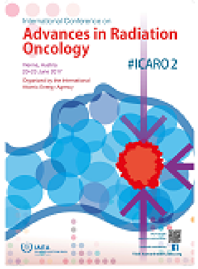


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# Testing the IAEA/AAPM code of practice on small field dosimetry at KFSHRC: preliminary results

*Thursday 22 June 2017 15:35 (5 minutes)*

**Purpose:** An International code of practice for reference and relative dosimetry of small static used in external beam radiotherapy is being jointly published by the IAEA and AAPM. This dosimetry protocol is intended to fill the gap left by the universally adopted codes of practices such as TRS398 and TG51 when dealing with small field sizes.
At the Department of Biomedical Physics belonging to King Faisal Specialist Hospital and Research Centre, we have undertaken to test the procedures described in the upcoming code of practice using a 6 MV flattened photon beam from a Varian True Beam machine. Measurement were performed in a full circle 3D scanner (San Nuclear Co.) using a farmer like ionization chamber and three small volume detectors (Semiflex, Pinpoint and Edge). The field sizes were ranging from 0.5 cm x 0.5 cm to 10 cm x 10 cm.

**Materials and Methods:** The beam profiles and depth dose data, for all the fields, were measured in a 6 MV fron a Varian True Beam, using two small volume ionization chambers and an Edge diode. The depth dose data were consistent when applying a 0.5r to the PDDs obtained with the central axis of the chamber, showing that this shift is still valid for small fields. The %dd(10,S) were deduced from these PDDS and the TPR20,10(S) values were experimentally determined with the Edge detector and the pinpoint chamber applying the standard procedure. The quality indexes TPR20,10(10) and %dd(10,10), were calculated from these values using the analytical expressions of Palmans, given in the Code of practice.
In addition, the output factors for a field sizes lying from 10 cm x 10 cm to 0.5 cm x 0.5 cm were measured using the same detectors. The field output factors were calculated using the output correction factors given in the COP. The values obtained with the three detectors were compared.

**Results:** For field sizes lying between 10 cm x 10 cm and 1 cm x 1 cm, the values of TPR20,10(10) calculated from the measured TPR20,10(S), ranged between 0.665 and 0.669. The values of %dd(10), calculated from the measured %dd(S) ranged from 65.04% and 66.29%. This gives maximum deviations of 0.57% and -1.9% respectively observed for 2 cm x 2 cm field size. Higher deviations were obtained for 0.5 cm x 0.5 cm (-8.68% and -5.7% respectively) stressing that the Palmans expressions are valid down to 1 cm x 1 cm.
Regarding the output factors, it is shown that the consistency between the calculated field output factors obtained with the three detectors was within maximum 1.5%.

**Conclusion:** Using the formalism of the IAEA/AAPM code of practice on small field dosimetry, the quality indexes TPR20,10 and %dd for a field size 10 x 10 cm$^2$ can be determined with sufficient accuracy using the experimental data of TPR20,10(S) and %dd(S) in machine specific reference fields. Better compliance between the calculated and experimentally determined beam quality specifiers are observed for TPR20,10 and larger discrepancies are observed for 0.5 cm x 0.5 cm coming probably from the alignment of the detectors with the central beam axis and from the accuracy of the scanning systems.
Regarding the field output factors, it is shown that the difference between the corrected and uncorrected output factors can be as large as 8 % for smaller field sizes stressing that the previous procedure of output factor determination was not appropriate for small field sizes.

## Institution

Biomedical Physics Department - King Faisal Specialist Hospital and Research Centre

## Country

Saudii Arabia

**Author:** ARIB, Mehenna (King Faisal Specialist Hospital and Research Centre)

**Co-authors:** ALKAFI, Abdullah (King Faisal Specialist Hospital and Research Centre); NOBAH, Ahmad (King Faisal Specialist Hospital and Research Centre); MOFTAH, Belal (King Faisal Specialist Hospital and Research Centre); ALZORKANI, Faisal (King Faisal Specialist Hospital and Research Centre); MAYHOUB, Fareed (King Faisal Specialist Hospital and Research Centre); SHEHADEH, Mamoun (King Faisal Specialist Hospital and Research Centre); NOOR, Omar (King Faisal Specialist Hospital and Research Centre); ALDELAIJAN, Saad (King Faisal Specialist Hospital and Research Centre); WADI-RAMAHI, Shada (King Faisal Specialist Hospital and Research Centre); MWIDU, Umar (King Faisal Specialist Hospital and Research Centre); AL-NAJAR, waleed (King Faisal Specialist Hospital and Research Centre)

**Presenter:** ARIB, Mehenna (King Faisal Specialist Hospital and Research Centre)

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