AbstractID: 12791 Title: Pencil beam for electron intraoperative radiotherapy. Early results from profile and percentage depth dose modelling

Purpose: To evaluate the feasibility and the accuracy of pencil beam modelling for electron intraoperative radiotherapy (IORT). **Methods and materials:** A complete set of dose measurements in water have been performed. They have been made with different source-to-applicator-end distance, bevel angle, applicator size and beam energy. Dose measurements in air have also been made with one applicator size and bevel 0° to obtain initial pencil beam angular spread and fluence intensity profile. An Elekta Precise and a Varian 21EX linacs have been used. Modelling has been carried out by Técnicas Radiofísicas (Zaragoza, Spain) adapting a modified Hogstrom's pencil beam implemented in TPS PCRT3D for external Radiotherapy. **Results:** Different profiles have been obtained according to different machine and applicator design. Lack of accuracy has been kept within 2% or 3% in most of the reference profiles modelled. Nevertheless, it rose to more than 5% for little applicator size, 30° and 45° bevel angle and high energy when modelling Varian beams. Discrepancies for Elekta modelling data have appeared when increasing bevel angle. Additional difficulties have been found when modelling beam edges for little applicators. Besides, percentage depth dose have been modelled for both machines and discrepancies are under investigation. **Conclusions:** Pencil beam is able to model IORT beams in water for dose delivery calculation. A trade-off between accuracy and linac time expense should be achieved. Thus, accuracy could be increased if taking extra dedicated data for each combination of energy and applicator size. Then, an improvement of modelling at beam edges should be expected, especially for large bevel angles. The authors expect that further research will lead to calculate absorbed dose in an IORT patient, turning an IORT virtual simulator developed by GMV (Madrid, Spain), Radiance, into a treatment planning system. Supported by grant PSE-300000-2009-5. Ministerio de Ciencia e Innovación. Spanish Government.