

GE Healthcare at RSNA 2017

Molecular Imaging (MI)

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Delivering on the Digital Promise: GE Healthcare's Discovery™ MI and Discovery NM/CT 670 CZT Help Clinicians Elevate the Impact of Molecular Imaging in Clinical Care

PET/CT

Discovery MI was created to help clinicians diagnose and stage disease earlier and better guide treatment strategies while enabling more compelling research with more novel, faster decaying tracers. Discovery MI is the industry's only PET/CT system that brings together the sensitivity of digital detection with the most innovative reconstruction technology available: the combination of Time-of-Flight (TOF) and Q.Clear. The result is outstanding resolution to improve the detection of small lesions¹. Since its introduction in 2016, 100 orders have been placed and 40 installations have occurred worldwide, resulting in over 8,000 patient scans. This has allowed GE to deliver on its promise of helping physicians improve clinical outcomes by allowing them to see smaller lesions while simultaneously reducing dose or scan time by 50%².

"It is important to have systems such as Discovery MI that can provide the information we need for both diagnosis and therapeutic planning," says Ronny Buechel, MD, cardiologist and nuclear medicine physician at the University of Zurich. He adds, "for example, with Discovery MI we can better stratify a patient and optimize preventive therapies that can help that patient avoid a cardiac event in the future. PET delivers that evidence-based information necessary for patient management, which can have a direct impact on outcomes."

GE is committed to providing superior care to more people in more places. To this end, GE is introducing a 3-ring, 15 cm axial field-of-view (FOV) option of Discovery MI to deliver greater access to digital technology, and its benefits, to more patients around the world. This 3-ring option is fully upgradeable to the 4-ring, 20 cm FOV configuration after installation in a facility. This makes Discovery MI a long-term investment that provides hospitals the flexibility they require as patient and department needs change over the years.

GE Healthcare has also introduced **Discovery MI DR**, a versatile, digital-ready PET/CT system that provides reliable images, low dose and accurate quantitation and allows physicians to image clinically-challenging cases, including those requiring cardiac and brain imaging. Discovery MI DR's modular design allows customers to acquire the system that fits their needs and allows for easy and cost-effective upgrade options.

Nuclear Medicine

GE Healthcare has always believed in the potential of nuclear medicine, and CZT (cadmium zinc telluride) is the key component to that potential. Having already invested in the manufacturing of CZT and the introduction of it into dedicated cardiac and breast imaging systems, GE has the only commercially-available general-purpose SPECT/CT system powered by CZT technology – **Discovery NM/CT 670 CZT**. Engineered for improvements in lesion detection³, image quality and patient comfort, this system renews the promise of nuclear medicine's potential for true discovery.

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With CZT, each photon is directly converted into an electrical signal that accurately identifies its location and energy. This reduces the signal loss and noise inherent to conventional SPECT/CT technologies. The result is a greater than 40% improvement in SPECT contrast-to-noise ratio⁴, a system spatial resolution down to 2.8 mm⁵ and the choice of reducing acquisition time or dose by up to 75%⁶ – capabilities that enable less than 4 minutes each for Bone SPECT and whole body bone exams⁷.

Combined with the quantitative applications provided through **Xeleris™**, these improvements in detection technology can help in efforts to diagnose and stage diseases earlier by allowing clinicians to detect smaller lesions and quantify them more accurately⁸.

As well, these improvements may play a significant role in assessing and monitoring responses to therapies. Furthermore, CZT's inherent improvements in energy resolution enables the opportunity to complete multiple scans in a single visit with the ability to complete dual or multi-isotope examinations.

In 2017, GE Healthcare also introduced **Discovery 670 DR**, a digital-ready SPECT/CT system that requires only a simple two-day upgrade, within a facility, to deliver CZT technology – and the investment protection healthcare systems demand. Both Discovery NM/CT 670 CZT and Discovery 670 DR come with 16-slice CT technology, offering additional improvements in CT image quality with an overlap reconstruction which enables 32 slices per rotation.

Additionally, the applications used to interpret and communicate molecular information are just as important as the technology used to capture it. With Xeleris, clinicians will find quantitative applications that help them to prove what they see and, more importantly, prove what can't be seen. For example, Q.Brain may aid the physician in interpreting neuro-degenerative diseases, and Q.Lung enables the diagnosis of pulmonary embolism by identifying Ventilation/Perfusion mismatch. Q.Lung can help clinicians confidently select patients eligible for lung resection surgeries, and Q.Metrix quantifies tracer uptake across any lesion or organ, which may improve the interpretation of a treatment response assessment.

¹ Improved detectability as demonstrated in phantom testing.

² Comparing Discovery MI 20m cm system to Discovery PET/CT 710.

³ Based on clinical practice.

⁴ Demonstrated in phantom testing using NEMA IEC Body Phantom at 50% scan times with Evolution⁹. Compared to Discovery NM/CT 670 Pro/ES/DR.

⁵ At detector surface.

⁶ Together with Clarity 2D/Evolution and compared to Discovery NM/CT 670 Pro/ES/DR without Clarity 2D/Evolution⁹. As demonstrated in phantom testing using NEMA IEC Body Phantom.

⁷ Demonstrated with NEMA IEC Body Phantom together with Clarity 2D and Evolution⁹. Compared to a typical 15-minute scan on Discovery NM/CT 670 Pro/ES/DR without Clarity 2D and Evolution⁹.

⁸ In clinical practice, the use of Discovery NM/CT 670 CZT may improve quantitation of lesions larger than 5.5 mL, depending on the clinical task, patient size, anatomical location and clinical practice. A consultation with a radiologist and a physicist should be made to determine the appropriate dose or scan time to obtain the claimed quantitation accuracy for the particular clinical task.

⁹ In clinical practice, Evolution options 7a (Evolution for Bone, Evolution for Cardiac, Evolution for Bone Planar) and Evolution Toolkit 7b are recommended for use following consultation of a Nuclear Medicine physician, physicist and/or application specialist to determine the appropriate dose or scan time reduction to obtain diagnostic image quality for a particular clinical task, depending on the protocol adopted by the clinical site.

^{9a} Evolution Options – Evolution claims are supported by simulation of count statistics using default factory protocols and imaging of 99mTc based radiotracers with LEHR collimator on anthropomorphic phantom or realistic NCAT – SIMSET phantom followed by quantitative and qualitative images comparison.

^{9b} Evolution Toolkit – Evolution Toolkit claims are supported by simulation of full count statistics using lesion simulation phantom images based on various radiotracers and collimators and by showing that SPECT image quality reconstructed with Evolution Toolkit provide equivalent clinical information but have better signal-to-noise, contrast, and lesion resolution compare to the images reconstructed with FBP/OSEM.

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