

AbstractID: 6989 Title: Accuracy of Automatic Couch Corrections with On-Line Volumetric Imaging

Purpose: To assess the accuracy of patient positioning using on-line image-guidance and automatic couch correction.

Method and Materials:

During device commissioning, automated movements of the robotic couch were assessed using a Rando phantom and a Polaris optical navigation system giving sub-millimeter accuracy at approximately 18 Hz. Clinically, after assessment of a volumetric scan, a couch correction is applied if the displacement falls outside a pre-defined action-level of 3mm in any translational plane or greater than 5° of rotation. If the setup was outside of tolerance, the remote automatic couch was used to adjust patient position. Verification scans were acquired after the shift and the residual error analysis was evaluated retrospectively. The data from 34 patients over a one month period is included in this study, representing a total of 135 CBCT volumetric images.

Results:

The Rando phantom's residual error over 10 trials for a 10mm movement in the L/R, S/I, and A/P directions was 0.16 ± 0.48 mm, 0.32 ± 0.30 mm, and 0.11 ± 0.12 mm. The mean residual error for 34 patients in the L/R, S/I and A/P directions was 0.00 ± 0.11 cm, 0.01 ± 0.10 cm, and -0.03 ± 0.08 cm respectively. The rotational setup errors about the L/R, S/I and A/P axes were $0.67 \pm 1.33^\circ$, $-0.47 \pm 1.30^\circ$, and $-0.32 \pm 1.31^\circ$. The maximum measurement in the translational L/R, S/I and A/P directions was 0.28cm, 0.29cm, and 0.22cm, while the minimum values were -0.30cm, -0.29cm, and -0.27cm. The maximum rotational residual was 4.3°, 3.0°, and 3.1° about the L/R, S/I and A/P axes, while the minimum values were -2.2°, -3.9°, and -3.8°. Rotational errors are still apparent, as the remote couch does not correct for this.

Conclusions: The remote automatic couch movement is reliable and accurate for adjusting the patient position. This gives the confidence that we can treat the intended target on a daily basis, quickly and efficiently.

Research sponsored by Elekta.