NEURODEGENERATIVE DISEASE AND STROKE

Cognitive function: the advantages of computerised testing

In a session on "Pathologies in focus", chaired by Professor Stephen Denyer, University of Brighton, on 25 September, participants heard about developments in assessing cognitive function and the pathology of stroke

KEITH WESNES, Cognitive Drug Research, gave a presentation on the latest developments in assessing cognitive function in neurodegenerative disease.

He began by explaining that cognitive function is the process that underpins everyday behaviour, helps us to process information, organises our thoughts and actions, helps us to store and retrieve information and enables us to plan and execute tasks.

Mr Wesnes said that he had spent a great deal of time trying to measure the aspects of cognitive function that are vulnerable to change, such as attention and concentration, working memory, long-term memory, reasoning, abstraction and planning, and the control of movement. He explained that any of these aspects of cognitive function can be targeted by trauma, fatigue, stress, viruses and toxins, ageing, psychiatric and physical illnesses and drugs.

He told participants that cognitive function is measured either directly, eg, by measuring performance of a task, or indirectly, eg, by electroencephalogram (EEG) — indirect measurements reveal patterns of activity but not cognitive function. Mr Wesnes said that in the past, pen and paper tests were used. "These were not sensitive enough and did not allow speed as well as accuracy to be tested." He said that important affects were missed and other affects were created when this method was used.

Keith Wesnes: computerised tests are less intimidating than pen and paper ones

Mr Wesnes focused on computer-based tests for the remainder of his presentation. These tests involve, for example, a series of words appearing on a monitor, which have to be remembered at a later time. The subject responds by pressing a "yes" or "no" key. A tester is still present in order to ensure that the subject knows what to do and the test is carried out correctly, said Mr Wesnes. It is possible for the subject to take a computer test while having an MRI or EEG scan, he added.

Mr Wesnes explained that computerised tests are available in different languages. They appear to be less intimidating for elderly people than pen and paper tests and can be used to compare the cognitive deficits of different types of dementia as well as to quantify the clinical effects of drugs on cognitive function in clinical trials.

Mr Wesnes concluded his presentation by suggesting that, in the future, computerised tests could be carried out over the internet, by telephone or by using handheld computers. "Computerised tests have identified a range of other [cognitive] impairments that clinicians suspected patients had. This will enable these disorders to be treated more appropriately as we all get older," he said.

In response to a question from the floor about whether computerised tests have been used to compare drugs currently on the market, Mr Wesnes said: "Computerised tests have shown differences in current anticholinesterases on the market — so they are not all acting in the same way." However, these data are not yet published, he added.

The pathology of stroke, and damage limitation

KEITH MUIR, senior lecturer in neurology, University of Glasgow, told Conference participants about the evolution of stroke damage, and said that a stroke is not a fixed event, it is often still evolving when the patient is seen by a doctor. "There is a gap of several hours in which there is time to rescue brain tissue — this is the single most important development in stroke in the past 10 years," he said.

What we understand of the pathology of stroke is based on animal studies, imaging studies and therapeutic intervention, said Dr Muir. In animals, an occlusion of the proximal part of the middle cerebral artery leads to infarction, the extent of which depends on the duration of the block and the percentage reduction in blood flow. To begin with the tissue has not yet died but is hypoperfused — this is the tissue that can be rescued.

He explained that the same process happens in people. If the occluded vessel is opened up then the size of the lesion can be limited. Persistent occlusion with no restoration of blood supply results in a large infarct, which correlates with neurological deficit.

Dr Muir then talked about acute treatment of stroke. Thrombolysis limits the amount of damage if it is given within three hours of stroke onset, however, its benefit declines rapidly as the interval between stroke onset and administration increases. Dr Muir posed the question: "Is it possible for patients to be treated early enough?" He said that research has shown that 37 per cent of patients arrive in hospital within three hours of experiencing a stroke, and 13 per cent arrive within six hours. The problem is not getting to hospital quickly, he said, but being seen by a doctor and having an MRI scan once in hospital.

Dr Muir also discussed neuroprotective agents, such as glutamate antagonists. He said that the body of evidence for these agents from 40 clinical trials is poor. He suggested several possible reasons for this: treatment may have been delayed for too long, eg, more than three hours; the trial population may not have had the right type of stroke leading to a dilution effect on the results due to a small sample size; and individual variation might have influenced the results — for this reason it is important for imaging technology to be applied in the acute setting, he said.

Dr Muir concluded by saying that it is possible to improve outcome in stroke by taking simple measures. Trials have shown that there is a significant decrease in mortality rate and risk of becoming institutionalised if patients are treated in a stroke unit rather than a general medical ward. He explained that it was also important to regulate blood pressure, blood glucose and temperature following a stroke. "Patients who have either a slight increase in temperature, eg, from 36.5 to 37.5C, an increase in blood glucose level or an increase in blood pressure, are significantly less likely to recover," said Mr Muir. He told participants that trials were currently ongoing to investigate whether intervening to decrease blood glucose improves mortality rate in stroke.