COMPARISON OF INTERSTITIAL AND INTRALUMINAL TEMPERATURES DURING DEEP HYPERTERMHA.

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Introduction

From a clinical point of view, the purpose of thermometry during hyperthermia is to optimise the hyperthermia dose distribution and to prevent hyperthermia induced toxicity. Sneed et al. have argued that also for deep-seated tumours interstitial thermometry is critically important [1]. On the other hand, Van der Zee et al. have shown that interstitial thermometry adds to the problems experienced with deep-regional hyperthermia, does not prevent toxicity, and is not helping in optimisation of SAR steering in the target volume [2]. Therefore, in our department, we have decided to limit thermometry for intrapelvic tumors to intraluminal sites. In this study, the relation between interstitially and intraluminally measured temperatures is analysed.

Materials and methods

The thermometry data of all 78 patients (treated from June 1990 to June 1996) in whom both interstitial and intraluminal temperatures were measured were included in the analysis. These patients were treated with hyperthermia in addition to radiotherapy for urinary bladder cancer (n=5), uterine cervical cancer (n=11), rectal cancer (n=48) and various other tumor types (n=14), mainly sarcoma. For each treatment the tissue type was defined based on information from a CT scan. The Rotterdam Hyperthermia Thermal Modulator (RHyThM) was used to get access to the data. Thermal dose parameters were calculated, the various temperature curves within each treatment session were compared and the relation between applied power and achieved hyperthermia dose was analysed.

Results

Overall, thermometry data from 89 of 120 interstitial catheters and 369 of 533 intraluminal catheters could be transferred from PDOS to MSDOS and made available for analysis. Here we present the T50 values for uterine cervical cancer, and for rectal cancer in male patients, and preliminary results of further analysis.

Cervical cancer: Thermal mapping data were available for 29 treatments of 8 patients: 10 interstitial catheters and 83 intraluminal catheters. T50’s were 39.3 ± 1.0°C for intratumor measurements, 39.9 ± 0.9°C for intravaginal tumor contact, 40.8 ± 0.9° for bladder tumor indicative, and 40.2 ± 1.0°C for rectum tumor indicative. Differences between all these values were significant.

Rectal cancer in male patients: Thermal mapping data were available for 70 treatments of 24 patients: 37 interstitial catheters and 89 intraluminal catheters. T50’s were 39.8 ± 1.2°C for intratumor measurements, 40.4 ± 1.1°C for rectum tumor indicative, and 40.1 ± 0.8° for bladder tumor indicative. Differences in T50 between tumor interstitial and rectum tumor indicative, and between tumor interstitial and bladder tumor indicative were significant.

Preliminary further results: Comparison of temperature curves from interstitial and intraluminal measurements during single treatment sessions showed that temperature changes are in the same direction: when intraluminal temperatures increase, the interstitial temperatures inc-
Temperatures measured interstitially or intratumorally at the same time points during one treatment session are significantly correlated.

**Conclusion**

Based on these findings, we confirmed the findings of Wust et al. [3] and consider it justified to limit thermometry during deep-regional hyperthermia to intraluminal measurements.

**Acknowledgement**

This work was supported by the Dutch Cancer Society grant 2003-2884. The first author was supported financially by the Shahrekord University of Medical Sciences (related to the Iranian Ministry of Health, Treatment and Medical Education).

**References**

