Abstract ID: 16063  Title: Determination of output factors with different types of active detectors and passive dosemeters for stereotactic systems equipped with microMLC and circular cones

Purpose: Radiotherapy techniques involving the use of small fields, especially for stereotactic treatments, require accurate determination of output factors (OF). Moreover OF reference values are not available. The aim of this work is to determine small fields OF using several active detectors and passive dosemeters for a dedicated medical linear accelerator (Novalis) equipped with m3 microMLC (BrainLAB) and circular cones and for an adaptative one (Varian Clinac 2100) equipped with an additional microMLC.

Methods: Small field sizes were defined either by microMLC down to 6x6 mm² or by circular cones down to 4 mm in diameter. Output factor measurements were performed in a water phantom with commercially available active detectors dedicated to measurements in small fields (high resolution diodes: IBA SFD, Sun Nuclear EDGE, PTW 60016, PTW 60017; ionizing chambers: PTW 31014 PinPoint chamber, PTW 31018 microLion liquid chamber and PTW 60003 natural diamond) and in a solid water phantom with passive dosemeters (TLD micro-cubes, EBT2 Gafchromic films).

Results: Significant differences between the results obtained by the different detectors are observed, particularly for the smallest field size for which the difference of the measured OF can reach 20%. Results obtained with both passive dosemeters present a good agreement (better than 2%). Some of these differences can be explained with the detector characteristics (detector size, tissue equivalence …).

Conclusions: This study provides data on the behavior of different detectors in terms of dose measurements for small beams. Results obtained with the passive dosemeters in this study as well as in another study performed on a Cyberknife system (Huet et al., 2011) are promising. The perspective of this study is to propose a methodology for the determination of correction factors for stereotactic systems.

Reference: Huet et al., abstract submitted to AAPM 2011