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## Impact of electromagnetic stray radiation in the hyperthermia treatment room

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### Introduction

Hyperthermia to temperatures of 41-43°C has been shown to be a valuable sensitizer for radiation- and chemotherapy in cancer treatment. During hyperthermia treatment (HT) the presence of health staff and accompanying persons in the treatment room is desirable for patient comfort. In this study the electromagnetic stray radiation in the treatment room with respect to limits for non-ionizing radiation was investigated.

### Material and Methods

The strength of the electromagnetic field inside the unoccupied HT room was measured with a calibrated power density meter (RAHAM Model 4C, General Microwave Corporation Amityville (NY), USA). Measurements were made on a 2-dimensional grid with measurement point 20cm apart. During the measurements the HT machine (BSD2000-3D with SigmaEye applicator, Pyrexar Medical, Salt Lake City, USA) was running with a dummy load of saline water. Power at the generator output was 1000W maximum, distributed through the feeding network to 24 antennas of the SigmaEye applicator. The results of the electrical field strength measurements were evaluated according to the ICNIRP guidelines (1).

### Results

A clear linear relation between output power at the generator and measured power density at a single measurement point was found. Inside the HT room electrical field strength values between 17.4 V/m and 137.3 V/m were detected. According to the ICNIRP guidelines (1) areas with electrical field strength below and above the limit for occupational exposure of 61 V/m were detected and marked on the floorplan of the HT room for a typical patient treatment generator output power of 800W (Figure1).

### Conclusions

In large areas of the empty HT room the limits for occupational exposure are exceeded. Specific areas around the treatment table were identified as safe. Since the presence of persons and objects inside the HT room strongly influences the measured field strength further measurements should investigate the actual field strengths during patient treatment and indicate measures to avoid high E-fields.

### References

(1) ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). In: Health Physics 74 (4): 494-522; 1998

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