By Janelle Miles, National Medical Correspondent AAP

BRISBANE, Oct 31 AAP - Two people, two similar brain injuries, two vastly different outcomes. A Sydney scientist is on an international team trying to understand why people suffer differing degrees of disability after damaging the same region of the brain.

Neuroscientist Michael Breakspear, of the University of New South Wales, is part of the newly-created Brain Network Recovery Group recently awarded $US4 million to research how brains adapt after strokes, tumours, Alzheimer's disease and other forms of dementia.

"Two people can damage the same brain region and have quite different impairments," Dr Breakspear said in an interview. “One might experience profound impairment in one or more cognitive functions, whereas the other may experience very few problems. In some people the brain is compensating for the damage and in other people it isn't. We want to explain this enormous variability."

Dr Breakspear, who's based at Sydney's Black Dog Institute, will look at damage in the brains of people with early dementia. "Some people get quite profound changes throughout the brain in Alzheimer's disease, but they still function quite well," he explained. "Other people can have much less disease ... and yet their cognitive function begins to be compromised very early. You might get two individuals with the same degree of disease burden, neither have dementia, yet in one to two years, one of them will have progressed to dementia and the other won't. What we're going to be looking at is what predicts which of those two people are going to get dementia."

Dr Breakspear will collaborate with other researchers at the Prince of Wales Hospital's Neuroscience Institute in Sydney to take magnetic resonance imaging (MRI) scans of the brains of people with and without dementia as they do simple and more difficult tasks.

"We're hoping that something about the way people go from doing an easy task to doing a hard task will predict whether or not they get dementia in two years," he said. “If they go from an easy to a hard task very efficiently then we predict they won't get dementia as early as somebody who has to really pull on all their brain reserves. We're hoping to see that on the scan."

The scientists will compare the scans of 40 healthy subjects against the same number of people with early dementia. Dr Breakspear said the research may lead to a better prognostic test for dementia. He said a similar approach could be used to understand recovery from depression, a major focus of his research at the Black Dog Institute which studies mood disorders.

"If you talk to people who are depressed, they find it very difficult to do a whole lot of reading, watching television and those problems can linger for months as people are getting better," Dr Breakspear explained. "We can use exactly the same approach to understand how people's cognitive function recovers after a depressed episode."