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MRI in HDR

The utilization of MRI in brachytherapy treatment of both gynecological and prostate cancer gains great interests over recent years and has become an important aspect in treatment planning. Using MRI is necessary in BT treatment for its capability to accurately define soft tissues such as the cervix, prostate, and target volumes that is limited by CT images.

Schindel et. Int J Radiat Oncol Biol Phys. 2013; 86:387-393

T2 weighted MR with contrast and MR compatible applicator. Compared to CT, MR provides:

- Superior soft tissue resolution
- Clear distinction of cervical tumor from the uterus, bladder, and rectum.
- Clear distinction of cervix versus vagina.
- Advantage of volumetric planning: adapt and conform dose to patient's anatomy

GEC-ESTRO recommendations for GYN HDR brachytherapy

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MRI in HDR

MRI based image-guided brachytherapy has the potential to significantly change the treatment planning process. Soft tissue contrast allows the user to customize treatment plans to accurately deliver therapeutic doses to the region-of-interest, while minimizing dose to the normal structures in the vicinity of the tumor, potentially resulting in fewer treatment related complications.

Joann Prisciandaro, Ph.D., FAAPM, Professor, Director of Brachytherapy Physics, University of Michigan
https://cdn0.scrvt.com/39b415fb07de4d9656c7b516d8e2d907/1800000002979969/0191a8479a58/MRI-Guided_HDR_Brachytherapy_for_Prostate_Cancer_1800000002979969.pdf

Comparison of outcomes for MR-guided versus CT-guided HDR interstitial brachytherapy in women with locally advanced carcinoma of the cervix. At 2 years overall survival was significantly better in the MR-guided cohort (84% vs. 56%, p=0.036). On multivariate analysis, squamous histology was associated with longer overall survival in a model with MR BT.

Kamran et al. Gynecol Oncol. 2017; 145(2):284-290

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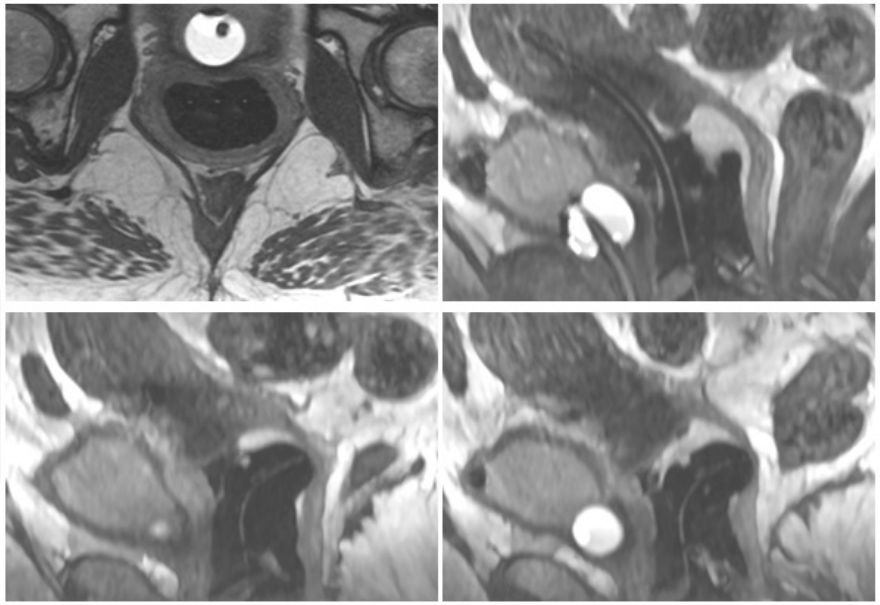
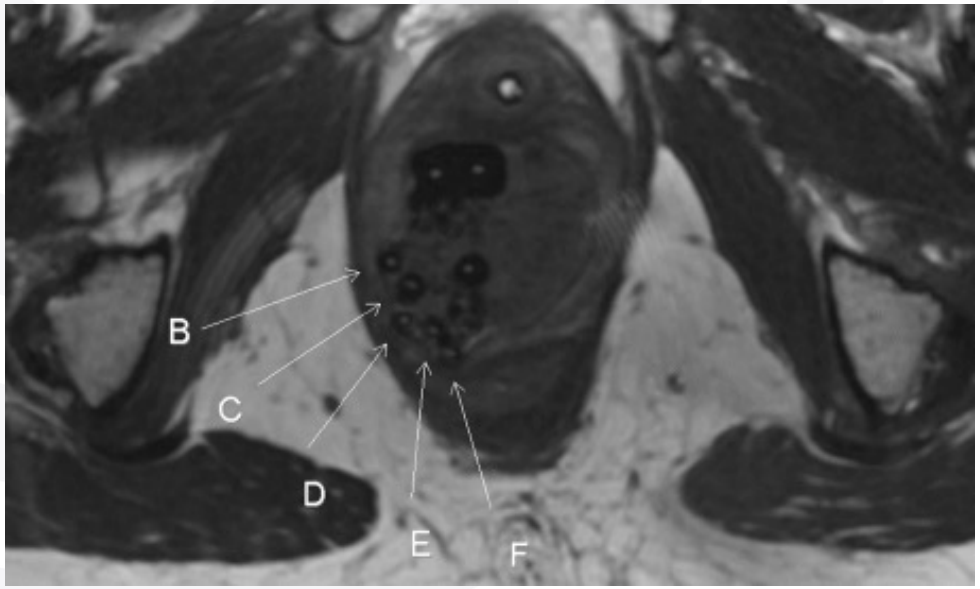


"the GYN section completed our first ever intra-op MR-guided brachy case, for which we again used the Orion Line Markers

Marker visibility was very strong, allowing treatment planning directly on MRI. For the first time ever, we completely excluded the cumbersome and redundant CT-Simulation normally obtained for planning."

Dr M Ning
MD Anderson



"We used a total of 8 Orion line markers (3 for T&O + 5 for Interstitial Needles), with excellent visibility on the CISS sequences, allowing treatment planning directly on MRI (without CT-Sim)."

Dr M Ning
MD Anderson

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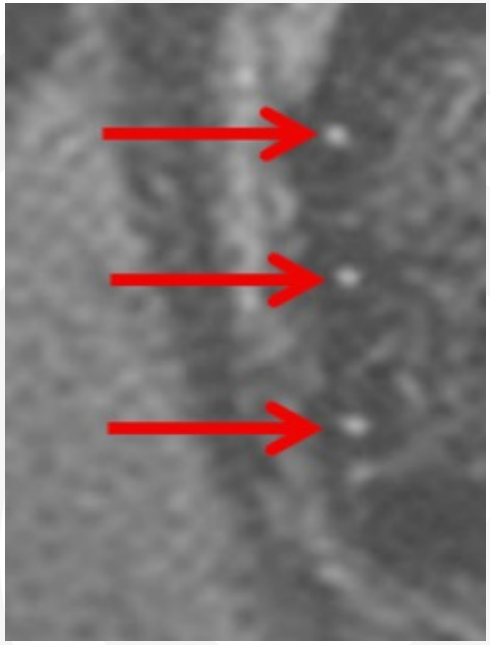
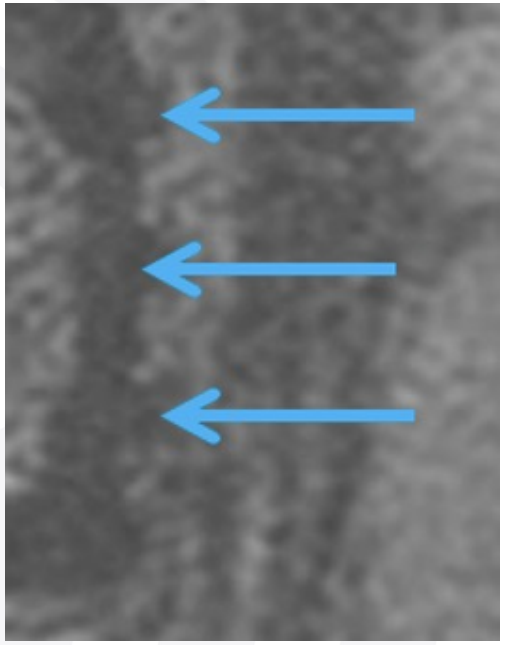
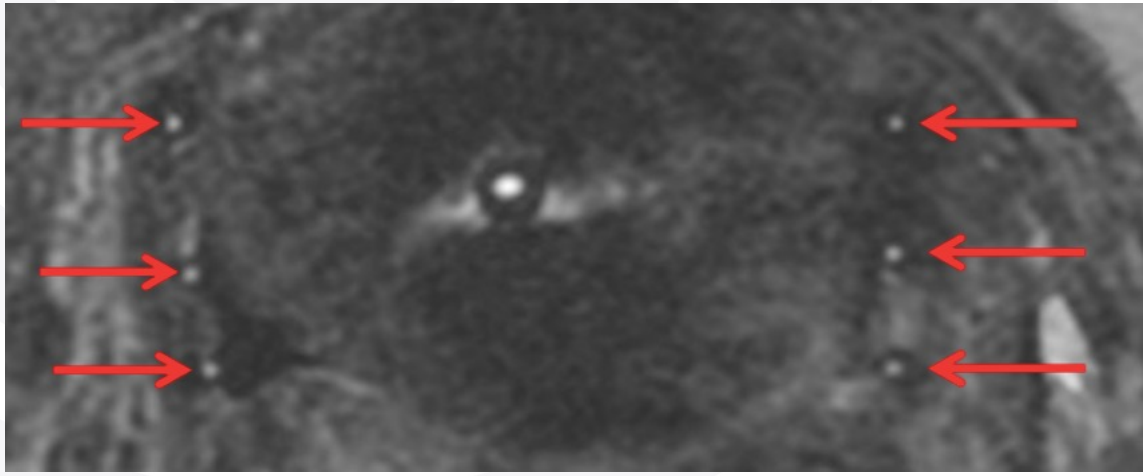




"MR-based (T2) clinical dosimetry is the ESTRO-ABS recommended planning procedure in cervix brachytherapy. To improve efficiency and accuracy, the planning should be done based exclusively with MR, avoiding CT registration.

Axial slice with three markers on the left-hand side (red arrow), and none on the right-hand side."

Dr J Perez-Calatayud
Hospital Universitari i Politècnic La Fe, València, Spain



Deeper axial slice in which all needles had the new marker.

Dr J Perez-Calatayud
Hospital Universitari i Politècnic La Fe, València, Spain

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