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.*

^{18}F-FDG PET in Myelopathy

Mayo Clinic (Rochester, MN) researchers conducted a retrospective study comparing spinal metabolic imaging outcomes in 51 patients with active myelopathy using ^{18}F-FDG PET. Flanagan et al. reviewed 10 y of records of patients who underwent PET imaging. This retrospective study, published in the November issue of *Mayo Clinic Proceedings* (2013;88:1204–1212), compared spinal cord tracer uptake in patients with active myelopathy resulting from inflammatory or neoplastic etiology. Excluded were those with myelopathy related to radiation exposure, inactive or extramedullary myelopathy, and patients without confirmed neoplasms. Three final diagnoses—neoplastic, neurosarcoid, and nonsarcoid inflammatory—were based on the final diagnostic evaluation. A blinded assessment of spinal FDG maximum uptake value was made by 2 radiologists unaware of disease etiologies. Results showed that of the 51 subjects, 24 had inflammatory, 21 neoplastic, and 6 neurosarcoid etiologies. Hypermetabolism was noted in 50% of sarcoid subjects. Median maximum standardized uptake value (SUV_{max}) were lower in nonsarcoid inflammatory types than neoplastic types (3.3 g/mL and 1.9 g/mL, respectively). Median SUV_{max} was higher in neoplastic than in nonsarcoid inflammatory myelopathies (81% and 25%, respectively). Agreement between radiologists was excellent (κ = 0.88).

Mayo Clinic Proceedings

Sex and ^{82}Rb PET MPI

In a study e-published on July 10 ahead of print in the *Journal of the American College of Cardiology,* Kay et al. from the Emory University School of Medicine (Atlanta, GA) compared sex differences in the prognostic accuracy of ^{82}Rb PET stress myocardial perfusion imaging (MPI). Diagnosis of women with cardiac symptoms presents challenges, including radiation safety issues, attenuation artifacts, and lower diagnostic accuracy. This study used the Prognosis Multicenter Registry to evaluate how sex affected ^{82}Rb PET stress MPI risk stratification. The study included 6,037 men and women, who were followed for a median of 2.2 y for indications of coronary artery disease (CAD) mortality. Five-year mortality rates were 6% for men and 3.7% for women. Multivariable models revealed that the percentage of abnormal stress myocardium was independently predictive of CAD mortality in both men and women and that patient sex had an insignificant influence on the percentage of abnormal stress myocardium. Only 2 cardiac deaths were reported in women <55 y old; however, the percent of abnormal stress myocardium was highly significant for women ≥55 y old. The authors concluded that ^{82}Rb PET stress MPI provides clinically meaningful risk stratification for women and men and is particularly helpful in identifying high-risk older women.

Journal of the American College of Cardiology

^{18}F-FDG PET/CT and Venous Thromboembolism

Current literature suggests that extensive screening for occult cancer in patients with venous thromboembolism has reaped little benefit. A prospective study e-published on May 29 ahead of print in the *International Journal of Cancer* led by Alfonso et al. from the Clínica Universidad de Navarra (Pamplona, Spain) used ^{18}F-FDG PET/CT to screen patients ≥55 y old with unprovoked venous thromboembolism for occult malignancy. Imaging took place 3–4 wk after the index event, and follow-up was completed after 2 y. Results indicated that 68.7% of scans were negative, and 31.3% of findings were positive or suspicious. Additional assessment showed that 22.6% of patients with positive scans had malignancies. The sensitivity and negative and positive predictive values of ^{18}F-FDG PET for detection of occult malignancy were 77.8%, 97.1%, and 22.6%, respectively. The authors concluded that ^{18}F-FDG PET/CT is feasible for screening for occult cancer in patients with unprovoked venous thrombosis. Tissue factor activity was significantly higher in patients with cancer, and its use in preselection of patients for ^{18}F-FDG PET could improve positive predictive values.

International Journal of Cancer

Oral Activity and SPECT/CT

Oral uptake associated with radioiodine scintigraphy is common and may lead to diagnostic dilemmas. Savas et al. from the University of Michigan University Hospital (Ann Arbor) reported on September 3 ahead of print in the *Journal of Clinical Endocrinology and Metabolism* on a retrospective study of ^{131}I planar and SPECT/CT scans in 216 patients after thyroidectomy to determine the causes of this uptake. The authors also performed a preliminary phantom study. Oral focal activity was noted in 111 (57%) of patients. SPECT/CT localized this uptake to high-attenuation dental material in 95 (86%) of these patients. All uptake seen on planar images was determined to be benign on SPECT/CT. The phantom study confirmed focal in vitro uptake within high-attenuation dental materials. The authors theorized that an affinity between negatively charged iodide ions in saliva

and the dental work's positively charged metal ions may be the basis for persistent focal radioiodine uptake in the oral cavity.

Journal of Clinical Endocrinology and Metabolism

Quantifying Respiratory Gated PET

Jani et al. from the University of California, Los Angeles compared tumor volume segmentation accuracy with phase-based and amplitude-based PET quantitation and reported the results in the November issue of the *International Journal of Radiation Oncology Biology Physics* (2013;1;87:562–569). The study included list-mode ^{18}F-FDG PET data from 10 patients with 12 FDG-avid tumors and 9 lymph nodes, as well as performance of phantom studies to replicate breathing motion. PET list-mode data were gated into a total of 8 bins by applying 4 algorithms—2 temporal phase–based and 2 amplitude-based algorithms. Internal target volumes were set by incorporating all contours per gated image. A gradient-based segmentation method was used at a fixed maximum uptake threshold of 40%. A comparison of internal target volumes, defined as subtended volume by tumor model positions >99% of breathing amplitude, was performed for both phantoms and patients. Calculations were made for superior and inferior distances from end-inhale and -exhale phases between sphere centroids. Study findings showed that internal target volumes based on amplitude were greater than those with temporal techniques. Volumes were also larger in both amplified-based techniques for lymph nodes. Phantom studies showed that techniques based on amplitude led to an average of 9.5% more motion displacement than temporal techniques under regular breathing conditions.

International Journal of Radiation Oncology Biology Physics

Myocardial Scintigraphy and DLB

In a study e-published on October 11 ahead of print in *Neurology*, Oda et al. from the Institute for Aging Brain and Cognitive Disorders and the Hygo Brain and Heart Center (Japan) and Kinki University (Osaka, Japan) compared the usefulness of ^{123}I-iodoamphetamine brain perfusion SPECT and ^{123}I-MIBG myocardial scintigraphy in predicting conversion of diffuse Lewy body (DLB) disease from possible to probable diagnostic status. A total of 94 patients with suspected DLB were followed for 1 y, after which 33 subjects met the consensus criteria for probable DLB. Areas under the receiver operating characteristic (ROC) curve for SPECT's ability to predict status conversion were based on occipital/cerebellum and occipital/striatum cortex ratios of blood flow counts and were 0.591 and 0.585, respectively. Areas under the ROC curve for scintigraphy were based on early heart-to-mediastinum ratio, delayed ratio, and washout rate, and were 0.935, 0.936, and 0.884, respectively. The authors concluded that ^{123}I-MIBG myocardial scintigraphy showed promise for predicting future conversion to DLB.

Neurology

Prognostic ^{18}F-FDG PET for Cervical Cancer

Oh et al. from the Samsung Medical Center and Sungkyunkwan University School of Medicine (Seoul, Korea) reported in the November issue of the *International Journal of Radiation Oncology Biology Physics* (2013; 87:549–554) on a study of the prognostic value of ^{18}F-FDG PET/CT in patients who received concurrent chemoradiation therapy (CRRT) for cervical cancer. Included in the analysis were 60 patients treated from February 2009 to December 2010. Three separate PET/CT imaging sessions were performed: prior to CRRT treatment, at 4 wk during CRRT and 1 mo after treatment. The average standardized uptake value (SUV_{max}) in primary tumors was 16.3 (range, 6.4–53.0) on pre-CRRT PET/CT and 5.3 (range, 0–19.4) on the PET/CT acquired during CRRT. A percentage change in SUV_{max}, with a cut-off value of 59.7%, was found to predict complete response on post-CRT PET/CT. Multivariate analysis showed that percentage change in SUV_{max} ≥60% and complete response on the post-CRRT PET/CT were statistically significant predictors of progression-free survival. These data led the authors to conclude that metabolic responses during CRRT at 4 wk of treatment and 1 mo after treatment can predict outcomes in patients with cervical cancer.

International Journal of Radiation Oncology Biology Physics

Metabolic Response in Esophageal Cancer

Reductions in standardized uptake value (SUV) in PET imaging of esophageal cancer are associated with response to therapy, but some residual cancer may remain when a complete response is suggested by PET, according to a prospective study e-published on July 26 ahead of print in the *Annals of Thoracic Surgery*. Stiles et al. from the New York Presbyterian Hospital/Weill Cornell Medical College (New York, NY). reviewed a database of imaging data for 120 esophageal cancer patients undergoing induction therapy and esophagectomy who had received PET imaging prior to and after treatment. Patients with SUVs of 0 were labeled as complete responders. PET findings showed 27% of patients had a complete response to induction therapy—26% after chemotherapy and 28% after chemoradiation. However, at the time of surgery, 59% of those labeled as complete responders showed evidence of residual disease. Remaining disease was found in 40% of those with a negative biopsy. The authors noted that PET findings suggesting a complete response to treatment for esophageal cancer are not as definitive as a complete pathologic response.

Annals of Thoracic Surgery

PTSD and Norepinephrine

Chronic stress may be associated with lower norepinephrine transporter (NET) availability in the locus coeru-

leus. Pietrzak et al. from the Veterans Affairs Connecticut Healthcare System and Yale University School of Medicine (New Haven, CT) described appropriate models for noradrenergic dysfunction in posttraumatic stress disorder (PTSD) in a study published in the November issue of *JAMA Psychiatry* (2013; 70: 1199–1205). Researchers used ^{11}C-methylreboxetine PET to examine NET availability in the locus coeruleus in healthy controls (n = 18), traumatized patients who did not develop PTSD (n = 16), and those who did develop PTSD (n = 22). Results showed that NET availability was 41% lower in the PTSD group than in healthy controls. The authors added that greater NET availability in the locus coeruleus is associated with increased severity of anxious arousal symptoms in individuals with PTSD.

JAMA Psychiatry

Dopamine Activity and ADHD

Research published in the November issue of *Brain* (2013;136:3252–3270) by del Campo et al. from Cambridge University (UK) reported on ways in which ^{18}F-fallypride PET imaging of nigrostriatal dopaminergic mechanisms can explore attention deficit/hyperactivity disorder (ADHD) and described results of treatment with a single dose of the psychostimulant methylphenidate. The double-blind, crossover study included 16 adults diagnosed with ADHD and 16 additional matched healthy controls, each of whom underwent PET and MR imaging and attention testing after administration of 0.5 mg methylphenidate or placebo. Increases in D2/D3 receptor availability and endogenous dopamine activity did not differ significantly in the 2 groups, although those on methylphenidate administration had significant attention deficits and reduction in gray matter. Those treated showed increases in dopamine levels in all nigrostriatal regions, which normalized reductions in dopamine activity in the left caudate seen in both healthy controls and ADHD patients who showed attention deficits during testing. Researchers concluded that dopamine dysregulation is unlikely to be the primary cause underlying ADHD pathology in adults. Regardless of diagnosis, significant improvements in attention performance followed methylphenidate treatment.

Brain

Dual PET/CT for Intrathoracic Lesions

A study published in the November issue of the *American Journal of the Medical Sciences* (2013;346:358–362) by Kadaria et al. from the University of Tennessee Health Science Center (Memphis) evaluated dual timepoint ^{18}F-FDG PET for differentiating malignant from benign lung and mediastinal lesions. Researchers reviewed PET scans for 72 consecutive patients undergoing imaging for intrathoracic lesions. Results showed that 87% of patients had increased maximum standardized uptake values (SUV_{max}) when imaged at 1 h after the first scan. Of these patients, 80% were found to have a malignancy. The remaining patients, who showed decreases in SUV_{max}, all had benign lesions. A higher SUV on later scanning was shown to be 100% sensitive for cancer diagnosis, with specificity of 42%. The authors concluded that this knowledge could be especially useful in cases of histoplasmosis and sarcoidosis, which are typically associated with benign lesions. The technique could aid in avoidance of unnecessary invasive procedures.

American Journal of the Medical Sciences