AbstractID: 4969 Title: Mechanical Accuracy of A Robotic Couch

Purpose: To take full advantage of image guided radiation therapy (IGRT), the target shifts must be done accurately and efficiently. Recently, University of Florida, Radiation Oncology Department has implemented Medical Intelligent HexaPOD™ 6D Robotic Treatment CouchTOP. The purpose of this study is to determine the accuracy and efficiency of the HexaPOD™ CouchTOP system.

Materials and Methods: The accuracy and efficiency of HexaPOD™ CouchTOP system were evaluated and compared with those of Varian and Elekta couch systems. All three couch systems were displaced in all three Cartesian coordinates and measured by BrainLab ExacTrac infrared (IR) camera system. To determine the efficiency of each couch system, average time spent for couch adjustment was recorded. Since HexaPOD™ system can be rotated with respect to three Cartesian axes, the rotation angular movement was evaluated for the HexaPOD™ system. Because the HexaPOD™ couch's default pivot point is not located at linear accelerator's isocenter, a user defined pivot point had been determined using a simple mathematical relationship.

Results: For the average time of couch adjustment, 25 sec/1-direction, 60 sec/1-direction and < 20 sec/3-direction were obtained for Varian, Elekta and HexaPOD™ couch systems, respectively. The average displacement differences in lateral direction for Varian, Elekta and HexaPOD™ were 0.33 ± 0.21, 0.33 ± 0.21 and 0.09 ± 0.11 mm, respectively. Similar results were observed for longitudinal and vertical directions. For roll angular movement, HexaPOD™ CouchTOP system was observed to be $0.01 \pm 0.01°$. Similar results were seen for both pitch and yaw angular directions.

Conclusion: It is concluded that HexaPOD™ CouchTOP system has the capability to make target shifts to the accuracy of within sub-millimeter and sub-degree with efficiency.