

AbstractID: 1373 Title: Determining Positional Accuracy for Tomotherapy Intensity Modulated
Radiosurgery using Megavoltage CT Image Fusion

The purpose of this study is to determine the setup accuracy of an image guided system, the TomoTherapy Hi-Art system. TomoTherapy generates megavoltage CT (MVCT) images which are subsequently fused with treatment planning kilovoltage CT (KVCT) images to optimize positional setup. The image fusion program calculates the lateral, longitudinal, vertical, pitch, roll and yaw adjustments that are necessary to align the MVCT images with those from the planning KVCT. To begin the analysis of the setup accuracy, a KVCT scan was performed on a phantom containing a metallic ring. The ring was contoured as a target structure and a treatment plan was generated to provide isodose distributions surrounding the structure. Next, a film was placed adjacent to the ring and an MVCT was performed. The position of the phantom was adjusted as indicated by the MVCT so the position of the ring coincided with the position of the ring from the treatment planning CT. The phantom was irradiated and the resulting relative dose distribution (darkness on film) was compared to the position of the wire identified by scatter radiation. After analysis of the film, it was found that the differences in the position of the wire and the contour of the wire were less than 1mm in the vertical, lateral and longitudinal directions. The position accuracy using MVCT image fusion is acceptable for Tomotherapy Radiosurgery according to AAPM Task Group 42 report.