

## Is brain imaging clinically useful for psychiatrists?

### *SPECT helps illuminate the variance of illnesses.*

Psychiatry remains the only medical specialty that rarely looks at the organ it treats.

If we agree that mental disorders and aberrant behaviors are related to functional brain problems, and that single photon emission computed tomography (SPECT) imaging is a reliable measure of regional cerebral blood flow and thus activity patterns, how can we not take advantage of this valuable tool when faced with complex and unresponsive patients? How can we evaluate brain function unless we look? Otherwise, we are left to deduce or guess what may be going on in our patients' brains.

In experienced hands, SPECT scans can be helpful in numerous problems that commonly present to psychiatrists. A scan can show brain areas implicated with specific clinical problems, such as the prefrontal cortex with impulsivity and the hippocampus with memory issues. SPECT frequently uncovers unexpected findings that may be contributing to presenting problems, such as toxicity or brain trauma. SPECT can help types of obsessive-compulsive disorder, or stabilize erratically firing temporal lobes often seen in aggression. Before and after SPECT can also show the effects of prescribed medication to give guidance on how to adjust treatment.

If the above is true, why don't more psychiatrists use imaging in clinical practice? First, clinical imaging is not part of psychiatric training. Most psychiatrists do not know when to order scans or how to use the information. Another reason is the mistaken concern that imaging may replace the physician. Imaging should never be used alone to make a diagnosis or direct a treatment decision. It is only part of the puzzle.

Another misconception is that SPECT advocates want to perform imaging tests on every psychiatric patient. I think of SPECT like radar. On a clear day, radar isn't necessary to land a plane. So, too, in psychiatry, a careful clinical evaluation can accurately diagnose most problems. However, radar is needed when there is

trouble seeing the airport. SPECT's best use is in complex or treatment-resistant cases. Withholding imaging in unclear cases does an injustice to our patients and may even harm them. Ineffectively treated psychiatric disorders are expensive and dangerous.

Some critics argue that brain imaging isn't ready for clinical use because research has yet to find any abnormality that is specific to a single psychiatric disorder. These critics miss the point. Of course, studies that use DSM-IV criteria as a standard for patient selection will not yield a single pattern of abnormalities. That's why we have a range of treatments for a single diagnosis; not every patient responds to every treatment, and many standard treatments directed at phenotypic subsets make patients worse. There is significant heterogeneity within DSM-IV diagnoses. SPECT helps us understand the variance of illnesses, such as depression and ADHD, rather than diagnosing these disorders.

Another argument against imaging is that the notion that studies to interpret findings are insufficient studies. Clearly, more research is needed, but to say that not enough peer-reviewed research exists is entirely false. Thousands of peer-reviewed imaging articles provide a sound clinical basis for interpreting findings.

One of the most powerful implications of imaging is that it immediately decreases the stigma associated with mental illness. It shows patients and their families that they are dealing with real medical problems, and increases compliance. We have nothing else in psychiatry that results in such an immediate and strong intervention. ■



*Dr. Daniel G. Amen is an assistant clinical professor of psychiatry at the University of California, Irvine.*

### *More well-designed studies are needed.*

Brain imaging does already have important clinical uses in detecting physical problems such as seizure activity, tumors, and head trauma.

The tool holds the promise of being a powerful one for psychiatrists. But for the moment, brain imaging remains primarily a research tool.

Last year the American Psychiatric Association's Council on Children, Adolescents and Their Families issued a resource document on brain imaging in child and adolescent psychiatry, with special emphasis on SPECT.

The committee, of which I am chair, undertook a review of the existing literature, because we were concerned that brain imaging was being used to promise more than it could deliver in terms of diagnosis and treatment of psychiatric disorders.

Our conclusion: At this point, brain imaging does not really add anything to what you would do as part of a good psychiatric evaluation.

Brain imaging has, however, been used extensively in research on numerous psychiatric disorders, including obsessive-compulsive disorder, schizophrenia, depression, panic disorder, and drug abuse.

For some disorders, imaging has been able to identify changes or abnormalities in several regions of the brain, but the clinical relevance of these findings remain unclear.

For other disorders, such as autism, we still do not have definitive answers to questions about how the brain functions differently in these disorders.

Perhaps the most fundamental problem with brain imaging research is that no published investigation in the field has determined that any structural or functional brain abnormality is specific to a single psychiatric disorder.

The imaging research that exists does show group differences, but the predictive value is not there.

SPECT can be an important adjunct in the diagnosis and treatment of many neurologic conditions—cerebral trauma,

certain types of dementia, strokes, seizure disorders, and brain tumors—in which characteristic patterns of perfusion abnormalities are detectable.

Certainly, if you suspected a brain tumor or a trauma based on your patient evaluation, it would make sense to use brain imaging techniques, such as SPECT.

But the fact remains that even considering the continued advances in brain imaging that have occurred since we published the resource document, brain imaging still has not progressed to the point of being useful for the clinical diagnosis of psychiatric disorders in individual patients.

Several problems would need to be resolved before we could consider using brain imaging in the diagnosis and treatment of our patients.

More well-designed studies are needed. Studies to date have been small. Great discrepancies exist related to sample size, subject selection, imaging protocol, and image analysis.

In addition, changes observed on imaging may not accurately reflect underlying neurobiologic dysfunction in the brain structures being studied. Instead, these changes may represent compensatory mechanisms reflecting adaptation to deficits in other aspects of brain function.

Lastly, a lack of data exists regarding the sensitivity and specificity of brain imaging studies for diagnosing psychiatric conditions.

For the present, the available evidence does not support the use of brain imaging for clinical diagnosis or treatment of psychiatric disorders. ■



*Dr. Lois T. Flaherty is a lecturer in psychiatry at Harvard Medical School, Boston.*