

# Computers could be used to diagnose Alzheimer's disease

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Computers are able to diagnose Alzheimer's disease faster and more accurately than experts, according to research published in the journal *Brain*. The findings may help ensure that patients are diagnosed earlier, increasing treatment options.

According to the Alzheimer's Research Trust, there are over 700,000 people currently living in the UK with dementia, of which Alzheimer's disease, a neurodegenerative disease, is the most common form.

Alzheimer's is caused by the build up in the brain of plaques and neurofibrillary tangles (tangles of brain tissue filaments), leading the brain to atrophy. Definitive diagnosis is usually only possible after death, but Alzheimer's is usually diagnosed using a combination of brain scans, blood tests and interviews carried out by a trained clinician. The tests are time consuming, and distinguishing the disease from other forms of dementia can be difficult. The accuracy of diagnosis is only about 85%

Now, a team of researchers led by scientists at the Wellcome Trust Centre for Neuroimaging at University College London, has shown that scans of patients with Alzheimer's can be distinguished from those of healthy individuals and patients with other forms of dementia. Computers can identify the characteristic damage of Alzheimer's disease with an accuracy as high as 96%.

"The advantage of using computers is that they prove cheaper, faster and more accurate than the current method of diagnosis," explains Professor

Richard Frackowiak from the Wellcome Trust Centre for Neuroimaging. "The new method makes an objective diagnosis without the need for human intervention. This will be particularly attractive for areas of the world where there is a shortage of trained clinicians and when a standardised reliable diagnosis is needed, for example in drug trials."

The new method, developed by Professor Frackowiak's team, works by teaching a standard computer the differences between brain scans from patients with proven Alzheimer's disease and people with no signs of the disease at all. The two conditions can be distinguished with a high degree of accuracy on a single clinical MRI scan. This could be especially useful for centres where facilities for extensive diagnostic workup are unavailable. One use might be to reassure the worried elderly well with mild memory problems that they are not suffering from early Alzheimer's.

The research tested scans from the US and the UK, from community and from academic hospitals. The method was shown to be valid by testing it on scans from people who had their status proven by pathological examination – the gold standard. The results were uniformly encouraging. The computer could be taught the distinction between normal and Alzheimer's with one set of scans and then used to correctly "diagnose" scans from another set. In all cases the results were better than the 86% correct diagnostic rate of best clinical practice. The researchers also found they could distinguish Alzheimer's better than clinicians from a similar disease called fronto-temporal dementia.

Professor Frackowiak emphasised that as symptoms from these diseases come on after a considerable amount of damage has already occurred in the brain, so it is important to make an accurate diagnosis early to improve the chances of effectively preventing deterioration.

"The next step is to see whether we can use the technique to reliably track progression of the disease in a patient," says Professor Frackowiak. "This could prove a powerful and non-invasive tool for screening the efficacy of new drug treatments speedily, without a need for large costly clinical trials."

Source: Wellcome Trust

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