

The Health Risk for Physicians Performing Microwave Ablation for Liver Cancer Treatment

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Treatments for liver cancer are dependent on their particular stage. These include partial hepatectomy, microwave ablation, chemotherapy, and radiation therapy. The method of ablation, in particular exposes cancerous tissue to cytotoxic temperatures to induce cell death. During treatment, an ablation probe is placed percutaneously into the tumor, then microwave energy is supplied, often 50 to 80 W, for 5 to 10 minutes in one continuous session. Frequencies used include 915 MHz and 2.45 GHz. This procedure has many benefits including being minimally invasive which leads to quicker patient recovery and fewer complications. Ablation therapy sessions are aided by a computed tomography (CT) scanner under fluoroscopic guidance so that the physician has an accurate and real time display of CT images on the monitor. Although this alternative cancer treatment is growing in popularity there is little information on the risks involved for the physicians performing the ablation procedure. According to the World Health Organization's International Agency for Research on Cancer (IARC) the exposure to small amounts of microwave radiation over time may be significant enough to have carcinogenic effects. Because ablation therapy utilizes large amounts of microwave energy, it is important to explore the levels of electromagnetic radiation experienced by a physician during such a procedure since they are by the patient's side for the entire duration of the treatment.

In this study, we investigated the physical hazards for health care providers due to 2.4GHz microwave ablation treatments. Local and whole-body average Specific Absorption Rate (SAR) values are simulated using CST Studio and the Virtual Family Models Duke and Ella along with experimental measurements using a patient receiving the treatment.