Defense Announcement

Reduction of MRI RF Coil Induced Heating for External Fixation Devices

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This dissertation focuses on understanding the effect of the MRI RF coil induced heating for external fixation devices and investigating methods to reduce such thermal impact. Absorption material is used as an effective way to reduce the RF induced heating. With the proper choice of absorption material properties, the RF coil induced heating on modular external fixation can be significantly reduced in simulation studies. Experimental results also show the effectiveness of this technique.

A novel leg phantom was designed for heat evaluation on circular external fixation. Good agreement can be seen from a comparison of the electric field or SAR distribution between the human model and leg phantom. Based on the worst-case scenario, the use of low permittivity absorption material with appropriate conductivity can obtain optimum heat reduction.

A circuit model of MRI RF coil induced heating on external fixation devices was proposed. This model provides qualitative insights on the mechanism of the heating reduction using absorption material.