# AbstractID: 5611 Title: A real-time MRI guided external beam radiotherapy delivery system

**Purpose:** We present feasibility studies in support of a real-time MRI guided external beam radiotherapy delivery system currently under commercial development.

**Method and Materials:** The system, (ViewRay Inc., Renaissance™), combines a low field open MRI scanner and a multi-headed $^{60}$Co γ-ray IMRT unit equipped with multi-leaf collimators. It is designed so that the center of the field of view of the MRI and the isocenter of the radiotherapy unit coincide. The inherent compatibility of the units allows for the acquisition of fast ciné MRI simultaneous to radiotherapy delivery to assess intra-fraction organ motion. Computational feasibility studies were performed to investigate: the compatibility of the MRI and the $^{60}$Co γ-ray IMRT unit; the impact of the MRI magnetic field on the dosimetry; and the feasibility of performing accurate heterogeneity dose computations with MRI data.

**Results:** The $^{60}$Co γ-ray IMRT unit was found not to significantly impact the operation of the MRI; the γ-ray IMRT unit is capable of producing high quality IMRT treatment plans; the MRI magnetic field eliminates contamination electrons and does not significantly perturb the dose distribution in lung, soft tissue, and bone; and accurate heterogeneity dose computations are possible employing only MRI data.

**Conclusion:** Performing IMRT allows for the seamless integration with, and simultaneous operation of, an open MRI unit.

**Conflict of Interest:** Research sponsored by ViewRay, Inc., Gainesville, Florida USA