

ABSTRACT SUBMISSION FORM

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Name (First, last)	Cammin, Jochen
Mailing address (including province/state, country, postal/zip code)	660 S. Euclid Ave., CB 8224; St. Louis, MO 63110; U.S.A.
Institution/organization	Washington University in St. Louis
Position	Instructor
Telephone (including country prefix)	+1.314.687.8010
Email	jcammin@wustl.edu

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<p>PRESENTATION TITLE</p> <p>Surface dose measurements in an MR image-guided radiation therapy system using OSLDs: comparison with and without a static 0.35 T magnetic field</p>
<p>AUTHOR(S)</p> <p>Jochen Cammin (*), Alex Price, Bin Cai, and Olga Green <i>Washington University in St. Louis, Department of Radiation Oncology, St. Louis, Missouri, USA</i></p>
<p>ABSTRACT</p> <p>Purpose: To compare surface-dose measurements without and with the magnetic field in a 0.35 T MR image-guided LINAC treatment unit using OSLD dosimeters.</p> <p>Materials & Methods: OSLD dosimeters (Landauer NanoDots) were placed on the surface of a 9 cm solid water phantom. The phantom was placed in an MR image-guided LINAC (ViewRay, Inc.) at an SAD of 90 cm to the OSLDs. Dose measurements were performed in a 9.96×9.96 cm 6 MeV flattening-filter-free photon beam without and with the magnetic field of 0.35 T. The angular dose dependence was measured on the surface with gantry angles of 0 degree (perpendicular to the surface), ±40, ±60, and ±80 degrees.</p> <p>Results: The surface dose with magnetic field for a photon beam perpendicular to the surface (gantry at 0 degree) was reduced by 16% relative to the dose without magnetic field. The surface dose was enhanced by 26% for very oblique incidence (+80 deg) with magnetic field, but no enhancement was observed for oblique incidence at -80 deg (Fig. 1). Relative dose measurement, after normalizing to the dose at 0 deg, show enhancement for all oblique incident angles compared to the situation without magnetic field (Fig. 2). Relative dose measurements were also compared to previous results obtained on a MR image-guided Co60 treatment system. Dose enhancement and asymmetry for oblique incidence was less pronounced in the Co60 system.</p> <p>Conclusions: There is a significant difference for the surface dose with and without a magnetic field in certain radiation beam orientations due to the influence of secondary electrons from head-scatter and in the build-up region. The degree of changes depend also on beam quality. The effect was observed to be stronger in an MR-LINAC system compared to an MR-Co60 system. Clinical surface-dose dosimetry in a magnetic field should apply asymmetric angle-dependent corrections.</p>

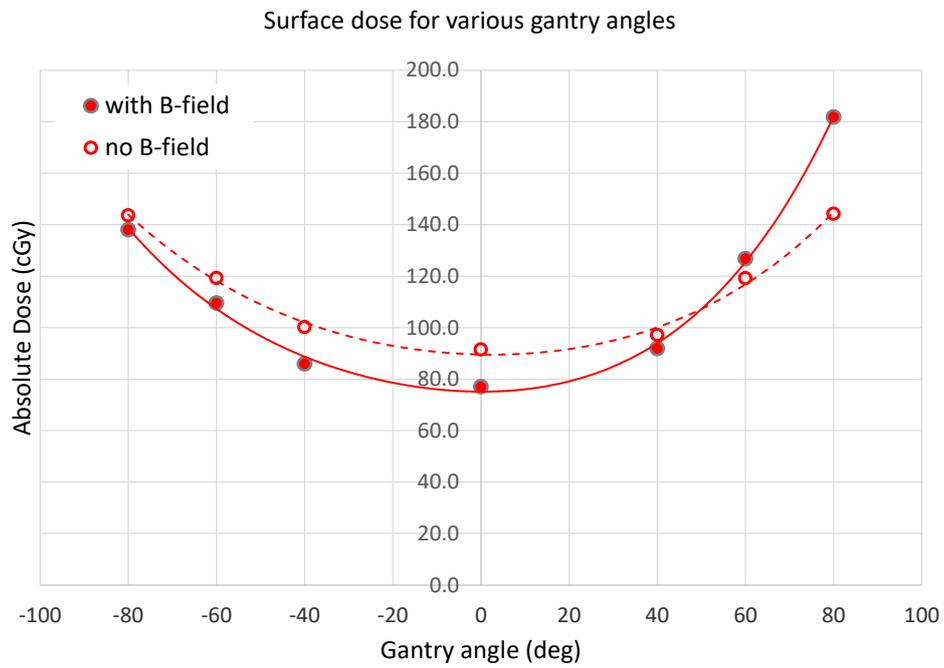


Fig. 1: Absolute surface doses for different gantry angles without and with magnetic field.

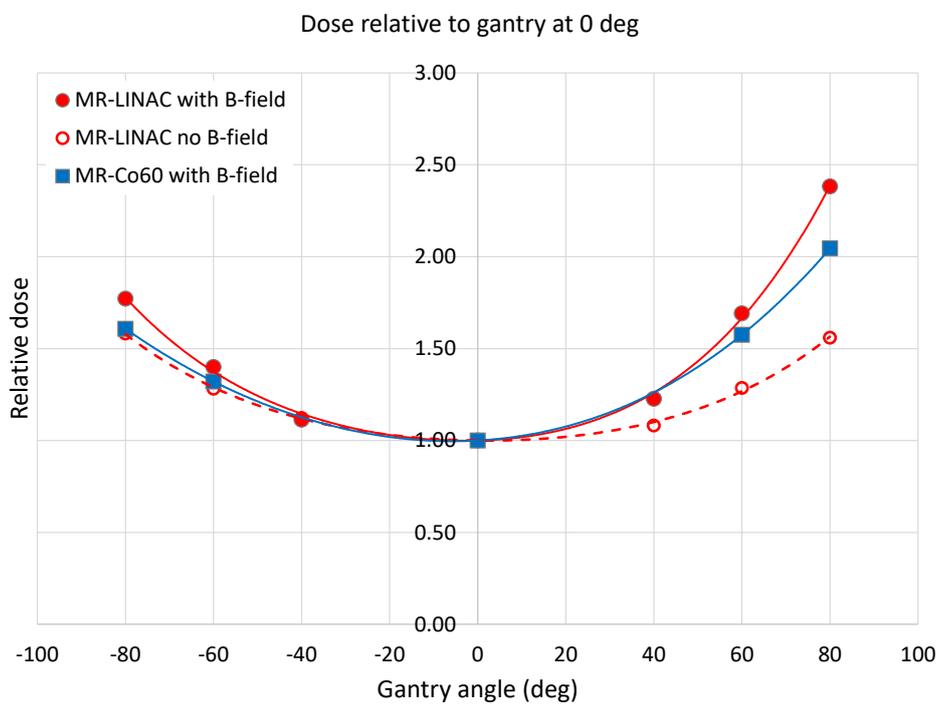


Fig. 2: Surface doses for different gantry angles relative to the dose with gantry at 0 degrees. Results are shown for an MR-LINAC without and with magnetic field, and for a MR-Co60 system with magnetic field.