



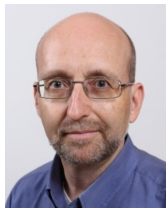
GE HEALTHCARE

Omni Legend PET/CT Evaluation

Rambam Health Care Campus, Haifa, Israel



Prof. Zohar Keidar†
Director of Nuclear
Medicine & PET/CT Dept.



Dr. John Kennedy†
Chief Physicist of Nuclear
Medicine & PET/CT Dept.



Mrs. Faten Daud†
Chief Technician of Nuclear
Medicine & PET/CT Dept.

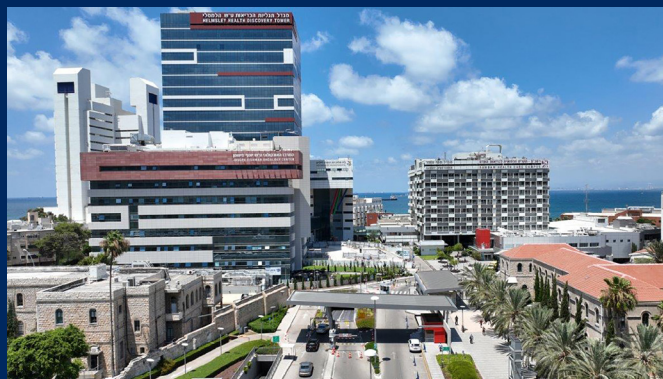


Omni Legend

Introducing a Breakthrough in Sensitivity, Fast Scan Times,
Low Dose, Workflow Efficiency and Patient Experience



As the largest hospital in North Israel, the 1,000-bed Rambam Health Care Campus hospital serves more than 2 million residents. Rambam is more than a world-class, academic medical center; it is also a center of technical innovation and cutting-edge research, especially in nuclear medicine and molecular imaging.



Over many years, Rambam Health Care Campus and GE Healthcare have collaborated on select pre-market technologies in molecular imaging. Currently, Rambam's nuclear medicine department is equipped with five GE Healthcare SPECT and SPECT/CT cameras. In addition to these systems, Rambam installed a Discovery™ MI 25 cm PET/CT and, in October 2021, an early-series production unit of GE Healthcare's newest PET/CT innovation, Omni Legend 32 cm.

"It is very exciting for us to be the first to use and test a device such as Omni Legend," says Zohar Keidar, MD, PhD, Director of

the Nuclear Medicine & PET/CT Department at Rambam and an Associate Clinical Professor at the Technion Faculty of Medicine.

"We've often provided the very first clinical images from these systems, going back several decades," adds John Kennedy, PhD, Chief Physicist, Nuclear Medicine Department, Rambam, and Lecturer at Technion – Israel Institute of Technology. Having access to the latest innovations in GE Healthcare molecular imaging technology delivers advantages not just in clinical routine, but also in research and medical residency programs, he adds.

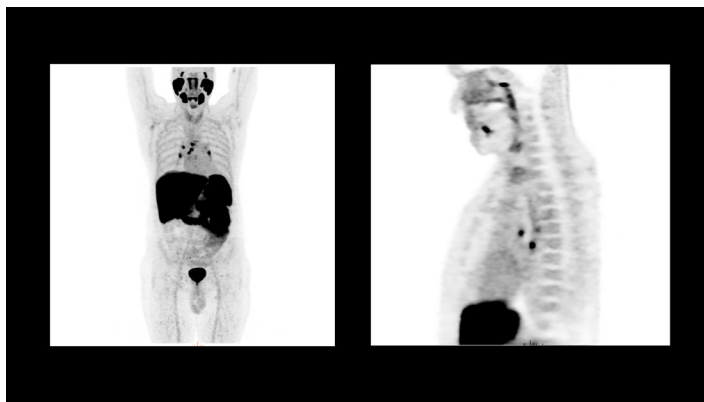


Astronomical increase in sensitivity¹

With the addition of Omni Legend and Discovery MI PET/CT systems to the large armamentarium of SPECT and SPECT/CT systems, Rambam's bustling nuclear medicine department typically handles 80 patients each day, of which 45 are PET studies. Previously, the department could only accommodate 20-32 PET/CT studies each day. Now, the 45 PET/CT studies are conducted in a shorter day. With all the advanced GE Healthcare systems in the nuclear medicine department, Dr. Kennedy believes it is feasible to scan up to 100 patients each day, increasing volume in both SPECT and PET studies².

"After some calibration and alignment of clinical protocols across our PET/CT scanners, Omni Legend PET/CT started working without any flaws," Professor Keidar says.

Omni Legend - Ultra-high sensitivity, small lesion detectability and conspicuity. Excellent image quality.



Theranostics ¹⁸F-PSMA case: after prostate removal, suspected recurrence due to elevated markers. No pathological findings at surgery area.

"From day one, we saw very good image quality with the potential to keep improving it. While reading daily mixed studies done on both the Discovery MI and Omni systems, both scanners generated images of equal quality and equivalent SUV in a way that allows me to direct patients to be assessed at any given moment to either scanner, regardless of which system the patient was previously scanned on, increasing department operational flexibility."

Omni Legend PET/CT is the first product introduced on GE Healthcare's all-new, all-digital Omni platform that enables a remarkable increase in NEMA sensitivity, enabling faster scan times, lower patient dose and small lesion detectability that is comparable or better than the top-of-the-line digital platform¹.

Dr. Kennedy has measured the Omni Legend PET/CT sensitivity at 46 counts per second/kBq, nearly 2.2 times higher sensitivity than their most premium digital PET/CT scanner⁴. Because there are significantly more counts, Dr. Kennedy adds that Omni Legend provides excellent quality data that readily enables clinicians to see lesions as small as 8 mm, or smaller under optimal conditions.

In factory evaluations, Omni Legend has demonstrated in phantom testing the ability to detect lesions as small as 4 mm¹. Rambam has received EANM/EARL FDG-PET/CT accreditation for both the Omni Legend and Discovery MI systems.

"Beyond geometry, it's the detector design that is giving more counts," Dr. Kennedy says. "I think it's safe to say that in its class, Omni Legend PET/CT has the highest sensitivity right now⁴."

Omni Legend – Highest Sensitivity³ and improved small lesion detectability¹. Outstanding image quality of multiple lesions.



Theranostics ⁶⁸Ga-PSMA case: Prostate cancer assessment response to treatment. Pathological findings in the lymph nodes at pelvic area.

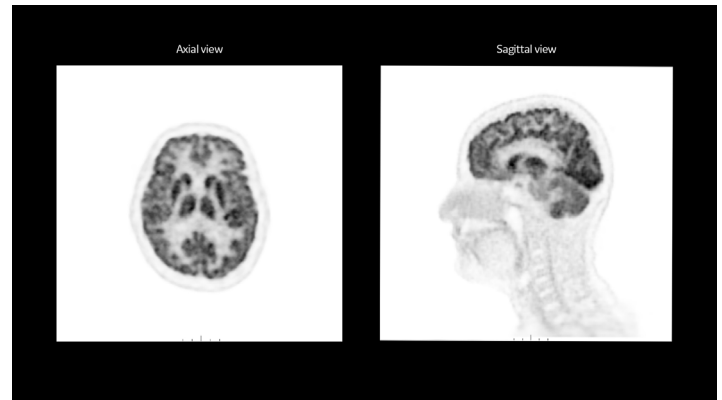


The state-of-the-art Omni Digital Detector is comprised of an innovative detector material with a small crystal size capable of producing high-resolution images and exceptional image quality.

In tests using the NEMA image quality phantom at Rambam, Omni Legend is matching the contrast-to-noise ratio (CNR) of Discovery MI with Time-of-Flight (ToF), demonstrating an improvement in small lesion detectability¹.

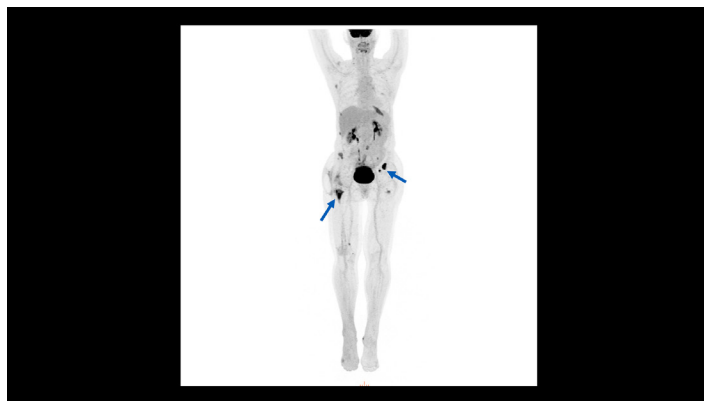
“In terms of NEMA acceptance testing on Omni Legend PET/CT, the values meet or exceed our expectations,” Dr. Kennedy says. “Our goal was to produce images from Omni Legend that were comparable to the 5-ring Discovery MI 25 cm.”

Omni Legend - great contrast and resolution. Exceptional image quality, high definition.



Female patient with Dementia (suspected Alzheimer's disease). Findings: non-pathologic.

Omni Legend whole-body scan with Q.Clear – outstanding image quality, small lesion detectability.



Breast cancer – restaging. Pathological findings in skeleton, pelvic bone.

Omni Legend with Precision DL* - Ultra-high sensitivity. Excellent lesion sharpness, conspicuity.



Pathological findings in the chest area - surgical bed (blue arrow). Inflammation in left tendon (orange arrow).



Significantly lower patient dose and scan times

Omni Legend is the first PET/CT system in the industry designed with Precision DL*, a new processing technique engineered with a sophisticated deep neural network trained on thousands of images made with multiple reconstruction methods. The intent is to provide the benefits most associated with hardware-based ToF, better contrast-to-noise ratio and contrast recovery. It is the exceptional sensitivity of the Omni Digital Detector coupled with Precision DL* that helps the system deliver a breakthrough in clearer images and clinical confidence at Rambam, enabling significantly shorter exam times and lower patient dose⁵ than their previous scanner, Discovery™ MI PET/CT 690.

“The high sensitivity on Omni Legend PET/CT gives us the opportunity to decrease exam time as well as lower patient dose,” Professor Keidar says. Lowering dose is beneficial for the patient’s health and lifetime radiation exposure limits, particularly in cases where the patient receives multiple follow-up PET/CT exams after cancer treatment. In addition, lowering patient’s dose is leading to a decrease in the care giver’s exposure as well.

With a larger 32 cm axial field of view (AFOV), it is also possible to capture larger organs, such as the liver or brain, with a single field of view (FOV). Professor Keidar believes this helps avoid truncation. Additionally, a 32 cm AFOV further enables shorter scan times by lowering the number of bed positions needed per patient scan as well as opens up the possibility to perform dynamic scans. In most PET/CT exams with Omni Legend, Rambam has cut the scan time in half².

Faten Daud, chief technologist in Rambam’s Nuclear Medicine & PET/CT Department, has worked on all the PET/CT systems installed at Rambam in the last two decades.

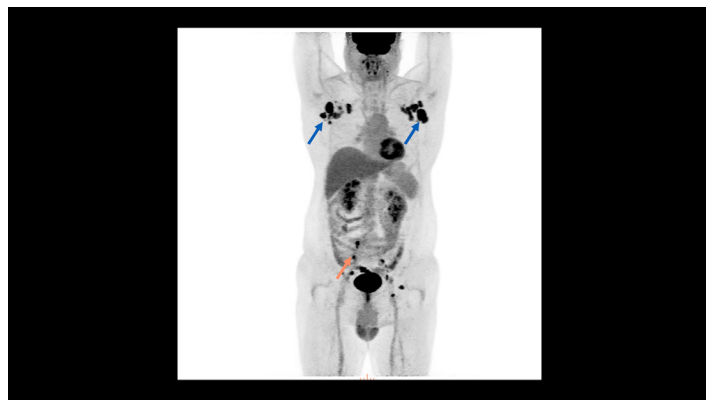
Prior to Omni Legend and Discovery MI, the scan times for a typical eye-to-thigh protocol was 24 minutes. Patient dose averaged 5.3 MBq/kg of fluorine-18 FDG (¹⁸F]-2-fluoro-2-deoxy-D-glucose), so the techs were also exposed to higher dose levels.

Now on Omni Legend, patient dose averages at least 40% lower than the dose required vs. their previous scanner^{2,5}. The same protocol is also used on Discovery MI. Daud hopes they can go even lower with Omni Legend in the near future.

The longer scan times impacted throughput and the ability to add more patients. Recently, there simply was not enough time in the day to meet the growing demand for PET imaging. That’s all changed with Omni Legend PET/CT.

“Even with shortened total scan times and drastically reduced dose on Omni Legend, we are getting much superior images to our prior PET/CT system,” *Dr. Kennedy explains.* “It’s really a new world for us.”

Omni Legend with Precision DL* - multiple lesions detected. Excellent image quality. Abdominal structures show excellent contrast.



Hodgkin's lymphoma follow up. Pathological findings in the axillary lymph nodes (blue arrows) and lymph nodes at pelvic area (orange arrow).



A more efficient workflow for added flexibility

Shorter scan times means the department now has the flexibility to accommodate modifications in the daily schedule. For example, if a patient or the radiopharmaceutical delivery is late, they can adjust the schedule versus having to cancel the appointment. If there is an emergency patient, they can accept that patient even when the schedule is full because now there is that flexibility to squeeze them in between patients. That flexibility translates to less stress for the technologists and patients.

Omni Legend with Precision DL* - excellent lesion detectability and contrast of diaphragm, spinal cord.



Hodgkin's lymphoma: assessment response to treatment. Pathological findings in the left axillary lymph nodes.

Because of the increased workflow, waiting times to obtain a PET scan have also decreased dramatically. Previously, it could take several months for a patient to get on the schedule for a PET/CT study, and even longer for a PSMA-PET study. On average, wait times have decreased from months to weeks or days depending on patient's clinical needs. Moreover, the technologists are not as stressed as they were before with an inflexible, demanding schedule, nor do they have to work as much overtime – even with the larger PET imaging volumes. It's simply a better staff experience in the nuclear medicine department with the Omni Legend PET/CT system.



“ We've increased our throughput of PET patients by more than a third, and we are doing it in a shorter time frame²,” says *Dr. Kennedy*.

“ Now we also have time for research, and that is very important especially in departments like ours with a very heavy workload,” adds *Professor Keidar*.



Technologist Friendly

Daud describes Omni Legend as both patient-friendly and technologist-friendly. An innovative, Auto Positioning feature creates a hands-free positioning experience by generating a 3D model of the patient's body, pinpointing the center of the scan range using a deep learning algorithm and automatically aligning it with the isocenter of the bore. This process is done remotely from the control room.

"The Auto Positioning feature is revolutionary in our workflow," Daud says. It delivers several benefits. First, the technologist can precisely pinpoint the center of the scan range and automatically align it to the isocenter of the bore. Second, that process only takes one-click, making it a completely hands-free patient positioning experience. According to Daud, this frees up the technologist's time to focus on making the patient feel more comfortable. Finally, for follow-up exams, Daud's experience is that Auto Positioning can more accurately replicate the patient's position from prior scans, and this translates to a more precise comparison of different time studies by the clinician, which is particularly important in oncology patients².

Adds Dr. Kennedy, "I know, quite frankly, we're doing a better job on Omni Legend right now because of the automated positioning, especially in terms of the CT isocenter."

Another workflow enhancement benefitting the patient and technologist is the simplified protocol selection on the gantry touchscreen and a new user interface enabling an easier PET/CT process from start to finish. For Daud, this simpler and faster workflow is most important because it reduces the time a patient must lie on the imaging table.

Patient Friendly

"A significant portion of our oncology patients come back frequently for a PET/CT and many of them have advanced metastatic disease," she explains. "Anything we can do to shorten their scan or table time benefits them, too, whether that helps to make them more comfortable or eases the stress of the exam."

The system features ambient LED lighting and a graphic pattern on the upper area of the bore to create a calming mood that may alleviate patient stress and help reduce any nervous movement.

Adds Daud,

“One patient who was previously scanned on Omni Legend came back two months later for her next follow-up PET scan and asked if she can have it done on the new system because she knew it would be faster and more comforting with the ambient lighting.”



Built for future growth

In addition to the obvious benefit to patients of lower radiopharmaceutical doses, the facility also benefits economically as they can now scan significantly more patients with the same or less amount of radioisotope. In fact, even with 40% more PET studies being conducted, Daud is still ordering the same volume of bulk radiopharmaceuticals (^{18}F -FDG, ^{18}F -PSMA, and ^{18}F -DOPA) for 45 patients as she did with the older systems scanning 32 patients.

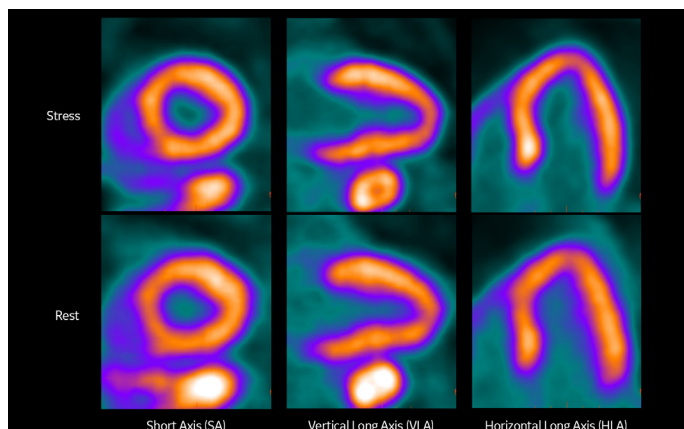
Professor Keidar says hospital management recognized the potential economic opportunity to decrease both consumable costs (radiopharmaceutical) and staff costs (overtime) per patient while also having the ability to increase patient volume and hospital income².

With the extreme rise in sensitivity on Omni Legend, Rambam has the capability to image tracers beyond FDG. This is important as facilities look to introduce theranostics, or the use of medical isotopes with specially designed agents to deliver ionizing radiation as a treatment for cancer.

Rambam is also exploring additional PET imaging capabilities in cardiac and neuro exams.

"In cardiology patients, Omni Legend did it all for us, which was the CT attenuation correction, a rest and stress myocardial perfusion scan, followed by a calcium scoring scan," Dr. Kennedy says.

Omni Legend - Excellent high count rate performance demonstrated win great image quality of cardiac scans.



^{82}Rb cardiac imaging - left ventricle walls and cavity show very clearly in both rest and stress imaging.

Images courtesy of Rambam Medical Center, Haifa, Israel.

"We can also perform cardiac flow reserve assessment because the peak count rate for Omni Legend PET/CT is quite high," adds Dr. Kennedy.

Professor Keidar is also interested in exploring more brain PET studies.

"I believe that PET has a lot to contribute to the neurology field, both in neurodegenerative diseases and in movement disorders such as Parkinson's," Professor Keidar says.

What's more, full body scans open the possibility for dynamic scanning, especially with the capability to capture an organ, such as the liver, pancreas, brain, or heart, in one FOV.

"Having gone through many system evaluations, this was a very good experience," Dr. Kennedy says. "We have a very reliable machine with Omni Legend."

"Both the Discovery MI and Omni Legend PET/CT systems created a revolution in our department by being a game changer in the way our patients are treated, our staff are functioning, and by exploring new possibilities for research and development. After scanning thousands of patients in the short time that the devices are here, I feel that this is just the tip of the iceberg," summarizes Professor Keidar.

¹Omni Legend 32 cm increases small lesion detectability 16% on average and up to 20%, as compared to Discovery MI 25 cm premium digital ToF PET/CT with matched scan time / injected dose, as demonstrated in phantom testing using a model observer with 4 mm lesions; average of different reconstruction methods.

²GE Healthcare does not warrant or guarantee these results. Ability to achieve such results is dependent on factors specific to each customer.

³Data on file.

⁴Omni Legend 32 cm has up to a 2.2 times increase in system sensitivity as compared to Discovery MI 25 cm. Measurement follows NEMA NU 2-2018.

⁵Omni Legend 32 cm can acquire with 47% the PET scan time and 40% the PET dose of a Discovery MI 25 cm, as demonstrated in phantom testing. Omni Legend 32 cm can image up to 104 cm in 4.7 minutes with an injected dose of 3.3 kBq/mL, maintaining the same amount of noise equivalent counts collected in an equivalent 10 minute Discovery MI scan with an injected dose of 3.3 kBq/mL, as demonstrated in phantom testing.

*Omni Legend and Precision DL are CE marked. Omni Legend is 510k-cleared by the US FDA. Precision DL is 510k-pending with the US FDA. Not available for sale in the United States.

#Not a consultant for GEHC.

