

## AbstractID: 4719 Title: Improving the Accuracy of Linac-Based Stereotaxy

### **Purpose:**

Stereotactic alignment accuracy of couch mount linac systems can be improved by analyzing the film test with a computer program and repositioning the setup appropriately.

### **Method and Materials:**

The Winston-Lutz style film test is scanned and analyzed with a computer program that can estimate the 3D alignment error of the stereotactic quality assurance (QA) setup to within 0.1 mm. The program gives repositioning advice, and digital cameras are used by another program to provide laser guided repositioning. A final film test is taken whenever the couch mount needs to be repositioned. The programs remember laser, cone, and gantry offsets, so if the system is used frequently enough the laser guided repositioning often makes it possible to get within 0.2 mm of isocenter on the first couch mount film test. This system can make the couch mount more accurate than the mechanical isocenter standard (MIS). When the MIS has alignment problems it typically takes weeks or months to resolve, and often a site visit from a field service engineer is required. Conversely, our new approach adapts every treatment day to slight gantry, couch, and collimator movements, and always adapts to minimize the overall alignment error.

### **Results:**

Clinical tests with a Varian 600c at Mercy Hospital in Scranton, Pennsylvania, and a Siemens Mevatron MXE 2 at Christiana Care in Newark, Delaware have shown that 0.2 mm isocenter alignment of the couch mount QA setup can be achieved using this system. This is 7.5 times more accurate than the current 1.5 mm radial alignment specification of a commercial linear accelerator based stereotactic system.

### **Conclusion:**

This research shows the potential of linac based stereotaxy to approach the accuracy of the dedicated stereotactic systems.

### **Conflict of Interest (only if applicable):**

NA