SNMMI Value Initiative
SOCIETY OF NUCLEAR MEDICINE & MOLECULAR IMAGING

JANUARY 2023 ▪ NEWSLETTER
VALUE INITIATIVE

Ensuring Quality in Radiopharmaceutical Therapy

SATOSHI MINOSHIMA, MD, PhD; VALUE INITIATIVE BOARD CHAIR

As 2023 gets underway, we prepare ourselves for what is anticipated to be another banner year for new advances in nuclear medicine and radiopharmaceutical therapy (RPT). Already we have seen the approval of lecanemab, an anti-amyloid therapy for early Alzheimer's Disease. A regulatory decision on donanemab, another Alzheimer's disease therapy, is expected later this quarter. These approvals are likely to invigorate amyloid PET imaging nationwide, nearly a decade after the imaging agents were first commercially available, and bring good news to patients and their families. SNMMI is preparing tools in the amyloid imaging space to ensure physicians and technologists are ready for these patients.

In the RPT space, we expect to see continued exponential growth in the number of therapy agents, indications, and clinical trials. This will be the first full year that ^{177}Lu vipivotide tetraxetan (Pluvicto) is on the market for metastatic castrate resistant prostate cancer (mCRPC). To meet that demand, it is anticipated that

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A Champion of PET Innovation

BY SIEMENS HEALTHINEERS, A SNMMI VALUE INITIATIVE LEADERSHIP CIRCLE MEMBER

As a pioneer in the use of PET since the late 1980s, Professor Michael Fulham, MBBS, of the Royal Prince Alfred Hospital (RPA) and the University of Sydney in Australia, recalls technical challenges and the difficulty convincing clinicians of the value of PET when he first returned to Australia from the United States.

Those challenges are a distant memory for Fulham and RPA, where he is the director of the Department of Molecular Imaging and the clinical director of Medical Imaging in Sydney Local Health District (SLHD). Today the hospital recently surpassed the milestone of 120,000 PET and PET/CT scans and has the distinction of being the first hospital in Australia and the second hospital worldwide to install Siemens Healthineers Biograph Vision Quadra™ PET/CT scanner.

Timeline of Changing Paradigms in Medical Imaging

Fulham conducted research on the capabilities of PET in the late 1980s at the National Institutes of Health in Bethesda, MD, USA, before returning to RPA in 1993, shortly after the hospital launched its PET program. Fulham notes that early PET scanners had gantries that could only accommodate the head, but the development of CTI ECAT 951 opened a new era by enabling the imaging of all body parts. The ECAT 951 was installed in RPA in 1992, and he recalls that surgical oncologists at RPA, rather than medical oncologists, were the most enthusiastic early adopters of PET imaging. Its utility in guiding and improving treatment for patients with cancer of the skin (melanoma), liver, lung, and stomach formed the foundation that later convinced other clinicians, such as hematologists, respiratory physicians, medical oncologists, radiation oncologists, of its potential.

Advances in scanner reliability and image quality continued throughout the 1990s, "but when PET/CT was released at RSNA 2000, it was clear that the paradigm would change," Fulham says. At that stage, Fulham said that 8 to 9 scans were the most scans that could be done in one day. Each scan took 64 minutes to acquire data from the base of the skull to the upper thighs.

Fulham says the central role that PET/CT now plays in patient care at RPA and how quickly the technology has evolved are perhaps best illustrated by looking back at the number of scans the hospital has performed. When he began working at RPA in the early 1990s, the hospital scanned its first 100 patients over a span of 10 months. Scanning the first 1,000 patients took 25 months. Fast forward to July 2019, and RPA reached a milestone of 100,000 patient scans. By the end of March 2022, it had already reached 120,000 scans.

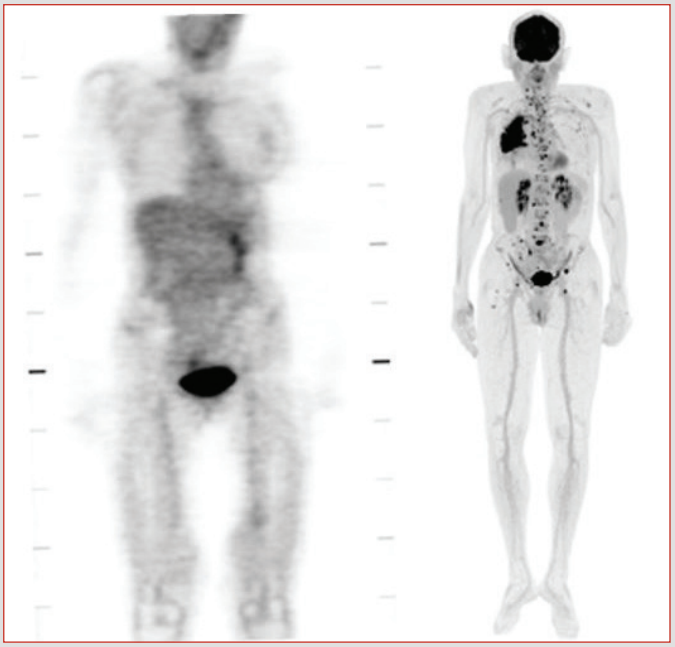

Figure 1: From left to right: PET (ECAT 951R) "bed positions" scans in 1992 to Biograph Vision Quadra (13-minute scan) in 2021. Data courtesy of Royal Prince Alfred Hospital, Sydney, Australia.

RPA installed two Biograph Vision™ scanners in 2019. With 3.2-mm LSO crystals that deliver high spatial resolution and fast time of flight, the scanners enabled Fulham and his colleagues to confidently detect small sites of disease that would otherwise be missed. "The image quality, which was already very good on the two Biograph™ mCTs we had, improved yet again, and with it came the confidence in detecting sites of disease in even smaller structures. This, once again, changed patient management."

A Workhorse for Clinical Care and Research in PET/CT Imaging

With the 106-cm axial PET field of view that Biograph Vision Quadra offers, Fulham and his colleagues have now achieved an even higher level of patient care and research excellence made possible by whole-body, vertex-to-thighs imaging. "When you can see everything at once—the brain, the heart, the liver, the abdomen, the pelvis—that to me is a game changer," Fulham says. "Why? Because you've got true simultaneity, both for clinical work and for research."

Fulham emphasizes the importance of being able to scan multiple organs simultaneously, noting that it enables the assessment of tracer kinetics. He and his

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Ensuring Quality. ***Continued from page 1.***

additional sites will offer this treatment. In December, Novartis announced topline results from a phase III study (PSMAfore) that showed Pluvicto demonstrated a statistically significant and clinically meaningful improvement in radiographic progression-free survival in patients with mCRPC after treatment with androgen-receptor pathway inhibitor who had not received taxane-based chemotherapy. The company stated that these data will be submitted to FDA for approval in 2023. If approved, another tranche of patients with prostate cancer would be eligible to receive Pluvicto, further increasing the already-high demand. A review of clinicaltrials.gov revealed 9 Ph III RPT trials of new agents or label expansion in neuroendocrine disease, prostate cancer, and bone marrow conditioning. Thus, the capacity to treat patients with RPTs will need to increase.

In anticipation, SNMMI launched the Radiopharmaceutical Therapy Centers of Excellence program last year. SNMMI designated Centers of Excellence (COE) meet strict regulatory, training, qualification, experience, and performance criteria to help assure patients, their families, referring physicians, and payors that rigorous procedures are in place and followed, leading to appropriate patient selection and outcomes from radiopharmaceutical therapy. Three levels of designation were created. Basic centers are those that provide one RPT. Clinical COEs have an ABNM-certified, or equivalent, authorized user on site, administer more than one RPT and at least 40 administrations/year, among other requirements. Comprehensive COEs must administer multiple RPTs in excess of 40 administrations/year, participate in at least two disease-specific areas including NM involvement in tumor boards, be capable of performing personalized dosimetry, and conduct and publish RPT research, among other criteria. To date, 56 applications have been received with 27 designated comprehensive, 13 clinical, and 3 basic sites. Criteria for pediatric RPT centers have been developed and the first children's hospital was recently designated, along with the first three Canadian site designations.

To expand on the designation program, SNMMI collaborated with the Intersocietal Accreditation Commission (IAC) on the Radiopharmaceutical Therapy Accreditation Program. The IAC is a nonprofit organization in operation to evaluate and accredit facilities that provide diagnostic imaging, thus improving the quality of patient care provided in private offices, clinics, and hospitals where such services are performed. SNMMI sees this joint program as the next level of the Centers of Excellence program. "Radiopharmaceutical therapy is a powerful technique for treating cancer that is now being used to great benefit in patients with prostate and other cancers. It is essential that patients receiving radiopharmaceutical therapy be confident that their providers meet high standards of training and experience. The new SNMMI-IAC Radiopharmaceutical Therapy accreditation helps assure that sites delivering radiopharmaceutical therapy are qualified and experienced, have appropriate facilities and equipment, and can offer safe and reliable radiopharmaceutical therapy," said Richard L. Wahl, MD, SNMMI Immediate Past President and IAC Nuclear/PET Board member.

SNMMI members have been integrally involved in the development of the standards as members of the IAC Nuclear Board. The new Radiopharmaceutical Therapy Accreditation Program will offer facilities a mechanism for demonstrating their commitment to quality and patient safety in radiopharmaceutical therapy. This program will join the existing IAC accreditation areas of Nuclear Cardiology, Nuclear Medicine and Positron Emission Tomography (PET), however sites do not need to have IAC equipment accreditation to apply. The program is scheduled to launch early this year.
Other activities of the SNMMI Quality of Practice domain include RaPTR and RaPTR+PLUS - registries for clinical and imaging data in RPT patients. The registry uses REDCap for the clinical data and is programed for Lutathera and Pluvicto therapies. The first centers have started entering data; the registry is open to all comprehensive RPT COEs and other interested centers. RaPTR data will be used for quality improvement purposes. The domain, in conjunction with EANM, ACR, and others, develops procedure standards and appropriate use criteria documents for RPTs and companion diagnostic agents.

Quality is a key component of fulfilling our mission of empowering our members to transform the science and practice of precision nuclear medicine for diagnosis and therapy to advance patient care.

Satoshi Minoshima, MD, PhD
University of Utah, Salt Lake City, UT

Nuclear Medicine Program Marks First Year With Dr. Hollie Lai Leading the Way

Shortly after she earned her undergraduate degree in biology and was about to enter medical school at UC Irvine, Hollie Lai (then Hollie Powers) auditioned for seasonal work at Disneyland as a character performer.
She nailed it and went on to perform as Eeyore, the glum and pessimistic donkey from "Winnie the Pooh" whose personality couldn't be more different from her warm, caring, can-do disposition.

Hollie was being groomed for Snow White and Cinderella look-alike jobs at the Anaheim theme park, but there was the small distraction of medical school to attend to.

Who knows how far she would have gone at Disneyland had she chosen that route.

These days, after a planned career in neuroradiology morphed into all things concerning pediatric medical imaging, Hollie is working her magic as director of Children's Hospital of Orange County's (CHOC) Nuclear Medicine program – a long-needed service that marks its one-year anniversary in December 2022 as a key component of the hospital's Radiology Department.

Nationally Regarded Expert

Longtime mentors and colleagues describe Hollie, who joined CHOC in 2017, as a nationally regarded expert in her field who is helping to advance CHOC's stature in the often-overlooked field of pediatric radiology, which provides specialized imaging through ultrasound, X-ray, magnetic resonance imaging (MRI), computed tomography (CT), and nuclear medicine (NM).

The launching of CHOC's NM program in December 2021 essentially completed the Radiology Department and made it free-standing (along with the recently added interventional radiology component).

"It's been a pleasure to see Hollie rapidly advance in her career to provide state-of-the-art technology to the children of Orange County and surrounding areas," says Dr. Barry Shulkin, section chief of NM at St. Jude Children's Research Hospital in Memphis, Tenn.

Dr. Shulkin has been a mentor in Hollie's professional development and has worked with her on numerous national boards, including the Society of Nuclear Medicine & Molecular Imaging (SNMMI) Pediatric Imaging Council, as well as the Children's Oncology Group (COG), a National Cancer Institute-supported clinical trials group that is the world's largest organization devoted exclusively to childhood and adolescent cancer research. "I'm a mentor of Hollie," says Dr. Shulkin, "but I'm also an admirer."

Dr. Marguerite "Meg" Parisi mentored Hollie during her pediatric radiology fellowship at Children's Hospital Los Angeles, encouraging her interest in pediatric nuclear medicine. Dr. Parisi's departure from CHLA led Hollie to pursue additional training in NM, a field in which Hollie has, according to Dr. Parisi, become "one of the leaders of tomorrow."

"Over the course of time, Hollie has really developed tremendous expertise in pediatric radiology and nuclear medicine," says Dr. Parisi, professor of radiology and adjunct professor of pediatrics at the University of Washington School of Medicine, and an attending radiologist and division chief of nuclear medicine at Seattle Children's Hospital.

Hollie is somewhat of a unicorn in her field, Dr. Shulkin adds. "She's a multi-technology expert," he says. "She's good at neuroradiology, she's good at general radiology, she's very good at nuclear medicine – she's a triple-threat, so to speak. Her expertise spans technologies.

Local Girl

Hollie moved to Orange from Buena Park when she was 9 and attended El Modena High School, so coming to CHOC five years ago was ideal for the hometown girl.

Born with poor hearing and a bad speech impediment, Hollie overcame both in special education classes and sessions at Providence Speech and Hearing, now part of CHOC. She initially was told she would never speak normally.

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Nuclear Medicine Program. *Continued from page 4.*

Hollie's mother was legally blind her whole life and now almost is completely blind. But she never used her condition as an excuse to not do her best.

"I think I got my fight and drive seeing my mom prove people wrong," says Hollie, who recently spoke before hundreds of people at an SNMMI webinar.

"My mom saw the webinar and was blown away by how far I have come," Hollie says.

She recalls facing roadblocks as an undergraduate.

"I asked a professor for a letter of recommendation for medical school and he asked me, 'Don't you want to get married and have kids?'"

In medical school, there were other naysayers. "Oh yeah?," Hollie recalls thinking. "I'm going to prove you wrong."

For the record, in addition to having a distinguished career in medicine, Hollie has two adult children from her first marriage. She is married to vascular surgeon Dr. Kin-Man Lai, who works at Kaiser Permanente in Baldwin Park. They met in medical school at UCI and reconnected years later.

Hollie says one of the main reasons she came to CHOC was to launch the NM program.

"I have the kind of personality that if I'm going to do something, or be in charge of something, I'm going to be the best at what I do," she says.

A multidisciplinary approach

CHOC is the only nuclear medicine program in Orange County dedicated specifically to pediatrics. All of the NM equipment is calibrated so that children receive smaller and safer doses of radiation.

Imaging produced by NM is very precise and cannot be replicated by other exams.

Nuclear medicine procedures are performed by injecting a small number of radioactive materials called radiotracers. After injecting the radiotracers, they emit an energy called gamma rays. State-of-the-art equipment captures the gamma rays to create images of the organs inside the body.

On the day in November 2022 when Hollie sat down in a conference room in the Radiology Department, located on the first floor of the Bill Holmes Tower, for an interview, a young female patient with epilepsy was being assessed by her team.

"She has intractable epilepsy and we thought she may have a subtle abnormality on her brain MRI," Hollie explains.

Hollie and her team performed nuclear medicine tests on the girl when she was having a seizure, and more when she wasn't. They were trying to identify an area in her brain that most likely was the cause of her seizures. The girl went on to have a successful surgery and is currently seizure free.

Depending on what's going on with a patient, CHOC's NM team will have multidisciplinary meetings with specialists from neurology, neurosurgery, psychology and other disciplines and decide what the next steps will be. "I love nuclear medicine because it brings together and integrates multiple disciplines of science and sheds light on phenomena we previously did not understand," says Hollie, who is board certified by the American Board of Radiology and American Board of Nuclear Medicine with certificates of added qualification in pediatric radiology and neuroradiology.

"Its evolution is fascinating and fun. I like the idea of solving problems, and nuclear medicine involves physiology, anatomy -- everything kind of rolled into one." CHOC is the only pediatric hospital west of Chicago that has been designated a Diagnostic Imaging Center of Excellence® (DICOE) by the American College of Radiology (ACR) for best-quality imaging practices and diagnostic care, says Laureen Smith, supervisor of Nuclear Medicine and CT.

And CHOC is one of a few medical centers in the country to have a child life specialist working in a dedicated pediatric radiology and imaging department. Child life specialist Ashley McGee is assigned full time to the Radiology Department.

Growing Fast

Hollie has been a member of SNMMI since 2002 and was one of the first physicians asked to helped lead the organization's recently formed Value Initiative, which aims to bridge physicians and industry and bring more awareness of NM to the world.

Hollie recognizes the many professional connections and friendships through medical societies, like SNMMI, that supported and guided her career Development in nuclear medicine. Dr. Norah Milne, a previous head of Nuclear Medicine at UCI Medical Center and her Residency Director, served as an incredible mentor. She recognized Hollie's aptitudes and encouraged her to pursue higher training in nuclear medicine. Dr. Milne and Drs. Peter Conti, Patrick Colletti, and Robert Henderson at USC allowed Hollie to be a visiting professor and complete fellowship level training. Dr. Gholam Berenji at the Los Angles VA sponsored her for the ABNM Boards. It was the support, encouragement, and collaboration of these mentors that helped her pursue her nuclear medicine aspirations. Others, like Drs. Marguerite T. Parisi and Barry Shulkin, have been additional valuable mentors for her professional development in the field of Nuclear Medicine. She credits so many people for encouraging, inspiring and mentoring her throughout her career.

She also is one of eight directors of the American Board of Nuclear Medicine. As such, she is in charge of advancing the high standards that are a requirement for certification by the American Board of Nuclear Medicine. Meanwhile, NM volume has skyrocketed at CHOC since the department went live in December 2021, says

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Voximetry Torch® Dose Assessment Receives FDA Market Clearance

BY JOE GRUDZINSKI, PhD, VOXIMETRY

The Torch Dose Assessment software application from Voximetry provides extremely accurate patient-specific absorbed dose assessments based on voxel-level density, pharmacokinetic modelling, and dose calculations. The proprietary GPU-accelerated Monte Carlo dose engine provides typical RPT dose calculations in less than 5 seconds.

Over the past few years, positive results of several Radiopharmacetucal Therapies (RPT) such as ^{90}Y-microspheres, ^{177}Lu-Dotatate (Luthathera™) and ^{177}Lu-PSMA-617 (Pluvicto™), have illustrated the importance of this therapy and has led to its rapid adoption.

Nuclear oncologists providing these treatments are seeing significant interpatient variability. This has been well documented in a paper by Sandström, et al,[1] that showed kidney absorbed dose of ^{177}Lu-Dotatate patients varied over 4-fold based on the same administered activity and Wahl, et al.,[2] showed that liver uptake per administered activity, by ^{90}Y-Zevalin® patients, varied over 3-fold. These publications highlight that the current one-size-fits-all standard of care may lead to suboptimal treatments.

Fighting Cancer by Making it Personal

Growing evidence supports the idea that personalized RPT treatments may be important to ensure patient safety and increase therapeutic efficacy.

In 2021, the DOSISPHERE-01[3] trial reported exciting improvements to ^{90}Y-labeled microsphere patient outcomes when the activity administered was varied based on personalized treatment plans designed to deliver a prescribed absorbed dose to the target tissue. Patients with personalized treatments showed a 71% improved tumor response and 16-month improved overall survival compared with those of non-personalized treatment plans.

In 2022, Sundlöv et al.[4] published the results of a Phase II trial demonstrating the efficacy and safety of individualized, dosimetry-based ^{177}Lu-Dotatate treatment in NET patients. The study concluded that ^{177}Lu-Dotatate based on renal dosimetry is clearly feasible with low toxicity and promising efficacy, showing the potential to further improve outcomes beyond the standard approach.

This body of work suggests we have yet to see the best outcomes possible from RPT.

How Does Dosimetry-Guided RPT (DG-RPT) realize the promise of personalized therapy?

To realize the full potential of RPT requires individualized care that can only be delivered through advanced dosimetry methods.

DG-RPT is an advanced dosimetry method which uses patient-specific pharmacokinetics to personalize the treatment. After the acquisition of post-injection images, the Integrated Time Activity in a region of interest (ROI) is modelled and the absorbed dose to the ROI is calculated. This capability enables optimization of treatments by allowing physicians to maximize tumor absorbed dose while staying below dose tolerance

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Where Did the Technologists Go?

Entering the Perfect Storm – January 2023

BY DMITRY BEYDER, MPA, CNMT

Photograph by Tim Mudrovic, BJC HealthCare.

What an excellent time for Molecular Imaging…PET diagnostic services are growing in many institutions at a double-digit rate, theranostics for noninvasive cancer treatment has finally launched with the therapy pipeline flowing with gold, and financial projections from the industry showing stratospheric growth in nuclear medicine, PET, and therapy over the next decade. It's a great time…with one small problem, where are all the Nuclear Medicine Technologists (NMTs), those who perform the imaging exams and administer the therapy doses?

Let's substantiate the problem quantitatively. Looking at NMT development trends over the last decade, many are pointing in the wrong direction. As a result, we already see a negative effect on NMT supply, thus decreasing patient access to Molecular Imaging care. When evaluating the Joint Review Committee on Educational Programs in Nuclear Medicine Technology (JRCNMT) student programs over the last 10 years, we have seen a decrease of 26 NMT programs nationally.[1] Those account for about a 27% decrease in Nuclear Medicine Technologist specific education programs. Looking at the broader American Society of Radiologic Technologists (ASRT) enrollment statistics over the last seven years, there has been approximately a 15% decrease in NMT students seeking certification per year.[2] Program closures lead not only to a decreased quantity of students enrolling to become future NMTs, but also has a significant impact on geographical access for interested students throughout the United States to apply and have a chance to become a future credentialed NMTs. Subsequently and directly correlated to NMT education program closures, we have seen a downward trend in the quantity of NMT students graduating per year. 2020 compared to 2012, yielded 164 fewer students per year graduating as an NMT, nationally, that is a 23% decline in just 8 years.[3] Finally, evaluating the Nuclear Medicine Technology Certification Board (NMTCB) annual examination report, these are students who graduated and are now sitting for their certification exam to practice clinical nuclear medicine; over the last 10 years, the number of examinees applying annually for certification in nuclear medicine has decreased by 46%.[4]

Why is it a perfect storm? According to a 2018 Workforce Projections Study by Health Resources & Services Administration (HRSA), over the next decade, the demand for NMTs will grow by approximately 37%.[5] Quick math shows that increase in demand for NMT services, combined with the previously discussed decline in available Nuclear Medicine Technologists, will result in a roughly 15 to 25% shortage of technologists by 2030.

What are we doing to address the lack of NMTs available for clinical care in molecular imaging? Last year, the Society of Nuclear Medicine & Molecular Imaging-Technologist Section (SNMMI-TS) established a Workforce Pipeline task force concentrated on NMTs. It recently developed three objectives and 12 tactics to focus on and address this vital work to grow the quantity and quality of NMTs coming into the field.

As this task force works with our membership base, education collaborators, and industry partners, we will continue to report to you the success of these initiatives in the years to come. We are addressing the perfect storm, and with our efforts, we will get the technologists back to the patient's bedside, so that patients can have access to the evolving technology of Molecular Imaging and the field can continue to grow.

REFERENCES

1. JRCNMT Reports 2012-2022
2. HRSA 2022
3. JRCNMT Reports 2012-2022
4. NMTCB Annual Examination Report 2021
5. HRSA 2022

Improved Image Quality with Anatomically Guided Bayesian Reconstruction for Bone SPECT/CT

BY CHRIS CONSTABLE, PhD, CLINICAL APPLICATION MANAGER AND ANTTI O. SOHLBERG PhD, HERMES MEDICAL SOLUTIONS

Bone SPECT/CT offers superior sensitivity and specificity compared to conventional whole-body planar scanning.[1] In addition, bone SPECT/CT enables quantitative imaging, which is impossible with planar methods. Despite its many advantages, bone SPECT is still limited by poor anatomical resolution. Bayesian reconstruction algorithms, including both image derived and anatomically guided priors, have been utilized in PET reconstruction[2] and have been shown to improve resolution and quantitative accuracy, but they have not been widely applied in SPECT/CT.

Kangasmaa et al. (2021), in a study published in EJNMMI Physics,[3] have evaluated the performance of CT-guided reconstruction in quantitative bone SPECT and compared three Bayesian reconstruction methods against the conventional ordered subsets expectation maximization (OSEM) reconstruction method. Bayesian methods in the evaluation were the relative difference prior (RDP), which has recently gained popularity in PET reconstruction. The other two methods, anatomically guided smoothing prior (AMAP-S) and anatomically guided relative difference prior (AMAP-R), utilized anatomical information from the CT scan.

The reconstruction methods were evaluated in terms of quantitative accuracy with artificial lesions inserted in clinical bone SPECT/CT patient studies and with 20 real clinical patients. Maximum and mean standardized uptake values (SUVs) of the lesions were defined.

The authors concluded, "the Bayesian methods with anatomical prior, especially the relative difference prior-based method (AMAP-R), outperformed OSEM and reconstruction without anatomical prior in terms of quantitative accuracy."

They found average relative error in mean SUV for the artificial lesion study for OSEM, RDP, AMAP-S, and AMAP-R was − 53%, − 35%, −15%, and − 10%, when the CT study had matching lesions, see figure 1.

These Bayesian reconstruction algorithms are now available in the HERMIA software developed by Hermes Medical Solutions bringing new clarity to Bone SPECT/CT. Increased lesion contrast and decreased noise can be achieved in the clinical bone SPECT/CT routine with no additional hardware requirements-Hermia advanced reconstruction works with current generation scanners

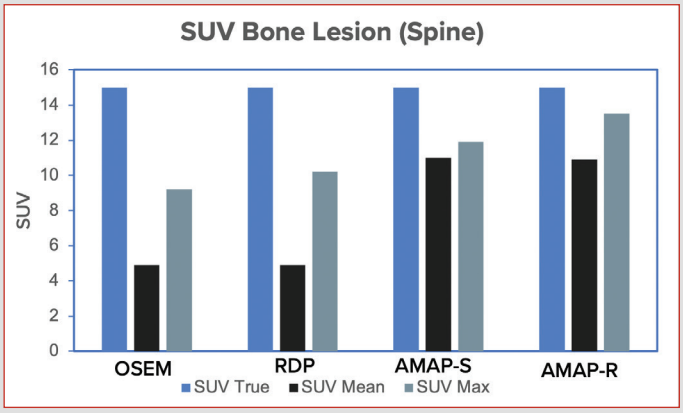
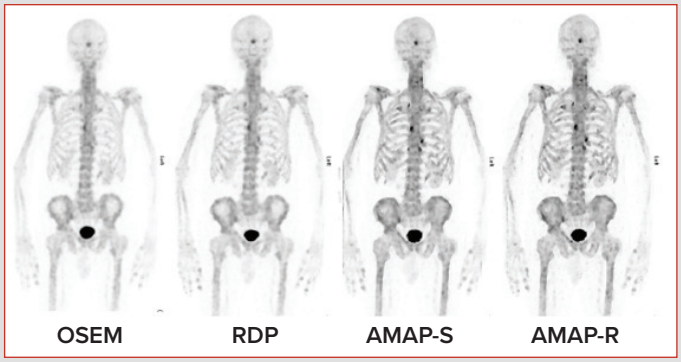


Figure 1: Mean and maximum SUV values of artificial lesions inserted in the spine reconstructed with OSEM, RDP, AMAP-S and AMAP-R.



SPECT Acquisition Parameters:

- 740 MBq ^{99m}Tc-HDP
- 256 x 256 matrix (2.4mm)
- 64 projection angles /360°
- 20 sec per step
- 3 x Axial FOV
- LEHR collimator
- Total Acquisition time = 32 mins (plus CT acquisition)

CT Parameters:

- Shallow free breathing
- 130 keV
- 25 mAs
- 512x512 matrix (0.98mm)
- 3.0 mm slice thickness

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Improved Image Quality. *Continued from page 8.*

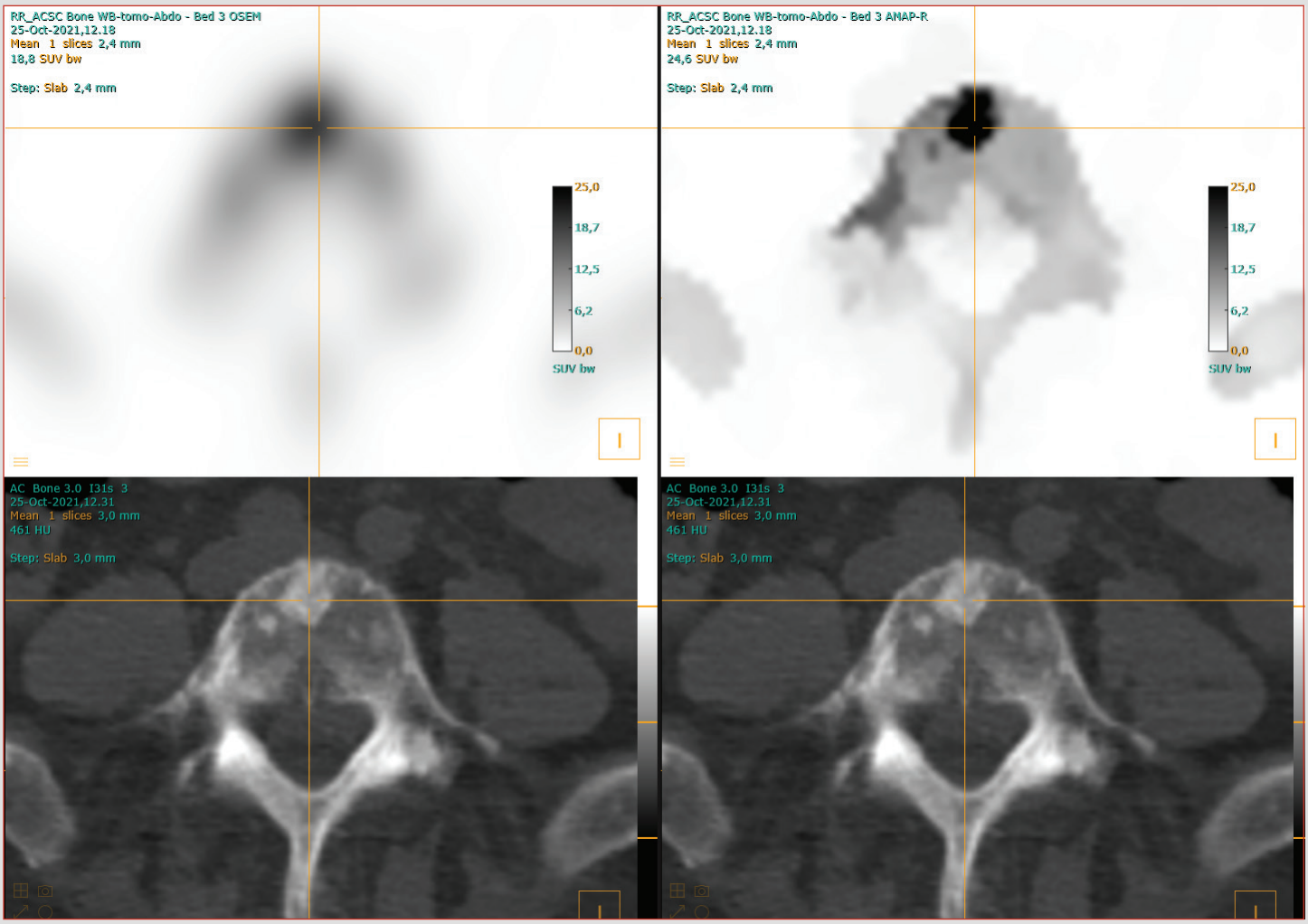

Figure 2: SPECT/CT image showing L5 vertebral metastasis from breast cancer. Conventional OSEM reconstruction on the left and CT Guided RDP reconstruction (AMAP-R) on the right.

from all manufacturers.

With easy-to-use software enabling precise determination of reconstruction parameters, Hermia offers two Bayesian reconstruction algorithms to optimise bone SPECT/CT images namely AMAP-S and AMAP-R. AMAP-R showed superior performance to all other tested reconstruction algorithms in the study by Kangasmaa et. al.[3]

The algorithms leverage the information from the CT to guide the SPECT reconstruction towards a clearer, less noisy solution. Anatomical prior information from the CT can be included to smooth only in uniform tissue areas and avoid smoothing over edges. This results in higher contrast lesions for bone SPECT/CT, less noisy images and better quantitative accuracy.

REFERENCES

1. Jambor I, Kuisma A, Ramadan S, Huovinen R, Sandell M, Kajander S, et al. Prospective evaluation of planar bone scintigraphy. SPECT, SPECT/CT, 18FNaF PET/CT and whole body 1.5T MRI, including DWI, for the detection of bone metastases in high risk breast and prostate cancer patients: SKELETA clinical trial. *Acta Oncol.* 2016;55:59–67.
2. Mehranian A, Belzunce MA, Niccolini F, Politis M, Prieto C, Turkheimer F, Hammers A, Reader AJ. PET image reconstruction using multi-parametric anato-functional priors. *Phys Med Biol.* 2017;62:5975–6007
3. Kangasmaa TS, Constable C, Sohlberg AO. Quantitative bone SPECT/CT reconstruction utilizing anatomical information. *EJNMMI Physics*. 2021;8:2 https://doi.org/10.1186/s40658-020-00348-1

A Champion of PET Innovation. *Continued from page 2.*

Figure 2: Professor Michael Fulham with Biograph Vision Quadra at Royal Prince Alfred Hospital, Sydney, Australia.

colleagues are assessing optimal scan acquisition time and dose and adapting the parameters for different body types. "Nothing can detect disease in small nodes in prostate cancer like a PSMA scan with Biograph Vision Quadra," Fulham says. "We pick up nodes as small as 2 mm that have uptake in them, and the scanner gives you the confidence that it's real, it's there, and it means better patient care."

DISCLAIMERS:

The statements by Siemens Healthineers customers described herein are based on results that were achieved in the customer's unique setting. Since there is no "typical" hospital and many variables exist (e.g., hospital size, case mix, level of IT adoption), there can be no guarantee that other customers will achieve the same results.

Biograph Vision Quadra is not commercially available in all countries. Due to regulatory reasons, its future availability cannot be guaranteed. Please contact your local Siemens Healthineers organization for further details.

Voximetry Torch®. *Continued from page 6.*

limits for the organs at risk. For example, in Pluvicto patients, uptake in salivary glands or bone marrow is often the leading cause of concern and unwanted side effects. By measuring absorbed dose in these ROIs after each cycle of therapy, the physician can monitor the accumulated absorbed dose delivered to that region and adjust the injected activity or the number of cycles.

Torch is the only DG-RPT software that incorporates patient-specific pharmacokinetics, patient-specific geometry, and full Monte Carlo dose calculation (all particles) with density correction at the voxel level without truncating radiation transport. This intensive calculation is accelerated to near real-time with lightning-fast GPU technology.

With the FDA market clearance for Torch Dose Assessment, there is now a tool available that has been designed specifically for personalization of RPT that offers unmatched accuracy to complement therapy-specific workflows.

REFERENCES

1. Sandström, et al. "Kidney dosimetry in 777 patients during ^{177}Lu-DOTATATE therapy: aspects on extrapolations and measurement time points" *EJMMI Physics* (2020) 7:73.

2. *Wahl, et al. "Prospective SPECT-CT Organ Dosimetry-Driven Radiation-Absorbed Dose Escalation Using the In-111 (^{111}In)/Yttrium 90 (^{90}Y) Ibritumomab Tiuxetan (Zevalin®) Theranostic Pair in Patients with Lymphoma at Myeloablative Dose Levels" *Cancers* 2021, 13, 2828.

3. *Lancet Gastroenterol Hepatol.* 2021, 6: 17-29.

4. Sundlöv et al. *Eur J Nucl Med Mol Imaging.* 2022 Sep;49(11):3830-3840.

Nuclear Medicine Program. *Continued from page 5.*

Andrew Ruiz, director of imaging services.

From fiscal years 2019 through 2022, when CHOC relied on St. Joseph Hospital for nuclear medicine services, annual volume averaged 428, Ruiz says.

In fiscal year 2022 at CHOC, the volume totaled 692, with fiscal year 2023 projected to total 1,222, based on the NW program going live through February 2022.

"We're growing so fast," Hollie notes, "and I think the word is getting out in the community that we are able to provide full nuclear medicine services in a pediatric hospital."

Avid Cook

Outside of work — which can total 80+ hours per week — Hollie loves spending time with her family. Her oldest daughter, Sara, 23, is working toward a career as a physician assistant, and Lauren, 21, is fluent in American Sign Language (ASL) and seeking work in that field.

An avid cook who loves to bake, Hollie says one of her biggest personal accomplishments was having a well-regarded chef ask for her recipe for financiers — small French almond pastries.

Although she's a prime candidate for recruitment at multiple major medical centers at highly prestigious universities, Hollie intends to remain at CHOC and dedicate the remainder of her career to the pediatric patients of Orange County. She loves coming to work and is usually one of the first to arrive and the last to leave.

"We provide great pediatric care and are a very welcoming hospital," Hollie says. "And I love my colleagues. I think we have a really good family at CHOC."

Hollie A. Lai, MD
Director of Nuclear Medicine
CS Radiology | OC Pediatric Radiology Associates
CHOC Main Campus - Orange, CA

Value Initiative Board

THE SNMMI VALUE INITIATIVE BOARD IS MADE UP OF SNMMI LEADERSHIP, ALONG WITH CHAIRS FOR EACH OF THE VALUE INITIATIVE DOMAINS. EACH DOMAIN CHAIR IS APPOINTED FOR A TERM OF THREE YEARS.

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Volunteer Involvement by Domain

Domain 1: Quality of Practice

- Committee on Medical Internal Radiation Dose (MIRD)
- Committee on Procedure Standards
- Committee on Radiation Dose Assessment Response (RADAR)
- Committee on Guidance Document Oversight
- Quality and Evidence Committee
- Quality and Patient Safety Committee
- RaPTR Registry Oversight Committee

Domain 2: Research and Discovery

- Committee on Radiopharmaceuticals
- Clinical Trials Network
- Center for Molecular Imaging Innovation & Translation
- PET Center of Excellence
- Therapy Center of Excellence
- Brain Imaging Council
- Cardiovascular Council
- Correlative Imaging Council
- Pediatric Imaging Council
- Physics, Instrumentation and Data Sciences Council
- Radiopharmaceutical Sciences Council

Domain 3: Workforce Pipeline & Life-Long Education

- Future Leaders Academy Task Force
- Academic Council
- Program Directors Committee
- Qualified Training Program Task Force
- Early Career Professionals Committee
- Women in Nuclear Medicine Committee
- Diversity, Equity, and Inclusion Task Force
- In-Training Committee
- Medical Student and STEM Working Group

Domain 4: Advocacy

- Committee on Government Relations
- FDA Task Force
- Committee on Coding and Reimbursement
- Third Party Payer Subcommittee
- Committee on Radiopharmaceuticals

Domain 5: Outreach

- Committee on Outreach
- Breast Cancer Imaging Outreach Working Group
- Brain Imaging Outreach Working Group
- Prostate Cancer Outreach Working Group
- Neuroendocrine Tumor Outreach Working Group
- Patient Advocacy Advisory Board

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SNMMI would like to thank our Value Initiative Industry Alliance member companies for their support. Together we have made incredible progress advancing patient care and precision medicine.

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