

## **BELdART: Results of 2 years of external audits for basic and complex dosimetry for photon beams**

**B. Yalvac<sup>1</sup>, N. Reulens<sup>1</sup>, B. Reniers<sup>1</sup>**

<sup>1</sup>Universiteit Hasselt, CMK, NuTeC, Diepenbeek, Belgium.

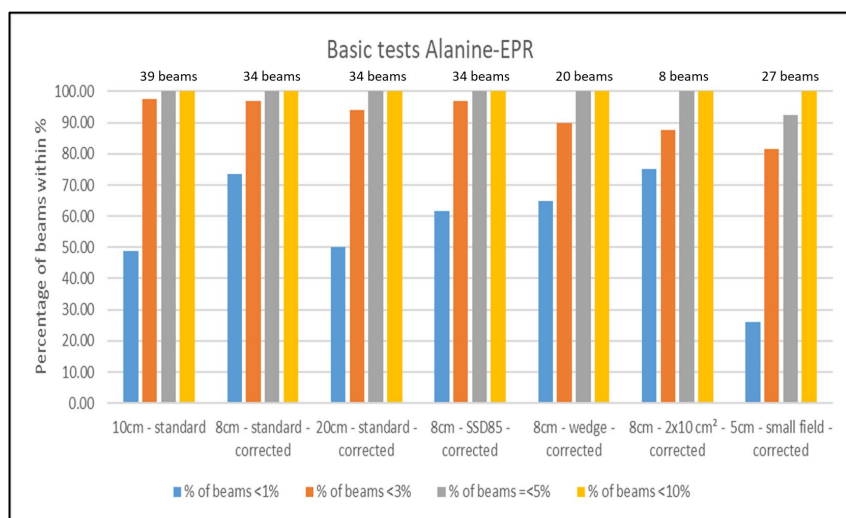
BELdART is currently offering mailed audits for basic and complex dosimetry for a prostate case and intracranial SRS (SRS is sponsored by the College of Medicine Radiotherapy) using a combination of L- $\alpha$ -alanine-EPR and radiochromic dosimetry. For the prostate case, the Easycube phantom (Euromechanics Medical GmbH, Nürnberg, Germany) is used and for intracranial SRS the Stereotactic End-to-End Verification (STEEV) phantom (CIRS Inc., Norfolk, Virginia, USA). The phantoms preloaded with alanine and film detectors are sent to the centres as well as images of the phantoms and structure sets.

Figure 1 shows the results for the basic tests. At the beginning of 2018, the 2x10-cm<sup>2</sup> test was replaced by a test of a 2x2-cm<sup>2</sup> field in solid water at 5 cm depth.

The alanine dose and planned dose agree within 3 % for 97.4 % for the beam output and 97.06 %, 94.12 %, 97.06 % for 8cm, 20 cm and SSD85 respectively. For the other tests, they agree within 5 % except for small fields where 2 of the 27 beams show more than 5% discrepancy with the planned dose. For the complex dosimetry of the prostate case (Figure 2) all the centres are within 5% except 1 beam and for SRS 5 of the 6 beams are within 3 %.

The gamma analysis of the films (Figure 3 and Table 1) shows that for the prostate case 86.3 % of the beams have a passing rate (3%/3mm)  $\geq$  95% and all 6 beams for SRS have a passing rate (5%/1mm) higher than  $\geq$  95%.

The results are very good for all tests in general.



**Figure 1 : Results basic testing with alanine-ESR dosimetry**

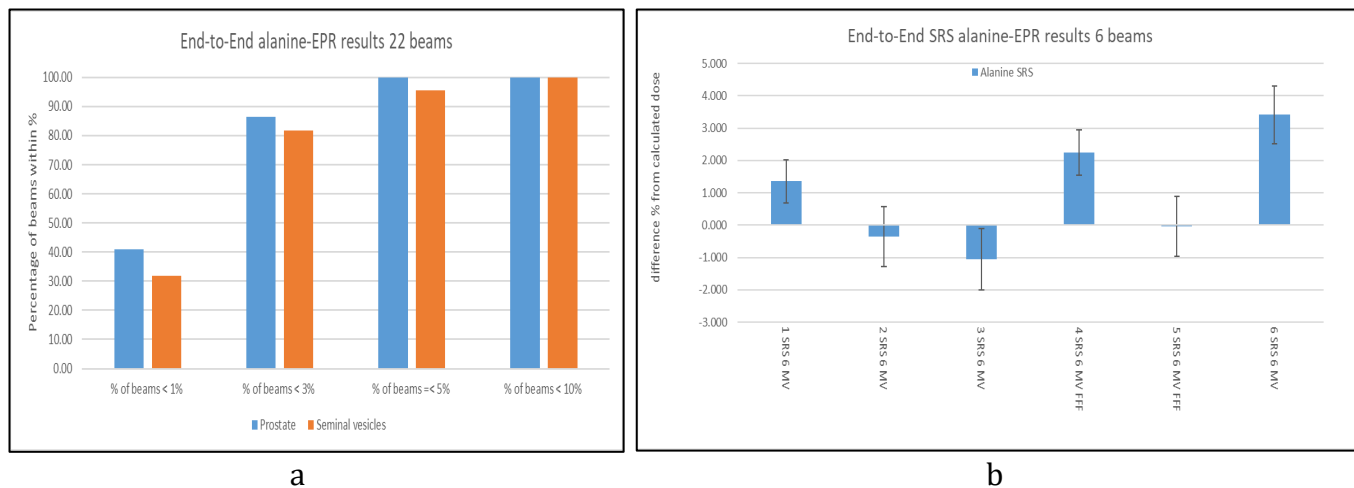


Figure 2: Alanine-ESR results for complex dosimetry. a) Prostate case for 22 beams. b) Intracranial SRS for 6 beams

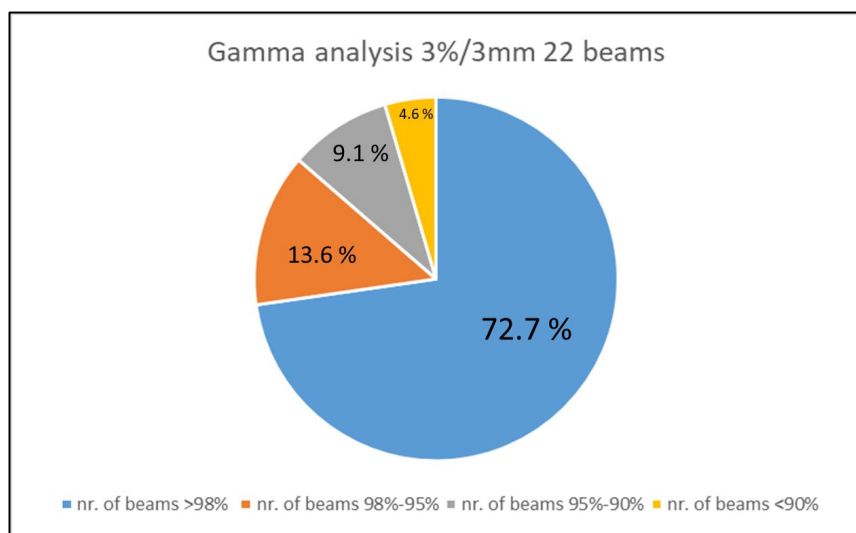


Figure 3: Gamma analysis results with 3%/3mm global 10% lower dose threshold for End-to-End testing for the prostate case.

Table 1: Gamma analysis results with 5%/1mm global 50% lower dose threshold for End-to-End testing for intracranial SRS for 6 centres.

Nr. of Centre	Passing rate 5%/1mm global 50% threshold	
	Target $\approx 2 \times 2 \text{cm}^2$	Target $\approx 0.8 \times 0.8 \text{cm}^2$
1	97	100
2	100	100
3	100	100
4	99.7	100
5	97.7	100
6 (framed SRS)	100	100

## **Acknowledgements and potential conflicts of interest**

We would like to thank the Cancer Plan, FOD Healthcare and the College of Medicine for the financial and scientific support. In addition, we would like to thank the members from the steering committee for their support and scientific contribution.

No conflict of interest