

THE ROLE OF ENGINEERING PRINCIPLES IN THE MEDICAL UTILIZATION OF ELECTROMAGNETIC ENERGIES: Examples

A PLENARY SESSION PRESENTATION

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ABSTRACT

The use of RF/microwaves in medicine has increased dramatically over the last ten years. RF and microwave therapies for the treatment of cancer in humans are well documented, and are presently used in many cancer centers. RF treatments for supra ventricular arrhythmias, and more recently for the treatment of ventricular tachycardia, are currently employed by major hospitals. RF/microwaves are also used in human subjects for the treatment of benign prostatic hyperplasia (BPH). In the last few years, several otolaryngological centers have been utilizing RF to treat upper airway obstruction and to alleviate sleep apnea. Many centers also utilize RF for the treatment of gastro-esophageal disease (GERD), for pain management, and for endometrial ablation. Balloon microwave catheters for ablating solid tumors, then forming cavities in those tumors for the local delivery of therapeutic agents, are currently being investigated. New modalities are being studied, such as RF/microwave for the enhancement of drug absorption and microwave septic wound treatment, microwave imaging for the detection of breast cancer, epidemiological studies on the effects of rats' exposure to microwave, as well as tissue regeneration using electromagnetic fields. In addition, technology is presently being developed that allows for permanent implantation of microwave wireless sensors in humans. A permanently implantable intra-cranial pressure monitor is one such application of the latter technology. Many more areas of research are currently being investigated, a partial list of which is summarized in the introduction.