

AbstractID: 5830 Title: 2D-3D registration of portal images with the planning CT for detection of patient positioning errors

Purpose: To compare the use of 2D-3D automatic registration of portal images with the planning CT for detection of patient positioning errors and the use of 3D-3D registration of MVCBCT with the planning CT.

Method and Materials: Two prototype programs were used to carry out 2D-3D and 3D-3D image registrations. To assess the accuracy and robustness of these programs, 25 sets of 2D portal images, 25 sets of megavoltage conebeam CT (MVCBCT) images with known positioning shifts were acquired. A planning CT of the RANDO was also acquired. The known shifts between these image sets were ranged from -17mm to 4 mm, -20mm to 5mm and -12mm to 6mm, with uncertainty of 4.278mm, 5.359mm, 3.396mm along the latitude, longitude and vertical directions

Results: The average differences between 2D-3D method and the known shifts were -0.632 ± 0.318 mm, -0.121 ± 0.437 mm, -0.416 ± 0.346 mm, compared to 3D-3D method of 1.487 ± 0.342 mm, -0.127 ± 0.528 mm, 0.083 ± 0.48 mm along the latitude, longitude and vertical directions. The average differences between 2D-3D and 3D-3D image registration methods were 0.86 ± 0.286 mm, -1.39 ± 0.347 mm, -0.33 ± 0.303 mm

Conclusion: Both 3D-3D and 2D-3D registration methods can detect positioning errors within 1 mm. For a rigid body, 2D-3D method is sufficient.

Conflict of Interest: This project is partly funded by SIEMENS.