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MRI: A Window on the Brain

Advances in brain imaging could lead to improved diagnosis of psychiatric ailments, better drugs, and earlier help for learning disorders.

By Paul Raeburn

When Bradley Peterson, a psychiatrist and researcher at Columbia University, offered to scan my brain with a magnetic resonance imager the size of a small Airstream trailer, I immediately said yes. I spent 10 minutes filling out a page-long checklist (I lied on the question asking whether I was claustrophobic) and another few minutes emptying my pockets and getting rid of keys, wristwatch, and pen, which could become missiles inside the MRI's potent magnetic field.

I lay down on a narrow pallet that slid into the machine like a drawer in a morgue. The machine groaned and clanged as it peered inside my skull, then fell silent. With a gentle whir, the pallet slid out, and I relaxed. In about the time it takes to burn a few CDs on my laptop, Peterson was leaning over a screen, showing me a detailed black-and-white image of my brain.

Brain scans like the one I had are now routine, used for everything from detecting signs of stroke to searching out suspected tumors. But researchers like Peterson are

pushing MRI technology further than anyone once thought it could go. In the last decade or so, MRI has been retooled to reveal not only the anatomy of the brain but also the way the brain works.

While conventional MRI scans, like the one Peterson gave me, reveal physiological structures, a variation called functional MRI (fMRI) can now also image blood flow over time, allowing researchers to see which areas of the brain are active during certain tasks.

Indeed, fMRI studies over the last few years have provided researchers with startling images of the brain actually at work. A yet newer extension is MRI spectroscopy, another kind of functional imaging that monitors the activity of particular chemicals in the brain -- providing different clues to brain function than fMRI does. And most recently, researchers have pioneered an MRI technique called diffusion tensor imaging (DTI) that produces 3-D images of the frail, spidery network of wires that connects one part of the brain to another.

MRI has become, says Robert Desimone, director of the McGovern Institute for Brain Research at MIT, "the most powerful tool for studying the human brain. I liken it to the invention of the telescope for astronomers." Desimone notes that the arrival of the telescope did not immediately revolutionize the scientific understanding of the universe. That took time, as researchers learned how to use their new tool.

The same thing is happening with MRI, Desimone says. Researchers are just now beginning to realize the potential of these

techniques, which were first widely used on humans about 15 years ago. "You're seeing a lot of excitement in the field," says Desimone.

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