

# Measurement of Out Factor for Small Radiation Field using Solid Water Phantom

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The small field dosimetry has been introduced since the implementation of stereotactic radiosurgery, the IMRT, and VMAT because a small segment or field has been utilized in most of the IMRT/VMAT plan. In this study, we present the simplified measurement method for output factor (OF) of small fields by utilizing commercialized solid water phantom and various ionization chambers for 6 and 10 MV. X-ray energies of the Elekta Infinity (Elekta, Stockholm, Sweden) with 90 cm SSD at gantry angle 0°. The simplified measurement method, suggested in this study, utilized the Blue Water phantom (BW in the following, Standard Imaging, Middleton, WI, USA) as a solid phantom instead of a MP3-XS (PTW, PTW-Freiburg, Germany) was utilized as a water phantom. The OFs for small field were measured with three type detectors, microdiamond type 60019 (MD, PTW, Freiburg, Germany), Pinpoint3D type 31016 (PP3D, PTW, Freiburg, Germany) and Extradin A16 (A16, Standard Imaging, Madison, WI, USA). The applied small field size was 1×1, 2×2, 3×3, 4×4, 5×5 cm<sup>2</sup> and 8×8 cm<sup>2</sup>, 10×10 cm<sup>2</sup> were applied as a standard field size and reference field size respectively.

The experiment results present that the measured output factor with water phantom and A16 was in good agreement within 2% error and its rate of the others was within 1% for all sizes except 1×1 cm<sup>2</sup> at 9.2 cm depth in 6 MV. The result of 10 cm depth was similar to the previous result of both two phantom. Also, in 10 MV photon beam, the measured output factors using a water phantom were also similar to those of 6 MV photon beam. On the other hand, the measured output factors using the blue phantom showed differences of up to 9.8% at a depth of 10 cm. We expect that easy and quick setup of solid water phantom for measurement of small field output factor could be helpful.

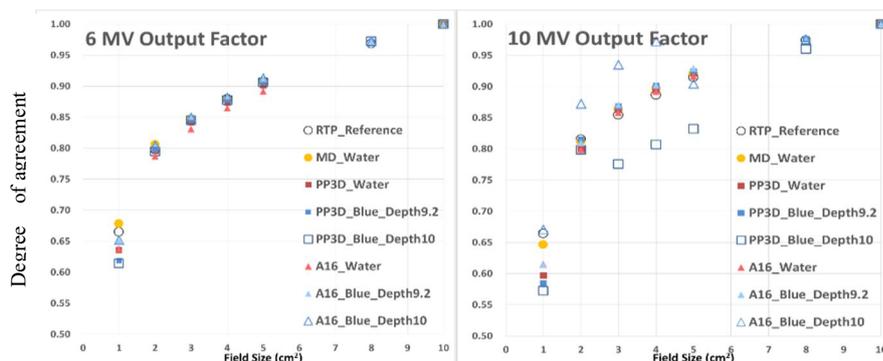


Fig. 1. Output factor for 6 and 10 MV from three different detectors with two different measurement condition

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