

ASTRO 2021 Exhibits Highlight Personalized Adaptive Therapy, Workflow Efficiency

Mary Beth Massat

Over the last decade, advances in radiation treatment planning and delivery have contributed to longer survival rates and more people living with cancer. With that comes a heightened focus on personalizing treatment by adapting therapy to the patient and reducing side effects with improved lesion detectability and targeting methods, thereby improving quality of life. Manufacturers at this year's American Society for Radiation Oncology (ASTRO) showcased new or enhanced technologies that impact workflow and the processes for treating patients with these core benefits in mind.

At **ViewRay**, new features in treatment planning and delivery were geared to either enable more personalized treatments for a particular patient or streamline the re-optimization planning to allow for more patient treatments.

The goal, says Mike Saracen, vice president of marketing, is to significantly reduce the workflow process, to enhance on-table adaptive planning, and expand the clinical utility of MRIdian, the company's MR-guided radiation therapy (MRgRT) system. New one-click tools for auto-contouring and auto image registration streamline workflow. Users can now utilize gating tools and perform 2D real-time dose distribution in the sagittal, coronal and axial planes. Additionally, a new brain treatment package and brain coil allow for 0.75-mm, thin-slice 3D

acquisitions. With specialized glasses, patients also can now see their treatment plan, further empowering them to participate in their health care.

Results of 148 inoperable pancreatic cancer patients treated with MRIdian SMART (MR-guided stereotactic adaptive radiation therapy) were presented at the conference, showing longer median survival of 26 months compared with 12 to 15 months for patients who received standard radiation therapy and chemotherapy.

"We are thrilled to see such an improvement, with long-term survival more than doubling when MRIdian SMART was used to treat this population of patients," says Michael Chuong, MD, medical director of radiation oncology at Miami Cancer Institute, part of Baptist Health South Florida. "In fact, some patients were still alive several years later with excellent quality of life. These results are a significant improvement over historical outcomes from standard computed tomography (CT)-guided radiation therapy."

At **Reflexion**, Chief Medical Officer Shervin "Sean" Shirvani, MD, MPH, said the RefleXion X1 has treated approximately 30 patients at 3 installed sites. The system combines positron emission tomography (PET) and 16-slice fan-beam kVCT imaging capabilities with a linear accelerator, enabling head-to-toe motion management and the ability to see and treat tumors using disease-specific tracers. This approach may allow for multiple tumors to be treated in 1 session as well as utilize the

Ms. Massat is a freelance health care writer based in Crystal Lake, IL.

Figure 1. The Multimodality RT Simulation Workspace by Royal Philips provides a vendor-agnostic single space for simulation, multimodality image fusion and contouring.



biology of the cancer to guide radiation therapy, a process called biology-guided radiation therapy (BgRT), which is currently limited to investigational use in the US.

Treating oligometastatic disease is one area where Dr. Shirvani sees great potential for the technology, with the ability of PET to track the radio-tracer signal and detect subtle lesions. The company has partnered with **Telix Pharmaceuticals** and **Lantheus** to explore the use of novel PET tracers beyond the use of fluorodeoxyglucose (FDG).

“With BgRT and PET imaging during treatment, our future goal is to decrease toxicity and open the door for more treatments in patients with oligometastatic or metastatic disease and not exhaust their (lifetime) radiation dose limits,” says Dr. Shirvani.

At the **Siemens Healthineers** and **Varian** booths, the companies connected dots with their combined vision and fight against cancer to accelerate the path from diagnosis to survivorship. The companies are working together to “close the gap between resources available to patients around the world,” said Tracey Fisher, senior director, Americas/global field marketing. “Where you live should not determine how and where you are treated.”

Varian’s Ethos therapy Adaptive Intelligence solution is designed to increase quality of life by adopting a patient-centric, personalized care approach. With approximately 40 systems in clinical use, Varian showcased the broad array of disease sites Ethos has targeted and how it can deliver adaptive planning in a standard 15-minute treatment slot, representing a “sea change in technology,” says Stephen Thompson, MS, DABR, senior product manager. Thompson adds that data from the Adaptive Intelligence Consortium shows that 81.5% of physicians using Ethos chose the daily adaptive plan based on tumor and anatomical changes.

The company also highlighted IDENTIFY, a new surface-guided positioning solution for patient verification and precise set-up to enhance safety. It uses a camera-projected light to increase accuracy and reproducibility across treatment fractions to provide the clinician with more confidence when utilizing hypofractionated plans and help reduce patient side effects. A biometric scanner verifies the patient, and RFID technology helps align the patient to submillimeter accuracy. Also featured was Noona, a patient engagement platform that interfaces with Aria or Epic to serve as a communication tool between the care team and patient.

Figure 2. VOLO Ultra is a new feature of the Accuray Precision Treatment Planning System designed to accelerate Radixact and TomoTherapy treatments and optimize plan quality.



At Siemens, the company showcased its synthetic CT solution for MR simulation, including the use of 4D MRI, as well as artificial intelligence (AI)-based auto contouring tools now available in the cloud in addition to being on the CT console or workstation. The cloud-based tools may increase availability to users who seek to provide a more personalized patient experience as well as shorten time from diagnosis to treatment, says Christoph Bauer, director of global clinical marketing for cancer therapy.

Elekta Unity was a highlight at the **Elekta** booth, buoyed by several award-winning abstracts demonstrating MRgRT benefits and the power of the system to generate information to improve therapy precision and optimize online adaptive workflow. The abstracts include two that received Basic/Translational Science Abstract Awards and were selected from nearly 2,000 submissions; one also received an ASTRO Recognition Award. “Elekta Unity is at its core an information-generating linear accelerator,

one that gives clinicians information about anatomy, dose and biology,” says John Christodouleas, MD, senior vice president of medical affairs and clinical research. “This information can be used to improve the precision of radiotherapy and optimize the online adaptive workflow.”

Elekta Studio, a fully connected image-guided brachytherapy suite with ImagingRing enables 2D cone-beam and fluoroscopic imaging that moves around the patient up to 360 degrees. Clinicians can image patients in the treatment position in the 120-cm bore of ImagingRing, export the images to the planning software and afterloader, and begin treatment – in 1 room and without moving the patient.

On Elekta Harmony, FastTrack can halve patient set-up time with the addition of controls on the patient treatment table by integrating iVue on the panel and using facial recognition software as part of the patient verification step. Quality assurance is also now fully integrated into the system, allowing the physicist to access all tests online and confirm

completion. This feature is particularly useful for centers without a physicist on-site at all times. With FastTrack, the Elekta Harmony has enabled users to conduct a standard 15-minute treatment in as little as 9 minutes.

FUJIFILM Healthcare Americas announced the grand opening of UroPartners' oncology center in Gurnee, Illinois, featuring FujiFilm's Persona CT for oncology simulation and general radiography imaging. With an 85-cm bore, which matches the arc of a linear accelerator, Persona CT delivers 64/128 slice imaging for submillimeter, high-resolution images. The system also has an extended field-of-view (FOV) and 4D gating with a grid overlay, says Rick Banner, senior director of marketing.

Also on display in the FujiFilm booth was its Virtual Hospital, highlighting the company's portfolio, including the recent Hitachi Healthcare Americas acquisition. "With 80 years of experience in image processing, we'll [continue to] leverage our experience in image processing and AI to expand in other areas," says Banner.

GE Healthcare showcased its oncology technologies that provide clinicians with images and information needed for precise treatment tailoring. In particular, the company will integrate Spectronic Medical AB's AI-based software for generating synthetic CT images from high-quality MR images and collaborate with Vysioneer to include its VBrain solution for auto-contouring of brain metastases, meningioma and acoustic neuroma.

Another key collaboration is the integration of Mirada Medical's RTx into GE's AW Workstation and AW Server to enhance visualization and diagnostic capabilities. RTx is a comprehensive image registration and visualization solution with multimodality contouring, adaptive planning and 4D image support.

The company also introduced the Discovery RT Gen 3 wide-bore CT simulator, providing submillimeter images free of motion and metal artifacts. The system also allows for simulation across an 80-cm field of view (FOV) reconstruction with MaxFOV 2, GE's next-generation extended FOV technology for radiation therapy planning. "The unique needs of radiation oncology make it important to have image data across the entire bore of the CT simulator. Patients are often positioned off-center to accommodate positioning accessories, and dose calculations require data from the entire physical anatomy," says Anna Flahaven,

solutions marketing manager, molecular imaging and computed tomography (MICT).

Royal Philips announced new innovations to its Multimodality RT Simulation Workspace (**Figure 1**). Compatible with MR, PET/CT and CT, the solution integrates with picture archiving and communication systems (PACS) and/or imaging devices to provide simulation, multimodality image fusion and contouring in a vendor-agnostic workflow. Common tasks such as normalization, local correlation and cross correlation are automated for MR and CT images. The company also highlighted its integration of MIM Software's Contour ProtégéAI next-generation, deep-learning segmentation solution on Philips' Big Bore RT platform. The recently released Spectral CT 7500 enables patient scanning in the treatment position and provides proton-stopping calculations, such as electron density and effective atomic number.

The company's MR simulation software is tightly integrated with Elekta Unity, including the same tabletop and sequences. The software also includes synthetic CT with pixel-by-pixel Hounsfield units (HU), eliminating the need to confirm HU with an additional CT scan. In addition, the company's new Compressed SENSE accelerates MR image acquisition and reduces the MR simulation acquisition by more than 50%.

Also highlighted was the company's Oncology Pathways for "reducing unwarranted variations in care and providing the same treatment recommendations regardless of who the doctor is," says Louis Culot, general manager, genomics and oncology informatics at Philips. The solution analyzes each plan based on efficiency, cost and toxicity; streamlines workflow with more multidisciplinary tools; assigns tasks for remote staff; and integrates with electronic medical records, PACS, laboratory information systems and pathology information systems. It can also help enhance efficiency in tumor board meetings and help obtain clinical trial consents by auto populating updates to these systems and matching therapies available in the institution to the patient care pathway.

At **Blue Earth**, the company shared the results of its poster lunch symposium presented by Ashesh Jani, MD, FASTRO, the James C. Kennedy Professor in Prostate Cancer at Winship Cancer Institute of Emory University. Dr Jani discussed the first randomized trial of PET using fluciclovine (^{18}F) over conventional imaging alone to

guide radiation therapy decisions and treatment planning. The results demonstrated a significant improvement in failure rates at 3 years. Equally important is that incorporating ^{18}F -PET changed the treatment planning and showed how it impacted the outcome, because the clinician could see the disease, treat more of it, and avoid overtreating it, said Dr. Jani.

Among technology debuts, **Accuray** unveiled VOLO Ultra (**Figure 2**) to help accelerate Radixact and TomoTherapy treatments with an optimizer that includes a fast gradient-based algorithm that auto selects planning parameters for any case. “Even a novice who hasn’t planned on this system can generate a high-quality plan efficiently,” says Corey Lawson, vice president of product strategy. He adds that optimization time is reduced by 90% and many treatment times become 30% to 60% faster.

On the Radixact system, the new ClearRT helical fan-beam kVCT delivers diagnostic-like quality images thanks to its slip-ring platform. A large FOV – 50-cm diameter and 135-cm scan length – also helps reduce scanning time. When the system is used with Synchrony motion tracking and correction, clinicians can better view the anatomy and track and move the beam to target the lesion for more precise adaptive therapy, Lawson says.

In partnership with **Brainlab**, Accuray is developing a works-in-progress brain package that brings Brainlab’s Elements – software that includes interactive and automatic segmentation applications for planning image-guided surgery – to CyberKnife. Accuray will also interface with Brainlab’s Qentry Cloud Service so CyberKnife users can participate in the Stereotactic Radiosurgery (SRS) Patient Registry and share data with other institutions globally.