SZENT ISTVÁN UNIVERSITY

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Essence of Oncothermia

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What are the limits of the old hyperthermia approach?

New paradigm is necessary for oncology

Hyperthermia contradiction:
"The biology is with us while the physics is against us" (J.Overgard)

Oncothermia changes the paradigm:
"The biophysics is with us"

Hyperthermia contradiction:
"The biology and the physics is with us while the physiology is against us" (S.Osinsky)

Oncothermia changes the paradigm:
"The fractal physiology is with us"

Hyperthermia contradiction:
"Reference point is needed!" (J.van der Zee)

Oncothermia changes the paradigm:
"Back to the gold standards, use the energy instead of temperature"

Avoid from high temperature

"Physics is with us, when we use it well"

- Temperature heats up the vicinity of the tumor, it can not be kept locally focused
- Temperature increases the danger of burn of healthy parts in depth (misfocusing, conduction, etc.)
- Temperature requests the increase of the safety-cooling on the skin
- The increased surface cooling blocks the temperature sensing in the skin,
- The increased surface cooling makes the skin even more isolating, and so the electric burn is more likely
- Temperature increases the blood-flow in the region, in consequence increases the dissemination
- In complementary application with radiotherapy the forced high temperature suppresses the efficacy or blocks at all the effect of radiotherapy
- In complementary application with chemotherapy the forced high temperature suppresses the efficacy or blocks at all the chemopenetration into the tumor (vasocontraction or blood-vessel blockage in the tumor)
- In complementary application with chemotherapy the forced high temperature increases the cytotoxic side effects in the heated healthy tissues around by increased chemo-reaction rates (vasodilatation in the healthy tissues)
- The toxins from the necrotic cells are rapidly transported into the whole body, challenging the anyway low immune status of the patient

Temperature is not dose

"Physiology is with us"

- ✓ Moderate temperature avoids the natural contra-regulation effects
- ✓ Temperature does not exceed the systemic physiological limit (42 °C)
- ✓ Tumor selection is solved by non-temperature dependent way (electric concept)
- ✓ Focus is to be fixed to the tumor, moves together with the natural body movements (impedance control)
- ✓ Selection is solved on cellular level suppress the dissemination of the malignant cells
- ✓ Cellular connections (adherent connections, gap-junctions) of malignant cells are reestablished to avoid the further dissemination
- ✓ Cellular communication (social signal) is reestablished to promote the natural (programmed) cell death for malignant cells
- ✓ Possibility of the cellular molecular exchange (gap junctions) is reestablished to promote the normal function of the cells.
- ✓ The "master switch" (p53 gene) is activated promoting the natural way of various cell killing pathways
- ✓ Cell-membrane permeability is increased to express the HSP on the outer membrane signalizing the cell malignancy for the systemic immune actions.
- ✓ Cell-membrane is excited to ignite various communication pathways in the cells.
- ✓ Electric field blocks the positive feedback loop of tumor-supporting injury currents

Technical specialties of oncothermia

The nano-scale heating

- Target the cell-membrane in nano-scale (correct energy is mandatory)
- Personalized information-delivery is applied (patented)
- Surface cooling is controlled (patented)
- Low voltage large current (at given energy) is applied (patented)
- Time-fractal modulation is applied (patented)
- No temperature measurement is necessary (patented)
- Every parts are designed to the actual task (oncotherm-design)
- Easy to use, comfortable for patient, tailored for patient

Avoid the static approach

"thermostatical considerations are against us"

Measurement of intensive thermodynamical parameters (like temperature) supposes at least local equilibrium, which never could be realized due to the intensive contra-regulatory effects. (This concept however, became the main request of the classical hyperthermia approach in its guidelines.)

The forced equilibrium increases the heat-flow to the blood-stream, which is an effective cooling media trying to block the static concept.

The heat-flow to blood supports the positive feedback loop of the basic-acidic electrolyte balance, and promotes the intensive growth of the tumor by addressed oxygen delivery.

Static constrains try to block the natural dynamism of the living system, which mobilizes its forces to keep the dynamic equilibrium instead of the static one. This creates protection mechanisms of the actual status quo in the tissue, defending the tumor instead its elimination. (These processes like intracellular HSP development, like forced delivery of metabolic species [oxygen and nutrition], like systemic cooling control, like various stress reactions, etc.)

Process reaching equilibrium mobilizes higher level of physiological contra-actions and accelerates a competition between the constrains and the nature. This falsely mobilizes the natural healing forces. (Natural actions are gained against the actual treatment and not against the "common enemy", against the malignancy.)

Application of dynamic processes

"Thermodynamics and fractal physiology is with us"

- ✓ Oncothermia uses tumor killing approach, which is well fitted to the dynamism of the living system, does not constrain it for false defense.
- ✓ Control of oncothermia is natural, always fitted to the actual conditions (changes of the electrolytes determines its actions).
- ✓ No considerable heat-flow to the blood-stream by oncothermia, no gain of the positive feedback of electrolyte balancing-loop.
- ✓ Thermal gradients make dynamism in a very local area of the cell-membrane of malignant cells. The applied selection focuses on this thermal non-equilibrium.
- ✓ The relatively slow "step-up" heating keeps the non-equilibrium stable for long time for action.
- ✓ The slow heating up does not create considerable physiological contra-actions.
- ✓ The slow heating makes the healthy tissue adapted to the growing temperature.
- ✓ The slow temperature change does not generate high stress and following stress reactions.
- ✓ The applied electric field makes at least three times more effective cell killing than the temperature does.
- ✓ The applied fractal modulation makes possible selecting and supporting the natural processes to activate the natural healing mechanisms and reestablish the healthy "social signal" between the isolated cells, promoting the anti-malignancy collectivity.

Avoid automatisms in treatment guidelines

Guidelines are not "cookery books";
we are in the clinic and not in the kitchen

Everybody is different....

The actual disease is not simple the disease of an organ. This organ belongs to somebody.

The personal differences are modified by the previous treatments and tolerances

The definite similarities after the chemo- or other serious therapies are mainly due to the side effects...

Most of the decisions in serious cases need medical experience, not "only" book-based evidences.

The patients with advanced diseases are not "naïve" in most of the cases. Their high-line treatments need personal decisions, frequently no evidence-based protocols are available for their special cases.

Many times the palliation is necessary, which definitely needs personal decisions.

The psycho-factors are not negligible in the case of malignant diseases.

The personal decision is the responsibility of the experienced doctor...

Make personalized processes

Guidelines of the thinking for experienced physicians

- ✓ Oncothermia is mainly regulated by the patient's tolerance
- ✓ Oncothermia control based on thermal sensing of the patients, for safety and for efficacy reasons. Safety is avoid burning the tissue of the subcutaneous layers, the efficacy to apply such energy, which does not overload the patient natural defending/protective system.
- ✓ Oncothermia uses natural processes to cure, understanding and using these needs thinking doctors and their understandings.
- ✓ Oncothermia acts of natural physiology regulation, which needs understanding of the processes.
- ✓ Oncothermia needs permanent dynamic approach, follow-up well what is happening during the treatment.
- ✓ Step-up heating is the basic treatment approach, which requests permanent care on the process.
- ✓ The effect of the activated natural processes are not acting immediately. To have a control treatment-by-treatment is essential.
- ✓ The patient's well being during and after the treatment is necessary side of the well conducted protocol.
- ✓ Complete relaxation could be supported by relaxing music, video or sound effects during the treatment.

In memoriam Reka Szasz