AbstractID: 7582 Title: Positioning accuracy using an image-guided patient localization system

An image-guided patient-positioning device called Novalis Body system is introduced to precisely localize the treatment target position. The system integrates two infrared cameras, one video camera, and two keV x-ray-imaging devices. We conduct a series of phantom studies to investigate the accuracy of this system for patient localization. A range of three-dimensional translations and rotations are simulated to test whether the system is able to recover the original isocenter position as planned. The effects of CT slice thickness, anatomical site, and keV x-ray image quality on positioning accuracy are investigated. Two image fusion approaches, automatic and implanted markers, are tested. The results show that the isocenter reproducibility of the localization system is less than 1 mm for CT slice thickness of 4 mm or less. With various translational target shifts, the isocenter position after correction is deviated less than 1 mm from the planned isocenter position. When the phantom is rotated with an angle of less than 5° at any direction, the corrected isocenter position is deviated less than 1.5 mm from the planned isocenter position. The results indicate that the positioning reproducibility is comparable for three different anatomical sites (head, lung and pelvis). The localization accuracy is more reliable when images are fused with implanted markers than using automatic fusion technique, especially for x-ray images with poor contrast and blurred anatomical structures. Our study indicates that the system is reliable for clinical use.

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