StarTribune.com | MINNEAPOLIS - ST. PAUL, MINNESOTA

Brain test could help make earlier diagnoses

A technique developed by a U scientist shows promise in detecting several neurological disorders for which there is no other single test.

By Maura Lerner, Star Tribune

Last update: August 24, 2007 – 9:49 AM

A University of Minnesota scientist has discovered a way to detect Alzheimer's disease, schizophrenia and other brain disorders by using a device that tracks magnetic signals in the brain.

Although the research is still in its early stages, it could lead to a relatively quick and painless test for a wide range of conditions that affect the brain, experts say.

The scientist, Dr. Apostolos Georgopoulos, calls it an "elegantly simple test" that has been surprisingly accurate so far in assessing nearly 300 patients and healthy volunteers.

He and his research team used a technology known as MEG (magnetoencephalography) at the VA Medical Center in Minneapolis to study people's brains as they stared at a point of light for 45 to 60 seconds.

In a study published Wednesday, they found that they were able to identify six types of disorders "with 100 percent accuracy."

They included patients with Alzheimer's, chronic alcoholism, schizophrenia, multiple sclerosis, Sjogren's syndrome (an autoimmune disease) and facial pain.

What they found, Georgopoulos said, is that each disease affects the brain differently, and alters the way brain cells communicate with one another.

There are no such tests for most brain diseases, which can be difficult and time-consuming to diagnose. They're usually identified over time by observing behavior, such as memory loss in Alzheimer's patients, and other external symptoms.

Georgopoulos, a regents professor of neuroscience known internationally for his work on how the brain affects movement, said even he was surprised by the apparent accuracy of the test. "It's just too good to be true," he said in an interview. But the results have continued to hold up, he said, even after they concluded the initial study, which involved 142 patients.

"We're approaching our 300th subject," he said, "and it looks better and better."

A tool for tracking treatments?

If it pans out, the new test could be used to diagnose brain disorders earlier, monitor their progress and track the effectiveness of new drugs and treatments.

"I think it has that potential," said Georgopoulos, who also heads the Brain Sciences Center at the VA hospital.

Tim Denison, a senior engineer who specializes in brain devices at Medtronic Inc., agrees. "I believe that if it works out how he's described it in the paper ... it could definitely help identify [diseases] much earlier and with greater precision," he said.

At the same time, he and other scientists agree that more research is needed to prove its value.

"This certainly is an innovative technique," said Dr. John Richert, executive vice president for research at the National MS [multiple sclerosis] Society in New York. But "it's not yet clear how helpful this technique will be as a diagnostic tool."

He noted that a relatively small number of MS patients were in the study, and they appeared to have advanced disease. He wonders if the test could identify patients at earlier stages, when it's tougher to diagnose. "We need to know a lot more about this study and what it's detecting before we will know how useful it will be," he said.

Currently, there are only several hundred MEG devices in the world, used mostly for research, Georgopoulos said. But that could change, he said, if the tests prove as effective as they seem.

Georgopoulos developed a method for analyzing the results, and holds a patent for it that he shares with the university and the VA. They have licensed that technology to a startup company, Orasi Medical Inc., in Edina.

His research team plans to study the technique with other disorders, such as depression, autism, fetal alcohol syndrome, Parkinson's disease and post-traumatic stress disorder.

The MEG device at the VA hospital cost about $2 million, including the specially built room that houses it on the fourth floor. It must be sealed in a vault-like space because noise can interfere with the results.

No risk to patients

For patients, though, there is no risk of radiation or other dangerous exposure, Georgopoulos said. They lie on a gurney as a helmet covers the top of the head. By tracking tiny magnetic fields produced by electrical activity in the brain, the superfast device can monitor the way the brain cells communicate with one another. After only a minute, it has tens of thousands of bits of data, which can be analyzed by computer for distinct patterns.

Georgopoulos said he got the idea after testing the device on 10 healthy volunteers and was struck by how identical their brain patterns were. When he tried the test on chronic alcoholics, who had agreed to be volunteers, the results were distinctly different.

Eventually, he tested it on volunteers with six separate conditions, and found that each group had its own distinct pattern.

Wednesday's study was published online by the British Journal of Neural Engineering.

Maura Lerner • 612-673-7384

Maura Lerner • mlerner@startribune.com

© 2007 Star Tribune. All rights reserved.