

## AbstractID: 13634 Title: Causes and Prevention of MR-induced Skin Heating for Patients with Attached Headframes for Gamma Radiosurgery

**Purpose:** We have investigated the potential for magnetic resonance imaging (MRI) induced skin heating for gamma radiosurgery patients with attached rigid headframes. MRI-induced heating through three mechanisms may be possible where the four headframe screws contact the skin surface of the patient's head.

**Method and Materials:** Using melons as head phantoms, optical thermometers were inserted sub-surface at selected points to measure the temperature profile of the melon-headframe composite as a function of the applied 3T MR pulse sequence. Multiple headframe post and screw combinations, representing possible clinical scenarios, were evaluated for MRI-induced heating.

**Results:** The potential exists for a range of MRI-induced skin heating from 2-10 C or more at the attachment sites of the radiosurgical headframe. This localized heating originates with the RF fields inducing current in a loop formed by the headframe, mounting screws and the region of the patient's head located between any of the two screws, with the loop in a position perpendicular to the RF field. This current is then resistively dissipated, with the regions of highest resistance, the screw-patient interface, experiencing the most heating. Thus skin heating, including burns, is a potential hazard for gamma radiosurgery patients during MRI scans. However, this hazard is easily prevented by replacing the metallic threads holding the screws with electrically insulated nuts that prevent the formation of current loops. This method has been confirmed and is a recommendation of the gamma unit's manufacturer.

**Conclusion:** MRI-induced heating of the skin has been investigated for patients with rigidly attached headframes. Using a melon-phantom system the cause of heating and potential burns has been determined for selected 3T MR imaging sequences and headframe-screw combinations. The recommended method for prevention of MRI-induced skin heating with an attached gamma radiosurgery headframe has been verified. **Disclosure:** Supported in part by NIH T32-CA113267.