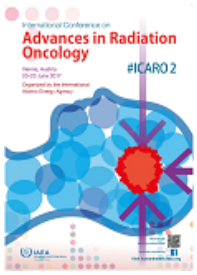

Contribution ID: **309** Type: **Poster**

Beam quality index for arbitrary reference fields.

Thursday, 22 June 2017 15:50 (5 minutes)

Introduction.

Readings of detectors used for reference dosimetry depend on beam energy therefore reference beam calibration requires utilization of beam quality correction factor kQ,Q0. This correction factor was calculated and published in IAEA TRS –398 for wide range of detectors and beam quality indexes (Q). Beam quality index is used because in clinical practice it's impossible to determine beam energy spectrum and it is defined as TPR20,10(10x10 cm2). All beam quality index definitions are utilizing a reference 10x10 cm2 field which cannot be achieved in case of some special radiotherapy irradiators such as CyberKnife® and TomoTherapy® (Accuracy Inc., Sunnyvale, CA). In this work we want to compare beam quality index calculated from TPR20,10 for non reference circular field with TPR20,10 (10x10) on the same LINAC.

Materials and methods.

Sauer et al. proposed to use formula (1) to calculate beam quality index from TPR20,10(s) measured in arbitrary field s.

```
Q=(TPR20,10(s)-b1-A1(1-e\^{}(-s/t)))/ (b2+A2(1-e\^{}(-s/t)))          (1),
```

where b1= -0.208±0.022, b2= 1.213±0.030, A1= 0.625±0.036 A2= -0.679±0.050 t= 19.5±2.0cm.

TPR20,10 for CyberKnife FFF beams and for Varian Clinac WFF beams was measured, including small beams made with BrainLab cone collimators. In spite of ionization chambers, which are widely recognized as a reference detectors for such measurements, it was decided to use diodes PTW diode E because that they shows better agreement with data from MonteCarlo simulation in small beams.

Results.

According to measured data with formula (1) it was calculated beam quality index. Figure 1 shows correspondence between beam quality index and field size from whereof it was calculated for two medical accelerators, CyberKnife and Varian Clinac. Beam quality index, calculated from different field sizes shows better than 1% agreement for fields bigger than 1 cm between each other and measured data for 10 x 10 field.

Conclusion.

As was shown in results calculated data was in good agreement with measured for fields bigger then 1 cm. So Sauer's method is acceptable in clinical practice. As a continues of this work we want to measure TPR20,10(s) with range of detectors, such as microchambers, diodes and diamond detector and compare beam quality index calculated from data measured with different detectors.

Country

Russia

Institution

CRT Oncostop

Primary author: KIRPICHEV, Yury (CRT ”Oncostop”)

Co-author: KRYLOVA, Tatiana (N.N. Blokhin Russian Cancer Research Center)

Presenter: KIRPICHEV, Yury (CRT ”Oncostop”)

Session Classification: Thursday afternoon - Poster Presentations - Screen5

Track Classification: Dosimetry