AbstractID: 2989 Title: Smart Fiduciary Plate for Port Films in RT

Purpose: New plate is devised to determine the geometrical information such as gantry and collimator rotations in weekly port films in routine radiation therapy

Method and Materials: : The plate consists of a base plate, an orientation marker, and scales. The base plate is made of 2cm acrylic plate and is inserted into the blocking tray slots of linear accelerators. It has three unique features: (1) two-step wedges are implemented on one side of the plate, thus, making easy inserting and removing the plate into or from blocking tray slot. (2) Special geometrical structures of 4 major axis and vertical/horizontal lines (1mm wide * 18mm long) are made in grooves in the base plate and the Lipowitz metal is injected into the grooves with the use of high -pressure pump. (3) The orientation maker is made of two cylinders , and one cylinder is situated on top of the other. The volumes of two cylinders are exactly the same, but the central portion of one cylinder is blocked. The half of two cylinders is filled with mercury or fine lead grains mixed with saline water.

Results: : The plate can be positioned with the uncertainty of < 0.2mm with 2 set-wedge structures. Because of the gravity effect, the shadow of the orientation marker has very unique shapes in the port film for various gantry and collimator rotation. The geometrical relationships between the marker and the various lines are unambiguously analyzed and provide the mechanical information such as gantry and collimator rotations, which are very critical in radiation delivery of 3D CFRT

Conclusion: : This plate has been used for weekly port film for several years. It is very effective tool as a port film QA in routine RT, 3D CFRT as well as mechanical QA for multi-lead collimators.