

Positioned for Precision: Optimizing MR Imaging from the Table Up

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Transforming MR workflows in radiation therapy

Improving MR imaging workflows in radiation therapy starts with seamless integration of patient positioning solutions that drive precision and efficiency. In this article, clinicians share real-world examples of how they are using CQ Medical's MRSeries and Symphony systems (CQ Medical, Avondale, PA, USA) to streamline treatment planning and enhance outcomes. These solutions are designed for optimal performance with MRI systems from Siemens Healthineers.

Real world impact: Precise positioning for high-quality imaging

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At the Northern Centre for Cancer Care in Newcastle upon Tyne, UK, clinicians Stephen Hadley and Serena West have demonstrated the clinical benefits of the Universal Couchtop MR Overlay (UCT, CQ Medical, Avondale, PA, USA) in enhancing MR workflows.

"We have used the UCT with our 1.5T MAGNETOM Sola (Siemens Healthineers, Erlangen, Germany) since its release in 2022, deploying the overlay daily for a wide range of anatomical sites. Our center serves over 2.1 million people and treats more than 6,000 patients per year. More than 35% of our patients receive radical intent external beam radiotherapy and have MRI as part of their standard of care. Therefore, maximizing efficiency whilst offering the best quality care is imperative, and the UCT overlay system allows us to achieve this for every patient.

As well as being used daily for radiotherapy patient scans, our MAGNETOM Sola is also routinely used for clinical trials and routine diagnostic scans. We, therefore,

greatly appreciate the fact that a single operator can easily place and remove the overlay, securely docking it into the MAGNETOM Sola's couch. We use the overlay and associated coil bridges for seven clinical sites: prostate, including stereotactic ablative body radiotherapy (SABR) and MR-only; gynecological external beam therapy (EBRT); head and neck, including SABR; rectum; anus; liver SABR; and spine SABR. The versatility and flexibility of positioning available using the included coil bridge allows us to achieve high-quality anatomical scans of all these sites using a single Body 18 receive coil and the posterior spine coil.

The compatibility of the UCT with the Body Pro-Lok ONEBridge abdominal compression bridge allows for slick setup of patients requiring respiratory motion management both for CT and MR imaging, such as liver SABR patients.

Overall, the UCT with its lightweight design, versatile coil placement options, and compatibility with the Body Pro-Lok ONEBridge system provides high-quality MR imaging for a wide range of patients, whilst maintaining high patient throughput and satisfaction."



1 The 1.5T MAGNETOM Sola with coil and positioning setup.

Clinical insights: Lithotomy patient transfer optimized for MR-guided radiotherapy

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Jay Shelton, M.D., notes that prostate and gynecological brachytherapy workflows are becoming increasingly complex and delicate. The Symphony lithotomy solution plays an integral role in supporting and enabling the addition of MRI into these procedures. This solution maintains patient position and increases comfort and compliance throughout insertion, image acquisition, and treatment, ultimately helping to improve outcomes.

MD Anderson implemented a Symphony solution with imaging equipment from Siemens Healthineers to enhance the efficiency and precision of its gynecological brachytherapy workflows.

One major challenge in obtaining multiple imaging modalities for gynecological and genitourinary patients is keeping patients and brachytherapy applicators in the same position during transportation. In many clinics, the CT, MRI, and treatment rooms are not in the same area or even on the same floor, so the patient must be transported quite far. Keeping patients and applicators in the exact

same position throughout the imaging and treatment process is crucial. A few millimeters of change in applicator location within the patient could alter the expected delivery dose to an unacceptable amount. Keeping the patients on the same tabletop from the time of implant until after radiation delivery is the best solution.

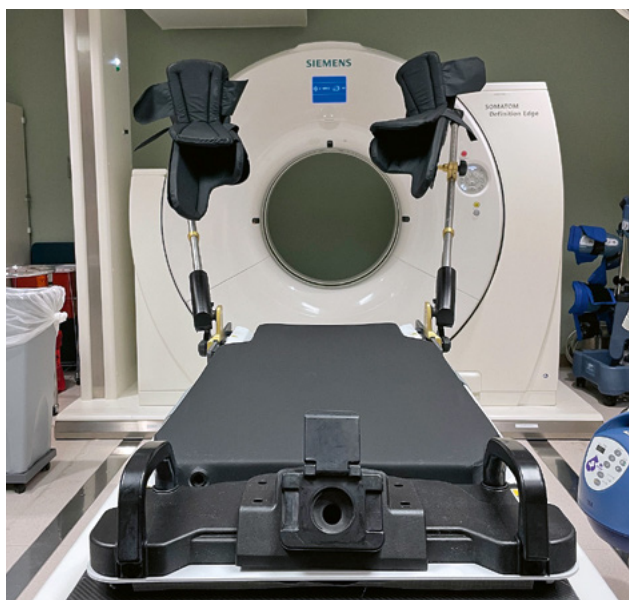
The MD Anderson workflow uses MR-conditional solutions including three AirShuttle devices, two AirDrive Caddie solutions, and one AirDrive Trolley, ensuring smooth transfers with minimal staff effort. This streamlined process reduces the risk of applicator displacement, improves staff efficiency, and enhances patient comfort.

The AirShuttle is positioned on the couchtop of the CT system (SOMATOM Edge; Siemens Healthineers, Forchheim, Germany). The patient was then set up on the AirShuttle and the implant procedure was started. To have the patient in lithotomy position, the AirShuttle contains side rails that allow stirrups to be easily attached.

Once the procedure is complete, the integrated AirDrive Trolley blower is used to inflate the AirShuttle and transfer onto the trolley. The patient is then rolled to the MRI suite, which is four floors above the brachytherapy suite. Since every part of the Symphony system is MR-conditional, the trolley can be rolled directly into the MRI scanner (a 3T MAGNETOM Vida; Siemens Healthineers, Erlangen, Germany) room, and the AirShuttle with the patient can slide from the trolley to the MR tabletop.

Once the MRI is done, the patient is slid back onto the trolley, rolled back to the brachytherapy suite, and treated.

In this workflow, the patient is never separated from the AirShuttle. This ensures minimum applicator displacement during transport. Fusing the CT and MR images and



2 Lithotomy position for initial CT image acquisition on a SOMATOM Definition Edge.



3 Transport to MR suite and transfer to MRI scanner (3T MAGNETOM Vida).

verifying relative locations of the applicator and patient anatomy validates this. Prior to using Symphony, the team would transfer the patient using sheets, which required more staff and effort. Additionally, they had to be extremely careful that the applicator position did not change during the shift. With the Symphony system, it is easy to slide the patient from one surface to another with two staff. The MRI suite does not accommodate normal stretchers. The team previously used a normal stretcher, so had to move the patient and the MR scanner tabletop to a separate room for patient transfers. Upon completion of the scan, this process was repeated. This was cumbersome and risked causing long wait times.

As brachytherapy implants become more complex with a mixed use of solid applicators and needles, maintaining patient position is of the utmost importance. With increased access to MRI scanners in radiation oncology departments, all patients are likely to receive an MRI for every brachytherapy fraction in the future. A big focus of recent brachytherapy research has been replacing CT with MRI as the primary imaging modality. This will lead to implants being done directly in the MR suite, requiring all devices used to be MR-conditional. To be future-proof, clinics should therefore only purchase brachytherapy equipment that is MR-conditional. Finally, for clinics with large patient volumes, duplicate patient transport devices are extremely helpful, increasing patient throughput and redundancy. In summary MRI is already a critical component of brachytherapy today and is expected to become a leading imaging modality as clinical adoption and supporting evidence continue to grow. With a focus on applicators and treatment planning, patient transport

is often overlooked. Having a low friction transfer device to keep patients in a fixed position while also easily transferable from one couchtop to another makes the entire workflow much smoother and can benefit all clinics.

Update on combining CT-based online adaptive radiotherapy with offline MR guidance: The modular adaptive radiotherapy system (MARS)

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Building on previous work integrating MR imaging into adaptive radiotherapy while maintaining consistent patient positioning, Fabian Weykamp, M.D., and his team at the German Cancer Research Center (DKFZ) in Heidelberg have refined their workflow using the Symphony Alta AirShuttle and AirDrive Trolley from CQ Medical.

At DKFZ, the Symphony patient transport system (AirShuttle) is used to facilitate continuity of positioning across imaging and treatment. The system connects the planning CT scanner, the Ethos adaptive radiotherapy system (Varian, a Siemens Healthineers Company, Palo Alto, CA, USA), and a 3T MAGNETOM Vida MRI scanner, allowing the patient to remain on a single transfer surface throughout the imaging and treatment workflow. This approach supports consistent positioning between MR acquisition and treatment, which can assist in spatial alignment.



4 MR image acquisition with a 3T MAGNETOM Vida.



5 Patient positioning after the MRI scan.



6 Shuttling the patient from the MRI scanner to the Ethos system.



7 Patient positioning on the Ethos system.

Incorporating MRI into the offline adaptive treatment planning workflow has allowed DKFZ to expand its use of advanced imaging techniques, including functional imaging such as diffusion-weighted imaging (DWI), while maintaining patient positioning from imaging to treatment. Insights on the clinical utility and outcomes of this approach continue to evolve through practical experience. Leveraging this shuttle-based approach further enables the use of existing MRI and treatment room setups – even when not co-located – without significant modifications to facility layout. It also supports more flexible scheduling of MRI sessions and treatment appointments, potentially improving overall patient throughput.

For more details, please see:

Weykamp F, Schlemmer H-P, Jäkel O, Debus J. Combining CT-Based Online Adaptive Radiotherapy with Offline MR Guidance: The Modular Adaptive Radiotherapy System (MARS). MRReadings: MR in RT. 2024;(10):13–19.

Available from:

➤ https://marketing.webassets.siemens-healthineers.com/a9d0b123b32272fe/81f3971a763a/siemens-healthineers_Weykamp_MARS_ESTRO_2024.pdf.

Collaboration in Practice

CQ Medical works closely with imaging and treatment technology leaders, including Siemens Healthineers, to address real clinical challenges. Through these collaborations, solutions are developed with input from users – prioritizing safety, precision, and workflow compatibility. The goal is to support clinicians in delivering more efficient and informed care.

Explore how these tools are being used in clinical practice:

➤ www.CQmedical.com.

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