hyperthermia in Cancer. In: Cancer: Principles and Practice of Oncology, 6th Edition, DeVita DT, Hellman S, Duggan C, eds. Philadelphia: JB Lippincott, 2001
- Kleef R: Hyperthermia and Dose-intensification. In: Steven - Hagen - Schwabach Market, Robert, Handbuch (ed). Springer, Wien, New York, 2006