AbstractID: 11819 Title: Treatment planning and delivery of modulated electron radiotherapy for an extensive scalp treatment using photon MLC

Purpose: To investigate treatment planning and delivery of modulated electron radiotherapy (MERT) to a large portion of the superficial scalp delivered by a photon MLC (pMLC) on a Siemens Primus accelerator.

Method and Materials: A Monte Carlo (MC) based inverse treatment planning system was developed for dose calculation and optimization of the MERT, and a plan was delivered using the existing pMLC system so that the necessity of an add-on device, e.g., an electron MLC is eliminated and additional complexity to the treatment system is therefore reduced. In the MERT treatment, a 60 cm source to surface distance (SSD) was used with two electron energies, 6, 9 MeV with a 1.0 cm bolus added to the target surface. Dosimetric comparisons were made with the conventional parallel-opposed photon beams.

Results: The treatment plan usually requires about 30 segmental pMLC fields to deliver. Comparing to the conventional treatment technique with two lateral opposed photon beams, the MERT plan demonstrates that dose conformity to the target is greatly improved, and dose to the brain is significantly reduced. For example, the percentage volume of brain receiving dose larger than 30 Gy is reduced from about 25% to 5%.

Discussions: Previous work has verified that dose accuracy of the plan delivery using the pMLC is about 2%/1 mm by film and ion chamber measurements in a solid water phantom and a special breast phantom for an intact breast cancer treatment. A quality assurance procedure is being developed for clinic implementation of scalp treatment using pMLC-delivered MERT.

Conclusions: Treating large, superficical portions of the scalp using the MERT technique can significantly improve dose conformity and reduce dose to the brain and other critical structures and its clinic implementation with pMLC delivery is under way.