

Purpose: Implanted radio-opaque markers can be used to correct patient setup errors. An important component of this process is determination of the marker positions at the time of CT simulation. However, the slice thickness limits the resolution in the longitudinal direction. We report on use of CT scout images to improve marker localization, particularly in the longitudinal direction.

Methods and Materials: We developed an acrylic phantom that contains gold markers in known positions relative to a 6.4 mm diameter radio-opaque ball. It is capable of translation in three axes and rotation around two axes. The phantom translation axes were aligned with the CT coordinate system. We obtained three scout images and reconstructed the marker positions using a ray tracing algorithm. The position of the reference ball was also determined. The phantom was moved to a known, randomly determined, translation and rotation. The same scout image views were obtained and the marker positions reconstructed. The reconstructed marker positions relative to the original position of the reference ball were compared with the expected values. Six translation/rotation measurements were performed.

Results and Discussion: The standard deviation of the differences between the reconstructed positions and the expected positions was 0.1 mm. The mean difference, which may be the result of small errors in the known positions, was 0.5 mm.

Conclusion: The reference positions of radio-opaque markers can be determined from CT scout images. The present study indicates that such determination can provide sub-millimeter accuracy.

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