SNMMI Mid-Winter and ACNM Annual Meeting

The SNMMI Mid-Winter and American College of Nuclear Medicine (ACNM) Annual Meeting, held entirely online January 28–31, featured a full range of educational, scientific, and professional offerings and was attended by more than 800 participants from around the world. The virtual platform featured 3 educational tracks highlighting the latest innovations and techniques in the field, with a special track focusing on therapy. Scientific sessions and technologist-focused programming were also available, with technologist sessions extending beyond the 3.5 days of the formal joint meeting. Sessions were available both live (with chat functionality) and on demand. In the dedicated Science Pavilion, recorded oral presentations, abstracts, and posters could be viewed, with questions submitted to authors.

Industry vendors and suppliers in the Virtual Exhibit Hall featured customized booths with videos and downloadable presentations. Direct text and video chat were also available to connect attendees and exhibit personnel. Industry-sponsored symposia covered "Precision imaging for detection and localization of recurrent prostate cancer" (Blue Earth Diagnostics, Inc.), "Role of Cerianna (^{18}F-fluoroestradiol) in breast cancer imaging" (Zionexa), "Detectnet (^{64}Cu-DOTATATE injection): A novel agent for PET imaging of neuroendocrine tumors" (Curium), "Expanded SPECT/CT integration into clinical nuclear medicine" (Siemens Healthineers), and ^{68}Ga-PSMA-11: Advances in technology, demand, and supply: Industry leaders' round-table discussion" (Telix Pharmaceuticals).

The ACNM Awards Ceremony, held on January 29, highlighted the ways in which meeting planners were able to successfully celebrate milestones and achievements despite the challenges associated with the pandemic. During this event, ACNM honored 2021 Lifetime Achievement Award winner Twyla Bartel, DO, MBA, and 2021 Gold Medal Award winner Jay Harolds, MD; inducted its 2021 class of ACNM fellows; and presented scientific and educational abstract awards.

Umar Mahmood, MD, PhD, chair of the SNMMI Scientific Program Committee, emphasized in welcoming remarks the collaborative effort that went into the complex planning and delivery of the SNMMI/ACNM meeting content: "As we continue to navigate this unprecedented time, I would like to sincerely thank the many planners of this year's meeting—the SNMMI Scientific Program Committee, SNMMI Councils and Centers of Excellence, the SNMMI Technologist Section, and the ACNM. Despite all the personal and professional challenges that everyone is facing, they once again collaborated on a truly exceptional meeting."

SNMMI 2021 Annual Meeting

To the nuclear medicine and molecular imaging/therapy community:

While the initial rollout of the COVID vaccine is a positive first step, we all know that there is still a long road ahead before this pandemic is fully behind us. As the highest priority is the health and safety of everyone involved in our meeting, the decision has been made to transition the SNMMI 2021 Annual Meeting to a fully virtual event.

Like you, we were hopeful to return to an in-person meeting and are disappointed that we won't be able to be together in Washington, DC. However, given SNMMI's highly successful rollout of the 2020 Virtual Edition of our Annual Meeting, as well as subsequent virtual events, we are confident we can build on those successes and provide you with a dynamic virtual experience at the 2021 Annual Meeting this June 12–15.

Look for additional details on everything you've come to expect from the SNMMI Annual Meeting—cutting-edge educational programming, the latest scientific research, interactive exhibit hall, lively networking events, and more—at www.snmmi.org.

We look forward to seeing each of you virtually this June!

Alan Packard, PhD
SNMMI President
Tina M. Buehner, PhD, CNMT
SNMMI-TS President

American Cancer Society *Cancer Statistics 2021* Report

On January 12, the American Cancer Society (ACS) released its *Cancer Statistics 2021* report and companion summary, *Cancer Facts & Figures 2021*, including data indicating that the death rate from cancer in the United States has continued to decline. From 1991 to 2018, the cancer death rate fell by 31%, including a 2.4% decline from 2017 to 2018, a new record for the largest 1-year drop. ACS researchers estimated that almost 1.9 million new cancer cases will be diagnosed in 2021 and >600,000 people will die from cancer. These numbers did not account for the effect of the COVID-19 pandemic because the projections are based on reported cases and deaths through 2018. The decline in deaths was attributed to fewer people smoking, earlier detection for many types of cancer, and improved treatments leading to ~3.2 million fewer cancer deaths from 1991 to 2018. These annual statistics are among the most highly cited by researchers and are used to inform decision making by regulators and federal funding agencies. They are available and searchable in multiple configurations at: https://cancerstatisticscenter.cancer.org/#!/.

The study summary noted that the 27-year decline in the overall cancer death rate is mainly the result of long-term drops in the 4 most common cancers: lung, colorectal, breast, and prostate, with the largest drops seen in lung cancer deaths. These 4 cancers account for >40% of cancer deaths. Declines in lung cancer were attributed to reductions in smoking as well as improved treatments, such as those for non–small cell lung cancer. Declines in breast cancer of >40% from 1989 to 2018 were attributed to earlier detection (through increased awareness and screening mammography) and advances in treatment. The rate of new female breast cancer cases, however, increased by about 0.5% each year from 2008 to 2017, a trend believed to be associated with rising obesity rates and decreased fertility. Although prostate cancer death rates declined by about 4% per year from the mid-1990s through 2013 as a result of prostate-specific antigen testing and treatment advances, most recently the death rate has remained steady. Death rates from colorectal cancer dropped by 55% from 1970 to 2018 because of changes in risk factors, screening, and better treatments; although death rates are increasing in adults <55 years of age.

The annual report also details the current state of cancer disparities in the United States and acknowledges that these are "closely linked with social, economic, and/or environmental disadvantages and other characteristics historically tied to discrimination or exclusion, including historical and persistent racism." The 5-year relative survival rate for all cancers combined remained substantially lower for black patients from 2010 to 2016, at about 20% lower for melanoma and cancers of the uterine corpus (endometrial cancer) and oral cavity. The death rate for black men with prostate cancer is more than double that of men in every other population, and black women have a 40% higher breast cancer death rate than white women, even though their diagnoses rates are slightly lower. The gap in cancer death rate disparities appears to be narrowing somewhat. In 1993, the cancer death rate was 33% higher among black than white individuals, a percentage that had dropped to 13% by 2018.

The report's Special Section on COVID-19, completed in September 2020 for publication, noted that it is too soon to assess the long-term impacts of the pandemic on cancer diagnosis, care, treatment, and survival. Cancer deaths, for example, dropped during the early months of the pandemic but are likely to rebound with increases in late-stage diagnoses and preventable cancer deaths. Some individuals may continue to delay preventive care and symptom follow-up because of loss of employment and/or employer-based health care. The initial drop in screening was steep, with 1 medical system reporting an estimated 80%–90% decline in screening for breast, colorectal, and cervical cancers among their patient population during March and April of 2020 compared to the same period in 2019. Although this had risen by summer 2020, levels were still down 29%–36% from the previous year.

The report emphasized that the full impact of the pandemic on cancer prevention and early detection will not be known until population-based data become available. The ACS recommended that as routine medical care resumes, individuals at high risk of cancer be prioritized in capacity-limited situations. In addition, "targeted efforts to promote screening are especially needed among historically underserved populations." The report concluded that despite the large range of current unknown factors, the COVID-19 pandemic is expected to result in increased cancer mortality over the long term. The National Cancer Institute estimated a 1% increase in deaths from breast and colorectal cancer over the next 10 years, the equivalent of ~10,000 excess deaths from the pandemic's impact on screening and treatment. This estimate, however, was based on an estimated 6-month disruption in routine care, a time period now more than doubled.

American Cancer Society

Retired ABNM Diplomates

George M. Segall, MD, Executive Director, American Board of Nuclear Medicine

The American Board of Nuclear Medicine (ABNM) has received inquiries from physicians who plan to retire and would like to continue their certification during retirement. The reasons for continuing certification include the importance of professional identity, confirmation of career-long commitment and expertise for potential return to work in some capacity, as well as supporting the mission of the ABNM. Retired physicians, however, may not have the means or desire to continue full medical licensure, fulfill all the requirements of Maintenance of Certification, and pay annual fees.

What does it mean to be retired? Retired academic physicians (emeriti) may be recalled to work. Some physicians may do occasional consulting. Any physician may do volunteer clinical work, teaching, or writing. The 24 member boards of the American Board of Medical Specialties (ABMS) have a policy on retired status, with the following definition and requirements:

- Possession of an active certificate at the time of retirement;
- No license restrictions at the time of retirement in any jurisdiction due to disciplinary actions;
- Attestation to no longer being actively engaged in direct, indirect, and/or consultative patient care, overseeing medical laboratories, or supervising in a medical field; and
- Not performing any function for which board certification is required.

The ABNM has certified 5,972 physicians since 1972. The board issued lifetime certificates until 1991 and started issuing 10-year certificates in 1992. The ABNM does not require diplomates to report retirement, so the precise number of retired diplomates is unknown. Approximately 29% of diplomates with lifetime certificates are retired. The proportion of retired diplomates with time-limited certificates is less than 2%.

George M. Segall, MD

Physicians who wish to continue certification after retirement should notify the board. Physicians must meet the ABMS criteria listed above to receive retired status. Physicians who wish to maintain certification after their current certificate expires must meet the requirements of Maintenance of Certification. Diplomates with no clinical responsibility can request a waiver of the requirement for Improvement in Medical Practice. The requirements for medical licensure, continuing medical education, and assessment of knowledge, skills, and judgment are unchanged. Physicians may conveniently fulfill the third requirement by participating in CertLink, ABNM's longitudinal assessment program. Retired physicians who meet these requirements will continue to be designated as certified on public websites. Retired physicians who do not want to continue certification will be designated as retired. Physicians who let their certificates expire without notifying the ABNM will not be listed.

It is important to note that ABNM diplomates certified by more than 1 ABMS member board cannot maintain different statuses with each board. The ABMS will notify all member boards of any changes for diplomates who have certifications issued by more than 1 board. The ABMS will display retired status for all of the physician's certifying member boards on public websites and professional databases.

Anna Celler, PhD, 1951–2020

Anna Celler, PhD, an extraordinary colleague, mentor, educator, and pioneer in medical imaging, passed away on December 24, after a more than 2-year battle with uterine cancer. Born and raised in Poland, she received her MSc in 1974 and her PhD in 1980 from the University of Warsaw, where she became an expert in nuclear physics. After spending time in research laboratories in Poland, France, and Finland, she moved to Canada with her husband and joined the Charge Exchange Group at TRIUMF (Canada's national particle accelerator center, in Vancouver) in 1984. In 1991, Dr. Celler joined the nuclear medicine department at the Vancouver General Hospital (VGH) as a clinical medical imaging physicist. Soon she was overseeing the quality assurance program for 12 nuclear medicine departments around the Lower Mainland. In 1995, she was certified as a member of the Canadian College of Physicists in Medicine (CCPM) in recognition of her competence in physics as applied to medicine. She became a fellow of the CCPM 1 year later.

Dr. Celler's passion for research led her to create the Medical Imaging Research Group in 1991 at the VGH/University of British Columbia (UBC). Her research interests were related to image quantification using diagnostic nuclear medicine imaging modalities, particularly with SPECT. She is considered a pioneer in quantitative and dynamic SPECT, as well as a leading expert in dosimetry for radiopharmaceutical therapies using SPECT. As an example, Siemens implemented a "profile attenuation correction system" in their medical equipment that was a method fully developed by Dr. Celler. She was a professor emeritus in the Department of Radiology at UBC, having also served as an adjunct professor in the Department of Mathematics at Simon Fraser University and an associate member of the Department of Physics and Astronomy at UBC. She was the author of more than 350 peer-reviewed articles, abstracts, and book chapters.

In 2012, Dr. Celler received the Sylvia Fedoruk Prize from the Canadian Organization of Medical Physicists (COMP) for her work in dual-isotope imaging with PET. She was also part of a multi-institutional and multidisciplinary team led by researchers at TRIUMF who developed methods of producing ^{99m}Tc with a cyclotron. This method received Health Canada's approval in early December 2020 and will make it possible to avoid shortages of this vital radioisotope used in more than 80% of nuclear medicine diagnostic procedures. This work was awarded the Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering from the Natural Sciences and Engineering Research Council of Canada in 2015. Her work has also found multiple applications in the development of personalized patient dosimetry for radiopharmaceutical therapies.

Over the last 3 decades, Dr. Celler supervised numerous trainees in medical physics, including postdoctoral fellows, graduate students, undergraduate students, and nuclear medicine residents. Many of her trainees now have leading positions in academia, industry, and health care. In recognition of her contributions to clinical practice, teaching, and research, Dr. Celler was awarded the COMP Gold Medal in 2018, the highest distinction given by this organization.

What stood out profoundly with Anna was that she valued human beings. She cared deeply about her trainees and the people around her and created and led a lively work and research environment. She will be tremendously missed. Her family has asked that donations in her memory be directed to the BC Cancer Foundation: http://donate.bccancerfoundation.com/goto/aceller.

Arman Rahmim, PhD
Carlos Uribe, PhD
Alex MacKay, PhD
Glenn Wells, PhD

Advocating for Our Field

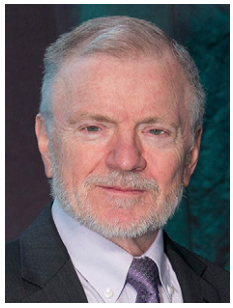
Alan B. Packard, PhD, SNMMI President

One of the more important but perhaps less visible arenas in which SNMMI is active is advocacy—for the field of nuclear medicine, for our members, and for our patients. Our work, from radiochemistry laboratories to patient care, is impacted by the regulatory policies of a number of federal agencies, ranging from regulation of radionuclides by the Nuclear Regulatory Commission (NRC) to approval of radiopharmaceuticals by the Food and Drug Administration (FDA) to decisions regarding reimbursement by the Centers for Medicare and Medicaid Services (CMS). It is also affected by the actions of legislatures, both federal and state; state government agencies; and insurance companies.

One ongoing issue is CMS's decision to bundle the cost of radiopharmaceuticals with the cost of the imaging procedure in the hospital outpatient setting. In many cases, reimbursement for the bundle is much less than the actual cost of the drug, which means that an imaging department loses money whenever it carries out an imaging procedure with these agents. This has, in some cases, led to departments not performing studies with these agents. In an effort to address this problem, SNMMI and its coalition partners worked to encourage the introduction of H.R. 3772 in July 2019—a bill that would require separate payment for high-value radiopharmaceuticals—with broad bipartisan support during the last Congressional term. Recently, however, after meeting with the House of Representative's Energy and Commerce Committee, the coalition was encouraged to once again explore a regulatory solution with CMS, and SNMMI and its partners are communicating with the new CMS administration to urge the agency to reverse its decision to bundle diagnostic radiopharmaceuticals. If this effort is not successful, SNMMI and its partners will reintroduce the bill, and SNMMI is asking other imaging societies to consider supporting this legislation. Shortly after the new bill is introduced, SNMMI plans to initiate a new letter-writing campaign and will explore options for an in-person or virtual fly-in event to show support for the bill on Capitol Hill.

In another CMS-related issue, after many discussions with CMS over the last year, SNMMI was successful in getting the national noncoverage decision removed for use of ^{18}F-FDG PET for infection/inflammation imaging. Coverage determinations for these indications will now be made by local Medicare Administrative Contractors. Our long-range goal is to achieve CMS coverage for all FDA-approved PET indications, and this is a significant first step.

SNMMI continues to work with CMS's National Correct Coding Initiative to correct procedure-to-procedure codes. The strategy is working, as many of these codes have been corrected.



Alan B. Packard, PhD

To address the challenge of providing in-person learning experiences during the COVID-19 pandemic, SNMMI successfully advocated for exemptions to in-person training and experience requirements from the NRC. Rather than mandating hands-on experience, this one-time modification allowed authorized users to participate in virtual training for imaging and localization studies. In a separate NRC issue, SNMMI responded to an NRC petition for rulemaking that would require that extravasations/infiltrations of radiopharmaceuticals be reported to the NRC as adverse medical events. SNMMI issued a statement expressing its belief that no additional rulemaking is required and is working with other imaging societies to address this issue. The Society will continue to monitor these and other NRC issues.

SNMMI also regularly monitors the work of the FDA to stay informed about changes that impact nuclear medicine and molecular imaging, and the Society has created a dedicated FDA PET Drug Manufacturing Q&A section on the SNMMI website (http://www.snmmi.org/IssuesAdvocacy/FDAQandA.aspx?navItemNumber=34424). In 2021, SNMMI and the FDA plan to cohost workshops focused on newly introduced radiopharmaceuticals.

In the commercial payer realm, in August 2020 Humana issued a policy decision denying coverage for PET/CT and SPECT/CT for several common indications. In response, SNMMI wrote 2 letters to Humana protesting this decision: 1 focused on cardiac indications and 1 on oncologic and neurologic PET/CT and SPECT/CT. The Society will continue to work with Humana to reverse this decision and will continue to oppose similar determinations by other third-party payers.

On the state level, SNMMI has been monitoring licensing legislation and regulatory developments in key states, such as Pennsylvania and Georgia, and bills that were not passed in 2020 will be reintroduced in these states this year. The SNMMI Technologist Section recently conducted a survey of technologist licensing requirements across the United States. The results are available on SNMMI's website (www.snmmi.org/stateinfo) and have been very helpful for

(Continued on page 22N)

Radiopharmaceuticals and COVID-19

In an article in the December 21 issue of *Pharmaceutics*, Neumaier et al. from the Institute of Neuroscience (Jülich), University Hospital Cologne/University of Cologne, and the Max Planck Institute for Metabolism Research (Cologne; all in Germany) outlined potential current and future uses of nuclear medicine techniques and radiopharmaceuticals in the context of the novel coronavirus SARS-CoV-2 and the global COVID-19 pandemic. They highlighted associated techniques that can be explored in functional imaging of pathophysiologic processes at the cellular or molecular level and for treatment approaches based on targeted delivery of therapeutic radionuclides. Among the topics discussed were PET-based imaging of host molecules and host responses to SARS-CoV-2 infection, PET- and SPECT-based antiviral drug development, and SARS-CoV-2–specific nuclear imaging. The authors also pointed to the potential for low-dose radiotherapy and/or radionuclide therapy targeting infected cells. They concluded that, given continuing threats from emerging coronaviruses and other pathogens, it seems likely that "improved approaches for preclinical imaging of animals infected with contagious pathogens will become available in the near future, so that nuclear medicine techniques could also contribute to a better understanding of disease transmission, progression, and eradication."

Pharmaceutics

Hanson Named NRC Chair

On January 20, Christopher T. Hanson was designated by U.S. President Joseph Biden as Chair of the Nuclear Regulatory Commission (NRC). Hanson replaced Kristine L. Svinicki, who had served as chair since 2017 and was the longest serving member of the commission in the agency's history. "I am honored to have been selected by President Biden to serve as the next NRC Chairman and to lead the talented women and men who oversee the licensing and regulation of our nation's civilian use of radioactive materials," said Hanson. "I look forward to building on Chairman Svinicki's many accomplishments as the commission takes on new challenges and faces new opportunities as nuclear energy technologies continue to evolve and uses of nuclear materials expand in the future." Hanson has served as an NRC commission member since June 8, 2020. He has more than 2 decades of government and private sector experience in nuclear energy. Prior to joining the NRC, he served as a staff member on the Senate Appropriations Committee, where he oversaw civilian and national security nuclear programs. He has also served as a senior advisor in the Department of Energy (DOE) Office of Nuclear Energy and the DOE Office of the Chief Financial Officer, where he oversaw nuclear and environmental cleanup programs and managed the department's relationship with Congressional appropriations committees.

U.S. Nuclear Regulatory Commission

LBNL and PET for α-Particle Therapy

In a December news release, the U.S. Department of Energy (DOE) Lawrence Berkeley National Laboratory (LBNL; CA) highlighted ongoing research at the facility on innovative ways to image and monitor targeted α-particle therapy (TAT). In a collaboration supported by the DOE Isotope Program at LBNL and Los Alamos National Laboratory (NM), researchers have developed new methods for large-scale production, purification, and use of ^{134}Ce, which could serve as a tuneable PET imaging surrogate for several α-emitting therapeutic isotopes. Findings reported in the December 14 issue of *Nature Chemistry* described studies that could lead to the use of a single molecular system for imaging and TAT in a range of cancers. "Our study demonstrates the power of designing small molecules that will control the chemistry of metallic elements for different applications in nuclear medicine," said senior author Rebecca Abergel, PhD, from LBNL. "But what's even more exciting is that the newly demonstrated large-scale production of new α-compatible PET imaging isotopes through the DOE Isotope Program may also serve as a roadmap for making targeted α-emitting therapies more widely available." The article, outlining the history and development of the project, the complex methodologies used to isolate ^{134}Ce from irradiated lanthanum, and potential applications is available at: https://www.nature.com/articles/s41557-020-00598-7. By "tuning" the oxidation state of ^{134}Ce to the favored states of ^{225}Ac or ^{227}Th, the researchers performed preliminary biokinetic studies in mice, using chelated ^{134}Ce. They plan next to investigate methods for attaching cell-targeting antibodies to the chelated ^{134}Ce and to demonstrate the targeting of cancer cells in animal models for diagnostic and therapeutic applications.

U.S. Department of Energy

NorthStar Announces FDA Approval for ^{99}Mo Production Capacity

NorthStar Medical Radioisotopes, LLC (Beloit, WI), a producer and distributor of radiopharmaceuticals, announced on January 6 that the U.S. Food and Drug Administration (FDA) had approved its application for producing ^{99}Mo from concentrated ^{98}Mo, as well as related software updates for the RadioGenix ^{99m}Tc generator system. Processing of concentrated ^{98}Mo targets increases production capacity for ^{99}Mo up to 4 times that of the company's current technology and enables the supply of higher activity source vessels to support enhanced radiopharmacy efficiencies. The process uses natural

molybdenum, which is ~24% ^{98}Mo, that has been concentrated to be up to 98% ^{98}Mo, to produce ^{99}Mo using neutron capture technology. FDA approval was granted through a Prior Approval Supplement to NorthStar's original RadioGenix System New Drug Application, which was approved in 2018. The company indicated it would begin shipments of larger capacity, multisized source vessels to customers "in the coming days" after the announcement.

"NorthStar and its partners at the University of Missouri Research Reactor (MURR) are proudly leading the way as the only commercialized producer of ^{99}Mo in the United States," said Stephen Merrick, President and Chief Executive Officer of NorthStar. "This approval of production utilizing concentrated ^{98}Mo and the related RadioGenix System software updates is a transformational event for NorthStar Medical Radioisotopes and a key milestone in significantly increasing domestic production and capacity of nonuranium-based ^{99}Mo for the United States. . . . The ability to provide our customers with a range of higher activity source vessels (7.5, 12, 15, and 19 Ci) will help drive efficiencies in radiopharmacy operations and patient access to ^{99m}Tc, which informs more than 40,000 U.S. health care decisions daily. . . . In conjunction with this approval, we also wish to recognize the important support that our partners at MURR, with whom we jointly produce ^{99}Mo in Columbia, MO, have had in helping to progress concentrated ^{98}Mo development."

NorthStar Medical Radioisotopes, LLC

TRIUMF Partners to Expand Access to ^{225}Ac

TRIUMF, Canada's national particle accelerator center (Vancouver), announced on December 16 a new research partnership with Fusion Pharmaceuticals (Hamilton, Canada) to expand production and availability of ^{225}Ac. The partnership is intended to increase availability of cyclotron-produced ^{225}Ac, bolster the development pipeline from basic sciences to clinical applications, and strengthen Canada's role in isotope production and research. The agreement will provide TRIUMF with funding to make the upgrades needed to scale up production of ^{225}Ac; in return, Fusion will receive increased research and development access to this promising isotope.

"Today's announcement marks an important step in positioning Canada to play a leading role in the development and deployment of next-generation radiotherapies, and in ensuring that researchers and patients around the world have a stable supply of life-saving medical isotopes," said Jonathan Bagger, PhD, Director of TRIUMF. "Enabled by decades of public investment in TRIUMF's infrastructure and research programs, this collaboration recognizes the laboratory's capacity to drive innovation, moving this promising treatment closer to market."

"TRIUMF and the wider nuclear medicine research community are working hard to usher in this new generation of radiotherapies for fighting cancer and other diseases," said Paul Schaffer, PhD, TRIUMF Associate Laboratory Director of Life Sciences. "Targeted α therapies, including those that employ ^{225}Ac, show some of the most promising results due to their ability to effectively deliver therapeutic doses of disease-killing radioactive payloads while leaving healthy parts of the body generally unaffected."

Despite the documented promise of ^{225}Ac in therapy, supplies are limited because the radioisotope does not occur naturally. In 2015, Schaffer noted that significant amounts of ^{225}Ac were present in TRIUMF's spent research targets as a result of spallation. Using particle accelerators at TRIUMF to produce ^{225}Ac has numerous advantages over the various legacy methods that rely on reactors or weapons, notably the ability to create consistent, scalable quantities of the isotope on demand.

With both its existing infrastructure as well as the new capacity that will be added through its new Institute for Advanced Medical Isotopes, TRIUMF is positioned to support partners such as Fusion Pharmaceuticals in accelerating the development of next-generation therapeutics.

TRIUMF

ARTMS ^{68}Ga-PSMA-11 Collaborations

ARTMS Inc. (Vancouver, BC) announced 2 international collaborations in January targeting improvement of ^{68}Ga-prostate-specific membrane antigen (PSMA)-11 production for PET imaging in prostate cancer. On January 12 the company announced that, working with Telix Pharmaceuticals Limited (Indianapolis, IN), they had successfully produced Telix's prostate cancer imaging product, TLX591-CDx (Kit for preparation of ^{68}Ga-PSMA-11), using multicurie quantities of cyclotron-produced ^{68}Ga via the ARTMS proprietary Quantum Irradiation System (QIS) solid target system. The testing demonstrated a 6-hour stability for TLX591-CDx. Testing exceeded relevant quality control standards for both low- (50 and 100 mCi) and mid-level output (>2,500 mCi) ^{68}Ga production runs. The "cold kit" format of TLX591-CDx enables rapid radiolabeling at room temperature with high radiochemical purity and production consistency. One week later, ARTMS announced with Isotopia Molecular Imaging (Petach Tikva, Israel) the successful radiolabeling of Isotopia's prostate cancer imaging kit product, PSMA-11, with >2 Ci of cyclotron-produced ^{68}Ga using the ARTMS QIS solid target system. Testing again exceeded targeted quality expectations.

ARTMS Inc.

FTC to Study Physician Group and Health Care Mergers

The Federal Trade Commission (FTC) on January 14 announced the issuance of orders to 6 health insurance companies to provide information that will allow the agency to study the effects of physician group and health care facility consolidation that occurred from 2015 through 2020. The study is part of a broader initiative announced in September 2020 by the FTC Bureau of Economics to revamp its merger retrospective program, with a goal to encourage economists both inside

and outside the agency to carry out more retrospective studies to test analytic tools and strengthen enforcement efforts.

The 6 companies receiving orders from the FTC were: Aetna Inc., Anthem, Inc.; Florida Blue; Cigna Corporation; Health Care Service Corporation; and United Healthcare. These orders seek patient-level commercial claims data for inpatient, outpatient, and physician services, including imaging data, in 15 U.S. states from 2015 through 2020. These data will help the FTC assess the impact of physician consolidation during this period, including physician practice mergers and hospital acquisitions of physician practices. It should also allow the FTC to assess the impact of health care facility consolidation during this period.

In a press release, the FTC noted that study results should aid the FTC enforcement mission by providing much more detailed information than is currently available about how physician practice mergers and health care facility mergers affect competition. The study results will also aid policy makers by providing evidence documenting how mergers and acquisitions of physician groups and health care facilities affect health care markets.

U.S. Federal Trade Commission

Sleep, Attention, and Experience in Image Reading

In an article e-published on January 19 ahead of print in the *Journal of the American College of Radiology,* Alshabibi et al., from the University of Sydney Cumberland Campus (Lidcombe, Australia), the College of Applied Medical Sciences of King Saud University (Riyadh, Saudi Arabia), and the Australian Council on Healthcare Standards (Ultimo), reported on a study intended to examine whether radiologists' mammogram reading performance varied relative to the number of hours they had been awake and/or the number of hours slept the night before. Participants were categorized as more and less experienced (reading $\geq$2,000 or $<$2,000 studies/year, respectively). The authors found that hours awake significantly influenced lesion sensitivity for less experienced participants. Those awake for $<$2 h had significantly lower sensitivity than those awake for 8–10 hours. In addition, less experienced radiologists with $\leq$6 h of sleep had significantly lower accuracy than those with $>$6 h of sleep. No statistically significant findings were correlated with sleep/awake time in the more experienced groups. "More experienced radiologists, despite the added responsibilities and pressure to read more images in less time, develop coping mechanisms to withstand the pressure and manage their fatigue," Alshabibi told *Radiology Business.* "A lack of this skill exacerbates the effects of fatigue in less experienced individuals. Moreover, novices tend to be less aware of their own limitations than experts, thus failing to employ fatigue-relieving mechanisms."

Journal of the American College of Radiology
Radiology Business

Each month the editor of Newsline selects articles on diagnostic, therapeutic, research, and practice issues from a range of international publications. Most selections come from outside the standard canon of nuclear medicine and radiology journals. These briefs are offered as a monthly window on the broad arena of medical and scientific endeavor in which nuclear medicine now plays an essential role. The lines between diagnosis and therapy are sometimes blurred, as radiolabels are increasingly used as adjuncts to therapy and/or as active agents in therapeutic regimens, and these shifting lines are reflected in the briefs presented here. We have also added a small section on noteworthy reviews of the literature.

^{225}Ac-PSMA-617 After ^{177}Lu-PSMA in mCRPC

Feuerecker et al. from the Technical University of Munich/German Cancer Consortium (DKTK), the German Cancer Research Center (DKFZ) (Heidelberg), the European Commission, Joint Research Centre (Karlsruhe), and University Hospital Heidelberg (all in Germany) reported on December 5 ahead of print in *European Urology* on a retrospective study of the safety of ^{225}Ac–prostate-specific membrane antigen (PSMA)–617 radioligand therapy in metastatic castrate-resistant prostate cancer (mCRPC) in men experiencing disease progression after ^{177}Lu-PSMA therapy. The study included 26 patients with a median of 6 previous treatment regimens, who were scheduled to receive ^{225}Ac-PSMA-617 every 8 wk until progression or intolerance resulting from toxicities/side effects. The participants received a median number of 2 cycles at a median activity of 9 MBq. In 17 patients, a ≥50% drop in prostate-specific antigen (PSA) was seen. The median PSA progression-free survival, clinical progression-free survival, and overall survival periods for all participants were 3.5, 4.1, and 7.7 mo, respectively. Hematologic grade 3 and 4 toxicities included anemia (35% of participants), leukopenia (27%), and thrombocytopenia (19%), with all patients experiencing grade 1 or 2 xerostomia. The study was halted for 2 patients as a result of hematologic toxicities and for 6 as a result of xerostomia. Liver metastases were associated with shorter progression times and overall survival. The authors concluded that "^{225}Ac-PSMA-617 showed measurable antitumor effect after ^{177}Lu-PSMA failure in late-stage mCRPC," with side effects and toxicities (including xerostomia) limiting study length in about a third of patients.

European Urology

Outcomes and Molecular Profiling with ^{225}Ac-PSMA-617

In an article published on December 19 ahead of print in *Urologic Oncology*, van der Doelen et al. from Radboud University Medical Center/Radboud University Medical Center (Nijmegen, The Netherlands), the European Commission, Joint Research Centre (Karlsruhe, Germany), University Hospital Heidelberg (Germany), and the Technical University of Munich (Germany) reported on the efficacy, quality of life considerations, and pretherapeutic biomarkers associated with ^{225}Ac–prostate-specific membrane antigen–617 (^{225}Ac-PSMA-617) treatment in metastatic castrate-resistant prostate cancer (mCRPC). Thirteen men were included in the trial. Median overall survival was 8.5 mo but was 1.3 mo for those who had previously undergone ^{177}Lu-PSMA therapy and 12.6 mo for those who had not. Prostate-specific antigen level decreases of ≥90% were seen in 6 (46%) patients and ≥50% in 9 (69%) patients. Of the 6 patients who were evaluable by CT, 50% showed partial responses. ^{68}Ga-PSMA-11 PET/CT imaging was available in 7 patients, with 6 (86%) showing partial responses according to PERCIST and all 7 showing >90% total tumor volume reduction. No grade 3 or 4 toxicities were observed, but all participants experienced varying degrees of xerostomia, which persisted in follow-up. Patients reported clinically relevant decreases in pain as well as quality of life improvement. Biopsies from several patients were analyzed with immunohistochemistry and next-generation sequencing, with results indicating that individuals with higher tissue PSMA expression or DNA damage repair alterations (potential predictive biomarkers) tended to have longer overall survival. The authors summarized their findings that targeted α therapy with ^{225}Ac-PSMA-617 resulted in "remarkable survival and biochemical responses in advanced mCRPC patients."

Urologic Oncology

Reduced PET/CT Scan Times in Lymphoma

Weber et al. from the University of Duisburg–Essen/University Hospital Essen, the German Cancer Consortium (DKTK) (Essen), and Siemens Medical Solutions USA, Inc. (Erlangen, all in Germany) reported on January 14 in *BMC Cancer* (2021;21[1]:62) on a study assessing the feasibility of reduced scanning times in evaluation of lymphoma, where the superior accuracy and sensitivity of ^{18}F-FDG PET/CT in comparison to morphologic imaging alone leads to an upstaging in up to 30% of patients. The study included data from 20 lymphoma patients (indications: initial staging, 6; after systemic treatment, 12; and for suspicion of recurrence, 2) who underwent imaging on a Siemens Biograph Vision using continuous bed motion with total scan times of 15 minutes (for reference acquisition data) and 5 minutes (for the reduced acquisition protocol). The resulting datasets were reconstructed in multiple ways for lesion detectability by blinded assessment, lesion image quantification, and image noise. No changes in staging were observed between data acquired at different scan times, with all defined regions correctly classified in the images. Lesion quantification was acceptable. Image noise increased in the shorter scans from 7.1% to 11.0% (reconstructed with 4 iterations) and from 4.7% to 7.2% (reconstructed with 2 iterations). The authors concluded

that "these results suggest that scan time duration or administered tracer activity can be reduced 3-fold without compromising diagnostic performance" and that larger trials are needed to confirm and elaborate on these results. They highlighted the potential benefits of shorter scan times and reduced tracer activity, including higher patient throughput, cost efficiency, and a reduction in radiation exposure in the large number of younger lymphoma patients.

BMC Cancer

PET/CT in Langerhans Cell Histiocytosis

Ferrell et al. from the University of Cincinnati College of Medicine and Cincinnati Children's Hospital Medical Center (both in OH) reported on January 14 ahead of print in *Pediatric Blood & Cancer* on a retrospective study of discrepancies between PET/CT and conventional imaging in patients with Langerhans cell histiocytosis (LCH). The study included 107 ^{18}F-FDG PET/CT images acquired in individuals with histopathologically confirmed LCH from a single institution over a 10-y period, as well as MR, CT, and other imaging acquired during clinical care. Discrepancies between PET/CT and conventional imaging were seen in 53 instances. In 13 instances, increased uptake on PET was not correlated with any identifiable lesion on conventional imaging. On 40 occasions, conventional imaging identified lesions where no increased uptake was seen on PET. The authors concluded that "^{18}F-FDG PET/CT is vital in the evaluation of LCH lesions given its ability to detect LCH lesions not detectable on conventional imaging modalities, as well as its ability to distinguish metabolically active from inactive disease" and thereby avoid unnecessary treatment. They noted that MRI and diagnostic CT remain useful adjunctive tests for identification of central nervous system and lung lesions.

Pediatric Blood & Cancer

PSMA-Targeting Ligands for Intraoperative Applications

In an article in the January 1 issue of *Theranostics* (2021;11[4]:1527-1541), Derks et al. from Radboud University Medical Center/Radboud University Nijmegen (Nijmegen, The Netherlands), Prosper Clinics (Nijmegen, The Netherlands), Canisius Wilhelmina Hospital (Nijmegen, The Netherlands), and University Hospital Bonn (Germany) reported on the development and characterization of photosensitizer-based multimodal ^{111}In-DOTA(GA)-IRDye700DX–prostate-specific membrane antigen (PSMA) ligands, with varying molecular composition, for use in intraoperative radiodetection, fluorescence imaging, and targeted photodynamic therapy of prostate cancer lesions. Initial studies in xenografted tumor models and human prostate cancer biopsies indicated the PSMA specificity of the ligand and allowed optimization with the addition of the IRDye700DX photosensitizer and other modifications to increase uptake in PSMA-expressing tumors. An additional incubation study on human tumor biopsies confirmed PSMA specificity. The authors highlighted the potential of this approach for reducing incomplete resection rates.

Theranostics

^{18}F-PSMA-1007 PET-Based Contouring Techniques

Spohn et al. from the Medical Center/University of Freiburg and the German Cancer Consortium (DKTK) Partner Site Freiburg (both in Germany) reported on December 7 in *Frontiers in Oncology* (2020;10:600690) on a study comparing manual and semiautomatic ^{18}F–prostate-specific membrane antigen (PSMA)–1007 PET-based contouring techniques for intraprostatic tumor delineation. The prospective study included 10 patients with primary prostate cancer who underwent ^{18}F-PSMA PET imaging before radical prostatectomy. The resulting images were contoured manually with PET scaling at $SUV_{min–max}$ of 0–10 performed by 3 teams with varying levels of reader experience; and semiautomatic contouring using SUV_{max} thresholds of 20%–50%. Coregistered histopathologic gross tumor volumes were used as standards of reference. Interobserver agreement on manual contouring was good, with derived volumes showing no statistical differences with the standard of reference as well as high sensitivities (median, 87%; range, 84%–90%) and specificities (median, 96%; range, 96%–100%). The best-performing semiautomatic contour (gross tumor volume, SUV_{max} 20%) achieved high sensitivity (median, 93%) and specificity (median, 96%). The authors concluded that both "manual contouring with PET scaling $SUV_{min–max}$ 0–10 and semiautomatic contouring applying a threshold of 20% of SUV_{max} achieved high sensitivities and very high specificities and are recommended for ^{18}F-PSMA-1007 PET-based focal therapy approaches." In addition, "semiautomatic approaches applying thresholds of 30%–40% of SUV_{max} are recommended for biopsy guidance."

Frontiers in Oncology

Cerebral ^{99m}Tc-TRODAT-1 SPECT in PD

In an article published on December 23 in *Medical Science Monitor*, Ariona et al. from the Hospital Israelita Albert Einstein and the Federal University of São Paulo (both in São Paulo, Brazil) reported on the use of cerebral ^{99m}Tc-TRODAT-1 SPECT imaging of dopamine transporters in patients with suspected Parkinson disease (PD) or clinically unclear parkinsonism. The study also included a brief questionnaire from referring physicians (the majority of whom were neurologists) to assess the scans' utility in clinical management decisions. Among the indications for requested scans were evaluation or confirmation of dopaminergic denervation (69%), differentiation of PD from essential tremor (10%), and differentiation of degenerative from drug-induced parkinsonism (6%). Resulting analysis indicated that ^{99m}Tc-TRODAT-1 SPECT was useful in 85% of cases, changing management in 75% of patients. "Inappropriate use" of dopamine transporter imaging was identified in 5% of cases. The authors concluded that this study "demonstrated that brain scintigraphy with the dopamine transporter ligand ^{99m}Tc-TRODAT-1 may influence diagnostic or therapeutic interventions" and that Brazilian physicians who requested the exam were considering these results in clinical decision making.

Medical Science Monitor

Quantitative PET/CT Dynamic Perfusion and SABR in Lung Cancer

Yang et al. from the University of Western Ontario (London), Lawson Health Research Institute (London), London Regional Cancer Program, London Health Sciences Centre, and the Sunnybrook Health Sciences Centre (Toronto; all in Canada) reported on January 13 in *Radiation Oncology* (2021;16[1]:11) on a study designed to develop a predictive model for true pathologic complete response to stereotactic ablative radiation therapy (SABR) using imaging-based biomarkers from dynamic ^{18}F-FDG PET and CT perfusion. The study included 26 patients with early-stage non–small cell lung cancer treated with SABR before surgical resection. Dynamic ^{18}F-FDG PET and CT perfusion imaging was performed before and 8 wk after SABR. PET provided SUV_{max} and SUV_{mean} and kinetic parameters, and CT perfusion measured blood flow, blood volume, and vessel permeability surface product. A resulting predictive model incorporating these data was compared to RECIST and PERCIST. The model identified 3 response groups based on tumor blood volume before SABR (threshold = 9.3 mL/100 g) and change in SUV_{max} (threshold, –48.9% change). The highest true pathologic complete response rate of 92% was observed in the group with corresponding values of <9.3 mL/100 g and change in SUV_{max} <–48.9% after SABR. The model achieved excellent pathologic complete response prediction (concordance: 0.92), whereas the corresponding values for RECIST and PERCIST were poor (concordance: 0.54 and 0.58, respectively).

Radiation Oncology

Postdiurectic ^{68}Ga-PSMA-11 PET/CT in Indeterminate Lesions

In an article in the December issue of the *Asian Pacific Journal of Cancer Prevention* (2020;21[12]:3719-3723) Ghadanfer et al. from Kuwait University, the Kuwait Cancer Control Center, the Sheikh Jaber Al Ahmad Al Sabah for Nuclear Medicine and Molecular Imaging Center (Kuwait), and Government College University (Faisalabad, Pakistan) evaluated the effect of diuretic-assisted ^{68}Ga–prostate-specific membrane antigen (PSMA) PET/CT on image quality and clinical interpretation of indeterminate/equivocal lesions in pre-Lasix imaging of prostate cancer. The study included 45 men who underwent baseline ^{68}Ga-PSMA-11 imaging 45–60 min after tracer injection followed by a post-Lasix administration study at ±15 minutes. Image data were analyzed, and experienced physicians evaluated lesion detectability and features that could affect clinical interpretation. Imaging in 12 patients was negative and in 33 indicated metastases. Thirty-six percent of the metastatic scans included indeterminate/equivocal lesions. Of these, the postdiuretic study produced false-negative findings in 7 (16%), better delineation of lesions in 10 (22%), and better confidence in reporting lesions as abnormal in 5 (11%), with an overall 11 (24%) cases showing increases in the number of the lesions after the Lasix study. Additional analyses indicated significantly improved contrast-to-noise ratios in the post-Lasix imaging (by 49.6% ± 24.5%), where substantial agreement was also noted between physicians when comparing lesion clarity and delineation. The authors concluded that postdiuretic ^{68}Ga-PSMA imaging at ±15 min "clears the unwanted activity in the urinary tract which in turn improves the contrast-to-noise ratios, thus leading to decline in false-positive findings, improved diagnostic certainty of physician, and better detection of indeterminate lesions."

Asian Pacific Journal of Cancer Prevention

GLP-1 R–Targeted Imaging in Insulinoma

Shah et al. from Seth GS Medical College/KEM Hospital (Mumbai, India), New York Medical College/Metropolitan Hospital Center (NY), and Tata Memorial Centre (Mumbai, India) reported on January 1 ahead of print in *Clinical Endocrinology (Oxford)* on a systematic review of the published English literature on the utility of glucagon-like peptide-1 receptor (GLP-1 R)–targeted imaging in insulinoma, with an accompanying individual patient data metaanalysis and calculation of performance parameters for histopathologic diagnosis of insulinoma. For the metaanalysis, a total of 179 cases (316 lesions) reported in 16 publications were included. For insulinoma localization, GLP-1 R–targeted PET/CT (both sensitivity and positive predictive value, 94%) performed better than GLP-1 R–targeted SPECT/CT (sensitivity, 63%; positive predictive value, 94%). Sensitivity was lower in malignant insulinomas, and specificity was higher in cases with multiple endocrine neoplasia type-1 syndrome. A few patients showed false-positive uptake in Brunner's gland, normal pancreas, and other β-cell pathologies and false-negative results in pancreatic tail lesions/malignancy with GLP-1 R–targeted imaging. True-negative results indicated the correct diagnosis of other endogenous hyperinsulinemic hypoglycemia subtypes. The authors concluded that for insulinoma localization, GLP-1 R–targeted PET/CT should be preferred over GLP-1 R–targeted SPECT/CT because of higher sensitivity and specificity, with certain false-positive and -negative limitations.

Clinical Endocrinology (Oxford)

PET/CT and CECT in Recurrent Gastric Cancer

In an article in the February issue of *Experimental and Therapeutic Medicine* (2021;21[2]:164) Zhang et al. from the Ninth People's Hospital of Chongqing (China) reported on a metaanalysis designed to evaluate the accuracy of ^{18}F-FDG PET/CT and contrast-enhanced CT for primary TNM staging and diagnosis of recurrent gastric cancers. The systematic search resulted in inclusion of a total of 58 studies with 9,997 patients. The sensitivity and specificity for nodal staging of gastric cancer were 49% and 92%, respectively, for ^{18}F-FDG PET/CT and 67% and 86%, respectively, for contrast-enhanced CT. The sensitivity and specificity for metastasis staging were 56% and 97%, respectively, for ^{18}F-FDG PET/CT and 59% and 96%, respectively, for contrast-enhanced CT.

The pooled sensitivity and specificity for diagnosing disease recurrence were 81% and 83%, respectively, for ^{18}F-FDG PET/CT and 59% and 96%, respectively, for contrast-enhanced CT. The authors concluded that although both ^{18}F-FDG PET/CT and contrast-enhanced CT were highly useful for diagnosing recurrent gastric cancer, "these techniques cannot be used to exclude or confirm the presence of lymph node metastases or recurrent gastric cancer tumors but can be used for the confirmation of distal metastasis."

Experimental and Therapeutic Medicine

Reviews

Review articles provide an important way to stay up to date on the latest topics and approaches through valuable summaries of pertinent literature. The Newsline editor recommends several general reviews accessioned into the PubMed database in December, January, and February. Murray and Du, from the Royal Marsden NHS Foundation Trust and Institute of Cancer Research (Sutton, UK), provided an overview of "Systemic radiotherapy of bone metastases with radionuclides" in the February issue of *Clinical Oncology (Royal College of Radiology)* (2021;33: 98–105). In an article in the December issue of *Translational Andrology and Urology* (2020;9:2908–2919), Kim, from the National Cancer Center (Goyang-si, Korea), reviewed the "Role of PET/CT in muscle-invasive bladder cancer." The "Role of nuclear imaging to understand the neural substrates of brain disorders in laboratory animals: Current status and future prospect" was outlined by D'Elia et al. from the National Research Council of Italy and University "Roma Tre" (both in Rome, Italy) in the December 11 issue of *Frontiers in Behavioral Neuroscience* (2020;14:594509). Dev et al. from the Massachusetts General Hospital/Harvard Medical School (Boston, MA) published "Neuroimaging in frontotemporal lobar degeneration: Research and clinical utility" in *Advances in Experimental Medicine and Biology* (2021;1281:93–112). In the January 1 issue of *Nanotheranostics* (2021;5:90-112), Abousaway et al. from the Dana-Farber Cancer Institute/Harvard Medical School and Brigham and Women's Hospital/Harvard Medical School (Boston, MA) reported on "Noninvasive imaging of cancer immunotherapy." Sier et al. from the Leiden University Medical Center, the University of Twente (Enschede), UniQure (Amsterdam), and Percuros BV Leiden (all in The Netherlands), University Medicine Center Göttingen/Max-Planck-Institute for Experimental Medicine (Germany), and the University of Sheffield (UK) offered perspective on "Cell-based tracers as Trojan horses for image-guided surgery" in the January 13 issue of the *International Journal of Molecular Sciences* (2021;22:E755). In an article published on January 13 in *Diagnostics (Basel)* (2021;11:E117), Luining et al. from the Amsterdam University Medical Center (The Netherlands) reviewed "Nuclear imaging for bone metastases in prostate cancer: The emergence of modern techniques using novel radiotracers." Ha et al. from Korea University (Sejong, South Korea) reported on "Inhibitors of prostate-specific membrane antigen in the diagnosis and therapy of metastatic prostate cancer: A review of patent literature" on January 17 ahead of print in *Expert Opinion on Therapeutic Patents.*

(Continued from page 15N)

technologists who have questions about what they can and cannot do in their states.

All of SNMMI's advocacy work this year took place against the backdrop of COVID-19, and SNMMI led multiple discussions on the impact on nuclear medicine and molecular imaging. The Society participated in letter-writing campaigns with coalition partners to address hero's pay, personal protective equipment shortages, and regulatory relief requests. Finally, SNMMI acted to ensure that nuclear medicine technologists were included in initial vaccine phases.

SNMMI has taken many positive steps in achieving its advocacy goals in the past year, and we look forward to carrying on this important work in the coming year.