AbstractID: 7711 Title: A preliminary comparison of a new fluence benchmark for clinical electron beams with fluence calculated with a commercial planning system

Objective:
To compare a newly developed benchmark of electron fluence in clinical electron beams with fluence calculated with a commercially available treatment planning system.

Materials and Method:
An accurate and detailed benchmark of fluence for clinical electron beams is under development. The benchmark is based on detailed measurements of the source, geometry, relative output factors and dose distributions of clinical electron beams of a single clinical linear accelerator, including the largest available field with no applicator, along with a precision Monte Carlo simulation of the treatment head. Fluence is divided into direct electrons and those scattered from collimators, including the applicator and insert. This benchmark is used to determine the accuracy of fluence calculated with a beam model in a commercial treatment planning system commissioned with measurements done on the same accelerator used to develop the clinical benchmark.

Results:
Energy and spatial distributions of fluence for direct and indirect electrons are generally in good agreement between the benchmark data sets and the commercial beam model. Differences include lower resolution in the beam model than in the actual beam in the penumbra and differences in the relative contribution of direct and indirect electrons to the total fluence.

Conclusion:
The new benchmark is very useful in determining the accuracy of models of clinical electron beams. The benchmark is not only an excellent benchmark for the large, open field, which is seldom used for treatment. It is useful for any applicator and SSD, assuming Monte Carlo can accurately account for the jaws, applicator and insert in the somewhat simplified geometry used in the simulation. The work, currently limited to the linac from a single vendor, is to be expanded to included linacs from other vendors.