

Hand dose reduction using sterile, disposable scatter protection drape: a prospective randomised study

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Background:

- Occupational exposure to staff in interventional radiology comes from patient scatter radiation
- This is likely to increase with increasing workload, more complex procedures
- Radiation protection of staff through dose monitoring and the "ALARA" principle
- A disposable, sterile, bismuth-based scatter reduction drape positioned over the puncture site, outside the primary beam area may reduce scatter radiation to the operator and offer additional protection to standard practice

Aims:

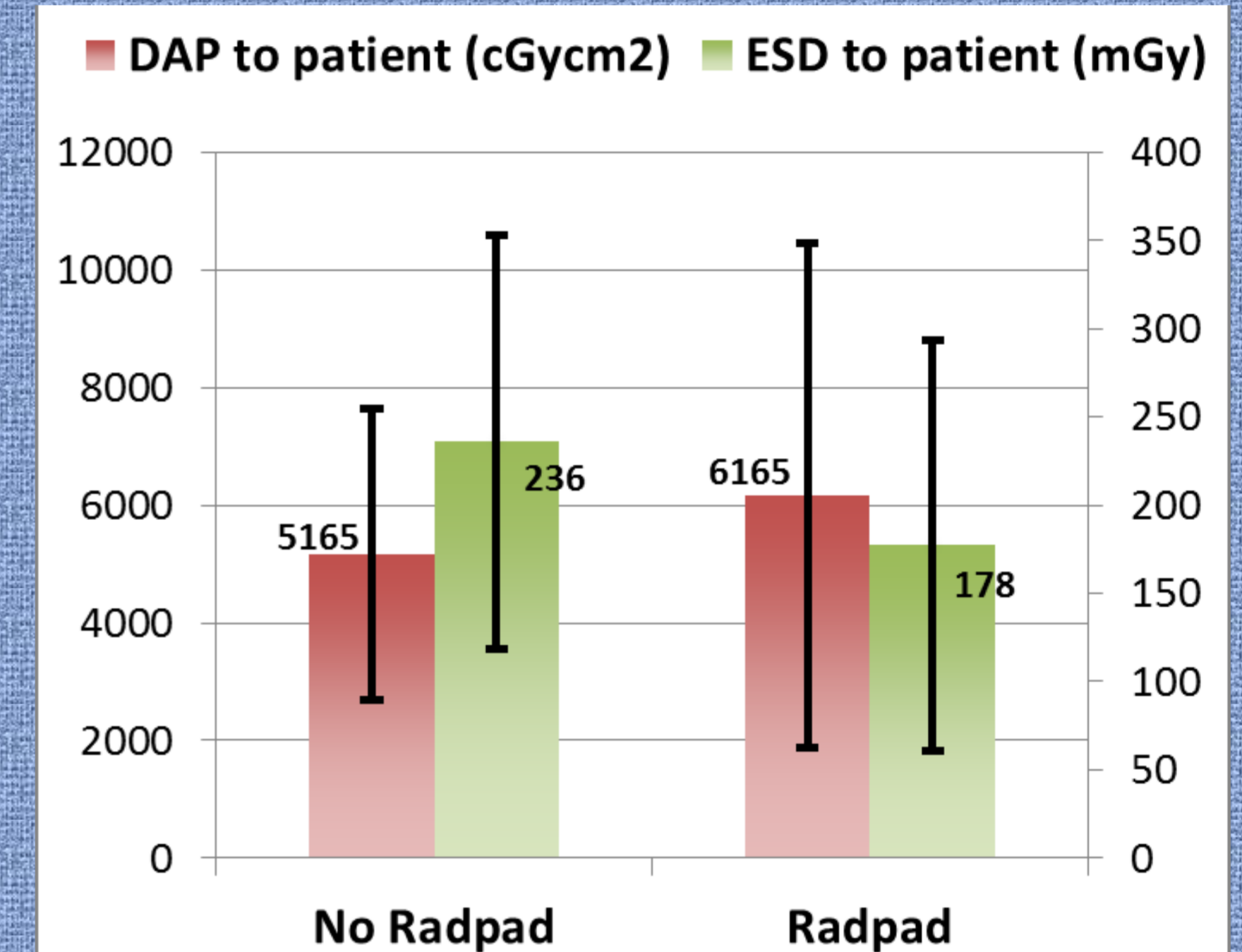
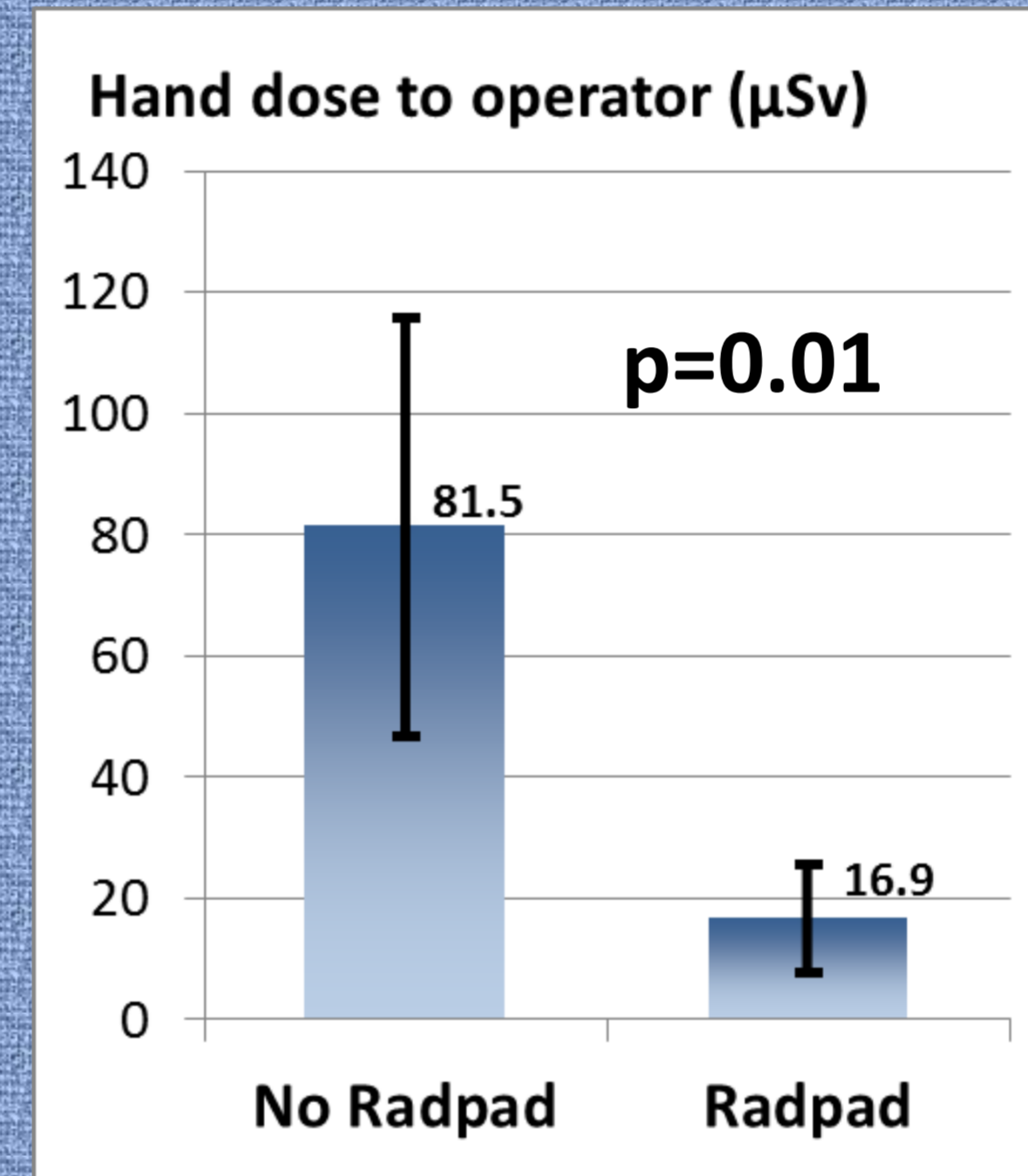
To evaluate the efficacy of a scatter radiation protection drape in reducing the hand dose to interventional radiologists

Materials and Methods:

- Prospective randomised study design
- Total 12 consecutive patients at a tertiary vascular centre undergoing percutaneous transluminal angioplasty to one or both iliac arteries
- Randomised by sealed envelope technique, opened at time of puncture, to either
 - Standard dose minimisation technique and radiation protection, or
 - Standard practice + RADPAD® under the operator's hands, outside primary beam (Figures 1 & 3)
- Radiologists left hand dose (HD) measured using AEGIS monitoring device (Figure 2)
- Entrant skin dose (ESD), dose-area product (DAP) recorded
- Blinded data analysis to compare HD and HD/DAP

Results:

- 12 patients included 10 males, 2 females; median age 71.5 years (range 55-90 years)
 - 7 cases (10 iliac arteries treated) with no RADPAD®
 - 5 cases (7 iliac arteries treated) with RADPAD®
- Hand dose to operator reduced from mean of 81.5µSv to 16.9µSv, a relative reduction of **79%** (p=0.01) (Figure 5)
- Dose area product and Entrant skin dose, measures of dose to the patient, are not significantly changed (Figure 6), in keeping with previous studies on phantom (data not shown)
- Hand dose as a fraction of DAP is reduced from 1.72µSv/Gycm² to 0.334µSv/Gycm², a relative reduction of **81%** (p<0.01) (Figure 7)



Figures 5-7 (right): mean hand dose (HD), dose-area product (DAP), entrant skin dose (ESD) and ratio of HD to DAP, with 95% confidence intervals, for no Radpad group and Radpad group

Hand Dose/DAP (µSv/Gycm²)

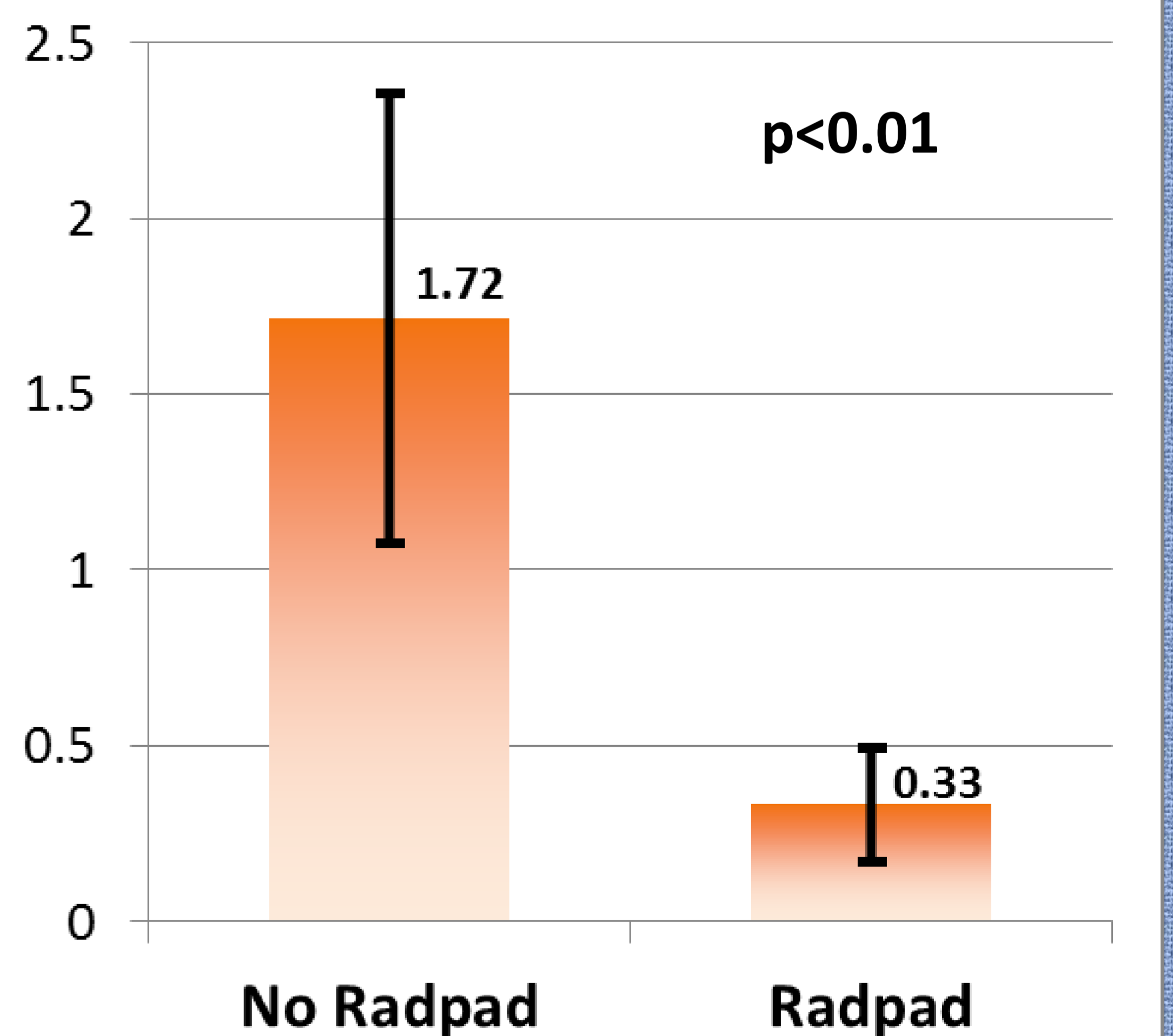


Figure 1: RADPAD®

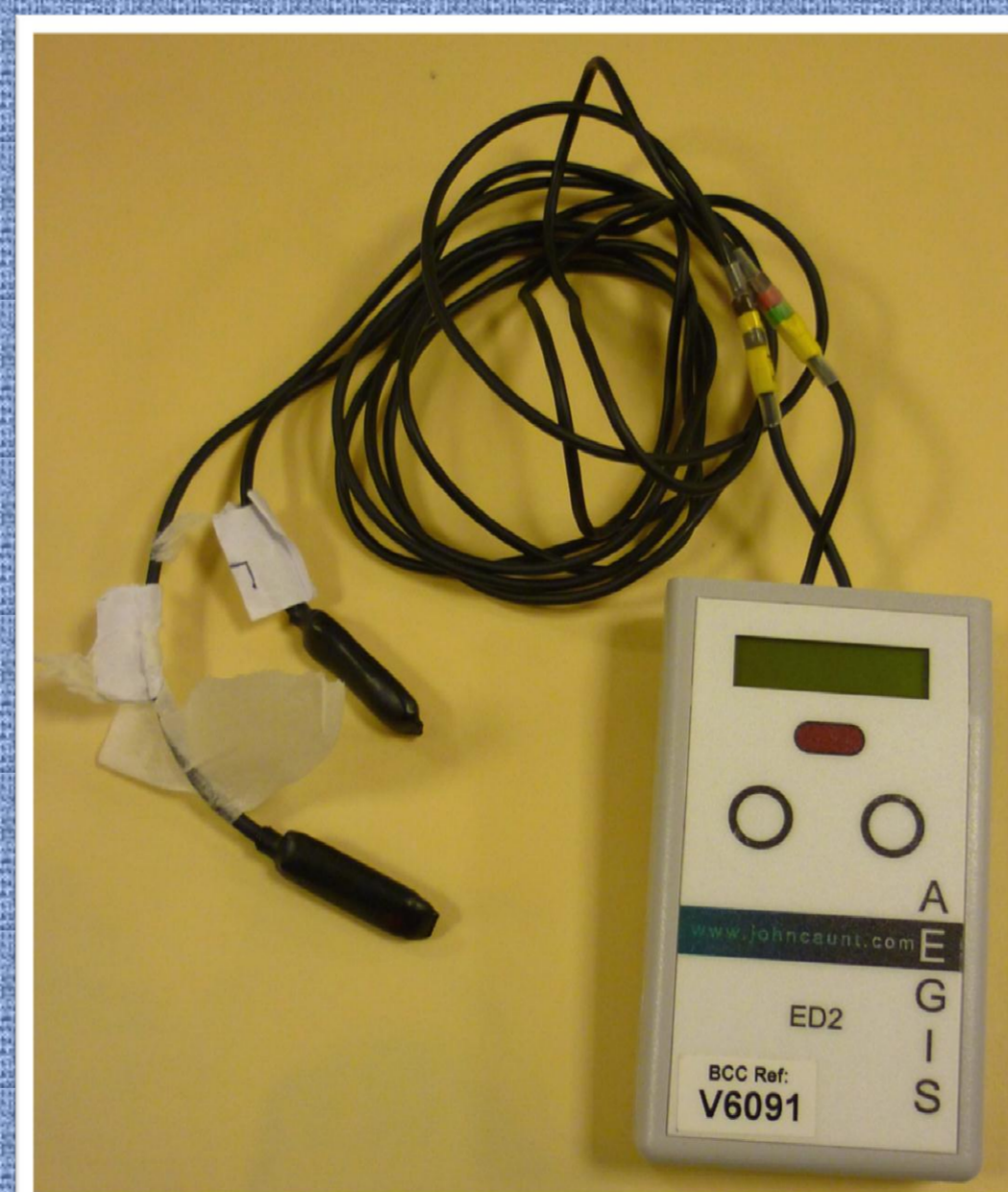


Figure 2: AEGIS dose monitor

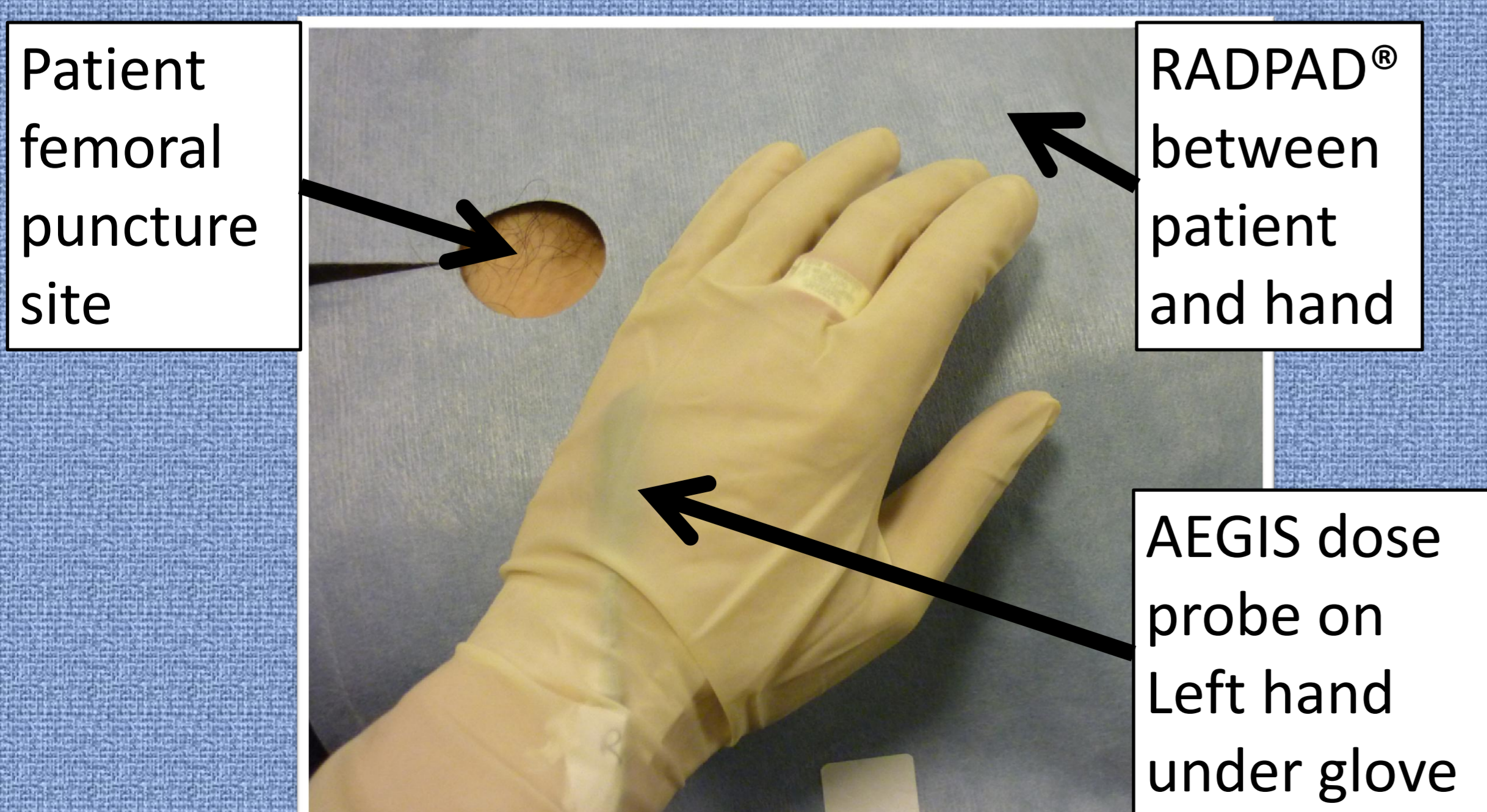


Figure 3: Experimental set up with RADPAD®

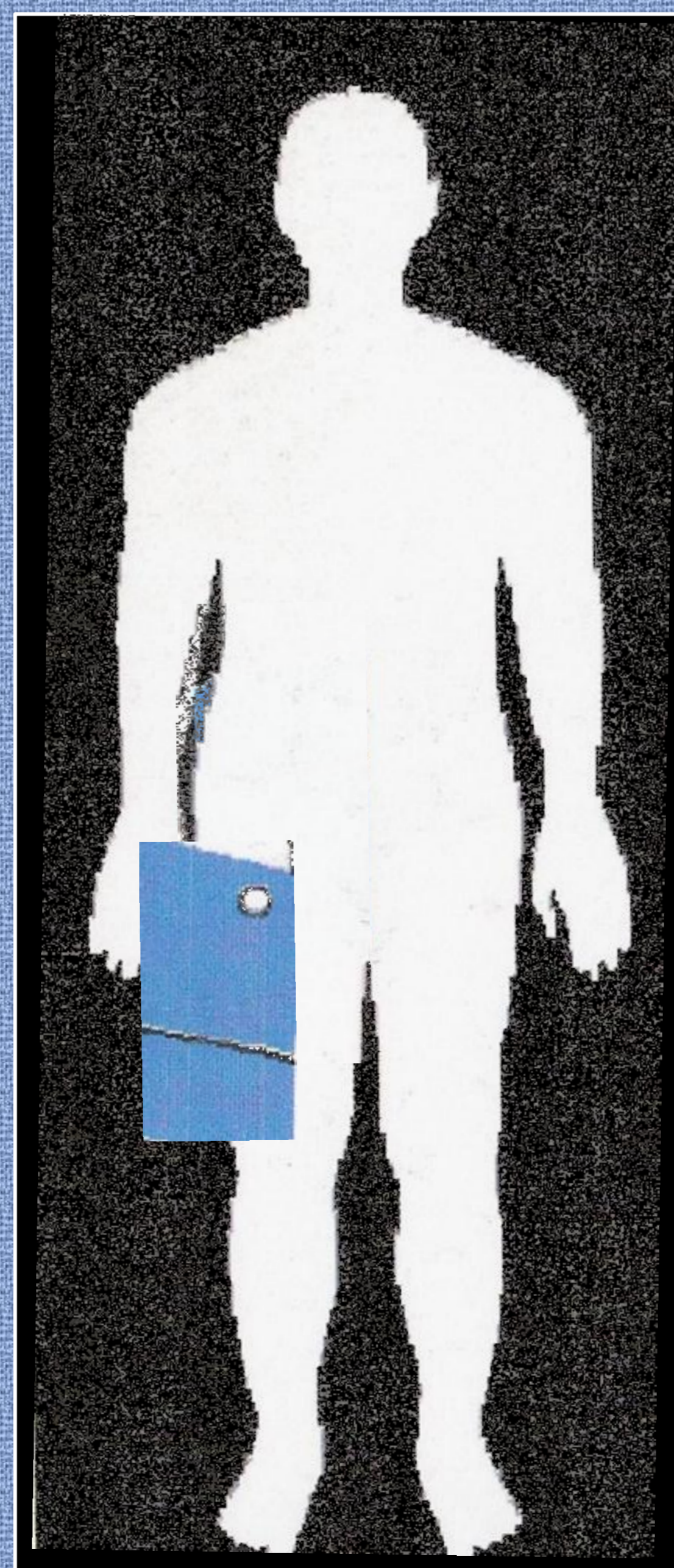


Figure 4: positioning RADPAD®

Conclusion:

- **Significant reduction in operator hand dose in Radpad group**
- **No significant increase in patient dose**
- Bismuth-based sterile, disposable drape (RADPAD®) provides additional radiation protection from cumulative effects
- Further work required to quantify magnitude of scatter reduction:
 - In other procedures e.g. EVAR
 - To other areas on operator e.g. eyes