and (5) reducing the regulatory burden on nuclear medicine billing, because current complexity requires extensive time and training for providers and must also be a burden for Medicare and its contractors. CMS will publish the final rule around October 1, 2018.

SNMMI

WINM Meet at SNMMI Annual Meeting

Women in Nuclear Medicine (WINM) held its annual breakfast and educational events on June 11 as part of the SNMMI Annual Meeting in Denver, CO. Leonie Gordon, MD, chair of WINM, led the group. The breakfast event featured Cara Ferreira, PhD, MBA, a management consultant at McKinsey & Company, who discussed issues related to women in the workplace. Following this event, the WINM attendees walked as a group to reserved seating at the SNMMI plenary session.

During the 2017–2018 academic year, WINM will focus on mentor/mentee matchups and other special projects, including awards and recognition. "WINM members can make an impact in marketing, education, and in providing great service to patients. Although the presence of women approaches 50% of the SNMMI membership, there are very few women in leadership positions," said Gordon. "We need to identify, grow, and promote women leaders within the organization. It is my hope that the WINM committee can in some way be part of or influence the SNMMI House of Delegates and Board to help with this effort."

The WINM committee is charged with promoting women physicians and scientists in nuclear medicine and molecular imaging, fostering development of professional interests, addressing problems encountered in the practice of nuclear medicine, promoting leadership and career development in women, raising awareness of scientific contributions of women in nuclear medicine, recognizing the challenges of balancing career and family, promoting fair and equitable treatment, and improving the climate for women in nuclear medicine in all stages of their careers.

Women in Nuclear Medicine

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.

^{18}F-DPA-714 PET and Zika Neuroinflammation

Kuszpit et al. from the U.S. Army Medical Research Institute of Infectious Diseases (Frederick, MD) and the National Heart, Lung, and Blood Institute (Bethesda, MD) reported on September 12 ahead of print in *Molecular Imaging and Biology* on a study evaluating the utility of ^{18}F-DPA-714, a translocator protein 18-kDa radioligand, in detecting and quantifying neuroinflammation in the brains of Zika virus–infected mice. The researchers studied Zika virus pathogenesis in wild-type C57BL/6 mice that were administered an antibody to inhibit type I interferon signaling. PET imaging was performed on d 3, 6, and 10 after infection, with serial analyses for histology, microgliosis, and detection of viral RNA. In the Zika-infected mice, viral titers in the brain increased from d 3 to 10 after antibody injection, during which period PET imaging showed a 2–6-fold increase in global brain neuroinflammation despite limited histopathologic detection of viral RNA. Significant increases in ionized calcium binding adaptor molecule-1 were also noted by d 10. The authors concluded that "the results of the current study demonstrate that global neuroinflammation plays a significant role in the progression of Zika virus infection and that ^{18}F-DPA-714 PET imaging is a sensitive tool relative to histology for the detection of neuroinflammation." They added that such PET imaging "may be useful in dynamically characterizing the pathology associated with neurotropic viruses and the evaluation of therapeutics being developed for treatment of infectious diseases."

Molecular Imaging and Biology

PET in FUO and IUO

In an article e-published on September 19 ahead of print in *Annals of the Rheumatic Diseases*, Schönau et al. from Friedrich-Alexander University Erlangen–Nürnberg and the Universitätsklinikum Erlangen (both in Germany) reported on ^{18}F-FDG imaging in elucidating underlying causes in patients with fever of unknown origin (FUO) and inflammation of unknown origin (IUO). The study included 240 patients (72, FUO; 142, IUO; 26 with FUO or IUO previously) who underwent ^{18}F-FDG PET/CT and standard clinical assessments. Imaging results were classified as helpful or nonhelpful in establishing a definitive diagnosis. Such diagnoses were achieved in 190 patients (79.2%), with leading diagnoses of adult-onset Still disease (15.3%) in FUO patients, large-vessel vasculitis (21.1%) and polymyalgia rheumatica (18.3%) in IUO patients,

and IgG_4-related disease (15.4%) in the group who had had previous FUO or IUO. PET was positive and determined to be helpful in 136 patients (56.7% of all patients and 71.6% of patients with final diagnoses). Additional analyses suggested that predictive markers for a diagnostic ^{18}F-FDG PET/CT were age >50 y, C-reactive protein level >30 mg/L, and absence of intermittent fever. The authors concluded that "^{18}F-FDG PET/CT scanning is helpful in ascertaining the correct diagnosis in >50% of the cases presenting with FUO and IUO."

Annals of the Rheumatic Diseases

^{11}C-Choline PET/CT and MR in Prostate Cancer Recurrence

Nehra et al. from the Mayo Clinic (Rochester, MN) reported on September 12 ahead of print in the *Journal of Urology* on a study assessing the ability of ^{11}C-choline PET/CT and multiparametric MR imaging to identify anatomic sites of recurrence among patients with prostate cancer with biochemical recurrence after radical prostatectomy and postoperative radiotherapy and/or androgen deprivation therapy. The study included 550 such patients: 108 who had undergone androgen deprivation therapy, 201 who had undergone radiation therapy, and 241 who had undergone both. All patients underwent both ^{11}C-choline PET/CT and multiparametric MR imaging after treatment, with sites of recurrence classified as local only (seminal vesicle bed/prostate fossa, vesicourethral anastomosis, and bladder neck) or distant metastatic disease. Seventy-seven patients (14%) experienced local recurrence, 411 (75%) had distant metastases only, and 62 (11%) had both types of recurrence. Additional analysis showed that radiotherapy or radiotherapy plus hormonal therapy were associated with increased risk of distant recurrence. Resulting data led the authors to conclude that the "combination of ^{11}C-choline PET/CT and multiparametric MRI successfully identified patterns of recurrence following postoperative radiotherapy, androgen deprivation therapy, or both at median prostate-specific antigen <4." They noted that half of the study group experienced local-only recurrence and/or low disease burden limited to pelvic lymph nodes, and that such patients may benefit from additional local therapy.

Journal of Urology

PET vs. BMB in Pediatric Malignancies

In an article e-published on September 13 ahead of print in *Pediatric Blood and Cancer*, Zapata et al. from The Children's Hospital of Philadelphia (PA), Nicklaus Children's Hospital (Miami, FL), MD Anderson Cancer Center (Houston, TX), Florida State University College of Medicine (Tallahassee), and the University of Texas Southwestern (Dallas) reported on a study comparing PET imaging and bone marrow biopsy in initial evaluation of bone marrow infiltration in pediatric cancers. The retrospective study included records from 69 patients (including children with diagnoses of Ewing sarcoma, rhabdomyosarcoma, neuroblastoma, and lymphoma) who had undergone both PET/CT imaging and bone marrow biopsy within a 4-wk interval and before treatment. Bone marrow infiltration was identified by PET/CT in 34 patients and by bone marrow biopsy in 18. The sensitivity and negative predictive value of PET/CT were both 100%. The authors noted that cases in which infiltration was not detected on biopsy were found to have abnormal marrow signal on PET/CT either focal or distant to the iliac crest. The authors concluded that PET/CT can "improve the precision of biopsy when used as a guiding tool" and proposed "the use of PET/CT as first-line screening for bone marrow infiltration to improve the accuracy of staging in new diagnoses."

Pediatric Blood and Cancer

PET vs. BMB in HL

In an article e-published on August 29 ahead of print in *Medicine Clinica (Barcelona)*, Lakhwani et al. from the Hospital Universitario de Canarias and the Hospital Universitario Nuestra Señora de la Candelaria (both in Tenerife, Spain) reported on a comparison of bone marrow biopsy and PET/CT in detecting bone marrow involvement in patients with Hodgkin lymphoma. The retrospective study included the records of 65 patients who had undergone both assessments in initial staging or disease relapse. Bone marrow biopsy was positive in 3 patients (4.6%), in all of whom PET was positive, with 2 showing diffuse + multifocal patterns and 1 showing a diffuse pattern only. PET/CT was positive in 11 additional patients in whom bone marrow biopsy was negative or equivocal. The PET/CT pattern was focal in 2, multifocal in 5, diffuse in 3, and diffuse + multifocal in 1 of these 11 patients. Bone marrow biopsy showed an unspecific myelopathy in the patients with diffuse and diffuse + multifocal patterns. The authors concluded that "PET/CT detects all cases with bone marrow biopsy affected and many that escape biopsy; however, when the uptake pattern is diffuse it could be by involvement or reactive hyperplasia and in those cases the bone marrow biopsy should be done."

Medicine Clinica (Barcelona)

^{90}Y-Zevalin RIT with ASCT

Dispenzieri et al. from the Mayo Clinic (Rochester, MN) and the Medical College of Wisconsin (Milwaukee) reported on September 4 ahead of print in *Bone Marrow Transplantation* on a phase 1 study to determine the maximum tolerated dose of ^{90}Y-ibritumomab tiuxetan with high-dose melphalan therapy in patients with multiple myeloma undergoing autologous stem cell transplantation. The study included 30 patients who received rituximab (250 mg/m^2) with ^{111}In-ibritumomab tiuxetan for dosimetry (d –22), rituximab (250 mg/m^2) with escalating doses of ^{90}Y-ibritumomab tiuxetan (d –14), and melphalan (100 mg/m^2; d –2 and –1), followed by autologous stem cell transplantation (d 0) and sargramostim (d 0) until neutrophil engraftment. Dosimetry data were used to

calculate the dose of ^{90}Y-ibritumomab tiuxetan to deliver 10, 12, 14, 16, 18, or 20 Gy to the liver. The overall response rate was 73% (22/30) with stringent complete response in 2, complete response in 5, very good partial response in 12, and partial response in 3 patients. Three patients experienced dose-limiting toxicities. Median progression-free survival was 16.5 mo and median overall survival was 63.4 mo. The maximum tolerated dose of ^{90}Y-ibritumomab tiuxetan with high-dose melphalan therapy in multiple myeloma was 18 Gy to the liver. The authors concluded that "the addition of radiation with novel delivery methods such as radioimmunotherapy combined with standard transplant regimens warrants further study."

Bone Marrow Transplantation

Bone SPECT/CT in Low Back Pain

In an article e-published on August 25 ahead of print in *World Neurosurgery*, Russo et al. from the National Hospital for Neurology and Neurosurgery (London, UK) reported on a study comparing scintigraphic patterns on bone hydroxydiphosphonate SPECT/CT with degree or structural facet joint degeneration on CT in patients with chronic low back pain. The study included 99 patients (59 female, 40 male; mean age, 56.2 y) with low back pain but without known/suspected malignancy, trauma, infectious processes, chronic inflammatory diseases, or previous surgery. Quality-of-life questionnaires were administered, and correlations between the degree of facet joint degeneration and osteoblastic activity on SPECT/CT were analyzed. When graded on the Pathria scale on CT, 49.6% of facet joints were Pathria grade 0–1 (normal-to-mild degeneration), 35% were grade 2 (moderate degeneration), and 16% were grade 3 (severe degeneration). Sixty-seven percent of patients had facet joints that were positive on SPECT/CT. For those joints that were Pathria grade 3 on CT, 69% were scintigraphically active, whereas 5.5% and 16.8% of Pathria 0–1 and Pathria 2, respectively, were active. More than 70% of the facet joints positive on SPECT/CT were at the L4-5/L5-S1 levels. The authors concluded that "The ability of SPECT/CT to precisely localize scintigraphically active facet joints may provide significant improvement in the diagnosis and treatment of patients with lower back pain."

World Neurosurgery

PET/CT and Giant Cell Arteritis

Clifford et al. from the University of Alberta (Edmonton), the Queen Elizabeth II Health Sciences Centre (Halifax, Nova Scotia), Dalhousie University (Halifax, Nova Scotia), and Valley Regional Hospital (Kentville, Nova Scotia) reported on September 15 ahead of print in the *Journal of Rheumatology* on the utility of PET/CT in newly diagnosed patients with giant cell arteritis and concurrent glucocorticoid treatment. The study included 28 patients with newly diagnosed giant cell arteritis (18 positive for arteritis on temporal artery biopsy and 10 negative on biopsy) and 28 healthy controls. All 28 patients were started on glucocorticoids, and all participants underwent serial ^{18}F-FDG PET imaging. Mean PET/CT scores after an average of 11.9 d of prednisone were higher in giant cell arteritis patients than in controls (total uptake: 10.34 ± 2.72 and 7.73 ± 2.56, respectively) and were also higher in these patients in 6 of 8 vascular territories. PET/CT scores were similar between patients who had and had not undergone temporal artery biopsy. A summed PET/score of ≥ 9 was an optimal cutoff for distinguishing giant cell arteritis patients, with a sensitivity of 71.4% and specificity of 64.3%. For the patients in the study, systemic symptoms, lower hemoglobin, and higher platelet count were correlated with higher total PET/CT scores. The authors concluded that "vascular FDG uptake scores were increased in most patients with giant cell arteritis despite exposure to prednisone; however, the sensitivity and specificity of PET/CT in this setting were lower than those previously reported."

Journal of Rheumatology

Reviews

Review articles provide an important way to stay up to date on the latest topics and approaches by providing valuable summaries of pertinent literature. The Newsline editor recommends several systematic and general reviews accessioned into the PubMed database in August and September. Bailey and Piert from the University of Michigan (Ann Arbor) summarized the "Performance of ^{68}Ga-PSMA PET/CT for prostate cancer management at initial staging and time of biochemical recurrence" in the September 9 issue of *Current Urology Reports* (2017;18:84). In an article e-published on September 12 ahead of print in *Expert Opinion on Drug Delivery,* Martins et al. from the Institute of Cancer Research and the Royal Marsden NHS Foundation (both in London, UK) reviewed "Radioimmunotherapy for delivery of cytotoxic radioisotopes: current status and challenges." On September 15, ahead of print in *Current Opinion in Infectious Diseases*, Douglas et al. from the Peter MacCallum Cancer Center, the University of Melbourne, Austin Health, Royal Melbourne Hospital, and the National Center for Antimicrobial Stewardship (all in Melbourne, Australia) discussed "What, where, and why: exploring fluorodeoxyglucose PET's ability to localize and differentiate infection from cancer." Polyak and Ross from the Hannover Medical School (Germany) reported on August 29 ahead of print in *Current Medical Chemistry* on "Nanoparticles for SPECT and PET imaging: towards personalized medicine and theranostics." Ranieri et al. from the National Cancer Research Centre, Istituto Tumori "Giovanni Paolo II" and the University of Bari "Aldo Moro" (both in Bary, Italy) reported on September 9 ahead of print in the *International Journal of Molecular Sciences* on "Tyrosine kinase inhibitor therapies with mainly anti-angiogenic activity in advanced renal cell carcinoma: value of PET/CT in response evaluation."