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An Expanded Role for Neuroimaging in the Evaluation of Mild Cognitive Impairment

New technology allows neuroradiologists to change their approach to elderly patients with memory loss



Sunil Ram, MD

Mild cognitive impairment represents a transitional state between normal aging and dementia. Recent advances in neuroimaging coupled with automated volumetry and data analysis now

make it possible to identify characteristic anatomic features of Alzheimer's disease at the earliest onset of symptoms.

Sunil Ram, MD, a neuroradiologist at Scottsdale Medical Imaging (SMIL), says the ability to quantify localized brain atrophy in patients with Alzheimer's has been studied for many years.

"Recent advances in automated post processing empowers us to now apply that analysis in a routine clinical setting," Ram says.

A NEW WAY

With the development of computer software capable of performing volumetric calculations combined with a large comparison database of normal controls, Ram says the evaluation can be done in minutes and allows him to accurately identify morphologic changes of the brain that are typical of Alzheimer's disease.

A 2013 study compared volumetric MRI imaging with NeuroQuant analysis in 20 patients with traumatic brain injury to a radiologist's traditional method of visual inspection. They found that the NeuroQuant analysis identified 10 of 20 patients (50 percent) with atrophy compared to 2 of 20 (10 percent) identified by the radiologist's traditional method of visual inspection.

Ram says SMIL is using CorTechs Labs' FDA-approved NeuroQuant software for MRI brain imaging because of its reliability and established track record at respected academic medical centers around the country.

"Advantages of ordering a brain MRI with NeuroQuant analysis in a patient



An MRI image with NeuroQuant analysis. SMIL uses this FDA-approved software because of its reliability and established track record.

NEUROQUANT

with memory loss can be twofold," he says. "First, patients with Alzheimer's disease can be diagnosed sooner and more accurately."

The second advantage is for patients suspected of having Alzheimer's who have a normal NeuroQuant study result.

"Rather than pursuing a diagnosis of Alzheimer's disease, clinicians can redouble their efforts to search for another source of memory loss," Ram says. •

REFERENCE:

Rathakrishnan B, Doraiswamy P, Petrella J. Science to practice: Translating automated brain MRI volumetry in Alzheimer's disease from research to routine diagnostic use in the work-up of dementia. *www.frontiersin.org*. 2014;4:3.

Ross D, Ochs A, Seabaugh J, et al. Man versus machine: Comparison of radiologists' interpretations and NeuroQuant® volumetric analyses of brain MRIs in patients with traumatic brain injury. *J Neuropsychiatry Clin Neurosci*. 2013;25(1):32-39.

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More Accurate Diagnoses in Patients with Prostate Cancer

Imaging with sodium fluoride can change treatment



Nishant Verma, MD

Positron emission tomography (PET) imaging with sodium fluoride (NaF) changed treatment in about half of men with prostate cancer and could prove to be a better tool than bone scintigraphy, according to an analysis from the National Oncologic PET Registry (NOPR) published online Feb. 27, 2015 in the *Journal of Nuclear Medicine*.

As an NOPR participant, Scottsdale Medical Imaging (SMIL) has been contributing NaF PET data to the NOPR data set for several years. Over that time, Nishant Verma, MD, nuclear

medicine oncologist at SMIL has become a proponent of NaF PET.

The study showed the overall frequency of change from non-treatment to treatment or vice versa was 46.7 percent for initial staging, 44.1 percent for suspected first osseous metastasis, and 52 percent for suspected progression of osseous metastasis.

"If someone has prostate cancer and evidence of progression, the first thing to look for is bone metastases, which is why sodium fluoride is the study you want to pick first," Verma says.

He says the advantage for the



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referring physician is that the diagnosis will be more accurate. And for the patient, there's an advantage people often don't talk about: Instead of the five or six hours it takes for a conventional bone scan, the NaF PET takes about an hour and a half.

"It is significantly faster, and significantly better," Verma says. •

REFERENCE:

Hillner B, Siegel B, Hanna L, et al. Impact of 18F-Fluoride PET in patients with known prostate cancer: initial results from the national oncologic PET registry. *J Nucl Med*. 2014; 55:574-581.

Adding Quantitative Analysis to Brain Scans

Imaging dementia gets increasingly accurate



John Millstine, MD

A meta-analysis of 119 studies evaluating the role of different modalities, including 27 studies evaluating fluorodeoxyglucose positron emission tomography (FDG-PET) in the diagnosis of Alzheimer's, resulted in a pooled sensitivity of 91 percent (95 percent CI), and specificity of 86 percent (95 percent CI) for FDG-PET.

Accurate interpretation of these studies requires experience in recognition of typical metabolic patterns caused by dementias and of artifacts introduced by image

processing. Although visual interpretation is a vital component of image analysis, computer-assisted diagnostic software has begun showing benefits in increased diagnostic accuracy and confidence.

Nuclear Medicine Radiologist John Millstine, MD, of Scottsdale Medical Imaging (SMIL), has extensive experience interpreting FDG-PET brain scans for the whole spectrum of dementia, including Alzheimer's. He says the addition of quantitative analysis software offers a significant improvement over subjective visual interpretation.

"Compared to other PET studies, brain PET imaging can be challenging," Millstine says. "It is nice to have quantitative and statistical analysis to help either reinforce your visual impression, or to draw your attention to more subtle findings that you may have been inclined to dismiss."

SMIL's nuclear medicine department is one of the few practices

in the Scottsdale area with five fellowship-trained nuclear medicine subspecialists. They have been assessing quantitative analysis programs for PET scans over the past several years. Millstine says they are currently using MIMneuro[®] software that employs an array of quantitative analytical tools in an automated comparison of a patient's brain scan to a database of normal controls.

"I think this is something that is going to really improve, and I almost want to say revolutionize, our approach to imaging dementia," Millstine says. "We'll be able to provide very high quality reports with good statistical backing for our diagnoses in a way that is easy for referring physicians to explain to their patients." •

REFERENCE:

Marcus C, Mena E, Subramaniam R. Brain PET in the diagnosis of Alzheimer's disease. *Clinical Nuclear Medicine*. 2014;39(10):414-426.

Percutaneous Ablation of Renal Masses

This option for nonsurgical candidates shows low complication rates



Rolf Hultsch, MD

Solid renal masses of small size are common and typically discovered as incidental findings on CT or MRI. Treatment options include conservative management and surgical resection. Percutaneous ablation using imaging guidance is also available for non-surgical candidates.

Interventional radiologist Rolf Hultsch, MD, and his colleagues at Scottsdale Medical Imaging (SMIL) recently compiled results of their first 100 renal ablation cases. The research showed that 87 of 92 lesions treated had no recurrence (95 percent) after a mean follow up of 1.7 years, and the overall complication rate has been low.

SMIL results are similar to those published by a group at Washington University School of Medicine and a French group with treatment success rates of 87 percent and 96 percent respectively.

These lesions are typically biopsied at the same time as ablation, Hultsch says, and post-treatment imaging is required to ensure complete lesion ablation and no recurrence. “We obtain our first follow-up with CT or MRI at three to six months post treatment, and usually follow patients for five years,” Hultsch says.

WHICH PATIENTS CAN BENEFIT?

Ideal lesions for ablation measure about 3 cm or less in diameter and are not immediately adjacent to critical structures including the renal hilum, ureter and bowel.

“In our current practice, essentially all of our referrals come from urologists who have already examined the patients and felt they may not be optimal surgical candidates,” Hultsch says.



This CT reconstruction of the abdomen shows a tumor involving the upper pole of the right kidney. PHOTO: MEDICAL BODY SCANS / SCIENCE SOURCE; COLORIZATION BY: MATTHEW BOLOGNA

He adds that he and his colleagues at SMIL are often asked about the differences between cryoablation and radiofrequency ablation (RFA). A significant advantage of cryo, he says, is the ability to see the ice ball formation in real time using CT, with a minor disadvantage that each needle achieves a relatively small ablation volume. RFA offers the ability to achieve a larger ablation zone (not often necessary for renal lesions), but the ablation margin cannot be visualized on CT during the procedure.

“We are always happy to offer an opinion regarding appropriateness and safety of percutaneous treatment,” Hultsch says. “We almost always use cryoablation of the target lesion using one to four ablation needles, each about 13 gauge in size. Radiofrequency ablation is appropriate as well and may be preferred by some operators.”

SMIL interventional radiologists may be reached at the SMIL IR Clinic at **480-425-4150**. •

REFERENCE:

Kim E, Tanagho Y, Bhayani S, et al. Percutaneous cryoablation of renal masses: Washington University experience of treating 129 tumors. *BJU Int*. 2013;111(6):872-9.

Buy X, Lang H, Garnon J, et al. Percutaneous renal cryoablation: prospective experience treating 120 consecutive tumors. *AJR*. 2013;201(6):1353-61.

“Essentially all of our referrals come from urologists who have already examined the patients and felt they may not be optimal surgical candidates,” says *Rolf Hultsch, MD*.



NEW: Online Appointment Scheduling

According to a recent report by Accenture, just 11 percent of U.S. health systems allow patients to schedule appointments online; however, the report predicts 2-in-3 patients will be self-scheduling online within the next five years.

Demand for convenience is driving the trend, but Accenture's research also found that some U.S. health systems are falling below the standards of other industries for handling calls. Difficulty scheduling is sometimes cited as a reason patients don't follow physician recommendations for additional testing. In fact, a 2012 trial found the opportunity to self-schedule contributed to improved osteoporosis screening rates.

Aware of these trends, Scottsdale Medical Imaging (SMIL) and SDI have launched "Appointment Avenue." This self-scheduling tool is a commitment to optimal patient experience and removing barriers to care. It allows patients to conveniently schedule mammograms, and DXA and ultrasound exams 24/7 online. SMIL plans to add more modalities in the future. To learn more, visit esmil.com/schedule-online.

New CMS Guidelines for Lung Cancer Screening Approval



Christopher J. Salmon, MD

The Centers for Medicare & Medicaid Services (CMS) issued a final determination that provides Medicare coverage of low-dose computed tomography (LDCT) screening for patients at high risk of lung cancer.

The organization expanded eligibility by raising the age limit to 77, and changed what constitutes an asymptomatic patient to include patients with COPD, asthma and smoker's cough. Now, most current or former smokers, 55 to 77, with a 30-pack-year history of smoking are eligible for Medicare coverage for the screening, says Christopher J. Salmon, MD, chest radiology specialist at Scottsdale Medical Imaging. *Continues online* ▶

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Breast Cancer Screening in an Era of Personalized Regimens

Both the National Health Service U.K. Breast Screening Program and the Ontario High Risk Breast Screening Program have

concluded studies showing that annual MRI for women at high risk of breast cancer can be effectively implemented into an organized breast-screening program.

"The message is that screening is evolving away from a one-size-fits-all approach and into something that is personalized and requires discussion between patients, clinicians and radiologists to define what is best for that patient," says radiologist Denise Hartoin Reddy, MD, of the breast-imaging center at Scottsdale Medical Imaging. *Continues online* ▶



Denise Hartoin Reddy, MD

Diagnosing Acute Cholecystitis

With improvements in ultrasound technology, some have questioned the need for hepatobiliary (HIDA) scans for diagnosing acute cholecystitis.

In a meta-analysis of 57 diagnostic trials in 5,859 adult patients, researchers evaluated the diagnostic accuracy of HIDA, ultrasound and MRI. They found that the sensitivity for HIDA at 96 percent was significantly higher than either MRI (85 percent) or ultrasound (81 percent).

"If you think someone might have acute cholecystitis and you do a HIDA scan and it is normal, the chances of the patient actually having acute cholecystitis are minuscule, less than 1 percent," says Christopher May, MD, nuclear medicine radiologist at Scottsdale Medical Imaging. *Continues online* ▶



Christopher May, MD



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