

AbstractID: 4963 Title: Results of a Multi-Institutional Benchmark Test for Cranial CT/MR Image Registration

Purpose: To assess variability in CT/MR image registration results using a benchmark case developed by the Quality Assurance Review Center. The benchmark was developed to credential institutions for participation in Children's Oncology Group Protocol ACNS0221 for treatment of low-grade glioma.

Method and Materials: Two DICOM image sets were provided. The MR scan had a small target in the posterior occipital lobe that was readily visible on two slices. The lesion was not visible on the CT scan, which was obtained with the patient in a BRW head frame. Each institution was asked to register the two scans using whatever software system and method it would ordinarily use for such a case, to outline the target volume on the two MR slices, and to report the coordinates of the center of the target in the CT coordinate system. To establish a common reference point, the coordinates of the center of the largest BRW rod on the most inferior CT slice were to be reported. Acceptability criteria are based on results from the first 17 submissions. The average of all submissions was used to determine the "true" center of the target.

Results: Results are reported from 31 submissions representing 26 institutions and 10 software systems. One standard deviation in the position of the center of the target is 1.9 mm. The least variation is in the lateral direction. There was no correlation of deviation with method of registration, i.e. automatic, manual, or match points.

Conclusion: When MR and CT scans of the head are registered with currently available software, there is inherent uncertainty. This uncertainty of approximately 2mm should be accounted for when defining the PTVs and the PRVs for organs at risk on registered image sets.

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