

WHY WE NEED NEW PARADIGM FOR HYPERTHERMIA?

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Introduction

Oncological hyperthermia has no common acceptance in medical science among the oncology practitioners. The situation is very much inconvenient for the patients, for whom the method could be a help and for the physicians who are much disoriented in the topic. Despite of its versatility and some well proven results, numerous contradictory opinions and beliefs exist, heated discussions tried to put the method to its place. The centre of all the disputes is the control of the hyperthermia process and the repeatability of the treatment results. Of course the clues are the quality control, the definite protocols and the connected technical abilities.

Objective

Our aim is to present a paradigm of the hyperthermia control to fix the basis of its quality guideline using similar approach than the traditional oncological modalities and with this making coherence in understanding the hyperthermia applications.

Method

The definition of hyperthermia is originated from the over-heating of the target to apply heat to reach the goals. This original definition was slightly modified by the time centred on the higher temperature instead of the higher heat-absorption. Unfortunately, the every-day practice uses these definitions as interchangeable but they are far not the same. We concentrate on showing the differences, and chose the adequate parameterization of the method.

Discussion

The temperature concept originated falsely from the symptoms of the malignant hyperthermia disease, and it fixes a practice of the easy measurement: the development of the temperature. However this parameter characterizes the average (homeostatic) situation, it does not satisfy the simple scientific request for the dose: it is a so called intensive value (a part of the characterized volume has the same value than the full target) instead of the usually applied extensive one (the part of the target has a proportional actual value). The traditional onco-modalities (radiology, chemotherapy, surgery) all use extensive parameters (mg/m^2 , J/kg , ℓ) which definitely characterize the actual dose. The absorbed heat (measured by J/kg , formally the same as the Gy) is extensive and satisfies the rigorous definition of the dose. This would be the right characterization of hyperthermia.

Conclusion

The correct characterization makes it possible to keep hyperthermia in the track of the usually accepted measurability, makes the correct quality control and the correct protocol making possible. The temperature is a great average making no possibility to measure the energy expenditure on the actual task. Measuring the energy consumption makes the characterization of the actually applied work possible.

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