6th ECMP 2026
European Congress of Medical Physics
23-26 September 2026 | Valencia | Spain
ecmp2026.efomp.org
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Robust Dosimetry at the Hight-density Moldable Bolus Edge Transition Despite Submillimetric Thicness and Eletronic Disequilibrium

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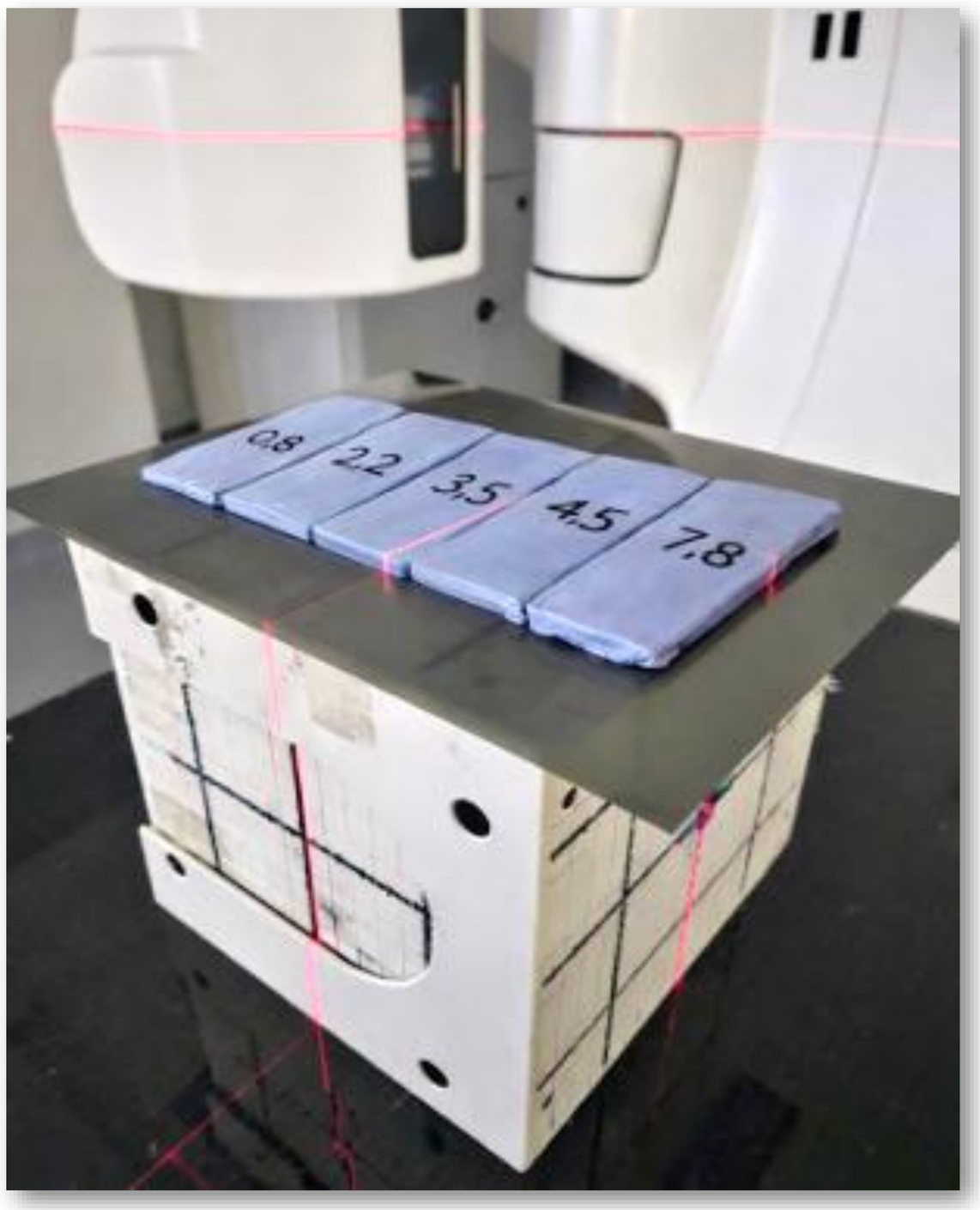
BACKGROUND AND AIMS

High-density moldable boluses (HDB) are widely used for superficial doce optimization in radiotherapy. However, the dosimetric accuracy at the bolus Edge transition región, particularly under submillimetric thickness and los of electronic equilibrium, remains insufficently characterized. This study evaluates the dosimetric performance in this critical región.

METHODS AND MATERIALS

A stepped HDB structure (eXaSkin® de Anatge, 1.7 g/cm³) with thicknesses of 0.8, 2.2, 3.5, 4.5 and 7.8 mm was placed on an IBA IMRT phantom. Surface dose was measured using Gafchromic EBT-XD films. Irradiation was delivered with a 6 MV photon beam using a TrueBeam linear accelerator. A direct beam at 0° was used, modulated and normalized such that the dose at 1 cm depth was uniform across the field.

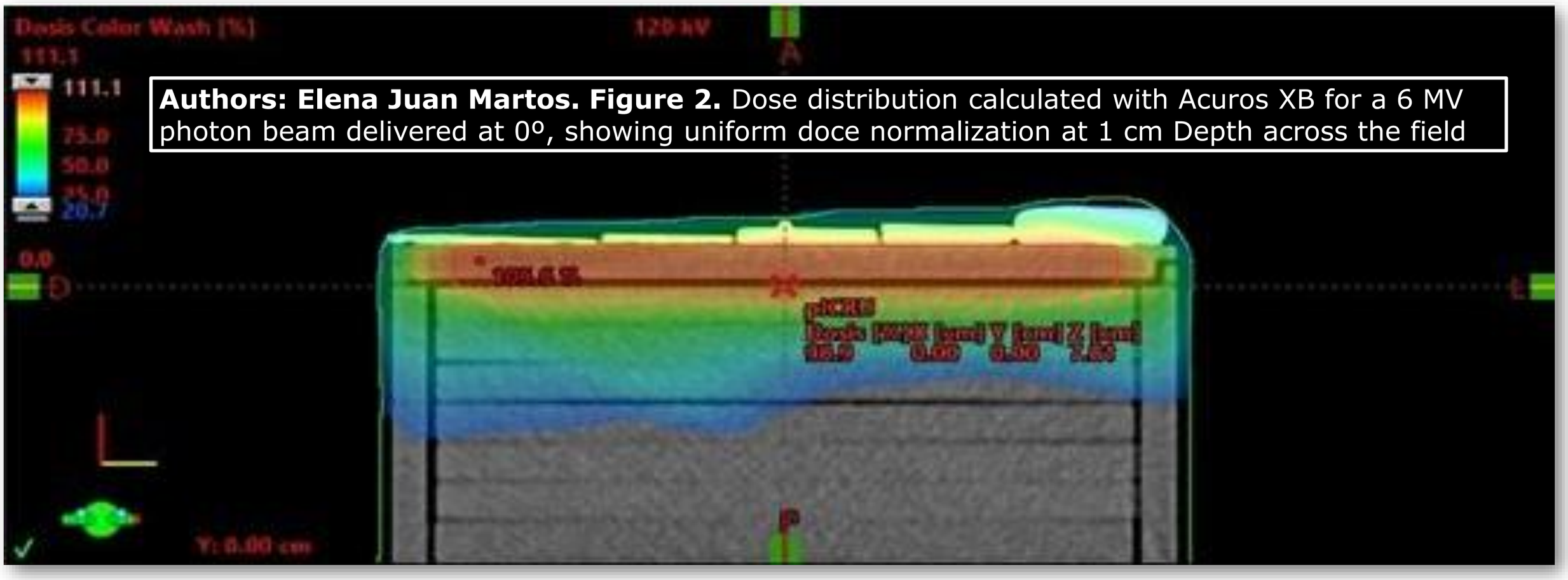
Treatment planning ws performed with the Acuros XB algorithm. Gamma análisis was conducted using OmniPro I'mRT with a 3/3 criterion, selected as a physically justified and clinically appropriate approach under conditions of electronic disequilibrium and steep dose gradients at the bolus edge transition region.



Authors: Elena Juan Martos. Figure 1. Stepped high-density bolus (eXaSkin, 1.7 g/cm^3) with thicknesses ranging from 0.8 to 7.8 mm positioned on the phantom. Alignment was performed using room lasers, and Surface doce measurements were obtained with radiochromic films.

RESULTS

A total of 405972 pixels were analyzed, with 95.12% evaluated and 4.88% excluded due to threshold criteria. The mean gamma value was 0.13 with a standard deviation of 0.88. These results are consistent with clinical QA recommendations such as AAPM TG-218.



Authors: Elena Juan Martos. Figure 2. Dose distribution calculated with Acuros XB for a 6 MV photon beam delivered at 0º, showing uniform doce normalization at 1 cm Depth across the field

References:

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