

AbstractID: 5124 Title: Implication of CT Couch Sag on Geometrical Accuracy during Virtual Simulation

Purpose: Advances in radiation therapy have increased the need for better patient positioning accuracy. We have measured and compared the degree of couch sag exhibited by various CT scanners at our institution, and have evaluated its implication.

Methods and Materials: Six CT scanners, a GE LightSpeed RT wide bore scanner, a GE LightSpeed RT standard bore scanner, a GE LightSpeed PET/CT scanner, a Philips wide bore scanner, a Philips MX-8000 IDT scanner and a Picker PQ 5000 scanner were evaluated for couch sag. In order to simulate the weight distribution of a patient, five large water bottles, each weighing 43.3 lbs, were placed evenly across the couch. To quantify sag, a laser QA phantom was placed at locations on the couch, corresponding to the approximate location of three commonly scanned regions of the body: head/neck, thorax and pelvis. Using virtual simulation software, the vertical position of the phantom alignment point inside the CT bore was determined, and then compared to the starting vertical position of the external reference laser. This comparison yielded the amount of couch sag under a clinically representative weight distribution.

Results: Results indicate that the amount of couch sag ranged from approximately 0.7 mm to 6.6 mm. As expected, couch sag varied with anatomical region. In addition, the amount of sag varied between different manufacturers, and between couches of the same model as well.

Conclusion: Failure to recognize this problem could lead to incorrectly derived isocenter localization, and subsequent patient positioning errors. The amount of sag should be measured under a clinically representative weight load upon CT-simulator commissioning. We are evaluating ways of incorporating these couch displacements into our virtual simulation process.