Booster for all medication processes

Dr. Oliver Szasz[1,3], Dr. Gabor Andocs[2], Mr. Bela Gnädig[3], Mr. Balazs Acs[3], Dr. Andras Szasz[1,4]

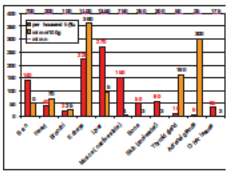
(1) Oncotherm GmbH, Troisdorf, Germany
(2) National Research Institute for Radiobiology and Radiohygiene, Budapest, Hungary
(3) Oncotherm Kft, Paty, Hungary
(4) Department of Biotechnics, St. Istvan University, Budapest, Hungary

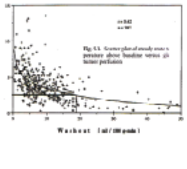
Objective

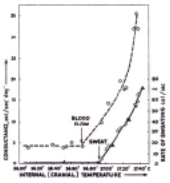
One of the problematic point of the medication its targeting The systemically administered drugs are distributed in the whole body by the blood, irrespective its origin by i v infusion, orally taken or getting by muscular injection, rectal suppository, skin addicted, inhalations etc However the delivery and the in situ effect of the given drug to the target is a crucial point of the treatment This is also the main point of the personalization of the drug administration in every medial actions and especially important in the oncology, where the toxicity is an effective danger Objective of our presentation is to introduce the device, which is devoted to help in this line of the problems: the chemo booster

Method

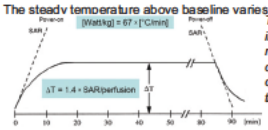
The drug in all systemically administered cases delivered and distributed by the blood stream The task to increase the drug concentration in a given volume is increasing the blood flow in the targeted area The higher temperature could activate the microcirculation of the capillaries (capillary filtration capillary pressure, etc), increasing the micro vascular perfusion, local tissue oxygen, nutrients, and phagocytes to the area being targeted It could also regulate the cell cycle by changing calcium ion binding







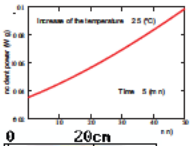
The steady temperature above baseline varies by the washout perfusion [1]



The sudomotor and vasomotor responses to the stimulus of internal temperature were plotted simultaneously, to show the relative positions of their thresholds and the coordinated action of the two phenomena No significant further decrease of conductance was observed as temperature dropped below the threshold of active vasodilatation [2]

SAR: specific absorption rate [W/kg]
ΔT: steady state temperature elevation [°C]
perfusion [ml/100g/min]

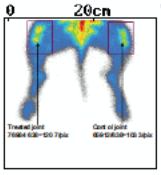
Increases pretty linearly with the heat input (I) [1] as



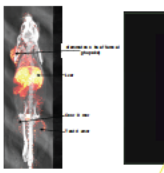
$$\Delta T = \frac{60I}{kS_t}\left(1 - e^{-kt}\right) \qquad \left[k = \frac{Fp}{100\lambda}\right]$$

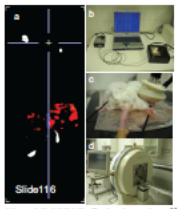
Eq 4

where S specific heat of the tissue [J/g/K]; F tissue blood flow [ml/min/100g]; λ ratio of absorption ability of heat in tissue and blood; p density of the tissue [g/ml]; I heat input rate [W/g] of the tissue; ΔT increase of the temperature in the tissue [K]; t time [min]



A healthy beagle dog was measured by the radiopharmaceutical (400 MBq 99mTc HAS) injection, to see the blood perfusion differences comparatively in joints The result shows a perfusion enhancement of 16 8% in the oncothermia treated joint



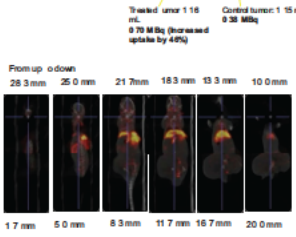


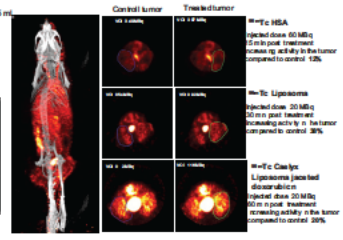
The measurement of the mice tumor with symmetrical control (a) the result in a depth (slide 116), (b) the experimental arrangement, (c) the mice under the treatment, (d) the SPECT tomography

MicroCT SPECT Rad ophamalkon: ^{99m}Tc signaling

Treated tumor 1 16 mL
0 70 MBq (increased uptake by 46%)

Control tumor: 1 15 mL
0 38 MBq

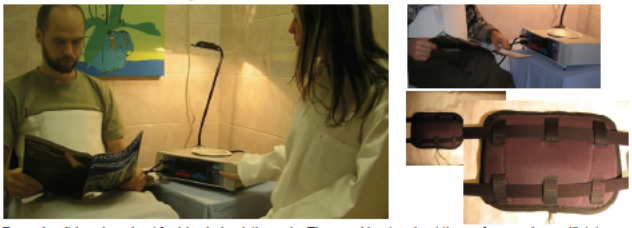




Results

A small device had been developed to heat up the full volume under the electrode in full depth It has no treating effect like oncothermia had (it has no cellular selection or focusing), it is a simple local heater in depth The heating is generated by the Joule loss in the body, and makes vasodilatation there The vasodilatated volume has higher blood perfusion which delivers more drug (and more oxygen) to the target, and relatively deprives it form the other areas of the body This is a drug boosting in a requested volume, but it does not make any more selection The temperature range is 37 39oC, which is optimal for boosting function The booster works not only by the vasodilation but also could be combined by the pharmacokinetic parameters of the given drugs, activating the chemo reactions and the reaction rates by the higher temperature in the targeted volume Its application covers a wide range of diseases For example it could be used for rheumy, goat, pain management, arthritis, dermatology, muscle spasms, sport supports, gynecology, allergy, rhinitis, common cold, pediatric ear diseases, nerve healing, bone Healing (unsure of any published clinical studies that are proven), cosmetics (like adipose problems, cellulites, acnes, blisters, etc), support of the general rehabilitation process It has a little curative effect on wound healing as well

The electrode heats up the tissue but itself remains cold after 60 min treatment



Remarks: It is a deep heat for blood circulation gain The usual heaters heat the surface, and vasodilatate the subcutan capillary bed This negative effect for drug targeting, because the drug could be concentrated on this area instead of the target The booster makes the heating deep by Joule heat of the current flowing through the targeted volume

Following actions also could be generated:

1 increased fibroblastic activity and capillary growth
2 increases the nutrition concentration in the volume
3 increases the metabolic activity in the volume (higher quantity of nutrition, oxygen and higher local temperature)
4 synergically increases the field dependent effects, (optimizes the membrane excitation and helps activating the signal pathways, etc)
5 increases the effects on the blood structure in the volume,
6 increases venous and lymphatic flow
7 changes in physical properties of tissues
8 increases tissue extensibility
9 possible changes in enzyme reactions
10 increases the heat and field stress reactions (mainly the developments of heat shock proteins, HSP)

Further actions are:

1 Muscular relaxation
2 Edema reduction
3 Lymphedema reduction
4 Treatment of venous stasis ulcers
5 Assists in removal of cellular debris and toxins
6 Alters diffusion rate across the cell membrane
7 Increases intramuscular metabolism
8 Superficial wound healing
9 Analgesia pain relief, pain killing device
10 Could help the analgesic drugs to be activated

Technical parameters:

1 It is a heating device in depth, not focusing, heats the full volume
2 Its frequency is 6 78 MHz
3 It has ultra light, super flexible, multi purpose and multi use electrodes
4 It has no modulation
5 It is 8 kg, and 40W power

Conclusion

The newest device from Oncotherm Company is not for oncology alone This universal small device could be indispensable support for the actual treatments by various medications, and could be essential for the personalization processes

This is not a curative device! This helps for personalizing and targeting every medicaments administered systemically, irrespective which disease is treated. The treatment is provided by the medication, the booster makes its personalization.

References

[1] Feldmann HJ Molls M Vaupel P (1998), Clinical investigation of blood perfusion in human tumors, in: Blood perfusion and microenvironment of human tumors, Implications for clinical radiooncology (Molls M Vaupel P [Eds]) Springer, Heidelberg, pp 47 62

[2] Benzinger TH: On the physical heat regulation and the sense of temperature in man, Proc Natl Acad Sci USA, 45:645 659, 1959