Philips introduces big bore PET/CT system for oncology

The world’s first PET/CT system designed to meet the unique requirements of radiation oncology, Philips GEMINI TF Big Bore system helps to remove the barriers to integrating PET in radiation oncology treatment planning.

Expanding its leadership in both PET imaging and radiation oncology simulation, the new Philips GEMINI TF Big Bore combines Philips time-of-flight PET imaging technologies with its Brilliance CT Big Bore simulation to consolidate radiation oncology procedures, improve the potential for greater accuracy, and improve patient scheduling.

The GEMINI TF Big Bore PET/CT system with its 85 cm bore opening supports a wider range of patient positioning options for treatment planning and simulation, which is particularly helpful for breast and colorectal cancer patients.
“Combining PET biologic information with CT anatomic information in one scan allows radiation oncologists to better characterize lesions, while the system’s TruFlight time-of-flight architecture delivers full PET application coverage and premium PET image quality – even with the 85 cm bore.”

Jay Mazelsky, Senior Vice President and General Manager, Philips Nuclear Medicine

Unlike traditional PET/CT systems, the GEMINI TF Big Bore helps expand PET/CT beyond diagnosis, staging, and follow-up to include therapy planning. Featuring an 85 cm bore, a new table design, and radiation oncology workflow optimization, the GEMINI TF Big Bore supports growing clinical evidence of the value of integrating PET biological information into radiation oncology treatment planning. “CT does a great job at depicting anatomy, but it lacks sensitivity and specificity in many regards,” says Martin Fuss, MD, Professor, Department of Radiation Medicine at Oregon Health & Science University. “PET/CT simulation using the GEMINI TF Big Bore PET/CT system allows radiation oncologists to appreciate the true extent of the disease at the time we make our treatment decisions.”

**Positioned for success**
The more precise the planning and treatment, the better the clinician can be at supplying a tumoricidal dose to cancerous cells while sparing normal tissues. The GEMINI TF Big Bore, with its rigid table design, will be the first PET/CT system to feature a large bore and meet the AAPM’s TG-66 positional accuracy requirements for CT and PET/CT simulation.

Radiation oncology requires extreme positional precision and reproducibility between treatment planning and treatment delivery, especially with advanced applications such as Intensity Modulated Radiation Therapy (IMRT). “Having access to registered biologic and anatomic information about the patient in a single scan allows clinicians to better characterize lesions and reduce the chance of error that comes from fusing individual CT and PET scans,” says Jay Mazelsky, Senior Vice President and General Manager, Philips Nuclear Medicine.

The Philips GEMINI TF Big Bore, an evolution enabled by time-of-flight imaging, expands the clinical utility of PET/CT in oncology care, combining the capabilities of a state-of-the-art CT simulator and a premium PET system into one leading-edge system.
“Philips has a long history of supporting the oncology world. The GEMINI TF Big Bore PET/CT system is evidence of the company’s commitment to maintaining its lead in providing radiation oncologists with advanced solutions to meet our unique requirements.”

Martin Fuss, MD, Professor, Department of Radiation Medicine, Oregon Health & Science University, Portland, Oregon

With a full 85 cm bore for PET and CT scans, the GEMINI TF Big Bore provides flexible positioning and allows clinicians to image patients in the same position in which they are treated. “It has often been challenging to place a patient into an optimal treatment position in a way that she or he does not collide with the limited opening of the PET or CT scanner,” notes Dr. Fuss. “For example, it might be advantageous to have a patient’s elbow stretch out to the side; a feat that may not be realized with a traditional 70 cm bore but is easily accomplished on the GEMINI TF Big Bore system.” Dr. Fuss continues, “Upgrading to the GEMINI TF Big Bore system will allow us the added flexibility to position our patient for optimal treatment—without compromise.”

Streamlining workflow
The clinical workflow in radiation oncology is very different from that of diagnostic imaging—a simulation scan is very different from a staging scan. The Brilliance CT Big Bore, with its proven track record of connectivity to a wide variety of radiation oncology information systems and treatment planning systems, makes it easier to integrate PET into the simulation process. Acquisition and reconstruction protocols are also optimized for PET/CT simulation. As a result, the combination of workflow capabilities and radiation oncology optimization consolidates diagnosis, staging, therapy planning, and follow-up procedures onto one system.

Fig. 1   Planning and therapy
GEMINI TF Big Bore interacts seamlessly with the industry-leading Philips Pinnacle³ radiation treatment planning system.

Fig. 2   Follow-up
A new optional Tumor Tracking application allows export of quantitative information on tumor volume and metabolic activity, enabling automatic segmentation and monitoring of tumor progression before, during, and after therapy.
Making a case for PET/CT in radiation oncology

In recent years, image-guided external beam radiation therapy has led to significant improvements in successful radiation therapy dose planning. In particular, FDG-PET is playing an increasing role in improving the definition of tumor from normal tissue by better delineating treatment volumes with the promise of delivering more dose to the tumor while sparing normal tissues. A recent review of literature indicates an overall improvement in target volume delineation when PET is used in addition to CT. The conclusion is that PET biological information has the potential to improve the accuracy of radiation therapy dose planning. This improvement can be attributed primarily to the incorporation of PET-positive nodes and a reduction in inter-observer variability. More clinical studies are underway to better define the role of PET in radiation oncology, and to demonstrate that the integration of PET imaging improves patient outcomes.

1 Carlo Greco, Kenneth Rosenzweig, Giuseppe Lucio Cascini, Oscar Tamburrini, PET/CT in Radiotherapy Treatment Planning for Non-small-cell Lung Cancer, Lung Cancer 2007 Aug 1

Continuing the legacy

“The GEMINI TF Big Bore leverages our experience and proven technologies to deliver the performance, efficiency, workflow, and connectivity required by radiation oncologists,” notes Mr. Mazelsky. “At the same time, our TruFlight time-of-flight technology provides premium PET image quality in traditional PET/CT applications.” Dr. Fuss agrees, “We upgraded to GEMINI TF a year ago. The promise was better spatial resolution of uptake, which has proven true. The quality of PET imaging provided by the GEMINI TF continues to amaze me; the use of dedicated radiation oncology simulation protocols results in the best PET studies I have ever seen.”

To learn more about Philips GEMINI TF Big Bore PET/CT system, please visit www.philips.com/healthcare or contact your Philips representative.

Fig. 3

Philips TruFlight time-of-flight technology uses an extremely precise measurement of photon arrival times to more precisely localize the annihilation event. The system captures the time difference between events in 600 picoseconds—resulting in positioning accuracy of under 10 cm.

The Philips patented OpenView gantry design has always enabled greater patient comfort, and now it’s coupled with a full 85 cm bore diameter for both PET and CT.