



Why Hybrid SPECT/CT?

What can hybrid SPECT/CT imaging do for you?

- Help expand your referral base
- Help enable change in your patient management
- Help increase diagnostic confidence
- Help expedite your interpretation and diagnosis
- Help prepare for challenging surgeries
- Help in treatment planning or follow-up

Why SPECT and CT?

Nuclear Imaging is based on the bio-distribution of a radiotracer over time and space, revealing functional characteristics of diseases. However, it lacks accurate anatomic localization for characterization of findings.

CT provides information on organ size and tissue density, as well as its localization. Diagnosis and characterization of disease by CT is based on morphologic criteria (i.e., size, texture and tissue density).

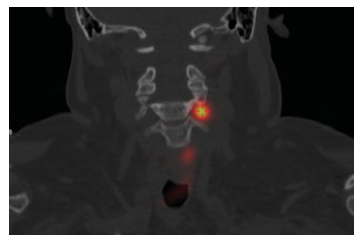
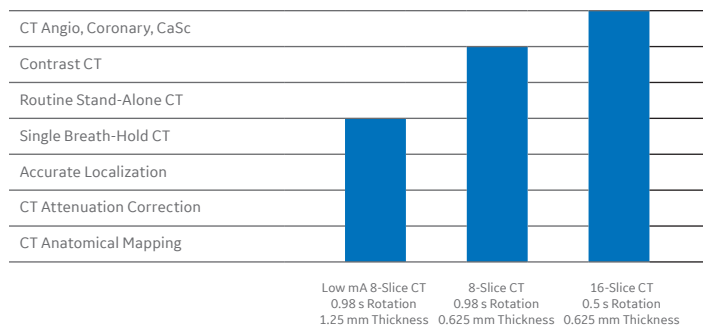
However, structural data does not necessarily correlate with the metabolic status of disease. Therefore, NM and CT complement each other in terms of diagnostic information.

How does Hybrid SPECT/CT work?

The SPECT part of the SPECT/CT procedure is performed by a dual-head gamma camera, and the CT imaging is done by the integrated multi-slice CT. For attenuation correction (AC) or localization purposes, the CT images are acquired either before or after the SPECT acquisition.

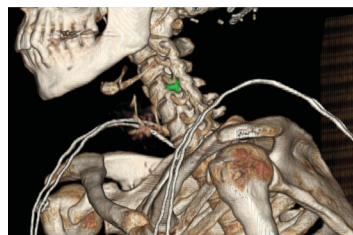
Precise image registration is made by mechanically integrating the SPECT system with the CT system in order to ensure alignment of the NM and CT data sets. CT data is used to correct the emission data for tissue attenuation and localize the NM uptake on the anatomical (CT) images.

Hybrid Systems Positioning by CT Clinical Applications



SPECT/CT single - slice

Courtesy of The Miriam Hospital; Providence, RI



3D SPECT/CT

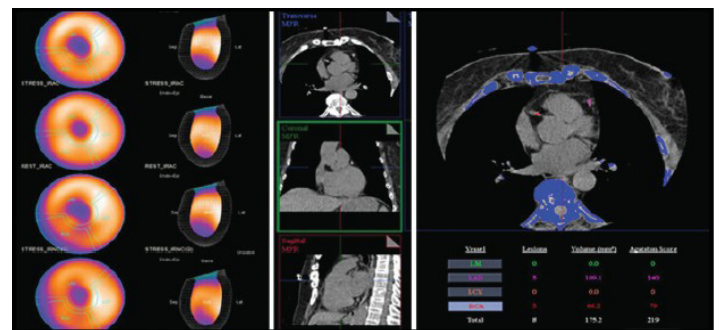
General Purpose SPECT/CT Procedures*

Care areas for SPECT/CT include but are not limited to imaging of/for the following:

- Oncology
- Parathyroid Diseases
- Sentinel Lymph Node
- Thyroid Cancer
- Neuroendocrine Neoplasms
- Bone Metastases
- Prostate Cancer
- Transarterial Remobilization
- Benign Skeletal Conditions
- Infection
- Lung Disorders
- Cardiology
- Neurology
- Gastrointestinal Tract
- Pediatrics
- Incidental CT Findings
- Dosimetry

Cardiac and Pulmonary SPECT/CT Procedures

- Myocardial perfusion imaging (MPI) with CT AC
- Combination of SPECT MPI and coronary artery calcification for short- and long-term risk stratification
- Lung SPECT/CT to identify clinically-relevant V/Q mismatches and simplify the approach to diagnosing PE, COPD, emphysema and other lung deficiencies
- SPECT/CT of lung perfusion to predict post-operative forced expiratory volume in one second (ppoFEV1) in patients prior to surgical resection



MPI SPECT & CaSc

Courtesy of Rambam Hospital; Haifa, Israel

How can Hybrid SPECT/CT impact your clinical practice?

- May assist in diagnosis when using Nuclear Medicine procedures
- May increase clarity of Nuclear Medicine studies
- May improve lesion detectability
- May improve image quality by reducing attenuation artifacts
- May help quantify tracer uptake

*Israel et al. "Two decades of SPECT/CT - the coming of age of a technology: An updated review of literature evidence." *European Journal of Nuclear Medicine*, 2019.

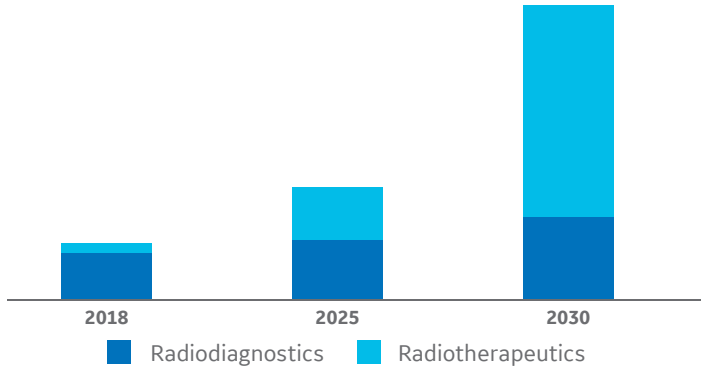
Voice of Customers: "...referral physicians are requesting SPECT/CT and our competitor hospital is getting one, therefore we expect to lose business unless we can offer it..." "(hybrid will deliver) better quality imaging and patient care with accurate cardiac interpretations..."; "...building our hospital's cancer practice and the ability to perform specialized studies like Octreotide is important..."

SPECT/CT Camera Market Growth¹

Interest in SPECT/CT cameras continue to grow with:

- **42%** of planned units being hybrid SPECT/CT (up from 12% in 2008; up from 37% in the 2011 IMV NM Outlook Report)
- The proportion of installed base cameras that are SPECT/CT doubled from 9% to **18%** since the 2011 IMV NM Outlook Report

The Global Nuclear Medicine Market, 2018-2030²



Graph courtesy of MEDraysintell 2020

- Radiotherapeutics represented **13%** of global nuclear medicine market in 2017 and are expected to reach **60%** by 2030²
- The graph demonstrates a projected increase from \$5.2 billion in 2018 to **\$30 billion** in 2030²
- ¹⁷⁷Lu has become the radionuclide of choice in Theranostics - almost all new radiotherapeutics are based on this radionuclide²

In what situations could SPECT/CT be useful?

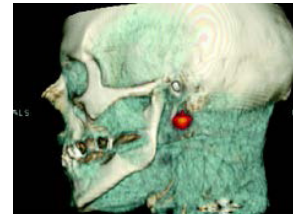
- **High suspicion for active disease**, or known structural pathology, as SPECT/CT may localize multiple sites and define extent of disease
- **Planning treatment:** medical, surgical, or radiation therapy
- **Monitoring response** to treatment
- Based on previous anatomic imaging, such as:
 - **Abnormal structural findings** or equivocal functional significance, either at diagnosis or post-treatment
 - **Absence of overt structural pathology** in the presence of high clinical suspicion

How can Hybrid SPECT/CT impact your financial performance?

- **Faster interpretation** may help drive high throughput workflows, potentially increasing income
- **More informative reports** may help enhance competitive edge, expanding your referral base for higher income potential
- **Reimbursement** for CT in hybrid scans may help increase income for better return of investment³
- **Backup CT** may help improve resource utilization for better return of investment³



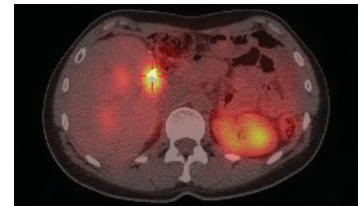
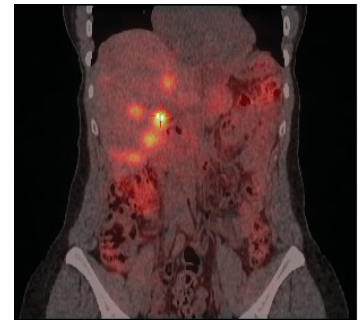
Bone metastases in lytic/sclerotic CT lesions at D9 vertebra level and right iliac bone
Courtesy of Rambam Hospital; Haifa, Israel



Melanoma on the right auricle
Courtesy of UZA; Antwerp, Belgium Prof. Stroobants & Dr. Huyghe



Uptake in the 3rd MTP joint area
Co-registered low dose CT reveals destruction of the metatarsal & luxation of MTP joint
Courtesy of UZA; Antwerp, Belgium Prof. Stroobants & Dr. Huyghe



¹⁷⁷Lu Lutathera images from NM/CT 870 CZT
Courtesy of University Hospital of Zurich; Zurich, Switzerland

¹ IMV 2018 Nuclear Medicine Market Outlook Report.

² Medraysintell Nuclear Medicine Report & Directory, Edition 2019.

³ Actual throughput, revenues, and expenses will vary depending on specific costs, savings, procedures, etc. Third party reimbursement amounts and coverage policies for specific procedures will vary by payer, time period, location, and other criteria. You should consult with your reimbursement manager or healthcare consultant prior to submitting claims or expanding service.

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