

# Pathways

THE CLINICAL TRIALS NETWORK NEWSLETTER

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## FES PET: Headed Toward the Clinic?

David Mankoff, MD, PhD, Department of Radiology, and Amy Clark, MD, Department of Medicine, Perelman School of Medicine, University of Pennsylvania

As highlighted in a recent Lancet Oncology editorial<sup>1</sup>, the PET estrogen receptor (ER) imaging agent,  $16\alpha$ -[<sup>18</sup>F]fluoro-17 $\beta$ -estradiol (FES), has been taking notable steps toward clinical application. FES was originally created back in the 1970s and 1980s through a pioneering collaboration between John Katzenellenbogen and Michael Welch to develop PET agents for steroid receptor imaging.<sup>2</sup> Washington University investigators subsequently showed that FES PET can estimate regional ER expression in breast cancer<sup>3</sup> and predict breast cancer response to treatment<sup>4</sup> in similarly pioneering efforts. These early results were supported by later single-center studies at the University of Washington,<sup>5,6</sup>



David Mankoff, MD, PhD



Amy Clark, MD

University of Groningen,<sup>7</sup> Asan Medical Center,<sup>8</sup> and other centers. Other studies demonstrated the ability of FES PET to measure the impact of ER-targeted drugs

### FES Uptake Predicts Breast Cancer Response to Hormonal Therapy

	Pre-Rx	Post-Rx	
<b>Example 1</b> <ul style="list-style-type: none"> <li>• Recurrent sternal lesion</li> <li>• ER+ primary</li> <li>• Recurrent Dz strongly FES+</li> </ul>			<b>Excellent response after 6 wks Letrozole</b>
<b>Example 2</b> <ul style="list-style-type: none"> <li>• Newly Dx' d met breast CA</li> <li>• ER+ primary</li> <li>• FES-negative bone mets</li> </ul>			<b>No response to several different hormonal Rx's</b>

University of Washington (Linden, J Clin Onc, 2006)

Image courtesy of Hannah Linden, MD, FACP; Molecular Imaging Techniques in Breast Cancer, ASCO 2019.

Continued on page 3. See **FES PET: Headed Toward the Clinic?**

# Message from the Co-Chairs:

## CTN Continues PET Harmonized Reconstruction Efforts

John Sunderland, PhD, MBA, CTN Co-Chair  
Jonathan McConathy, MD, PhD, CTN Co-Chair

One of CTN's main goals has always been to enhance the quality of molecular imaging data in clinical trials. In our quest to optimize comparability of PET data in the multicenter setting, CTN advocated both standardized PET imaging procedures and implementation of harmonized reconstruction parameters for all PET/CT scanners engaged in the trial. The CTN's initial Scanner Validation Program (2009-2016) used a novel, proprietary anthropomorphic oncology phantom (CTN phantom v.1) implementing a standardized filling and scanning protocol that was used on over 500 PET scanners at sites around the world. An extensive database of quantitative scanner performance was created during this period and was used primarily to validate quantitative performance for purposes of qualifying the scanner for clinical trials.

With the advent of new higher-performing scanners and the accelerated testing of novel, highly targeting PET radiopharmaceuticals, it became apparent that there was a need to develop even more quantitatively rigorous methodologies to demonstrate reproducible PET measurements, primarily for multicenter oncology clinical trials. This situation demanded an enhancement of the previous scanner validation system to include a newly designed, more challenging anthropomorphic phantom (CTN phantom v.2), more rigorous analysis software, and performance-based reconstruction protocol specifications designed to harmonize reconstructions across a broad range of scanner makes and models.

An NIH-sponsored R01 Image Reconstruction and Harmonization grant awarded to the University of Iowa (John Sunderland, PI) in 2014 brought together representatives from major PET scanner vendors, physicists and other experts in the field to identify such harmonized reconstruction parameters. Results were validated on a series of studies performed with the CTN v.2 phantom. The culmination of this work resulted in the implementation of harmonized reconstructions currently being used in three multicenter Pharmaceutical trials being supported by CTN. This harmonization approach can both reduce variability and optimize quantitative accuracy across scanners and provide critical information on the residual errors of measurement due to image reconstruction necessary for optimal trial design.

We are continually reviewing and testing the effectiveness and impact of the harmonized image reconstruction in ongoing multicenter clinical trials using PET imaging. The overarching goal of this evaluation is to more accurately assess response to new cancer therapies in multicenter trial environments. It is our hypothesis that by understanding and minimizing scanner-based variability, clinical trials will require fewer patient accrual numbers to achieve statistical significance, have a higher probability of success, and will result in lowering sponsor's overall trial costs so as to encourage their efforts into research and development of other therapies.



John Sunderland, PhD, MBA  
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Figure 1. Clinically Relevant Recovery Coefficients for A Trial's Scanners

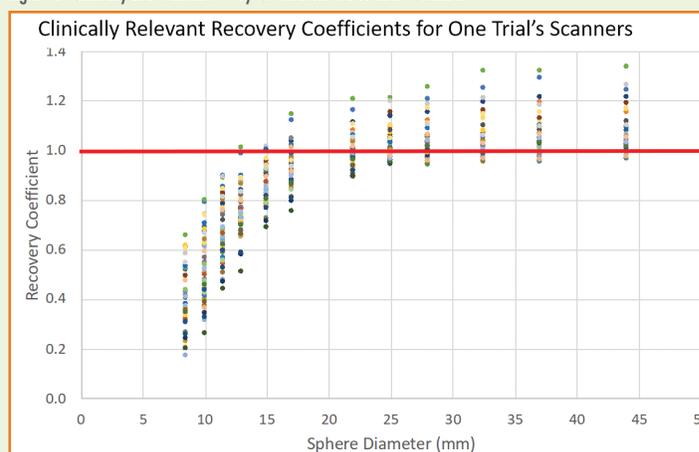


Figure 1 shows a range of recovery coefficient measurements for each sphere size. These clinically relevant reconstructions were based on the reconstructions used in the CTN Scanner validation program.

Figure 2. Harmonized Reconstructions Parameters

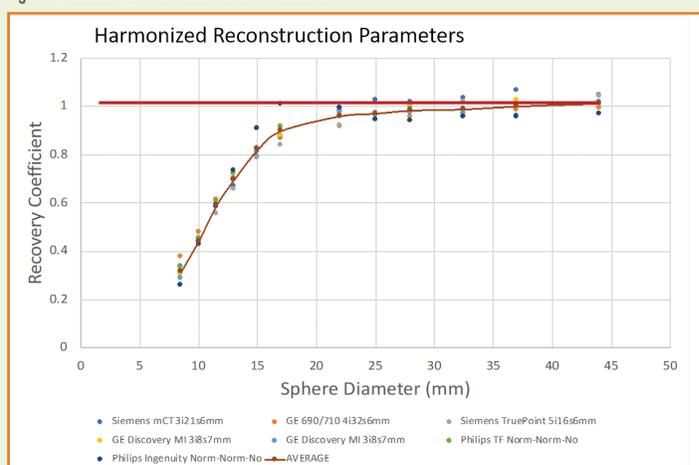


Figure 2 shows the recovery coefficient curve for the same PET/CT scanner models now using the harmonized reconstruction parameters while imaging the CTN V3 phantom.

# SPECIAL FEATURE

## Theranostics Consensus Conference

John Sunderland, PhD, MBA, CTN Co-Chair

Jonathan McConathy, MD, PhD, CTN Co-Chair

The SNMMI's Therapy Center of Excellence and the Clinical Trials Network (CTN) co-sponsored a self-described "Theranostics Consensus Conference" on Thursday and Friday, November 8-9, 2018, hosted by the National Cancer Institute (NCI). The goal of the two-day meeting was to gather representatives from major stakeholders in the theranostics space - including representatives from the FDA, NCI, academia, clinical physicians, and pharmaceutical company executives—to discuss overarching issues critical to the growth and development of theranostics. Topics discussed included guidelines for efficient clinical trial design, trial endpoints, reimbursement challenges, NCI funding opportunities, FDA regulatory considerations and complexities, the need (or not) for personalized dosimetry, and training challenges for both physicists and physicians.

For each topic a series of short education talks were followed by a Q&A session with experts from various stakeholder groups serving on the discussion panel. A remarkable diversity of perspective was clearly achieved as evidenced by robust and candid discussions throughout.

Given the breadth of topics discussed at this conference in this admittedly evolving field, "consensus" was perhaps an overly-ambitious target. That said, the event did result in elucidation and confirmation in several areas.

- There is a clear dynamic tension between industry's goal of the most rapid, cost-effective path to regulatory approval of theranostics agents and the perceived cost and complexity of personalized dosimetry in the context of theranostic clinical trials.

- There is general consensus that, although personalized dosimetry in theranostic treatments would likely enhance efficacy, the evidence of such benefit is currently scant and demands good science to determine its role.
- FDA had a large and active contingent at the conference and continues to demonstrate strong commitment to helping both industry and academia navigate the regulatory space from early to late phase clinical trials.
- The ability to get CMS to participate in these meetings to inform their approach to reimbursement decisions continues to be a challenge.

Additionally, the conference served as a springboard for several inter-societal initiatives to the evolution and development of the professional practice of theranostics.

- The American Association of Physicists in Medicine (AAPM) created an Ad-Hoc Committee on Recommendations for Better Integrating Radionuclide Therapy (AHRBIRT) into its structure.
- Formal discussions between leadership of the American Society for Radiation Oncology (ASTRO) and SNMMI have commenced with the goal of jointly determining training requirements for theranostics.
- A general agreement to have follow-up theranostic consensus meetings; however, with more focused topics. The first follow-up meeting is scheduled as a categorical session at the SNMMI 2019 Annual Meeting on Saturday, June 22 from 7:00-3:00 pm. This session was organized by the FDA, NCI, and The Clinical Trials Network. A second consensus conference is tentatively scheduled for fall 2019.

### CFES PET: Headed Toward the Clinic? *Continued from page 1.*

on ER occupancy,<sup>9-11</sup> suggesting a role for guiding drug dose and timing. Some studies showed that when combined with FDG PET, FES PET could identify breast cancer metastasis in challenging cases<sup>12</sup> and provide a powerful predictive marker for patient benefit from ER-targeted therapy.<sup>13</sup> Other studies showed potential utility for FES in women's cancers other than breast cancer, including endometrial cancer<sup>14</sup> and ovarian cancer.<sup>15</sup>

The accumulated evidence provided by these smaller trials, recently reviewed in *Lancet Oncology*<sup>16</sup> and *J Nucl Med*,<sup>17</sup> suggests that FES PET could be a valuable clinical tool for identifying ER-expressing breast cancer and guiding breast cancer treatment. Regulatory approval for clinical use of FES PET in breast cancer was granted in France based on published studies and local experience ([www.Zionexa.com](http://www.Zionexa.com)), and Zionexa is pursuing an NDA in the U.S. Other recently completed or ongoing trials, many of them multicenter studies, seek to provide a higher level of evidence of the clinical efficacy of FES PET in supporting broader approvals in the U.S., Europe, and Asia. A recent publication in *Lancet Oncology*<sup>18</sup> described the results of a well-designed prospective study carried out

at Asan Medical Center that provided level I evidence of the accuracy of FES as a marker of estrogen receptor status, strongly supporting a role as a biomarker for breast cancer. Ongoing multicenter trials in the U.S. (ECOG-ACRIN, EAI142, NCT02398773) and Europe (IMPACT [NCT01832051] and T-FES JTC 2011 TRANSCAN studies) seek definitive confirmation of the predictive value of FES PET for the response of metastatic breast cancer to ER-targeted therapy that was seen in prior, smaller studies. This is perhaps the most compelling role for FES PET, comparable to the universally employed practice of ER assay of biopsy material to guide treatment decisions for primary breast cancer. Future use of serial FES PET imaging may help clinicians understand emergence of endocrine therapy resistance and indicate when non-endocrine therapies such as chemotherapy should be considered. The body of promising data from smaller trials, and recent efforts to provide a high level of evidence in prospectively designed and properly powered trials to support the clinical efficacy of FES PET, suggest that wider clinical use of the potential valuable imaging approach may not be far off. References for this article can be found at [CTN Pathways Newsletters](#).

# SPOTLIGHT

## CTN Intern Awarded 2019 Henkin Fellowship



SNMMI is pleased to announce that Courtney Lawhn-Heath, MD, is the recipient of the 2019 Robert E. Henkin Government Relations Fellowship. Each year, the Henkin Fellow comes to Washington, DC, and spends a week with SNMMI staff, visiting Congress, federal agencies and other medical societies. Throughout

the week, the Fellow learns, first-hand, how the federal legislative and regulatory process impacts nuclear medicine and molecular imaging. The program is designed for young professionals, defined as residents or fellows (physicians, scientists or technologists who have completed

their training within the last 10 years).

During Dr. Lawhn-Heath's internship with SNMMI's Clinical Trials Network, she had the opportunity to interface with governmental regulatory agencies such as the FDA. "Working through the process of safely bringing new nuclear medicine agents from development to the patients who benefit from them sparked my interest" she says. During her time as the 2019 Robert E Henkin fellow, she hopes to gain a deeper understanding of the policy goals of SNMMI. Dr. Lawhn-Heath believes that "nuclear medicine is the future of medicine—one that will revolutionize our ability to more precisely diagnose, prognosticate, and treat a host of human maladies."

## CTN Education Technologist Co-Chair Receives Prestigious Award



Amanda Abbott, MS, CNMT, RT(N) (CT), PET, Imaging Research Manager in the Department of Imaging and Center for Biomedical Imaging in Oncology at Dana-Farber Cancer Institute in Boston, is the recipient of the SNMMI Technologist Section Editor's Choice award for the best continuing education article published in JNMT in 2018 "Nuts and

Bolts of <sup>177</sup>Lu-DOTATATE Administration in the Nuclear Medicine Division: Guidance from a Single Institute's Experience." The award is being presented during the SNMMI-TS Business Meeting & Awards Recognition on Monday, June 24.

Amanda is an experienced imaging research technologist with a demonstrated history of working in the hospital and health care industry. She is skilled in nuclear medicine and molecular imaging, clinical research, clinical trial imaging data management and physician, academic and industry relations. Amanda has a Master's degree focused in Molecular Imaging and Therapeutics from Regis College.

The article, which first appeared online in JNMT August 2018, is the result of her department's experience as part of the Phase 3 NETTER-1 study and, subsequently, the Expanded Access Program. Since April 2018, the department has routinely administered over 100 doses. As lead author on the article, Amanda has also given presentations about their experience, both locally and nationally, and presented the information in a SNMMI-TS webinar. The article's abstract is provided below and,

along with the complete list of authors, can be found at [Nuts and Bolts of <sup>177</sup>Lu-DOTATATE PRRT](#) (jnm.118.209148).

### Article Abstract

<sup>177</sup>Lu-DOTATATE is a radiolabeled somatostatin analog that has been approved by the U.S. Food and Drug Administration (FDA) for the treatment of somatostatin receptor-positive gastroenteropancreatic neuroendocrine tumors in adults. Radionuclide therapies have been administered for many years within nuclear medicine departments in North America. However, in comparison to other radiotherapies, <sup>177</sup>Lu-DOTATATE peptide receptor radionuclide therapy involves more planning, coordination, concomitant medication administration (antiemetic medications and amino acids), and direct patient care. To date, various methods have been used in multiple centers during the NETTER-1 trial and the provision of patient care. As participants in the phase 3 NETTER-1 trial and the subsequent expanded-access program for the administration of <sup>177</sup>Lu-DOTATATE studies, as well as recently starting post-approval clinical care, we have administered 61 <sup>177</sup>Lu-DOTATATE therapies at the time of this manuscript submission (13 in the NETTER-1 trial, 39 in the expanded-access program, and 9 clinically) at the Dana-Farber Cancer Institute and here share our procedures, personnel training, and workflow to help other centers establish programs for this FDA-approved <sup>177</sup>Lu-DOTATATE peptide receptor radionuclide therapy.

We are very happy for Amanda; she is so deserving of this award. CTN is privileged to have her serve as the Technologist Co-Chair for our Education Committee.

# RESEARCH ESSENTIALS

## Supporting the Evolution of PET: Ontario's Experience

Deanna Langer, PhD; Manager, Cancer Imaging Program, Clinical Programs and Quality Initiatives, Cancer Care Ontario

It's fairly common knowledge that much of Canadians' healthcare is publicly funded, embedded as part of federal legislation. Certainly, many services and testing that a patient might receive within a hospital—such as PET scans—falls under this mandate. What may be less known is that the organization of care is under provincial and/or territorial jurisdiction, which can lead to significant differences in practice across the country. Add to that federal Health Canada regulations when new isotopes are involved, and the landscape can get complicated quickly.

The province of Ontario funds PET scans for indications where the scan informs patient management and has benefits over other testing, based on best-available evidence. Oversight falls under a provincial government agency (Cancer Care Ontario (CCO)) and is guided by a multi-disciplinary expert panel ("PET Steering Committee"). In addition to the direct funding of scans, Ontario's program also supports evidence-building; e.g., for indications with more limited evidence, a Registry may be established to ensure patients receive a scan while collecting limited additional data (e.g., pre- and post-PET stage). Linked to administrative databases, this helps understand real-world patient and system impacts—especially important within a publicly funded system. Less often, provincial (multi-centre) clinical trials might be established. For

less common scenarios, physicians can also apply for case-by-case coverage via the "PET Access Program." At a provincial level, CCO performs system level planning, works with government to secure funding, and in turn funds PET centres including accountabilities for performance and quality.

Within this framework, the regulatory status of newer isotopes has required new solutions in bringing emergent technologies to the patient. If a vendor has not filed for Health Canada approvals for the isotope (regardless of FDA approvals), access may be possible in the context of a Health Canada Clinical Trial Application (CTA). Thus, CCO has partnered with academic institutions to establish CTAs. It can be a challenge – the process was not designed with provincial-level access in mind, and it certainly adds complexity and time. But doing so supports access outside of single institutions and provides a coordinated approach (at least provincially).

Ontario's approach to PET uses a number of strategies to support patient care—including access to emerging indications and/or radiopharmaceuticals—while also contributing to evidence with respect to real-world evaluation.



## Focus on the Interns

### Facing Change Together: Collaboration and the Clinical Trials Network

Courtney Lawhn-Heath, MD

As we all know, this is an exciting time to be in the field of nuclear medicine and molecular imaging. Unprecedented interest in precision medicine has brought about exponential growth in radiopharmaceutical development for both diagnostic and therapeutic purposes. However, the landscape of medicine is rapidly changing, bringing a host of new challenges. It seems clear that collaboration offers the greatest opportunity to not only survive but also thrive in this changing landscape. Collaboration offers safety in numbers; diversity of experience, ideas, and strengths; improved

flexibility for adapting to change; and increased velocity of innovation. To me, these benefits of collaboration are embodied by the Clinical Trials Network (CTN). With the combined expertise of physicians, technologists, physicists, radiochemists, and industry professionals from a wide range of locations and practice settings, the CTN is uniquely poised to facilitate radiopharmaceutical development and to expedite the translation of these radiopharmaceuticals into clinical practice.



### CTN Welcomes Our New Intern

EunKyung Angela Park, MD, PhD

EunKyung Angela Park, MD, PhD, graduated from Seoul National University College of Medicine in South Korea and completed training in nuclear medicine at the same institution. Dr. Park is now the chief resident in nuclear medicine at the University of Iowa. She joins the faculty as a clinical assistant professor at the University of Iowa in July 2019. Dr. Park's career in nuclear medicine spans 10+ years, including experience as a tenure-track faculty at a university hospital in Korea and as

an associate research scientist at Yale. Her professional interests include translational research, targeted radionuclide therapy, functional neuroimaging analysis, and global promotion of nuclear medicine. She hopes to learn from, as well as contribute to, the Clinical Trials Network and the SNMMI by working with various people in the CTN on clinical trial initiation and implementation.



# Tech Talk

## Working Towards the Future

Douglas Hussey, BSc, MRT(N), Medical Imaging PET/CT Tech Specialist, UHN Princess Margaret Hospital, Ontario, Canada

Clinical research, to most workers in healthcare, is associated with leveraging what you do routinely but with an eye toward the future. Technologists wonder and anticipate how our efforts in performing clinical research PET scans will contribute to the success of the research and the patient's outcome. This is the life of a technologist who crosses between clinical and research.



In Ontario, Canada, PET imaging relies heavily on evidence-based cases. These cases are evaluated by a Provincial Steering Committee to determine the use of PET in new indications. Registries or provincial trials are assembled, and participating PET sites work with referring doctors to accept patients who fall within the inclusion criteria and complete the PET scans. Although this sounds routine, it is the details that matter. Technologists who want to blend the research and clinical world must be diligent when it comes to data collection. This is especially important when collecting completed pre- and post-PET management forms from referring clinicians. These forms help the Steering Committee answer the question of whether PET has an impact on the detection of the indication and the management of the patient. After recruitment numbers are met, the evidence is examined and the indication for PET is accepted or modified.

The completion of a registry or trial and the development of a new indication for an insured PET service is rewarding both individually and as a group within the province, with each PET center contributing as many patients as it can. When it comes to indications that require a different tracer (other than FDG), the scope of the work changes, as new tracers require additional consent and submissions must be more comprehensive. Procuring these tracers and fitting these patients into the usual clinical FDG workflow requires additional teamwork from all members of the healthcare team, including clerical, technologists, and radiologists. Participating in a clinical research trial in addition to routine clinical work can be challenging, but it is worth the effort to reach the end goal: providing a seamless transition into using PET imaging for new indications that have been rigorously proven to help patient care.

# Educational Opportunities

## CTN 2019 Fall Webinar Series

We are excited to announce our 2019 Fall Webinar Series on the review of radiopharmaceuticals and uses in various disciplines. The CTN 2018 Anatomy Webinar Series was very successful, with more than 200 registered for each webinar. Each webinar focused on a specific part of the anatomy and its related tracers. In a follow-up survey, a number of attendees said it was the best course they had ever taken through SNMMI.

Continuing that high level of education, the CTN Education Committee is presenting a new webinar series this Fall on radiopharmaceuticals commonly used in nuclear medicine and molecular imaging studies. CE credit is offered at no charge to attendees. Don't miss the opportunity to be part of this excellent group of topics and speakers:

- Review of Radiopharmaceuticals Used for Bone and Infection Imaging —Matthew Robertson
- Review of Radiopharmaceuticals Used in Nuclear Cardiology—April Mann
- Review of Radiopharmaceuticals Used for Oncology PET and SPECT Imaging—Adam Opanowski
- Review of Radiopharmaceuticals Used for Neurologic PET and SPECT Imaging—Lance Burrell
- Review of Radiopharmaceuticals Used in Pediatric Nuclear Medicine —Helen Nadel
- Review of Radiopharmaceuticals used for Radionuclide Therapy—Adam Brown

These webinars occur once a week for six weeks on the following dates: September 27, October 3, 10, 17 and 24, and November 7. Please check the [CTN website](#) for the final schedule.

# Tech Tip

## Sharing Resources & Staffing Across Multiple Sites

Douglas Hussey, BSc, MRT(N), Medical Imaging PET/CT Tech Specialist UHN Princess Margaret Hospital, Ontario, Canada

In most studies that track progression, repeat scans using PET tracers to image tau or amyloid deposition are required at variable time points. As staff members in a PET department rotate across imaging sites, a different technologist may potentially be required to position and scan the same patient at each time point. It is crucial to duplicate the same technique previously used to obtain accurate imaging.

A good technique to consider is to specifically document

- the head-holder device used for the scan bed, including thermosplastic masks,
- bed position and setup, and
- any other comfort aides used for the scan.

When the patient is reliably and comfortably in the same position, the imaging component goes much more smoothly, and there are better longitudinal results.

# SNMMI 2019 ANNUAL MEETING: CTN HIGHLIGHTS

The SNMMI Annual Meeting provides physicians, technologists, pharmacists, laboratory professionals, and scientists with an in-depth view of the latest research and development in the field as well as insights into practical applications for the clinic. Included in the meeting's educational schedule are a number of Pre-Meeting Categorical Seminars. The Clinical Trials Network is sponsoring a number of sessions as outlined below. To view the entire educational program and develop your personalized schedule, visit [snmmi.org/AM](http://snmmi.org/AM)

**Saturday, June 22 ▶ 7:30 am-3:30 pm (Categorical 4)**

## **Theranostics: Regulatory Considerations for Product Development**

*Sponsored by the Clinical Trials Network, FDA, and NCI*

This workshop discusses regulatory perspectives of products that combine an imaging modality with therapeutic radiopharmaceuticals. The content will be specific to the needs of the community based on what the Food and Drug Administration (FDA) members in the Medical Imaging and other divisions are seeing in Investigational New Drug, New Drug, Abbreviated New Drug, and Drug Master File applications filed with the agency and in other interactions with the community. Members of the FDA, NCI (National Cancer Institute), industry and academia deliver the important information and answer questions.

**Saturday, June 22 ▶ 9:00 am-12:00 pm**

## **LIVE Fluciclovine Training Session**

Discover how to interpret <sup>18</sup>F-fluciclovine scans in recurrent prostate cancer patients from the experts in a 3-hour, hands-on, case-review training session.

**Saturday June 22 ▶ 1:30-3:00 pm (CE04)**

*Sponsored by CTN and the Therapy CoE*

- Nuts and Bolts: Using Lutetium-177 DOTATATE

**Sunday June 23 ▶ 4:30-6:00 pm (Non-CE)**

## **Emerging Technology Session**

*Sponsored by CTN and CMIIT*

Join us to hear the most current status of these novel agents and therapies.

- Fluciclovine for glioma
- <sup>64</sup>Cu-DOTATATE
- <sup>18</sup>FES

**Monday, June 24 ▶ 10:00-11:30 am (CE39)**

*Sponsored by CTN and SNMMI's Center for Molecular Imaging Innovation and Translation (CMIIT)*

- Current State of Development of New Theranostic Agents

**Monday June 24 ▶ 3:00-4:30 pm (TS24)**

*Sponsored by CTN for the Technologist Section*

- Nuts and Bolts on New Radionuclide Therapies

**Tuesday, June 25 ▶ 10:00-11:30 am (CE74)**

*Sponsored by CTN and SNMMI's Center for Molecular Imaging Innovation and Translation (CMIIT)*

- Nuts and Bolts: How Do I Get New Imaging Agents at My Site?
- Fluciclovine: Molecular Imaging and Therapy: Current and Future Approaches
- <sup>64</sup>Cu-DOTATATE: A Review of Clinical Trial Findings in Neuroendocrine Tumor Patients
- <sup>18</sup>FES: Molecular Imaging in Breast Cancer: Moving Closer to the Clinic
- Imaging the Immune System: CD8+ and Beyond

ANAHEIM, CALIFORNIA  
JUNE 22-25, 2019



## SNMMI 2019 Annual Meeting Networking Event

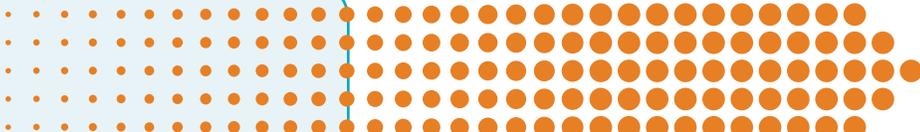
# Drink & Think

Grasslands Meat Market  
BBQ & Churrasco

An informal gathering at the popular restaurant Grasslands gives attendees an opportunity to discuss a number of common interests. **CTN is sponsoring the topic of "Personalized Dosimetry."** Hope to see you there!



## Save the Dates



### SNMMI 2019 Annual Meeting

June 22–25, 2019 • Anaheim, CA

### DIA Annual Meeting 2019

June 23–27, 2019 • San Diego, CA

### WMIC 2019—World Molecular Imaging Congress

September 4–7, 2019 • Montreal, Quebec

### ASNC 24<sup>th</sup> Annual Scientific Session

September 12–15, 2019 • Chicago, IL

### European Association of Nuclear Medicine (EANM19)

October 12–16, 2019 • Barcelona, Spain

### JSNM 59<sup>th</sup> Annual Scientific Meeting

November 1–3, 2019 • Ehime, Japan

### RSNA 105<sup>th</sup> Scientific Assembly and Annual Meeting

December 1–5, 2019 • Chicago, IL

### SNMMI 2020 Mid-Winter Meeting

January 23–26, 2020 • Tampa, FL



CLINICAL TRIALS NETWORK

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