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Improving Radiotherapy Planning with PET·CT

How FlowMotion technology supports more effective planning.

Answers for life.

"We're able to make a seamless transition between radiology, diagnostic PET·CT, and radiation oncology treatment planning and follow-up."

Dustin Osborne, MD
Assistant Professor and Director of Clinical Research
University of Tennessee Medical Center

"Since we've had the Biograph mCT Flow, we've seen a huge increase in our collaboration with radiation oncology," says Shelley Acuff, clinical research leader at the University of Tennessee Medical Center (UTMC) in Knoxville, TN. "The reason for that, I believe, is now we have the ability to gate CTs and combine that with a PET that is gated, which was not possible before."

As part of their radiation therapy planning, physicians at UTMC are using a Biograph mCT Flow™ positron emission tomography/computed tomography (PET·CT) system, which provides unique FlowMotion™ technology that eliminates the need for step-and-shoot imaging in PET-CT. This has led to very positive changes—for patients, physicians, and the institution.

Save time for patients and staff

"We use the Biograph mCT Flow to more accurately define the target that we need to treat with radiation," says Joseph Kelley, MD, PhD, associate professor at UTMC. "We're able to scan the patient once and then place the isocenter within the tumor at the same time. Then we can transfer the entire data set with the isocenter already set into our treatment planning system in one step and with one process. As a physician, I can see the patient in one setting; perform a diagnostic procedure and radiation planning procedure all in one process."

This saves patients—as well as physicians and the hospital on the whole—time. Combine faster imaging with high quality and physicians have the opportunity to achieve more effective treatment planning. "Our gated studies and our dynamic imaging take far less time on this system than they did on previous generations of scanners," agrees Dustin Osborne, MD, assistant professor and director of Clinical Research, UTMC. "In addition, with continuous bed motion, we can provide gated studies for all of the chest, pancreatic, and liver patients we see at the hospital. This has translated into our ability to better support radiation oncology by enabling them to better see the regions of interest they are trying to treat."

Pulmonary nodules that are close to the diaphragm and smaller lymph nodes, for example, can be difficult to visualize. With the Biograph mCT Flow, however, clinicians can adjust imaging parameters for each area of interest in the body. This supports higher levels of clinical confidence and more precise therapy planning. "Previously, I had a single protocol for all cancers and a separate protocol for melanoma," says Yong C. Bradley, chief of Nuclear Medicine at UTMC. "But now, I'm able to actually change the protocol for lung, colon, melanoma, and head and neck cancers. It enables a more precise scan range to the area of interest."

Improved clinical confidence reduces risk

In addition to better managing protocols based on patient needs, continuous bed motion through FlowMotion technology supports more uniform axial images throughout the entire scan range, which ultimately supports more precise treatment planning. "By integrating FlowMotion PET·CT with gated radiation treatment, we're able to accurately focus our radiation on a much smaller target and, at the same time, have much more confidence that we're treating the proper tumor and avoiding normal tissue," says Dr. Kelley.

And beyond protecting normal tissue, treatments can potentially change when more accurate information is available. "When we first started using the mCT [Flow] versus a step-and-shoot system, we wondered whether or not it would really make a difference," says Dr. Bradley. "So with our patients' consent, we actually imaged them with the step-and-shoot and with FlowMotion. While looking at those cases, I saw one patient who had lung cancer with what appeared to be hilar nodes involvement. In the traditional step-and-shoot image, there was no evidence of metastasis. When I looked at the FlowMotion image, I realized that the lymph node was actually pathologic because of the amount of pharmaceutical uptake there was. So I reassessed the patient, which changed the treatment plan."

Importantly, the fast, high quality imaging the Biograph mCT Flow provides has been easy to use and implement. In fact, the staff is now able to handle a larger volume of patients while completing what were once complex workflows with ease. And the better collaboration between radiology and radiation oncology has led to improvements in patient care and organizational objectives. "We're able to make a seamless transition between radiology, diagnostic PET·CT, and radiation oncology treatment planning and follow-up," says Dr. Osborne.

The statements by Siemens' customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption) there can be no guarantee that other customers will achieve the same results.

How FlowMotion Solves the Real-Life Challenges of Radiation Therapy Planning

Challenge:	**Creating individualized therapy planning for a wide range of patients.**
Solved with:	A large bore that accommodates a wide range of patient sizes; an exclusive design enables precise CT and PET image registration and accurate contouring; and Acculine installation and siting for precise gantry, room, and component alignment for high planning precision.
Challenge:	**Improve efficiency of care with better, more confident planning.**
Solved with:	High-quality imaging and isocenter placement can occur during the same exam, saving patients and staff time. The entire dataset is easily transferred to the treatment planning system in one step and with one process, enabling faster, more confident treatment planning.
Challenge:	**Limit motion for clearer images that support higher clinical confidence and fewer rescans.**
Solved with:	Improved patient comfort; one click synchronization and fused visualization of PET and CT data; and chest imaging with automated selection of the area in the breathing curve with the least motion.

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