with National Health Service (NHS) oversight of MR, CT, and linear accelerator purchasing and operations. The NHS has spent £50 million ($80.5 million U.S.) on these technologies in the last 3 y but has delegated responsibilities for purchasing and operating them to individual trusts. "We continue to question whether the system provides value for money when foundation trusts act independently with no explicit incentive to adopt best practices nor to work together to achieve economies of scale," the report stated. Currently, NHS has no mechanism to compare imaging system performance, cost, and capacity value across trusts.

The report concluded: "The NHS needs to make high quality, comparable data available on machine use and cost. We welcome the department's plan to require all trusts to produce data on MRI and CT scan use. A standardized, national dataset would help trusts to compare unit costs and benchmark their performance. It would also enable commissioners to identify the large variations in utilization across trusts and take appropriate action." The report included 6 recommendations covering accounting and value documentation, improved data collection, more well-defined purchasing processes, consideration of bulk purchasing, and streamlined supply chains.

Health Imaging

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. We have added articles outside of radionuclide-based procedures, in recognition of the extraordinary activity and promise of diagnostic and therapeutic progress across the spectrum of molecular imaging. 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.

DIAGNOSIS

SPECT/CT and ^{131}I Therapy

Blum et al. from the New York University Langone Medical Center (NY) reported in the November issue of *Thyroid* (2011;21:1235–1247) on an investigation of ^{131}I SPECT and noncontrast CT to resolve cryptic findings on ^{131}I whole-body scans after thyroidectomy for thyroid cancer. The study included 184 whole-body scans from 38 patients after thyroidectomy. From a group of 184 whole-body scans, the authors identified a total of 49 "cryptic" findings in 40 scans (22%) in thyroidectomized thyroid cancer patients. Each was followed up with ^{131}I SPECT/CT imaging after either a tracer dose of ^{131}I ($n = 15$) or a week after an ablative or therapeutic dose of ^{131}I ($n = 25$). In 35 of these patients the whole-body scans were negative for evidence of metastatic disease, except for the cryptic findings; 5 patients' scans showed evidence of thyroid cancer. SPECT/CT indicated that 10 of the cryptic findings were of thyroid origin. In the 15 patients who received tracer ^{131}I doses, SPECT/CT analysis of the original scans provided significant information for the decision on administering ablative ^{131}I. In the 25 patients in whom SPECT/CT was performed after ablative or therapeutic doses of radioiodine, information from SPECT/CT was useful in identifying the presence of thyroid remnants or metastases. The authors concluded that "by identifying activity in some possible cancer sites as not thyroid cancer, SPECT/CT can reduce inappropriate treatment with ^{131}I" and that SPECT/CT of whole-body scans performed after ablative doses of ^{131}I is "useful in determining the nature of cryptic findings" and therefore likely to provide prognostic information."

Thyroid

Comparing MR and PET in AD

In an article e-published on November 16 ahead of print in *Neurology*, Chen et al. from the University of Pennsylvania (Philadelphia), Northwestern University (Chicago, IL), and AstraZeneca R&D (Sodertalje, Sweden) compared the abilities of arterial spin labeling with MR imaging and those of ^{18}F-FDG PET to differentiate patients with Alzheimer disease (AD) from age-matched controls without dementia. Arterial spin labeling MR imaging assesses cerebral blood flow. The study included 15 patients with AD and 19 controls, each of whom underwent MR imaging followed by PET. Statistical parametric mapping and region of interest analyses, including a voxel-by-voxel comparison, were used to compare the ability to identify patients and controls. Results from the 2 modalities were also compared against neuropsychological test scores. The authors found good agreement between the 2 imaging approaches, including similar hypoperfusion and hypometabolism patterns and overlaps in region of interest analyses. Both MR and PET were successful in differentiating patients from controls, with good correlations with neuropsychological test results. They concluded that these results suggest that arterial spin labeling MR imaging "provides largely overlapping information with FDG PET," with both

modalities detecting similar degrees of functional deficits in affected areas. They added that "given its ease of acquisition and noninvasiveness, arterial spin MR imaging may be an appealing alternative for AD studies."

Neurology

PET and Meningiomas

Arita et al. from the Osaka University Graduate School of Medicine (Japan) reported on November 17 ahead of print in the *Journal of Neuro-Oncology* on a study using ^{11}C-methionine and ^{18}F-FDG PET to assess the clinical characteristics of meningiomas, a setting in which MR imaging provides little differentiating information to support alternative treatment decisions. Specifically, the study was designed to clarify relationships between tumor characteristics and ^{11}C-methionine and ^{18}F-FDG uptake in meningiomas. The study included results from 51 patients with a total of 68 meningiomas. ^{11}C-methionine uptake was assessed by measuring mean and maximum tumor-to-normal (T/N) ratios for the entire area of the tumors. ^{18}F-FDG uptake was analyzed in 44 of the 68 meningiomas. Additional data included tumor volumes and tumor doubling time, with histopathologic studies performed in 19 patients who proceeded to surgery. The researchers found that mean and maximum T/N ratios with ^{11}C-methionine PET were significantly higher in skull-base lesions than in non-skull-base lesions. Although the T/N ratios with ^{11}C-methionine PET did not correlate significantly with tumor doubling time or histopathology, the mean T/N correlated significantly with tumor volume when assessed with logarithm regression modeling. The mean and maximum T/N ratios with ^{18}F-FDG PET correlated with none of the tumor characteristics studied. The authors concluded that "these results suggest that ^{11}C-methionine uptake correlates with tumor volume, but not with tumor aggressiveness."

Journal of Neuro-Oncology

PET/CT After Chemo in Rectal Ca

In an article e-published on November 15 ahead of print in *Cancer*, Perez et al. from the Angelita and Joaquim Gama Institute and the University of São Paulo School of Medicine (both in São Paulo, Brazil) reported on the results of a clinical trial that evaluated the accuracy of PET and clinical assessment in determinating complete rectal tumor regression after neoadjuvant chemoradiation. The prospective study included 99 patients with clinical T2–T4NxM0 rectal adenocarcinomas. Each patient underwent neoadjuvant therapy with 54 Gy of radiation and 5-fluorouracil–based chemotherapy. PET/CT studies were acquired before therapy (baseline) and at 6 and 12 wk after completion of therapy. Clinical assessment was performed at the time of the final scan, and PET/CT findings were compared with both clinical and pathologic data. Analysis of the final PET/CT (12 wk posttherapy) indicated 18 patients had complete responses and 81 patients had incomplete responses. These results included 5 false-negative and 10 false-positive PET/CT results. PET/CT for detection of residual cancer had 93% sensitivity, 53% specificity, 73% negative predictive value, 87% positive predictive value, and 85% accuracy. Clinical assessment without the information provided by PET/CT resulted in an accuracy of 91%; with the addition of PET/CT information this improved to 96%. The authors concluded that "assessment of tumor response at 12 wk after chemoradiation therapy completion with PET/CT imaging may provide a useful additional tool with good overall accuracy for the selection of patients who may avoid unnecessary radical resection after achieving a complete clinical response."

Cancer

PET/CT in Advanced Pancreatic Ca

Topkan et al. from Baskent University (Adana, Turkey) reported on November 10 ahead of print in *BMC Gastroenterology* on a study designed to assess the predictive value of ^{18}F-FDG PET/CT in patients with locally advanced pancreatic carcinoma treated with concurrent chemoradiotherapy. The study included 32 patients with unresectable disease who received a total of 50.4 Gy of radiation therapy and concurrent 5-fluorouracil–based chemotherapy followed by 4–6 cycles of gemcitabine consolidation. Each participant underwent ^{18}F-FDG PET/CT imaging at 12 wk after chemoradiotherapy. For the purposes of analysis, patients were divided into 2 groups of 16 according to the median difference between pre- and posttreatment maximum standard uptake values (SUV_{max}) as an indicator of response. At a median follow-up of 16.1 mo, 16 (50.0%) patients had experienced local/regional failures, 6 of which were predicted by PET/CT results. No marginal or isolated regional failures were noted. Median overall survival, progression-free survival, and local–regional progression-free survival were 14.5, 7.3, and 10.3 mo, respectively. Comparative median overall survival, progression-free survival, and local–regional progression-free survival rates for those in the greater and smaller SUV_{max} change groups were 17.0 vs. 9.8, 8.4 vs. 3.8, and 12.3 vs. 6.9 mo, respectively. SUV_{max} difference was found to be independently predictive of all 3 types of survival rates. The authors concluded that these results suggest that PET/CT-based "metabolic response assessment is an independent predictor of clinical outcomes in locally advanced pancreatic cancer patients treated with definitive concurrent chemoradiotherapy."

BMC Gastroenterology

PET and Creutzfeld–Jakob Disease

In an article e-published on November 4 ahead of print in the *European Journal of Neurology*, Kim and a consortium of researchers from Busan National University (Busan, Korea), the University of Toronto (Ontario, CA), Hayllym University (Anyang, Korea), Sungkyunkwan University School of

Medicine (Seoul), the University of California, San Francisco, and KAIST (Daejeon, Korea) reported on the use of ^{18}F-FDG PET to assess glucose metabolism in sporadic Creutzfeld–Jakob disease. The authors applied statistical parametric mapping techniques to the scan data to determine whether and which brain regions are preferentially affected in the disease. The study included 11 patients with sporadic Creutzfeld–Jakob disease and 35 controls and also compared results in a subset of 5 patients with Heidenhain variant of sporadic Creutzfeld–Jakob disease. All patients with sporadic Creutzfeld–Jakob disease showed decreased glucose metabolism in the bilateral parietal, frontal, and occipital cortices. Those with the Heidenhain variant showed glucose hypometabolism mainly in the bilateral occipital areas. Glucose hypometabolism was not found in the basal ganglia or thalamus in either group of patients, although this region is frequently reported to be affected on diffusion-weighted MR imaging.

European Journal of Neurology

PET-MR in Childhood Epilepsy

Rubi et al. from the Hospital Clinic (Barcelona, Spain) reported on November 2 ahead of print in *Epilepsia* on a study designed to validate the use of coregistered PET-MR imaging for epileptogenic zone detection in children with MR lesion–negative refractory epilepsy. The prospective study included 31 children with refractory epilepsy whose MR results indicated no lesions. All patients underwent ^{18}F-FDG PET imaging, and PET results were coregistered with those from MR. Areas of decreased uptake on PET and the fused images were compared and also evaluated against presumed epileptogenic zone localization predicted from other clinical data. The original MR studies were reevaluated using information on areas of hypometabolism identified in the fused studies. Both PET and PET-MR were found to detect hypometabolism in 67.8% of patients, with good agreement on an individual basis and by cerebral region involved. Among patients who showed hypometabolism on PET-MR fused images, 43% had original MR interpretations changed from nonlesional to subtle-lesional. The authors concluded that PET-MR coregistration "is at least as accurate as PET alone in detecting epileptogenic zone in pediatric nonlesional patients and can guide a second look at MRI studies previously reported as nonlesional, turning a meaningful percentage into subtle-lesional."

Epilepsia

BAT Changes in Puberty

In an article e-published on October 31 ahead of print in the *Journal of Pediatrics,* Glianz et al. from the University of Southern California, Los Angeles, reported on a PET/CT study designed to characterize changes in brown adipose tissue during puberty in both boys and girls. The study included scans from 73 pediatric patients at different stages of sexual development who had undergone PET/CT. Brown adipose tissue was identified on imaging in 43 (59%) patients. It was detected less frequently in children before puberty (15%; Tanner stage 1) than in those during puberty (75%; Tanner stages 2–5). Brown adipose tissue volume increased as puberty progressed, particularly in the final 2 stages (Tanner stages 4 and 5), with changes in volume significantly greater in both boys than in girls. Changes were also closely related to muscle volume. The authors concluded that "metabolic and hormonal events related to the achievement of sexual maturity are likely responsible" for the rapid increase in the presence and volume of brown adipose tissue during puberty.

Journal of Pediatrics,

CSF τ Proteins and AD

Yakushev et al. from University Medical Center Mainz (Germany) reported on October 26 ahead of print in *Current Alzheimer Research* on a study of stage-dependent agreement between total τ and phosphorylated τ proteins in cerebrospinal fluid and ^{18}F-FDG PET findings in patients with Alzheimer disease (AD) of varying severity. The study included 47 patients with incipient (n = 11) and probable (n = 36) AD based on clinical test assessment. Each participant underwent ^{18}F-FDG PET imaging as well as lumbar puncture for cerebral spinal fluid assays of amyloid β, phosphorylated τ, and total τ. Imaging findings were classified as positive or negative for AD, and statistical analyses were performed for all participants and for subgroups stratified as mild (n = 30) and moderate (n = 17) AD by clinical assessment. In the whole patient sample, the agreement with PET was 77% for total τ, 68% for phosphorylated τ, and 68% for amyloid β. Strong agreement between imaging and total and phosphorylated τ were found in the moderate AD group, with no significant agreement in the mild AD group. The authors concluded that this "significant agreement between the FDG-PET and cerebrospinal fluid τ findings in patients with AD supports the view that both are markers of neurodegeneration" and might substitute for each other "as supportive diagnostic tools in patients with suspected moderate-to-severe Alzheimer's dementia, while this is not the case in subjects at an earlier disease stage."

Current Alzheimer Research

^{18}F-FLT PET and Sunitib Therapy

In an article e-published on October 28 ahead of print in *Clinical Cancer Research*, Liu et al from the University of Wisconsin Carbone Cancer Center (Madison) reported on a pharmacodynamic study using ^{18}F-fluorothymidine (^{18}F-FLT) PET/CT to characterize proliferative changes in tumors during sunitinib malate exposure/withdrawal. The study included results from 16 patients with advanced renal cell and other solid malignancies, metastatic lesions, and no prior anti–vascular

endothelial growth factor (anti-VEGF) exposure. Standard sunitinib therapy was initiated, and all participants underwent ^{18}F-FLT PET/CT imaging before therapy (baseline), during sunitinib exposure, and after sunitinib withdrawal within cycle 1 of therapy. VEGF levels and sunitinib pharmacokinetic data were collected at the same times as imaging. The authors found that during sunitinib withdrawal (i.e., between the second and third scan), the median ^{18}F-FLT mean standardized uptake value increased by 15% (range: –14%–277%) for patients on a 4-wk-on/2-wk-off sunitib schedule and by 19% (range: –5.3% –200%) for those on a 2-wk-on/1-wk-off schedule. Sunitinib pharmacokinetics and VEGF ligand levels increased during sunitinib exposure and returned toward baseline during withdrawal. The authors concluded that "the increase of cellular proliferation during sunitinib withdrawal in patients with renal cell carcinoma and other solid malignancies is consistent with a VEGF receptor tyrokinase inhibitor withdrawal flare" and that additional analyses "suggest that plasma VEGF is associated with this flare, with an exploratory analysis implying that patients who experience less clinical benefit have a larger withdrawal flare." This led to the additional suggestion that "patients with a robust compensatory response to VEGF receptor tyrokinase inhibitor therapy experience early 'angiogenic escape'."

Clinical Cancer Research

THERAPY

Pretargeted RIT for NHL

On November 16 ahead of print in *Clinical Cancer Research,* Park and researchers from the university of North Carolina (Chapel Hill), University of Washington (Seattle), and University Hospital of Lausanne (Switzerland) reported on the development of a series of streptavidin fusion proteins with potential for use in pretargeted radioimmunotherapy (RIT) in non-Hodgkin lymphoma. The series successfully downmodulates the affinity of streptavidin for biotin (an affinity that can impede the effectiveness of streptavidin-based therapies) and retains high avidity for divalent DOTA-bis-biotin. The authors described the development of the genetically engineered fusion proteins and initial experiments in mice with lymphoma xenografts. Biodistribution studies confirmed greater delivery of radioactivity to tumors in mice pretargeted with the engineered streptavidin fusion proteins followed by ^{111}In-DOTA-bis-biotin than with other types of streptavidin proteins. In mice pretreated with the mutant fusion proteins and ^{90}Y-DOTA-bis-biotin, tumor volumes were controlled significantly better than with nonengineered streptavidin and fusion proteins separately. The authors concluded that "genetically engineered mutant-streptavidin fusion proteins and bis-biotin reagents provide an attractive alternative to current streptavidin-biotin pretargeted RIT methods in settings where endogenous biotin levels are high."

Clinical Cancer Research

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 reviews accessioned into the PubMed database in late October and November. In an article e-published on November 11 ahead of print in *Hormones and Cancer*, Deandreis et al. from the Institut Gustave Roussy (Villejuif, France) reviewed "FDG PET in the management of patients with adrenal masses and adrenocortical carcinoma." In the November 10 issue of *Alzheimer's Research and Therapy* (2011;3:31), Laforce and Rabinovici from the University of California San Francisco described "Amyloid imaging in the differential diagnosis of dementia: review and potential clinical applications." Novello et al. from the University of Turin (Italy) provided an overview of "Functional imaging in predicting response to antineoplastic agents and molecular targeted therapies in lung cancer: a review of existing evidence" on November 5 ahead of print in *Critical Reviews in Oncology/Hematology.* Weiner and a large group of researchers from across the United States reported on October 31 ahead of print in *Alzheimer's and Dementia* on "The Alzheimer's Disease Neuroimaging Initiative: a review of papers published since its inception," including details of the initiative's major accomplishments to date.