

AbstractID: 10387 Title: A Comprehensive QA Program for Radiotherapy MR Simulators

**Purpose:** To our knowledge, there are no publications on the acceptance, commissioning and quality assurance (QA) procedures for MR simulators in radiotherapy. The purpose of this work is to develop a comprehensive protocol for MR simulators in radiotherapy.

**Materials and Method:**

A GE 1.5T MR scanner was installed in our department in 2006. During acceptance testing and commissioning, the MR scanner was tested according to the standards established by the American College of Radiology (ACR) MRI Accreditation Program. An ACR phantom was used for the study. Our QA protocol includes procedures for geometric accuracy, high-contrast spatial resolution, slice thickness accuracy, slice position accuracy, image intensity uniformity, percent signal ghosting, low-contrast object detectability, inter-slice RF interference, fringe field survey, magnetic field homogeneity, eddy currents, coils SNR check and cryogen consumption. We also checked the patient/console intercom system, table stop buttons, emergency stop button, table docking, vertical movement, alignment lights and the ventilation system. Monthly QA were developed to check the RF, transmission gain/attenuation, imaging distortion and resolutions using the ACR phantom. A phantom from GE was used for daily QA to check the SNR, RF, isocenter position and the gradients. The lasers installed in the MR room for patient setup were also checked. QA procedures were developed for MR spectroscopy. The results from monthly and daily QA were compared with the commissioning data.

**Results:** The acceptance/commissioning test and monthly QA showed that the MR scanner met the criteria established by the ACR MRI Accreditation Program. The results from the daily QA are SNA:  $29.66 \pm 0.84$ ; Noise:  $2.31 \pm 0.1$ , CTR Frequency:  $63860229 \pm 4778$ ; iso-Z:  $8916.33 \pm 9.26$ ; Gradient X, Y and Z:  $100.14 \pm 0.11$ ;  $100.05 \pm 0.08$ ; and  $99.8 \pm 0.10$ , respectively, for >2 years. The variations were within 1% of the commission data.

**Conclusions:** A comprehensive QA protocol was developed and routinely used for our MR simulator for radiotherapy.