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Reducing the burden of neurological disease and mental illness

Kay L Double[1], Linda J Richards[2]

The key to finding solutions for brain disorders is cooperation and collaboration, from the laboratory to the clinic

Australia is challenged by the rising economic and social costs of neurological disease and mental illness, which together account for one-third of the total disease burden in Australia.[1] The financial cost of these disorders — about $45.5 billion annually[1-4] — does not take into account the emotional impact and social isolation they cause. Many are chronic conditions with limited options for even ameliorative treatment, so that research into finding new approaches to their management is urgently needed. Translation of research into improved clinical practice, however, requires a continuum of process, including basic research, application of research findings, clinical trials, and implementation. Involving both basic researchers and clinicians in this process is crucial to its success. The Australasian Neuroscience Society (ANS; www.ans.org.au) recognises this need both by representing neuroscientists and clinicians in Australia and New Zealand active in neuroscience and mental health research, and by acting as a conduit for clinicians to interact more closely with researchers to achieve their shared goals.

This issue of the *MJA* highlights examples of current progress in the neuroscience of neurological disease and mental health conditions. As discussed by Koblar and colleagues,[5] restoring brain function in people who have had a stroke or incurred other damage to the central nervous system remains an area of unmet need. Australian researchers play significant roles in international efforts to develop regenerative neurology; for example, the 2017 Australian of the Year, Professor Alan Mackay-Sim, was recognised for his work in developing stem cell therapies for people with spinal cord injuries. Australians have long played an important role in developing devices for restoring central nervous system function. For instance, the cochlear implant, invented by Professor Graeme Clark and colleagues at the University of Melbourne in 1978, has restored hearing to nearly 350 000 individuals across the world with sensorineural hearing dysfunction. Australians continue to operate at the cutting edge of the development of devices at the brain–computer interface, such as those described in this issue by Rosenfeld and colleagues.[6]

The burden of neurodegenerative disorders is rising as the Australian population ages. Dharmadasa and her co-authors[7] review advances in the treatment of motor neurone disease, including three ongoing Australian clinical trials of potentially neuroprotective therapies; that is, of interventions that aim to slow the progress of the disease, not just provide symptomatic relief.

2017 promises to be an exciting year for accelerating progress in understanding the human brain. Major research projects seeking to deepen our understanding of its function and to translate this understanding into practical therapies are underway in the United States, Europe, Japan, and China, and the number of participating countries is rapidly expanding.[8] Australia itself has a national brain project; developed by the Australian Brain Alliance and coordinated by the Australian Academy of Science, it is a collaboration of 28 organisations (including ANS) involved in brain research.[9] The Australian Brain Project aims to understand how the brain encodes, stores and retrieves information, and its goals will be the focus of a proposal to be presented to the federal government in 2018. The Australian Brain Alliance also participated in an historic meeting at Rockefeller University (New York) in September 2016 with the goal of promoting collaboration and cooperation between large scale brain research projects around the world.[10]

The fundamental brain functions investigated by the members of ANS and the Australian Brain Project are intrinsic to our humanity, and they are often compromised by neurological disease and mental illness. Comprehensive understanding of these processes, and of precisely how and why they are disrupted in disease states, will provide us with new opportunities for improving diagnostics and developing more effective therapies that enhance the lives of the many Australians burdened by these disorders.

Competing interests: Kay Double is the Executive Secretary and Linda Richards the President of the Australasian Neuroscience Society.

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