

## Portable Device Quickly Detects Early Alzheimer's

ScienceDaily (Jan. 17, 2008) — The latest medications can delay the onset of Alzheimer's disease, but none are able to reverse its devastating effects. This limitation often makes early detection the key to Alzheimer's patients maintaining a good quality of life for as long as possible.

Now, a new device developed by the Georgia Institute of Technology and Emory University may allow patients to take a brief, inexpensive test that could be administered as part of a routine yearly checkup at a doctor's office to detect mild cognitive impairment (MCI) — often the earliest stage of Alzheimer's. The device is expected to be commercialized later this year.

Current assessment tests capable of detecting early Alzheimer's typically are taken with a pen and paper or at a computer terminal and last about an hour and a half. They must be given by a trained technician in a quiet environment, because any distractions can influence the patient's score and reduce the test's effectiveness. Because of their length and expense, the tests are not used as regular screening tools and typically are given only after there is obvious cognitive impairment such as forgetfulness or unsafe behavior.

“Families usually wait until their mom or dad does something somewhat dangerous, like forgetting to take their medications or getting lost, before bringing them in for testing. At that point, the patient has already lost a significant portion of their cognitive function,” said David Wright, MD, who helped develop the device. Wright is assistant professor of emergency medicine at Emory University School of Medicine and co-director of the Emory Emergency Medicine Research Center. “With this device, we might be able to pick up impairment well before those serious symptoms occur and start patients on medications that could delay those symptoms.”

The Georgia Tech and Emory device, called DETECT, gives individuals a roughly ten-minute test designed to gauge reaction time and memory — functions that, when impaired, are associated with the earliest stages of Alzheimer's disease. The test is a specially modified, shortened version of the traditional pen and paper test and could be given repeatedly by doctors to evaluate any changes in cognitive functions.

“We really envision this to be part of the normal preventative care a patient receives from a general practitioner,” said Michelle LaPlaca, Ph.D., one of the creators of the device and an associate professor in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University. “It would be part of a regular preventative medicine exam much like a PSA test or EKG (electrocardiogram), serving as a cognitive impairment vital sign of sorts.”



*The DETECT system includes an LCD display in a visor with an onboard dedicated computer, noise reduction headphones and an input device (controller). The display projects the visual aspect of the test and the headphones provide the verbal instructions. (Credit: Image courtesy of Georgia Institute of Technology)*

The portable test runs patients through a battery of visual and auditory stimuli such as pictures and words that assess cognitive abilities relative to age, gauging reaction time and memory capabilities. Its software can track cognitive capabilities — and decline — year to year during annual appointments. And because the device blocks outside sound and light from the patient’s environment, it can be administered in virtually any setting, providing more consistent results.

Preliminary analysis of the first 100 patients of a 400-person clinical study being conducted at Emory’s Wesley Woods Center has shown that the 10-minute DETECT test has similar accuracy to the 90-minute “Gold Standard” pen and paper test.

With millions of baby boomers easing into late adulthood, the number of patients with Alzheimer’s is expected to skyrocket over the next few decades. More than 24 million people worldwide are currently thought to have Alzheimer’s disease and by 2040, an estimated 81 million people worldwide are expected to develop the disease.

To give these millions of potential Alzheimer’s sufferers a chance to slow the disease’s advance before serious symptoms set in, doctors need an inexpensive and easy-to-administer test to detect and track the cognitive decline associated with the early stages of the disease.

The DETECT device is designed to be administered while a patient is still healthy, tracking any abnormal decreases in the patient’s cognitive performance over time. If a patient’s performance declines outside the normal range, the patient would then undergo additional testing and care from a neurologist, neuropsychologist or other specialist.

The DETECT system includes an LCD display in a visor with an onboard dedicated computer, noise reduction headphones and an input device (controller). The display projects the visual aspect of the test, the headphones provide the verbal instructions and the controller records the wearer’s response.

DETECT’s creators have formed a company, called Zenda Technologies, to commercialize the device for MCI, as well as other conditions. Georgia Tech and Emory researchers are exploring other types of cognitive impairment such as Attention Deficit/Hyperactivity Disorder (ADHD) that could be picked up by DETECT. A version of the system designed to detect mild concussions on the sidelines of a football game, during other high-impact sports or on a battlefield is still being tested.

The research was funded with a grant from the Wallace H. Coulter Foundation and support from the Georgia Research Alliance through Georgia Tech’s VentureLab.

*Adapted from materials provided by [Georgia Institute of Technology](http://www.gatech.edu).*

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