

Small Field Dosimetry

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INTRODUCTION

- Small radiation fields are not measured during commissioning or periodic QA of medical linear accelerators.
- Small radiation fields are very important in Stereotactic Radiosurgery and Stereotactic Body Radiosurgery techniques.

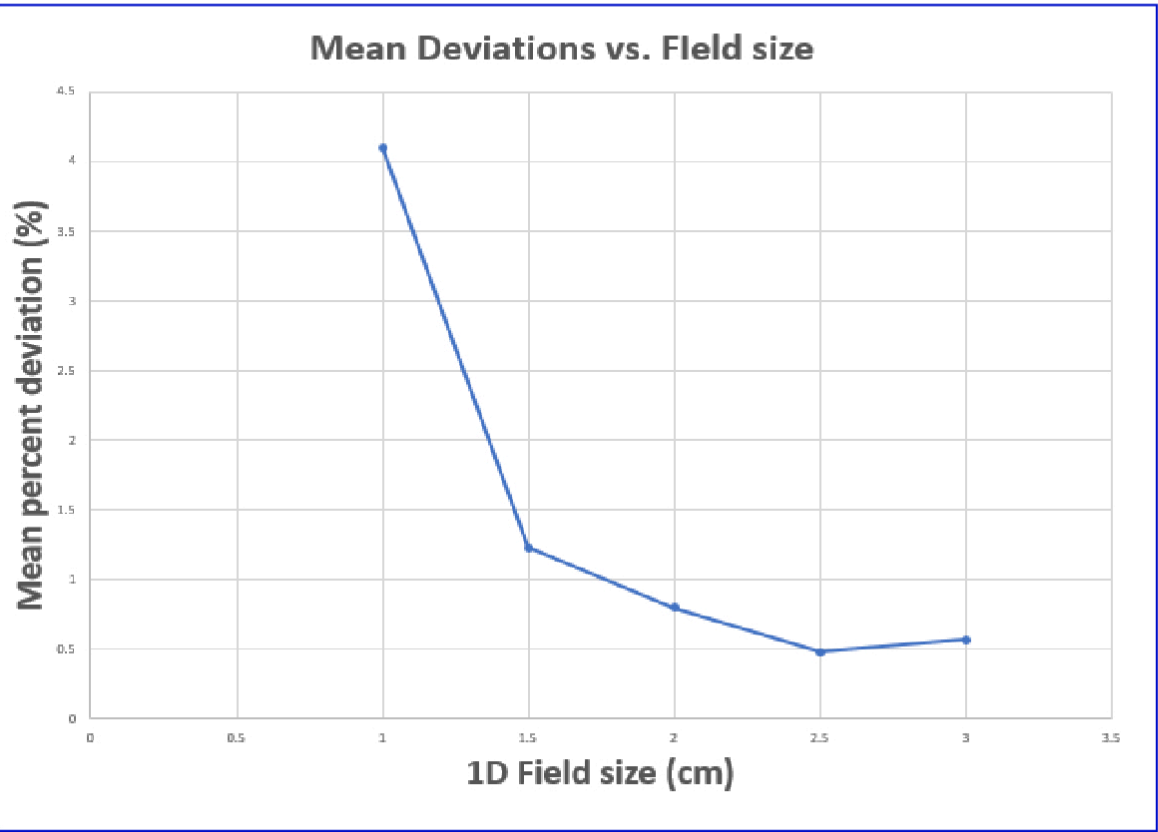
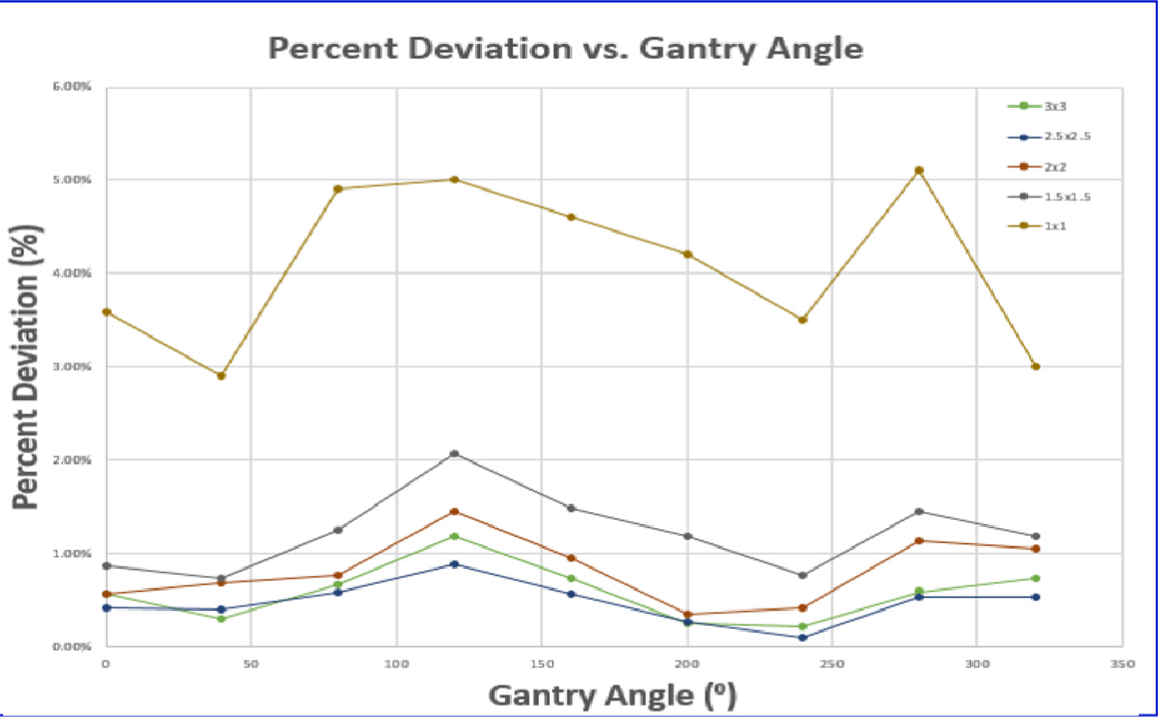
AIM

To assess the accuracy of a commercial treatment planning system (TPS) for small radiation field dose calculations via implementation of the IAEA TRS-483 code of practice.

METHOD

- Eclipse TPS – Five RT Plans – Expected Values
- Treatment Room – Delivered Plans – Measured Values
- Analysis of expected and measured values – Accuracy of Eclipse TPS
- Detector used was the PTW 60018 unshielded silicone diode
- Spherical Gamma knife solid-water dosimetry phantom
- One plan per evaluated field size:
 $r = (1.0 \times 1.0, 1.5 \times 1.5, 2.0 \times 2.0, 2.5 \times 2.5, 3.0 \times 3.0) \text{cm}^2$
- All fields were defined by the MLCs and jaws were set 0.2cm wider than MLCs
- Total prescribed dose was 1000cGy equally weighted among all nine beams
- Positioning was verified via kV-kV image registration

RESULTS



Average Deviations
 $(\mu \pm \sigma)$
 between planned and
 measured doses

Field size (cm ²)	Mean % deviations (%)
1.0 × 1.0	4.1 ± 1.0
1.5 × 1.5	1.2 ± 0.7
2.0 × 2.0	0.8 ± 0.7
2.5 × 2.5	0.4 ± 0.8
3.0 × 3.0	0.5 ± 0.7

$$\sigma_{r \geq 2 \times 2 \text{cm}^2} < 1\%$$

$$\sigma_{r < 2 \times 2 \text{cm}^2} \rightarrow 4\%$$

CONCLUSIONS

- Eclipse TPS dose calculation accuracy for small fields is clinically acceptable.
- Dose non-uniformity inside the PTV is about 40%
 - Diode angular dependence and output variation as a function of gantry angle.

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REFERENCES

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