TEMPERATURE AND POWER DATA ANALYSIS OF CERVICAL CANCER PATIENTS TREATED WITH HYPERTHERMIA DURING 1991-2005.

Fatehi D. *[1, 2], van der Zee *[1] J., de Bruijne[1] * M., Franckena[1] * M., and van Rhoon *[1] G. C.

[1] *Department of Radiation Oncology, Unit Hyperthermia, Erasmus MC, Daniel den Hoed Cancer Center, PO Box: 5201, 3008 AE, Rotterdam, The Netherlands.*

[2] *Department of Medical Physics, Shahrekord University of Medical Sciences, PO Box: 88155-571, Shahrekord, Iran.*

Purpose: Analysis of RF-temperature and power data of primary cervical cancer patients to evaluate 15 years performance of loco-regional deep hyperthermia (DHT) with four configurations of the BSD-2000 system.

Materials and methods: Patients (n=444) were treated with the Sigma-60 applicator connected to one of four configurations of the BSD-2000 system from 1991 to 2005. The patients were grouped in three weight-groups: <61kg, 61-70kg, and >70kg. Temperature indices were calculated per patient, per treatment, per lumen and per tissue type. Ten power-related parameters were calculated for individual treatments. Then, the relationships between different temperature and power indices were computed per configuration, per weight-group, and over the time-period. Also percentages of normalized net integrated power per pelvic area and vagina T_{50} were calculated and the relationship between these was evaluated.

Results: No substantial variations were found for temperature and power indices over the four BSD configurations. The power indices increased from weight-group 1 to 3, however, the power data per pelvic area (or per weight) and also temperatures decreased slightly. Large variations were seen in the power-related parameters over the 1st time-period (1991-996), but they were much lower over the 2nd time-period (1997-2005). The average frequency of switched-off time was remarkably higher (2.6-fold) in the 2nd time-period. In contrast, the average duration of each switched-off was substantially lower in the 2nd time-period (75s vs. 44s). The yearly average of vagina T_{50} was in the range of 39.3-40.2°C (1st time-period) and 40.0-40.5°C (2nd time-period). In 40% of the patients, a positive correlation (mean: 0.7, range: 0.5 – 0.99) was found between the normalized power and temperature.

Conclusions: The small variation for the yearly average of applied-power and achieved temperatures in the last nine years shows the reproducibility of the application of loco-regional DHT to primary cervical cancer. A global view of the four BSD configurations indicates that the power outputs are almost similar; additionally, the achieved temperatures show that the four systems have provided relatively low doses of HT in the treatment area with a very small difference in the averages of temperature. An overall view of the three weight-groups shows that the applied powers increased from low-weight to the high-weight patients but the achieved temperatures decreased slightly from the low-weight to the high-weight patients. The experience of staff-members and changes in the treatment protocols certainly affected the switched-off strategy.

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). The

authors would like to thank all hyperthermia staff-members of the Daniel den Hoed Cancer Center in Rotterdam for their technical assistance.