FROM THE LITERATURE

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.

^{223}Ra-Dichloride in High-Risk Osteosarcoma

In an article e-published on February 7 ahead of print in *Clinical Cancer Research*, Subbiah et al. from the University of Texas MD Anderson Cancer Center (Houston), Children's Hospital of Los Angeles (CA), and Baylor College of Medicine (Houston, TX) reported on a phase I dose escalation trial investigating ^{223}Ra-dichloride treatment in high-risk osteosarcoma and assessing the utility of PET and SPECT, as well as other metrics, in early-stage response prediction. The study included 18 patients (15 male, 3 female; ages 15–71 y) with progressive osteosarcoma and an indicator lesion on bone scintigraphy or ^{18}F-FDG or ^{18}F-sodium fluoride (^{18}F-NaF) PET. Patients underwent ^{18}F-FDG or ^{18}F-NaF PET or ^{99m}Tc-methylene diphosphonate SPECT at baseline, midstudy, and at the end of the study. They also underwent analyses of alkaline phosphatase and bone turnover markers at these timepoints. Subtypes of sarcomas included osteoblastic ($n = 7$), high-grade not otherwise specified ($n = 7$), chronoblastic ($n = 2$), fibroblastic ($n = 1$) and giant cell ($n = 1$). Disease locations included spine ($n = 12$), pelvis ($n = 10$), ribs ($n = 9$), extremities ($n = 7$), and skull ($n = 2$). ^{223}Ra-dichloride dose escalations were set at 50, 75, and 100 kBq/kg, with 3 patients enrolled at the lowest dose, 3 at 75 kBq/kg, and 12 at the highest dose. Patients received 1–6 cycles (cumulative doses, 6.84–57.81 MBq) that were reasonably well tolerated, despite some adverse effects noted, including 1 grade 3 thrombocytopenia resulting in bronchopulmonary hemorrhage. ^{18}F-NaF PET identified more sites of metastases and bone lesions than ^{18}F-FDG PET/CT, but the latter better characterized soft-tissue features. One patient showed a clear metabolic response on both ^{18}F-FDG and ^{18}F-NaF PET/CT, verified on SPECT. Four patients showed mixed responses. Median overall survival time was 25 wk. Of note, ^{223}Ra-dichloride was shown in 1 patient to cross the blood–brain barrier. The authors concluded that this first evaluation of safety and efficacy of an α particle in high-grade osteosarcoma indicated that "the recommended phase II dose for $^{223}RaCl_2$ in osteosarcoma is 100 kBq/kg monthly (twice the dose approved for prostate cancer), with minimal hematologic toxicity, setting the stage for combination therapies."

Clinical Cancer Research

ILROG Guidelines for Imaging in Lymphoma Radiation Treatment

Mikhaeel et al. from Guy's Cancer Centre/King's College London University (UK), the University of Texas MD Anderson Cancer Center (Houston), the Johns Hopkins University School of Medicine (Baltimore, MD), the Rigshospitalet/University of Copenhagen (Denmark), Princess Margaret Cancer Centre (Toronto, Canada), the University of Muenster (Germany), the Medical University of Vienna (Austria), the Chinese Academy of Medical Sciences/Peking Union Medical College (Beijing, China), and Memorial Sloan Kettering Cancer Center (New York, NY) reported on February 11 ahead of print in the *International Journal of Radiation Oncology, Biology, Physics* on International Lymphoma Radiation Oncology Group consensus guidelines for best practices in imaging in pretreatment evaluation, treatment choice, radiation therapy target volume delineation, and treatment verification and delivery in patients with lymphoma. The group pointed to the evolution of radiation treatment fields from large extended areas to smaller site or nodal volumes, a transition that has been largely facilitated by advances in imaging technology and techniques. Among the 17 consensus guidelines: (1) PET/CT was recommended as the standard modality for staging and response assessment in ^{18}F-FDG–avid lymphomas, with baseline pretreatment PET/CT recommended as a best practice; (2) radiation oncologists were advised to familiarize themselves with the limitations of ^{18}F-FDG imaging and be aware of potentially confounding results; (3) in defining treatment targets with PET/CT, physicians were advised to carefully consider the anatomic information from CT; (4) PET/CT was highly recommended as a best practice for planning radiation volumes; and (5) in sites where MR imaging is useful, both PET/CT and MR scans were recommended to be coregistered with planning CT scans to guide target volume definition.

International Journal of Radiation Oncology, Biology, Physics

SPECT, EEG, and MEG in Epileptogenic Zone Localization

In an article e-published on February 12 ahead of print in the *Journal of Child Neurology*, Sachdev et al. from Dell Children's Medical Center of Central Texas (Austin), the University of Texas at Austin, the University of Texas Dell Medical School (Austin), and Texas Children's Hospital/Baylor College of Medicine (Houston) reported on a study to determine the relative efficacies of SPECT, electroencephalography (EEG), and magnetoencephalography (MEG) in localizing

epileptogenic zones in children with pharmacoresistant epilepsy. The retrospective study included 12 such patients who had proceeded to laser ablation. All had undergone either ^{99m}Tc-pertechnetate or ^{99m}Tc-bicisate SPECT and EEG; 6 had also undergone MEG. Ablation in 11 of the cases was considered to be palliative. On the 77 ^{99m}Tc-pertechnetate SPECT scans, 62.34% showed focal-onset zones. On the 45 ^{99m}Tc-bicisate SPECT scans, 66.7% showed focal-onset zones, suggesting that the type of radioisotope used was not a confounding factor in the study. SPECT showed more sensitivity and specificity than EEG and more specificity than MEG when compared with laser ablation outcomes. The authors concluded that "SPECT proved to be an efficacious form of localizing the epileptogenic zones in pediatric pharmacoresistant epilepsy patients by providing higher localization sensitivity than EEG and a more specific median concordance level than both EEG and MEG when held against laser ablation zones." They noted that a larger study, controlling for seizure location, is needed.

Journal of Child Neurology

PET/CT and Residual Disease in Oropharyngeal Cancer

de Ridder et al. from the Antoni van Leeuwenhoek–Netherlands Cancer Institute (Amsterdam), Verbeeten Instituut (Tilburg, The Netherlands), and the University of Amsterdam (The Netherlands) reported on February 13 ahead of print in the *European Archives of Oto-Rhino-Laryngology* on the value of posttreatment ^{18}F-FDG PET/CT in detecting local residual disease after chemotherapy and/or radiation therapy for oropharyngeal cancer. A total of 352 eligible patients were included in the study, with 94 undergoing PET/CT at 3 mo after treatment. These patients were classified as having complete or partial metabolic response on imaging (the latter defined as visually detectable metabolic activity above normal tissue background). ^{18}F-FDG PET/CT had a sensitivity of 100%, specificity of 85%, accuracy of 86%, and positive and negative predictive values of 38% and 100%. Patients with local residual disease saw significantly worse overall survival at 2 y than those without residual disease, and after additional analyses local residual disease remained a significant predictive factor for death. The authors concluded that because ^{18}F-FDG PET/CT had excellent performance in detection of residual disease, "examination under anesthesia today in the vast majority of the PET-negative cases is not necessary anymore."

European Archives of Oto-Rhino-Laryngology

PET/CT-Based Disease Assessment in RA

In an article e-published on February 16 in *Arthritis & Rheumatology*, Lee et al. from the Kyungpook National/University Chilgok Hospital (Daegu, South Korea) reported on correlation between PET-derived parameters and rheumatoid arthritis (RA) disease activity in joints and compared the reliability of PET/CT and clinical assessment in this setting. The study included 91 patients with active RA who underwent ^{18}F-FDG PET/CT and clinical assessment. Patients were divided into development (n = 69) and validation (n = 22) groups. The authors also reported on development of a disease activity score using PET-positive joints. In a total of 96 joints, PET positivity was significantly correlated with swollen and tender joint counts and with erythrocyte sedimentation rate. Intra- and interobserver reliabilities for PET were excellent, as was agreement between nuclear medicine physicians and rheumatologists. A significant correlation between the PET/disease activity score and erythrocyte sedimentation rate was confirmed in the validation group. The authors concluded that "PET/CT could serve as a sensitive and reliable method, complementing clinical assessment for evaluating disease activity in RA patients" and may also be applicable as a research tool in clinical trials.

Arthritis & Rheumatology

Dedicated Neck PET/CT in Thyroid Nodule Risk Assessment

Trimboli et al. from the Oncology Institute of Southern Switzerland (Bellinzona), the E.O. Ospedali Galliera (Genoa, Italy), the Kapodistrian University School of Medicine (Athens, Greece), Sapienza University of Rome (Italy), and La Pitié Salpêtrière Hospital/Sorbonne University (Paris, France) reported on February 11 ahead of print in *Clinical Endocrinology* on a study evaluating the reliability of ^{18}F-FDG PET/CT in stratifying the risk of malignancy in thyroid nodules. The study included 93 patients with 48 European Thyroid Imaging and Reporting Data System (EU-TIRADS) grade 4 and 45 EU-TIRADS grade 5 nodules. Twenty-six patients underwent thyroidectomy after fine-needle aspiration cytology suggested malignancy, 38 for inconclusive cytology, 27 because of large goiters, and 2 for high-risk lesions assessed at ultrasound. Histology showed 35 carcinomas and 58 benign lesions, with cancer diagnosed in 16.7% of EU-TIRADS 4 and 60% of EU-TIRADS 5 patients. ^{18}F-FDG PET/CT was positive in 33 of the 35 cancers (sensitivity, 94.5%) and negative in 31 of the 58 benign lesions (specificity, 53.4%). PET/CT was also positive in 7 of 8 EU-TIRADS 4 cancers and negative in 20 of 40 benign lesions, with PET/CT showing 85.7% sensitivity and 41.4% specificity at this disease grade. The authors concluded that "thyroid lesions classified as EU-TIRADS 4 and with no ^{18}F-FDG uptake could be ruled out from further examination, similar to other anamnestic and clinical suspicious factors of patients" and called for additional prospective and cost effectiveness studies.

Clinical Endocrinology

^{18}F-Albumin as a Biomarker of Antiangiogenic Tx Efficacy

In an article e-published on February 15 ahead of print in *Cancer Biotherapy & Radiopharmaceuticals*, Roy et al. from the National Institutes of Health (Bethesda and Rockville, MD) and Leidos Biomedical Research, Inc.

(Frederick, MD) reported on tumor distribution volume of the imaging agent ^{18}F-albumin in human tumor xenografts and investigated ^{18}F-albumin uptake in an antiangiogenic tumor model. Tumor distribution volumes were assessed at different time points in the xenografts, with U87MG tumors showing the highest uptake. ^{18}F-albumin uptake on PET in a U87MG tumor was assessed at 0, 7, 13, and 21 d after treatment with sunitib, and tumors were measured at each time point. After completion of imaging, tumor blood vessel counts and biodistributions were studied, and autoradiography of tumor tissues was acquired. PET imaging showed significant decreases in ^{18}F-albumin distribution volumes (–39%) at 7 d after treatment when compared with controls, but caliper-measured tumor volumes were not significantly decreased until d 14 and 21. At d 21 distribution volumes in the treatment group had decreased by 44%, which correlated with biodistribution measurement and immunohistochemistry findings. The authors concluded that "these data suggest that ^{18}F-albumin distribution volumes obtained by imaging may serve as an early biomarker of the effectiveness of antiangiogenic therapy and thus aid in patient management and treatment planning."

Cancer Biotherapy & Radiopharmaceuticals

PET and Distant Mets in Cervical Ca Staging

Lin et al. from Washington University in Saint Louis (MO) reported on February 9 ahead of print in the *International Journal of Gynecological Cancer* on a study describing the frequency and sites of distant metastatic disease at diagnosis in patients with cervical cancer as detected by ^{18}F-FDG PET. The retrospective study began with a database of 1,158 such patients over a 20-y period and focused on the 72 patients (6.2%) in whom PET showed ^{18}F-FDG–avid distant metastases at diagnosis. Patients were not surgically staged; however, biopsy to confirm metastatic disease was at the discretion of the treating physicians (27 patients, 38%). Of the ^{18}F-FDG PET–detected metastases, 35 (49%) were clinically apparent. Distant disease sites included lung (35%), multiple sites (25%), omentum (16.5%), bone (16.5%), and liver (7%). Twelve (17%) patients with distant disease did not display ^{18}F-FDG–avid lymph nodes. Median overall survival in those with distant ^{18}F-FDG–avid disease was 7 mo, with multiple-site disease showing the worst overall survival. The authors concluded that prospective investigation is needed to further explore the implications for use of PET in identifying distant metastases early in the course of cervical treatment and management.

International Journal of Gynecological Cancer

Transcriptomics, ^{18}F-FCH PET/CT, and HCC

In an article e-published on February 13 ahead of print in *Cancer Research*, Kwee et al. from the University of Hawai'i Cancer Center and the Queen's Medical Center (both in Honolulu, HI) reported on a study looking at correlations between the multiple molecular subtypes of hepatocellular carcinoma shown by transcriptomic analyses and molecular imaging subtypes categorized by differing choline metabolism on ^{18}F-fluorocholine (^{18}F-FCH) PET. The study included 41 patients with hepatocellular carcinoma who underwent ^{18}F-FCH PET/CT followed by surgery and gene expression profiling. The researchers used gene set analysis of previously published gene signatures to identify correlations with high and low ^{18}F-FCH uptake and looked for associations with overall survival. Ten gene sets related to hepatocellular carcinoma were significantly associated with high ^{18}F-FCH PET tumor uptake, including 3 different clinical molecular classification systems and 2 prognostic signatures that showed predictive value in the study cases. ^{18}F-FCH PET tumor avidity was associated with favorable characteristics based on these signatures and with lower overall mortality. Tumors with high tracer uptake were also enriched for genes involved in oxidative phosphorylation, fatty acid metabolism, peroxisome, bile acid metabolism, xenobiotic metabolism, and adipogenesis. The authors concluded that "these results provide a pathobiological framework to further evaluate ^{18}F-FCH PET/CT as a molecular and prognostic classifier in hepatocellular carcinoma."

Cancer Research

Tau PET in Autosomal Dominant AD

Gordon et al. from Washington University in St. Louis (MO), Banner Health (Phoenix, AZ), the Mayo Clinic (Rochester, MN), the University of Pittsburgh (PA), Indiana University (IN), the University of California, San Diego (CA), McGill University (Montreal, Canada), Emory University (Atlanta, GA), the University of Toronto (Ontario, Canada), Yale University School of Medicine (New Haven, CT), Avid Radiopharmaceuticals (Philadelphia, PA), Roche Pharma Research and Early Development (Basel, Switzerland), and Roche/Genentech Product Development (Basel, Switzerland) reported on February 11 ahead of print in *Brain* on a study of tau PET imaging in autosomal dominant Alzheimer disease (AD). The authors noted that "the heritability of the age of dementia onset tied to the specific mutations found in autosomal dominant AD families provides an elegant model to study the spread of tau across the course of the disease as well as the cross-modal relationship between tau and other biomarkers." The study focused on levels of tau PET binding in individuals with and without dominantly inherited AD using data from the Dominantly Inherited Alzheimer Network (DIAN), including 15 cognitively normal mutation noncarriers, 20 asymptomatic carriers, and 15 symptomatic mutation carriers. Depending on their groups, participants underwent assessments of amyloid-β (^{11}C-Pittsburgh compound PET [^{11}C-PiB]), tau (^{18}F-flortaucipir PET), glucose metabolism (^{18}F-FDG PET), and gray matter degeneration (MR imaging). A comparison group of 17 older adults with sporadic, late-onset AD also underwent tau PET imaging. In symptomatic patients from the DIAN group, tau PET binding was elevated throughout the cortex,

and although brain areas with tau PET binding overlapped with those in sporadic AD, these had a greater cortical involvement and higher levels of binding even with similar cognitive impairment. In these symptomatic DIAN individuals, tau PET binding was elevated in the temporal lobe and most markedly elevated in the precuneus and lateral parietal regions. Symptomatic mutation carriers also showed elevated tau PET binding in the basal ganglia. Binding of ^{18}F-flortaucipir on PET in symptomatic individuals was also correlated with other biomarkers, including markers of neurodegeneration. On ^{11}C-PiB imaging, amyloid-β was increased in both asymptomatic and symptomatic carriers compared to noncarriers, with ^{18}F-FDG PET glucose metabolism showing declines mainly in the symptomatic group. MR imaging showed structural degeneration in both asymptomatic and symptomatic DIAN cohorts. The authors noted that this study "provides the first insight into how tau PET, amyloid-β PET, glucose hypometabolism, and structural atrophy are related" in autosomal dominant AD. They concluded that "these results indicate that tauopathy plays a vital role in the pathophysiology of AD and that tau PET will have high utility in clinical trials and is a potential surrogate biomarker of clinical outcomes."

Brain

PET/CT Dosimetry for ^{131}I-MIBG Neuroblastoma Therapy

In an article e-published on February 13 ahead of print in *Medical Physics*, Seo et al. from the University of California, San Francisco reported on a study designed to assess the feasibility of reducing the number of ^{124}I-metaiodobenzylguanidine (^{124}I-MIBG) PET/CT scans needed for estimation of tumor and normal organ dose for ^{131}I-MIBG therapy of neuroblastoma. The researchers looked at percent of injected activity and tumor SUVs at 2 imaging time points (d 0 and 1) and correlated the results with time-integrated activity coefficients (TIACs) from full data at the standard 3 or 4 imaging time points. TIACS can serve as direct correlates with radiation dose (when the volume and radionuclide are known). Percentages and areas of injected activity were correlated not only with tumor and organ TIACS but also tumor and organ absorbed doses. Reasonable accuracy in estimating tumor doses for subsequent radiopharmaceutical therapy was achieved using imaging at only 2 time points. The images acquired at these time points (<48 h after radiopharmaceutical administration) were also seen as useful for diagnostic interpretation. This study was specific to ^{124}I-MIBG PET/CT pretreatment imaging for ^{131}I-MIBG therapy of neuroblastoma, but the authors noted that the methodology may be applicable to other imaging and therapeutic radionuclides after appropriate data analyses.

Medical Physics

PET/CT in H&N Cancer: Surgical Impact

Lowe et al. from the Mayo Clinic (Rochester, MN), Brown University (Providence, RI), University of Texas Southwestern Medical Center (Dallas, TX), Global Advanced Imaging (Little Rock, AR), Fox Chase Cancer Center (Philadelphia, PA), Washington University School of Medicine (St. Louis, MO), Massachusetts Eye and Ear Hospital (Boston), the University of Oklahoma (Oklahoma City), the Thomas Jefferson University (Philadelphia, PA), and the University of Arkansas for Medical Sciences (Little Rock) reported on February 15 ahead of print in the *Journal of Clinical Oncology* on results from American College of Radiology Imaging Network trial 6685 on the negative predictive value of ^{18}F-FDG PET/CT in N0 head and neck squamous cell carcinoma (HNSCC). The multicenter study included a total of 287 patients who were newly diagnosed (first-time) with HNSCC and had at least 1 clinically N0 neck side for which dissection was planned. ^{18}F-FDG PET/CT findings were compared with neck dissection results. PET/CT images and pathology results were available for 268 NO neck sides in 210 participants. On imaging, the negative predictive values specific to the nodal basins were 0.940 and 0.937 at prespecified cutoffs of 2.5 and 3.5, respectively. The optimal cutoff maximum SUV was 1.8, with a negative predictive value of 0.942. Taking into account information from PET/CT imaging, surgical treatment planning was changed in 51 of 234 participants (21%) compared with a PET/CT-blinded surgical plan. This led to dissection of additional nodal levels in 29 participants (12%) and to fewer dissected nodal levels in 12 participants (5%). PET/CT imaging in N0 necks was true-negative in 87% and false-negative in 13% of patients. The authors concluded that "these findings suggest that ^{18}F-FDG PET/CT may assist the clinician in deciding on the best therapy for the clinically N0 neck in HNSCC" and that "well-designed clinical trials should be performed to test the outcome of omitting neck dissection by using PET/CT."

Journal of Clinical Oncology

Amyloid PET and CSF Biomarkers in Memory Deficit

In an article e-published on February 5 ahead of print in *Clinica Chimica Acta*, Bouter et al. from the University Medical Center Göttingen (Germany), Georg-August-University (Göttingen, Germany), the German Center for Neurodegenerative Diseases (Göttingen), and the University of Aveiro (Portugal) reported on a study correlating cerebrospinal fluid (CSF) and imaging biomarkers with cognitive measurements of memory deficit. The study included 33 patients (13 women, 10 men; mean age, 68.4 ± 10.3 y) with suspected cognitive decline who underwent ^{18}F-florbetaben imaging as well as mini-mental state examinations and CSF amyloid-β (Aβ) concentration analysis for $A\beta_{40}$, $A\beta_{42}$, and $A\beta_{42/40}$. Global cortex SUV ratios on PET correlated highly with CSF $A\beta_{42/40}$ and moderately with $A\beta_{42}$ but not with $A\beta_{40}$. Both global cortex SUV ratios and $A\beta_{42/40}$ correlated with mini-mental state examination results. The authors concluded that these results "strengthen previous findings that CSF and PET reliably show amyloid plaque pathology" and that "a combination of CSF and imaging biomarkers in clinically and neuropsychologically

confirmed cognitive impairment considering the cognitive status seems to be the most accurate way to characterize AD patients to date."

Clinica Chimica Acta

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 January and February. In an article e-published on January 29 in *Frontiers in Medicine (Lausanne),* Donche et al. from Ghent University (Belgium) reported on "The path toward PET-guided radiation therapy for glioblastoma in laboratory animals: A mini-review." Lindenberg et al. from the National Cancer Institute (Bethesda, MD) and Aarhus University Hospital (Denmark) reviewed "PET imaging in renal cancer" in an article e-published on February 11 ahead of print in *Current Opinion in Oncology.* Weitzman and Sherman from the University of Texas MD Anderson Cancer Center (Houston) provided an overview of "Novel drug treatments of progressive radioiodine-refractory differentiated thyroid cancer" in the March issue of *Endocrinology and Metabolism Clinics of North America* (2019 Mar;48[1]:253–268). In an article e-published on February 8 ahead of print in *Neuro-Oncology* Schiff et al. from the University of Virginia (Charlottesville), Erasmus MC Cancer Institute (Rotterdam, The Netherlands), the Cleveland Clinic (OH), the German Cancer Research Center (Heidelberg, Germany), the University of North Carolina (Chapel Hill), Leiden University Medical Center (The Netherlands), the University of California Los Angeles, the Mayo Clinic (Rochester, MN), Mannheim University Proton Center (Germany), Apollo Proton Cancer Center (Chennai, India), the National Institutes of Health (Bethesda, MD), and the Dana-Farber Cancer Institute (Boston, MA) described "Recent developments and future directions in adult lower-grade gliomas: Society for Neuro-Oncology (SNO) and European Association of Neuro-Oncology (EANO) consensus." Rowe et al. from the Johns Hopkins University School of Medicine (Baltimore, MD) reported on January 27 in *Annual Review of Medicine* (2019;70:461–477) on "Imaging of prostate-specific antigen with small-molecule PET radiotracers: From the bench to advanced clinical applications." In an article e-published on February 10 ahead of print in *Medicinal Research Reviews*, Xu, an independent radiopharmaceutical consultant, and Li, from SOFIE Biosciences (Somerset, NJ), reviewed "Imaging metabotropic glutamate receptor system: Application of positron emission tomography technology in drug development." Ylli et al. from MedStar Health Research Institute (Washington, DC) offered an overview of "Conventional radioiodine therapy for differentiated thyroid cancer" in the March issue of *Endocrinology and Metabolism Clinics of North America* (2019;48[1]:181–197). In an article released online on January 31 in *Cells*, Zella et al. from the Ruhr-University Bochum, Katholische Kliniken Ruhrhalbinsel (Essen), and University Medical Center Göttingen (all in Germany) described "Novel immunotherapeutic approaches to target alpha-synuclein and related neuroinflammation in Parkinson's disease."

(Continued from 11N)

we—the society, individual members, and all stakeholders—also must advocate for the most appropriate use of imaging based on evidence that can lead to better outcomes for patients. It is important to remember that our value is defined by quality, outcomes, service capacity, accessibility, and other metrics relative to cost.

A multipronged approach is essential to bringing the highest value of our specialty to patient care. The SNMMI Value Initiative is fully investing in these efforts so that our field can move forward robustly. I appreciate everyone's efforts to advance the ever-increasing value of nuclear medicine and molecular imaging.