Thinking Outside the Box

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Offering better return on investment and workflow efficiency, Siemens Healthcare unveils Molecular CT – the next evolution in multimodality imaging. More than just a hybrid, Biograph mCT is the imaging crossover that will drive change in the way hospitals think about integrated imaging.

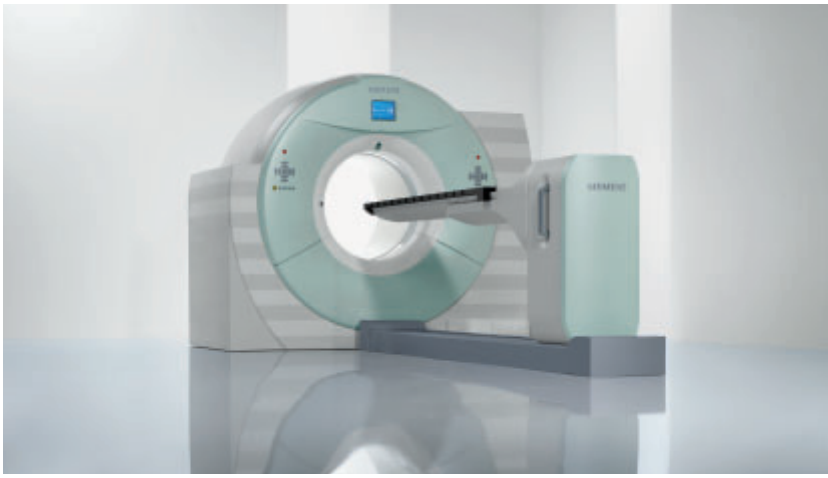
By Claudette Yasell, MBA

Siemens Healthcare recently invited imaging opinion leaders from around the globe to discuss the future of integrated imaging and showcase an innovative new Siemens solution: Biograph Molecular CT – mCT. As the first scanner developed specifically for an integrated imaging environment, Biograph mCT sheds light on how to maximize workflow efficiencies while improving diagnostic capabilities for better patient care.

"As the forerunner in integrated imaging solutions, Siemens wants to lead the evolution of PET·CT [positron emission tomography – computed tomography] to maximize these innovations in imaging and make them available where they will have the most impact. What we've done with Biograph mCT is taken the best Siemens has to offer in CT and enabled the introduction of 'smart' contrast – molecular contrast – using the most advanced PET technology available," says Bernd Montag, CEO of Siemens Healthcare's Imaging and IT Division. While hybrid imaging is not new to molecular imaging experts, the availability of molecular contrast in radiology opens doors to increased cooperation and, potentially, new standard protocols that provide diagnostic information which is unachievable using independent imaging modalities. Financially, using one all-encompassing scanner can make the most of an institution's imaging equipment and strengthen the existing workflows between radiology and molecular imaging; all of which target the patient as the ultimate beneficiary.

Smaller Footprint, Larger Impact

Biograph mCT was designed to obtain functional, anatomical, and molecular information from one noninvasive diag-



Summary

Challenge:
- Obtaining functional, anatomical, and molecular information in a fast, efficient, and economical way

Solution:
- Adding advanced PET functionality to a premium CT system
- Placing PET·CT in the radiology suite
- Enabling molecular contrast in radiology

Result:
- Increased return on investment on imaging equipment
- Maximized workflow efficiencies and patient comfort
- Improved diagnostic capabilities for better patient care

nostic exam. Using Siemens premium CT technology, it adapts to virtually any patient and any clinical need with higher resolution, contrast, and speed.
Biograph mCT comes together in one powerfully small package. It boasts a large bore, short tunnel, and small footprint for unparalleled patient care and comfort. Biograph mCT is offered with up to 128 slices. With a table that can accommodate patients up to 500 pounds (227 kilograms), it makes the technology available so that many more patients can benefit from the valuable information it provides.
In addition to cutting-edge CT technology, Biograph mCT maximizes the most advanced PET technology available, including features such as a 33-percent increase in the PET field of view, high-definition imaging technology with increased spatial resolution, and time-of-flight functionality. It offers the ultimate in PET image quality and count rates for faster, more comprehensive scanning. It can complete routine five-minute PET scans, which provide maximum patient comfort and workflow efficiency. Applications in oncology include the ability to delineate lesions for diagnosis, staging, and restaging of cancer, providing exquisite anatomical detail plus a measurement of cell metabolism.

Patient-centric

The ability to provide a high-quality imaging environment for patients that is accommodating, comfortable, and reliable plays a key role in the success of a hospital's imaging center. The investment made in imaging equipment such as this will provide physicians the information necessary to better diagnose and treat patients.
With this innovation, patient care can also be optimized. With the fastest PET acquisition times available and ultra-fast CT scanning, patient movement is decreased, leading to better image quality. In addition, higher patient comfort is achieved due to shorter scan times. Biograph mCT also offers low-dose scanning[1] in both PET and CT; a very important feature in imaging, as more concerns are raised with respect to radiation dose and increased frequency of tests.

Working Better Together

This type of imaging innovation and integration is taking a front-row seat in the eyes of hospital administrators. Facilities can boast major cost savings, return on investment, and excellence in patient care as well as patient and staff satisfaction when innovation and integration are optimized. The establishment of new paradigms such as molecular CT for integrated imaging diagnostics using state-of-the-art CT and PET technologies allows patient data to flow seamlessly and swiftly among departments, harmonizing departmental cooperation.
Biograph mCT is the quintessential definition of efficiency: one team, one room, one machine, and one comfortable patient. It offers the potential of diagnosing disease earlier and of more effectively managing disease at reduced costs. "And speaking directly to the bottom line," says Montag, "with Biograph mCT, an institution may only need to purchase one imager instead of two, representing a huge cost savings potential at a time when healthcare budgets are tight." Replacing a two scanner purchase with just one can lead to savings in space, construction costs, operating costs, and life-cycle costs. This scanner is also upgradeable to higher slice configurations and increased molecular capabilities such as high-definition PET and time-of-flight capabilities, so the investment made today stands firm well into the future.
A smart new solution, Biograph mCT offers increased benefits for patients and represents an intelligent solution for physicians and administrators who want to provide the best patient care available and get the most out of their investment.

Optimizing the Gold Standard

The first choice in imaging diagnostics, CT provides ultimate imaging capabilities in anatomical and functional evaluations. Historically, radiologists were first able to visualize anatomical structures using axial CT, then spiral, multislice, and now Dual Source and adaptive CT. They have come to rely on the wealth of information provided by the growing speed and evolving capabilities of dynamic CT. In fact, 28 million CT scans were completed in the U.S. in 2006 for oncological evaluations, making CT the most widely used technology to offer insight into diagnosis and treatment for cancer.[2] But as the prevalence of diseases and conditions such as cancer and heart disease increases, the question becomes, "How can we offer even better diagnostic information with CT?"
Currently, information from CT scans can visualize abnormalities such as blood clots, cysts, fractures, infections, and tumors in internal structures (for example, bones, muscles, organs, and soft tissue). CT is also used to guide the placement of instruments within the

[1] Data on file

[2] IMV 2006 CT Market Summary Report

body, for example, to perform a biopsy. The addition of an iodine contrast agent also allows organs and structures to be seen more visibly. And with the latest CT technology, tumor perfusion is also possible.

Crossing Over to Molecular Resolution

Obtaining even better diagnostic information comes not from the ability to visualize a tumor or abnormality through the use of a contrast agent, but from the ability to delineate the metabolic activity within the tumor and to determine whether or not it is responding to treatment. To move oncology forward, CT will break out of being a black-and-white modality and capture this type of information through the use of a molecular contrast agent. This concept, using molecular contrast with PET and CT, has been applied in the molecular imaging arena with unprecedented success. "For years now, we've seen how molecular imaging has influenced the diagnosis and treatment of cancer. Hybrid molecular imaging with PET·CT has made significant inroads in everything from diagnosis and staging in oncology to determining the effectiveness of cancer treatments. It has even been used in the development of new drugs," says Montag.

The information offered by cellular molecular activity using PET·CT has been proven to change the management of oncology cases. Using colorectal cancer as a prime example, PET·CT changed the management of the disease in 66 percent of patients, and additionally, new disease was found in 43 percent of the cases.[3]

Using a radiolabeled tracer, or molecular imaging agent, physicians can visualize metabolic information in tumors from initial diagnosis through the patient's treatment and follow-up care. The most common molecular imaging agent, fluorodeoxyglucose, or 18F-FDG, is used to illustrate metabolic activity within cancerous tumors. Unavailable using CT alone, information from the molecular imaging agent in conjunction with the PET scan can also determine if metastases are developing as a result of the primary cancer. This information can be pivotal in the management of disease, as this type of metastatic activity may be too small to be seen on conventional CT. Other imaging agents are currently in the process of being developed. These agents are being created to capture disease-specific information. There are also a number of imaging agents being developed that can differentiate between active and inactive tumor cells within a single tumor, to help the radiation planning physician determine where to best target therapy.

The correlated PET·CT images provided in a multifaceted imaging environment offer a level of information not previously available. Taking this information and applying it in a new arena, asserting that every CT can have molecular imaging capabilities, clearly addresses the need for more effective imaging in oncology and makes it more widely available; offering personalized and very specific information about patients' disease. So many advances are being made in the development of imaging agents that the most commonly used imager for oncology studies – CT – should be better equipped to handle them.

Claudette Yasell *holds an MBA from Dominican University, River Forest, IL, USA.*

Further Information

www.siemens.com/mCT

[3] Scott et al. PET Changes Management and Improves Prognostic Stratification in Patients with Recurrent Colorectal Cancer: Results of a Multicenter Prospective Study. *J Nucl Med*, 2008; DOI: 10.2967/jnumed.108.051615

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