general public resources, are robust and based on large-sample-size studies.

Ensuring that test results are not lost or misplaced, including through the use of health information technology, is a critical part of reducing diagnostic errors. AHRQ recently published a toolkit to help doctors, nurses, and medical office staff improve processes for tracking, reporting, and following up with patients after medical laboratory tests. The toolkit, Improving Your Office Testing Process, is available at: www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/office-testing-toolkit/. The Office of the National Coordinator for Health Information Technology recently released the "SAFER Guides"—a set of interactive tools to help health care providers more safely use electronic health information technology products, including test results reporting and follow-up. These guides are available at www.healthit.gov/safer/safer-guides.

BMJ Quality & Safety
Agency for Healthcare Research and Quality

Accreditation and Diagnostic Imaging Access

The Government Accountability Office (GAO) on April 21 issued its second Congressionally mandated report on implementation of the Medicare Improvements for Patients and Providers Act (MIPPA) of 2008 accreditation requirement for Medicare suppliers who provide the technical component of advanced diagnostic imaging (ADI) services. This report, "Medicare Imaging Accreditation: Effect on Access to Advanced Diagnostic Imaging is Unclear Amid Other Policy Changes," follows the 2013 report "Medicare Imaging Accreditation: Establishing Minimum National Standards and an Oversight Framework Would Help Ensure Quality and Safety of Advanced Diagnostic Imaging Services." MIPPA required that beginning on January 1, 2012, suppliers who produce images for Medicare-covered ADI services in office settings be accredited by an organization approved by the Centers for Medicare & Medicaid Services.

In the current report, the GAO looked at the effect the accreditation requirement may have had on beneficiary access to ADI services provided in the office setting. GAO staff examined trends in the use of CT, MR, and nuclear medicine imaging (including PET) provided to Medicare beneficiaries from 2009 through 2012 and subject to the ADI accreditation requirement. GAO also interviewed CMS officials; representatives from the Intersocietal Accreditation Commission and the American College of Radiology (the 2 CMS-approved accrediting organizations that accounted for 99% of all accredited suppliers as of January 2013); and 19 accredited ADI suppliers reflecting a range of geographic areas, imaging services provided, and accrediting organizations. GAO also reviewed relevant literature to understand the context of observed changes in ADI services during the period.

The researchers found that the number of ADI services provided to Medicare beneficiaries in the office setting began declining before and continued declining after the accreditation requirement went into effect in 2012. The rate of decline from 2009 to 2010 was similar to the rate from 2011 to 2012 for all ADI modalities studied. They concluded that these data "suggest that the overall decline was driven, at least in part, by factors other than accreditation." Reduced Medicare payments for specific imaging studies, for example, may have contributed to the decline in numbers for those services. In addition to payment reductions, other potential factors cited were changes in prior authorization policies and physician and patient awareness of risks associated with radiation.

Government Accountability Office

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.

PET and Disorders of Consciousness

In an article e-published on April 15 ahead of print in *Lancet* that received press coverage around the world, Stender, from the University of Copenhagen (Denmark), and researchers from Belgium and Canada reported on the "Diagnostic precision of PET imaging and functional MR imaging in disorders of consciousness." The study included patients diagnosed with unresponsive wakefulness ($n = 41$), locked-in syndrome ($n = 4$), or minimally conscious states ($n = 81$). Patients underwent standardized clinical assessments (Coma Recovery Scale–Revised) as well as cerebral ^{18}F-FDG PET and functional MR imaging during mental activation tasks and were followed up at 12 mo with the Glasgow Outcome Scale–Extended. The researchers found that PET had high sensitivity for identification of patients in minimally conscious states and high correlation with Coma Recovery Scale scores. MR imaging was less sensitive and had poorer correlations. PET accurately predicted outcomes in 74% of

patients; functional MR was able to do so in 56%. Of special note, almost one-third (32%) of patients categorized as behaviorally unresponsive (diagnosed as unresponsive on the Coma Recovery Scale) showed brain activity compatible with consciousness (activity associated with consciousness but diminished compared with fully conscious individuals) on at least 1 neuroimaging test. Of the patients whose scans showed such activity, 69% subsequently recovered consciousness. The authors concluded that "cerebral ^{18}F-FDG PET could be used to complement bedside examinations and predict long-term recovery of patients with unresponsive wakefulness syndrome." They added that although active functional MR imaging may be useful for differential diagnosis, it is less accurate.

A press release from the National Institutes of Health highlighted the implications of this work for individuals in minimally conscious and "vegetative" states. "I think these patients are kind of neglected by both medicine and society," said Steven Laureys, MD, senior author of the study and director of the Coma Science Group at the University of Liège in Belgium. "Many of them don't even see a medical doctor or a specialist for years. So I think it's very important to ask the question, are they unconscious?"

Lancet

Arterial Stiffness and β-Amyloid Progression

Hughes, from Wake Forest School of Medicine (Winston-Salem, NC), and colleagues from the University of Pittsburgh (PA) and the University of Virginia (Charlottesville) reported on March 31 ahead of print in *JAMA Neurology* on a study exploring associations between arterial stiffness and changes in cerebral β-amyloid deposition over time. The study included 81 individuals who were $\geq$83 y old and nondemented. All participants underwent ^{11}C-Pittsburgh compound B PET imaging twice, with a 2-y interval between scans. Measures of arterial stiffness acquired contemporaneously with imaging included pulse wave velocity in the central, peripheral, and mixed vascular beds. Changes and correlations in imaging and arterial results were assessed. The percentage of individuals who were β-amyloid–positive on PET increased from 48% to 75% over the 2-y study period. Central arterial stiffness was found to be directly associated with changes in β-amyloid deposition over time. The authors concluded that "the association between β-amyloid deposition changes over time and generalized arterial stiffness indicated a relationship between the severity of subclinical vascular disease and progressive cerebral β-amyloid deposition." The results "add a new dimension to our understanding of the intersection of arteriosclerosis, brain health, and β-amyloid deposition in nondemented older adults."

JAMA Neurology

Proteins and Parkinson Disease

In an article appearing in the April 10 issue of *Cell* (2014;157:472–485), Dawson, from Johns Hopkins University School of Medicine (Baltimore, MD), and colleagues and researchers from Kyung Hee University (Seoul, South Korea), Ajou University School of Medicine (Suwon, South Korea), and the Mayo Clinic (Jacksonville, FL) explored connections between leucine-rich repeat kinase 2 (LRRK2) activity and neurodegenerative disease, such as Parkinson disease (PD). Their work showed that ribosomal protein s15 is a key pathogenic LRRK2 substrate in Drosophila and in human neuron PD models. In a press release highlighting the National Institutes of Health–supported work, Ted Dawson, MD, PhD, said, "Our results support the idea that changes in the way cells make proteins might be a common cause of PD and possibly other neurodegenerative disorders." The research group hypothesized that blocking the phosphorylation of s15 ribosomal proteins could lead to future therapies, as might other strategies to decrease bulk protein synthesis or increase the cells' ability to cope with increased protein metabolism. They also noted that a means to measure s15 phosphorylation could serve as a biomarker of LRRK2 activity in treatment trials of LRRK2 inhibitors.

Cell

SSTR Expression in Merkel Cell Carcinoma

Buder et al. from University Hospital Würzburg (Germany), Central Hospital of Augsburg (Germany), and Medical University of Graz (Germany) reported in the April 17 issue of *BMC Cancer* (2014;14:258) on a study designed to assess somatostatin receptor (SSTR) expression in Merkel cell carcinoma using ^{68}Ga-DOTATOC or ^{68}Ga-DOTATATE PET. The study included 24 patients with histologically proven Merkel cell carcinoma who underwent both ^{68}Ga-labeled PET imaging and CT. In a patient-based analysis, the sensitivity of PET was 73% for nodal, 100% for bone, and 67% for soft-tissue metastases. PET was concordant with CT in 20 of the patients. Four patients (17%) were upstaged as a result of PET imaging, and PET led to management changes in 3 patients (13%). These and other results led the authors to conclude that "the advantage of SSTR PET is based on an improved visualization of bone, soft tissue, and brain metastases, whereas limitations relate to an insufficient detection of lung and liver metastases." They recommended that SSTR PET always be performed in combination with contrast-enhanced CT. They added that the focally increased tracer uptake observed in the study suggests the feasibility of treatment of Merkel cell carcinoma using β-emitter–labeled SSTR analogs, such as ^{90}Y- or ^{177}Lu-DOTATATE.

BMC Cancer

PET/CT and Osteomyelitis in Diabetes

In an article e-published on March 21 ahead of print in *Diabetic Medicine*, Vouillarmet et al. from the University of Lyon (Oullins, France) reported on a study assessing the diagnostic performance of white blood cell SPECT/CT in identifying diabetic foot osteomyelitis after antibiotic therapy. The study included imaging results from 26 patients (total of 29

osteomyelitis episodes) without persistent clinical signs of infection at the end of antibiotic treatment. At the end of treatment, each patient underwent 3-phase ^{99m}Tc-methylenediphosphonate bone scintigraphy and ^{99m}Tc-HMPAO SPECT/CT, as well as radiography centered on the foot. Remission was defined by absence of clinical and/or imaging signs of infection at the initial site after follow-up at 12 mo. White blood cell SPECT/CT was positive in 22 osteomyelitis episodes and negative in 7. Relapse occurred in 5 of these episodes after a median of 4 mo (range, 2–7 mo). The respective sensitivity, specificity, and positive and negative predictive values for osteomyelitis relapse were 80%, 33%, 20%, and 89% for radiography; 100%, 12.5%, 15.5%, and 100% for 3-phase bone scintigraphy; and 100%, 91.5%, 71.5%, and 100% for ^{99m}Tc-HMPAO SPECT/CT. The authors concluded that "negative uptake on white blood cell SPECT/CT is a good marker for diagnosis of diabetic foot osteomyelitis remission and might be very useful in guiding antibiotic therapy."

Diabetic Medicine

Tau Pathology in AD

Okamura et al. from the Tohoku University School of Medicine (Sendai, Japan) and the University of Melbourne (Australia) reported on March 27 ahead of print in *Brain* on the use of ^{18}F-THK5105 PET in assessment of neurofibrillary pathology in Alzheimer disease (AD). The study included 16 individuals (8 with AD; 3 men, 5 women; 66–82 y old) and 8 healthy controls (3 men, 5 women; 63–76 y old), each of whom underwent neuropsychological examination, 3D MR imaging, and both ^{18}F-THK5105 and ^{11}C-Pittsburgh compound B (^{11}C-PiB) PET imaging. Results showed significantly higher ^{18}F-THK5105 retention in the temporal, parietal, posterior cingulate, frontal, and mesial temporal cortices of individuals with AD than in controls. AD patients (100%) were found to have especially high retention in the inferior temporal cortex, with frontal ^{18}F-THK5105 retention (in 37.5%) less marked and observed only in individuals with moderate-to-severe AD. ^{11}C-PiB retention was highest in the posterior cingulate cortex and did not correlate with ^{18}F-THK5105 retention in the neocortex. ^{18}F-THK5105 retention was ~10% higher in the mesial temporal cortex than in the neocortex in the control participants. ^{18}F-THK5105 retention (and not ^{11}C-PiB retention) was found to correlate closely with cognitive parameters and hippocampal and whole-brain gray matter volumes, a finding consistent with postmortem identification of dense neurofibrillary tangles in these areas in dementia and neuronal loss. The authors concluded that ^{18}F-THK5105 PET may be "useful for the noninvasive assessment of tau pathology in the living brain" and could be well suited for "longitudinal evaluation of tau deposition."

Brain

Glucose Hypometabolism in Normal Elderly

In an article e-published on April 15 ahead of print in the *American Journal of Physiology, Endocrinology, and Metabolism*, Nugent et al. from the Université de Sherbrooke (Canada) reported on the results of an ^{18}F-FDG PET and MR study designed to quantify the cerebral metabolic rate of glucose (CMRg) and cortical volume and thickness in 43 brain regions in cognitively normal younger (n = 25; 25 ± 3 y old) and older (n = 31; 71 ± 9 y old) individuals. After correcting for partial volume effect, the authors found 11%–17% lower CMRg in the superior frontal cortex, caudal middle frontal cortex, and caudate in the older group. In this group, cortical volumes and cortical thickness were 13%–33% and 7%–18% lower, respectively, in multiple brain regions. No differences were found among individuals who did and did not take antihypertensive medication, and no significant correlations were identified between CMRg and cognitive performance or metabolic parameters in fasting plasma. The authors concluded that "highly localized glucose hypometabolism and widespread cortical thinning and atrophy can be present in older adults who are cognitively normal as assessed using age-normed neuropsychological testing measures."

American Journal of Physiology, Endocrinology, and Metabolism

SLN Biopsy and Thyroid Carcinoma

Cabrera et al. from the Campinas State University (Brazil) reported on April 3 ahead of print in the *European Archives of Oto-Rhino-Laryngology* on a study evaluating the performance of sentinel lymph node biopsy (SLNB) in detection of occult metastases in papillary thyroid carcinoma (PTC). The study included 23 clinically node-negative PTC patients (21 females, 2 males; mean age, 48.4 y) who underwent SLN lymphoscintigraphy before total thyroidectomy. Two hours before surgery and after ultrasound-guided peritumoral injections of ^{99m}Tc-phytate, cervical SPECT/CT images were acquired. SLNs were located with a gamma probe during surgery and removed with non-SLNs located in the same neck compartment. SLNs were located in levels: II in 34.7% of patients, III in 26%, IV in 30.4%, V in 4.3%, VI in 82.6%, and VII in 4.3%. Metastases were noted in the SLN in 7 patients, in non-SLN in 3 patients, and in the lateral compartments in 20% of patients. Significant associations were found between lymph node metastases and angiolymphatic invasion, extrathyroid extension, and tumor size, with no correlations found between lymph node metastases and age, sex, stimulated thyroglobulin levels, positive surgical margins, aggressive histology, or multifocal lesions. The authors concluded that not only can SLNB detect occult metastases in PTC, but the fact that metastatic SLNs are associated with extrathyroid extension, larger tumors, and angiolymphatic invasion may "help guide future neck dissection, patient surveillance, and radioiodine therapy doses."

European Archives of Oto-Rhino-Laryngology

Outcomes in Treatment of Pediatric WTC

In an article e-published on April 14 ahead of print in *Thyroid*, Markovina et al. from the Washington University School of Medicine (St. Louis, MO) reported on a study of treatment approaches and outcomes in children with well-differentiated thyroid cancer (WTC). The study included the records of 112 patients <22 y old treated for WTC at a single institution. Relationships between patient and tumor characteristics and progression-free survival (PFS) were assessed along with the predictive value of whole-body ^{131}I scintigraphy in monitoring and follow-up. Overall survival at 20 and 30 y was 100% and 94.4%, respectively; and PFS at 10, 20, and 30 y was 71%, 62%, and 55%, respectively. Sex and age at diagnosis were not associated with PFS; nor were the presence of vascular invasion, capsular extension, positive margins, or soft-tissue invasion. Patients who underwent immediate postoperative ^{131}I therapy experienced mean times to recurrence of 3.8 y compared with >14 y in patients who never received ^{131}I therapy or were treated in the salvage setting. Negative findings on posttreatment whole-body ^{131}I scintigraphy strongly predicted decreased risk of recurrence, especially after 3 consecutive negative scans. The authors concluded that whole-body ^{131}I scintigraphy is useful in this pediatric population who are likely to present with more advanced disease and who receive postoperative radioactive iodine. *Thyroid*

Also of note:

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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 March and April. On April 9, ahead of print in the *Journal of Neuro-Oncology*, Ryken et al. from the Iowa Spine and Brain Institute (Waterloo) published "The role of imaging in the management of progressive glioblastoma: a systematic review and evidence-based clinical practice guideline." Ahmed et al. from the University of Pittsburgh (PA) reviewed "Malignant gliomas: current perspectives in diagnosis, treatment, and early response assessment using advanced quantitative imaging methods" in the March 24 issue of *Cancer Management and Research* (2014;6:149–170). In an article e-published on April 8 ahead of print in *Current Pharmaceutical Biotechnology*, Marvaso et al. from Magna Graecia University and T. Campanella Cancer Center (Catanzaro, Italy) summarized "The current status of novel PET radio-pharmaceuticals in radiotherapy treatment planning of glioma." Stockhofe et al. from the Johannes Gutenberg University Mainz (Germany) provided an overview of "Radiolabeling of nanoparticles and polymers for PET imaging" in the April 2 issue of *Pharmaceuticals* (Basel) (2014;7:392–418). On October 1, ahead of print in *CA: Cancer Journal for Clinicians*, Thakor and Gambhir looked at "Nanooncology: the future of cancer diagnosis and therapy." On March 24 in *Frontiers in Neurology* (2014;5:31) Pittau et al. from University Hospital of Geneva and the University of Geneva (Switzerland) described "The role of functional neuroimaging in pre-surgical epilepsy evaluation." Wiegering et al. from the Universitätsklinik Würzburg (Germany) reviewed the "Importance of FDG PET/CT for surgery of rectal cancer" in an article e-published on March 26 ahead of print in *Der Chirurg.*