

Brain SPECT Gets Favorable Review from Neurology Panel

SPECT has emerged as a useful tool for the evaluation of a variety of neurological disorders, but further studies are needed to evaluate the cost-effectiveness of the modality, concluded a recent study published in the journal *Neurology* (*Neurology* 1996;1:278). The review study, commissioned by the American Academy of Neurology's Therapeutics and Technology Subcommittee, brought together a broad panel of experts to review the current literature on brain SPECT applications and evaluate the clinical utility of the modality in the diagnosis and treatment of neurological disorders. The 12 experts were from the fields of neurology, nuclear medicine and radiology. In the study's summary, the experts said: "Brain SPECT

is beginning to emerge as a helpful tool in the evaluation of a variety of neurologic disorders."

The expert panel pointed out that SPECT has been utilized in a myriad of neurological situations, partly because it is less expensive than other functional neuroimaging techniques and partly because it enables health care professionals to obtain three-dimensional images of radionuclide distribution in different regions of the brain. The panel stressed that the most attractive feature SPECT can bring to neuroimaging is its ability "to provide a qualitative estimate of regional cerebral blood flow (rCBF)." Since rCBF is closely linked to brain metabolism in many brain disorders, the study noted, SPECT enables physicians to obtain information generally unobservable with conventional imaging techniques.

SUMMARY OF THE EFFECTIVENESS OF SPECT FOR BRAIN APPLICATIONS

APPLICATION	RATING
Stroke	
Detection of acute ischemia	Established
Determination of stroke subtype	Promising
Vasospasm following SAH	Promising
Prognosis/recovery from stroke	Investigational
Monitoring therapies	Investigational
Diagnosis of TIA	Investigational
Prognosis of TIA	Investigational
Neoplasm	
Grading of gliomas	Investigational
Differentiating radiation necrosis from tumor recurrence	Investigational
HIV encephalopathy	
	Investigational
Head trauma	
	Investigational
Epilepsy	
Presurgical ictal detection of seizure focus	Established
Localization of seizure focus	Promising
Differential diagnosis of ictus	Investigational
Interictal detection of seizure subtype	Investigational
Receptor studies	Investigational
Monitoring therapy	Doubtful
Alzheimer's Disease	
To support clinical diagnosis	Established
Huntington's chorea	
	Investigational
Persistent vegetative state	
	Investigational
Brain death	
	Promising

Underutilization of SPECT

Although nuclear physicians rely on SPECT as a high quality imaging tool, SPECT has yet to come into its own. As recently as 10 years ago, the inability of SPECT to provide adequate resolution of targeted areas caused some neurologists to shun SPECT imaging as the modality of choice to measure brain perfusion, according to the *Neurology* panel. When looked at together with the common perception that SPECT is technologically complex—an instrument whose reliability depends highly on the user—it is easy to see why referring physicians do not often call on nuclear physicians to perform SPECT, wrote the panel.

In recent interviews with *Newsline*, nuclear medicine experts on the panel outlined several explanations for the under-utilization of SPECT. Part of the problem may stem from the fact that brain SPECT procedures are not standardized, according to Alan Waxman, MD, director of nuclear medicine at Cedars-Sinai Hospital in Los Angeles. "We must have a systematic way to prepare, obtain data, display the data we obtain, and read the images," Waxman said, "otherwise, we'll continue to face the same obstacles we do today."

Ronald Tikofsky, PhD, associate research scientist in the Department of Radiology at Columbia University College of Physicians and Surgeons' Harlem Hospital Affiliation, viewed the minimal use of SPECT as a product of inadequate promotion by nuclear physicians. "Clinicians from other specialties are not used to calling on nuclear medicine practitioners to help them out," Tikofsky said.

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This attitude can only lead to improved dialogue and better understanding of the opposing view.

General Considerations

The point of this two-part commentary was to discuss facets of risk communication specific to lawmakers, patients, adversarial groups and broad-based coalitions. It was not intended to comprehensively consider risk communication in general. Some general considerations, however, deserve to be reiterated.

Concern and compassion for an opposing view is an effective strategy to help convince opponents that they are being heard. Fear of cancer and of the radiation that may cause it is a real fear. If that fear is acknowledged in a compassionate manner, a defensive posture on either side may be prevented, allowing both sides to be open to ideas not previously considered. Despite open dialogue, a speaker should no more expect to convert an entire audience to one side of an issue than he/she expects to be converted by the opposition. If a speaker listens to the concerns of the opposition and addresses those concerns honestly and accurately, an opportunity to educate the opposition and to open doors to further dialog will be created.

Communicating risk that is associated with exposure to ionizing radiation is a difficult task. It is one often faced by physicians and physicists who work with radioactive materials. Distrust, inflexibility and anger on both sides of the discussion can be formidable barriers to open dialogue. Communication must be maintained, however, if any progress toward the intelligent use of radioactive materials is to be achieved.

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“We need to interact with other specialists and demonstrate that we appreciate the clinical problems they’re up against and then participate in joint studies with them to gauge the effectiveness of our tools in these situations.”

Grading System for SPECT Indications

Tikofsky said nuclear physicians can use the findings of the Neurology expert panel to educate their colleagues on the benefits of brain SPECT compared to other imaging modalities such as CT. Using a four-tiered rating system, the panel graded and evaluated the effectiveness of SPECT in diagnosing and guiding treatment for brain disorders ranging from stroke, to epilepsy, to HIV encephalopathy. (See chart on page 14N) For each SPECT application in the current peer-reviewed literature study, the panel reviewed SPECT’s effectiveness and graded its utility as either doubtful, investigational, promising, or established. Most of the brain SPECT applications received an “investigational” rating. Several other applications, including the differentiation and grading of gliomas, the determination of seizure subtype, the prognosis of recovery from stroke, the evaluation of transient ischemic attacks, and the diagnosis of Huntington’s chorea, were judged to be investigational “promising” by the panel. Assessment of brain death, determination of stroke subtypes, and the diagnosis of vasospasm following subarachnoid hemorrhage were found to be among

the most promising applications of SPECT. The technology’s ability to detect acute ischemia, presurgical ictal detection of seizure focus and confirm a clinical diagnosis of Alzheimer’s disease rank among its most dependable applications, concluded the panel. With regards to Alzheimer’s disease, the panel wrote, “SPECT’s established accuracy in detecting decreased perfusion in the association cortex of the parietal lobe has led to sensitivity rates as high as 95% for the disease.” As a member of the expert panel, Tikofsky maintained that the review is a “significant step” forward in demonstrating the effectiveness of the technology to other medical practitioners.

He did, however, feel that the panel was too strict in its evaluation of head trauma; he would have liked to see it rated “promising” rather than “investigational”. Waxman saw a few problems with the study as well. “It should have listed some of the areas where SPECT is abused and misused,” he said. “This would have brought attention to researchers who attribute unsubstantiated abnormalities to vague clinical problems such as general behavioral changes.” Tikofsky and Waxman both hope that the study will bring increased attention to the nuclear physician’s ability to aid the referring neurologist. They also agree that there is a significant need for outcome studies to differentiate the neurological conditions that are best evaluated using SPECT versus CT—both in terms of clinical effectiveness and in terms of cost.

—Brendan M. Peter