<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Forewords</td>
<td>02</td>
</tr>
<tr>
<td>Professor Ian Everall</td>
<td>02</td>
</tr>
<tr>
<td>Professor James A Angus</td>
<td>03</td>
</tr>
<tr>
<td>2.0 Directors’ Report</td>
<td>05</td>
</tr>
<tr>
<td>Professor Christos Pantelis &amp;</td>
<td></td>
</tr>
<tr>
<td>Dr Dennis Velakoulis</td>
<td>05</td>
</tr>
<tr>
<td>3.0 Introduction</td>
<td>09</td>
</tr>
<tr>
<td>What is Neuropsychiatry?</td>
<td>10</td>
</tr>
<tr>
<td>Why is this field so important?</td>
<td>10</td>
</tr>
<tr>
<td>4.0 MNC Timeline (2003-2011)</td>
<td>17</td>
</tr>
<tr>
<td>5.0 MNC Executive Group Profiles</td>
<td>20</td>
</tr>
<tr>
<td>Professor Christos Pantelis</td>
<td>20</td>
</tr>
<tr>
<td>Dr Dennis Velakoulis</td>
<td>20</td>
</tr>
<tr>
<td>Professor Murat Yücel</td>
<td>21</td>
</tr>
<tr>
<td>Associate Professor Mark Walterfang</td>
<td>21</td>
</tr>
<tr>
<td>Dr Ramon Mocellin</td>
<td>22</td>
</tr>
<tr>
<td>Dr Alex Fornito</td>
<td>22</td>
</tr>
<tr>
<td>Dr Ben J. Harrison</td>
<td>23</td>
</tr>
<tr>
<td>Dr Sarah Whittle</td>
<td>23</td>
</tr>
<tr>
<td>Mr Tony Dann</td>
<td>23</td>
</tr>
<tr>
<td>Mrs Barbara Starbrowski</td>
<td>24</td>
</tr>
<tr>
<td>6.0 Former Members of MNC Executive</td>
<td>25</td>
</tr>
<tr>
<td>Professor Stephen J Wood</td>
<td>25</td>
</tr>
<tr>
<td>Dr Marc Seal</td>
<td>25</td>
</tr>
<tr>
<td>Ms Bridget Soudby</td>
<td>25</td>
</tr>
<tr>
<td>7.0 Clinical and Research Streams and Platforms</td>
<td>28</td>
</tr>
<tr>
<td>Psychosis And Developmental Neuropsychiatry</td>
<td>28</td>
</tr>
<tr>
<td>Addiction Neuropsychiatry</td>
<td>42</td>
</tr>
<tr>
<td>Affective Neuropsychiatry</td>
<td>51</td>
</tr>
<tr>
<td>Systems Neuropsychiatry</td>
<td>56</td>
</tr>
<tr>
<td>Clinical Neuropsychiatry</td>
<td>64</td>
</tr>
<tr>
<td>Data, Imaging and Methods Platform</td>
<td>74</td>
</tr>
<tr>
<td>Business and Administration Platform</td>
<td>75</td>
</tr>
<tr>
<td>Current Students</td>
<td>76</td>
</tr>
<tr>
<td>8.0 MNC Operations</td>
<td>78</td>
</tr>
<tr>
<td>Governance and Management</td>
<td>78</td>
</tr>
<tr>
<td>MNC Organisational Structure</td>
<td>79</td>
</tr>
<tr>
<td>Media</td>
<td>82</td>
</tr>
<tr>
<td>Funding</td>
<td>83</td>
</tr>
<tr>
<td>MNC People</td>
<td>87</td>
</tr>
<tr>
<td>Special Thanks</td>
<td>90</td>
</tr>
<tr>
<td>Collaborators</td>
<td>91</td>
</tr>
<tr>
<td>9.0 Publications</td>
<td>96</td>
</tr>
<tr>
<td>Peer-Reviewed Journal Publications</td>
<td>97</td>
</tr>
<tr>
<td>E-Pub and In Press Articles</td>
<td>110</td>
</tr>
<tr>
<td>Books and Book Chapters</td>
<td>111</td>
</tr>
<tr>
<td>10.0 Acknowledgements</td>
<td>114</td>
</tr>
<tr>
<td>11.0 Donations and Bequests</td>
<td>115</td>
</tr>
</tbody>
</table>
1.0 FOREWORDS

1.1 Professor Ian Everall BSc, MB ChB (Hons), PhD, FRCPsych, FRCPath, FRANZCP
Cato Professor of Psychiatry, Royal Melbourne Hospital and Head of Department of Psychiatry, The University of Melbourne

The Melbourne Neuropsychiatry Centre (MNC) was officially launched in 2004 as a joint centre of The University of Melbourne, Department of Psychiatry and Melbourne Health. Since its inception, MNC has been tremendously successful in bringing together an outstanding team of research active clinical academics, clinicians, scientists and professional staff to advance our knowledge and treatment of neuropsychiatric conditions. This dynamic team are contributing to better outcomes for the quality of life of our patients. This clinical-research interface is at the heart of MNC and is reflective of the strong partnership that exists between The University of Melbourne and the NorthWestern Mental Health service of Melbourne Health.

The success of the first eight years of the Centre has been due to a dedicated, hardworking team of people, with many working across both the clinical and academic areas relevant to neuropsychiatry. Professor Pantelis and Dr Velakoulis have brought together a highly talented group of people that has led to new discoveries in schizophrenia and other psychoses, bipolar disorder, depression, obsessive-compulsive disorders, substance abuse, and disorders of brain development as well as degenerative disorders of the brain and mind. This work is internationally recognised and is already contributing to better outcomes for the patients they treat.

These successes have been possible through the generous support of Melbourne Health (NorthWestern Mental Health), The University of Melbourne, the Department of Human Services Mental Health Branch, the Howard Florey Institute, Neurosciences Victoria and the Victorian State Government.

With this foundation of support and clinically impressive research programme the future of MNC is exciting and provides much promise for novel interventions and treatments. The Centre has grown to more than 80 staff and students. Their output is prolific, with over 400 publications in since 2006. The planned projects and activities of the Centre include highlighting the importance of knowledge transfer by continuing the well received, and informative education sessions and furtheing clinical research projects with identifiable health and treatment outcomes. Associate Professor Alex Cockram, Acting Chief Executive Officer of Melbourne Health, and myself, are extremely pleased with the progress of MNC and we are looking forward to working with the Centre, as part of its Management Committee, to ensure that it continues with its mission in the future.

1.2 Professor James A Angus BSc (Sydney), PhD (Sydney), FAA
Dean, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne

The Melbourne Neuropsychiatry Centre, directed by Professor Christos Pantelis and Dr Dennis Velakoulis has achieved beyond expectation. The Centre has more than doubled in size, and the clinical and research outputs have exceeded this growth, in quantity and quality; this has further added to the Centre’s internationally renowned reputation.

The unique clinical, teaching and research environment for researchers and students has allowed MNC to make significant advances within the field of neuropsychiatry and neurosciences. This is reflected in the Centre’s impressive publication record and various awards and media exposure. Scientists and clinicians from Australia and abroad regularly join the Centre to collaborate on various research studies.

Increasing excellence in research is a key goal of The University of Melbourne. The people of MNC are clearly demonstrating this excellence and leading the way for other groups in the application of neurosciences into psychiatric and clinical practice in Australia and internationally.
2.0  DIRECTORS' REPORT

Professor Christos Pantelis and Dr Dennis Velakoulis

It is a great pleasure to provide this report of the Melbourne Neuropsychiatry Centre (MNC), which provides an overview of our substantial growth and development since our first report in 2006. MNC has experienced a two-fold increase in people, a two-fold increase in competitive grant funding, and a four-fold increase in publications. This growth has been a direct consequence of ideas evolving from our research, and reflects the work of passionate and talented teams of researchers and clinicians.

A number of achievements are highlighted throughout this report. Most notably, in a series of studies in early psychosis and established schizophrenia, including longitudinal work, we have delineated the extent of the progressive brain changes occurring as psychotic disorders emerge and become established. In further work we are exploring the neurobiological factors relevant to these changes, including the role of inflammation of the brain during acute illness. Our imaging work is evaluating the brain's connections, that is, how different brain regions communicate and how this is affected in mental disorder.

This has led to thinking about how the brain develops as mental disorders emerge during adolescence and early adulthood, particularly schizophrenia, depression and bipolar disorder. We are now mapping trajectories of brain development from childhood through to adulthood, with a focus on children with language and behavioural difficulties, children with autism spectrum disorders, and those with schizotypal features. We will follow these children to assess their mental health and function as they develop into adulthood. Our work with children also includes identifying genetic predictors of autism with our colleagues from the Centre for Neural Engineering (CINE). We will extend this work to schizophrenia and other serious mental disorders.

Our research has developed further in a number of ways, for example, we are assessing the impact of substances of abuse on the developing brain, including the impact of drugs such as cannabis, opiates (especially heroin) and solvent abuse (e.g. paint sniffing). We are also examining the similarities and differences between the brains of schizophrenia sufferers compared with those suffering depression and bipolar disorder, using a range of brain scanning techniques. Further, using the latest brain imaging techniques we are examining how brain connectivity may be adversely affected in neuropsychiatric disorders, and how genetic influences may modulate such brain connections.

Our Centre's clinical expertise in the diagnosis and assessment of younger people with dementia has driven our research interests in uncommon or rare neurological disorders that present with psychiatric conditions. We have focussed on two particular disorders, frontotemporal dementia and Niemann Pick Type C, which will often present with schizophrenia or bipolar like illnesses when they begin in adulthood. This work has led to a better understanding of these disorders and has added to our understanding of the neurobiological changes associated with psychiatric symptoms and conditions.

We are part of national and international collaborative initiatives, funded by the National Health & Medical Research Council (NHMRC), including joint projects with the European Union. Working with our neuropathology colleagues, we are exploring biomarkers relevant to schizophrenia and other psychotic disorders, as part of a recently funded $23 million Cooperative Research Centre (CRC) grant.

Exciting novel initiatives include work with our colleagues at University of NSW, using imaging techniques to identify neurogenesis (the birth of new neurons), especially during treatment. We are also exploring new ways to look at the brain by growing brain cells from skin biopsies (together with CINE), an exciting initiative that will provide new directions for identifying how these neurons malfunction in people with mental disorder. These initiatives will help us to identify new treatments.
We have established one of the world’s largest neuropsychiatric data resources. This resource includes clinical, neuropsychological, and brain imaging data on almost 4,000 participants and includes over 4,500 MRI scans. Important cohorts of individuals at ultra-high risk of developing psychosis and recently diagnosed patients with first-episode psychosis have now been followed up over a 10-year period.

Our resources also incorporate data in other neuropsychiatric and neurological disorders, including obsessive-compulsive disorder, bipolar disorder, depression, borderline personality disorder, epilepsy, fronto-temporal dementia, and Huntington’s disease.

An important milestone has been the aggregation of these data into one registered informatics system (MNC Brain Research Databank). We are working with computational scientists, engineers and geneticists to explore patterns in these brain scans that may reveal neurobiological signatures (markers) of particular disorders. Such markers will help us to predict who will develop these conditions.

We thank the wonderful group of talented researchers and clinicians who work tirelessly to solve some of the most complex problems of the brain and mind. We would also like to say a special thanks to the people who left us recently to take up other exciting positions locally and abroad.

We thank our supporters and funding bodies, and particularly thank the patients and their families who have generously contributed their time, and who continue to support the various studies we are undertaking. Our goal is to improve the outcome for disorders that have an impact on those functions and abilities that fundamentally define who we are.

MNC is interested in how the brain matures in health and disease. We are following people over critical periods of development.

We are the first group to show that active brain changes occur as people become ill with psychosis.

Treatment at the earliest stages may prevent or reduce these brain changes and their impact on the individual.
MNC uses the latest technologies to identify the brain changes in mental illness.

Our work is identifying potential brain and genetic markers that are precursors to disorders including schizophrenia and autism.
3.1 What is neuropsychiatry?

Neuropsychiatry is the area of medicine that uses our knowledge of the brain to understand and improve the lives of people with disorders of the brain and mind.

MNC focuses on people suffering with disorders of mental health. We seek to further our understanding of these disorders, through the translation of new knowledge acquired from research to our patients. Our clinical observations at the bedside directly inform the questions needing answers in our research.

Research innovations are made possible by the specialised approach of MNC clinicians and researchers across a number of disciplines, forming an integrated collaborative network. This includes fields as diverse as psychiatry, neuropsychology, neuroscience, genetics, biostatistics, medical imaging, mathematics, physics, engineering, and information technology.

3.2 Why is this field so important?

Mental disorders tend to affect young people with peak incidence in young adulthood, have a high prevalence throughout life, and are often chronic. These disorders are disabling for the individual and their families, and have a significant societal cost.

Mental illness and neurological disorders account for 25% of the total burden of disease in Australia after cancer and cardiovascular disease. Mental illness was one of the seven health problems identified by the Commonwealth, State and Territory governments for priority attention. (1)

Mental illness affects the quality of life of those who suffer from it, as well as those around them. Anxiety and depression are the most prevalent chronic illnesses for females and are the third most prevalent among males. When we consider total non-fatal, chronic illness, mental illness accounts for 24% of ongoing disability and neurological diseases account for 19%. (1)

Disorders affect a higher proportion of people between the ages of 15 to 44 years than other medical diseases, and accounts for over one-third of total illness for this age group.

A large amount of public money is spent on treating mental illness each year. In 2001, $4.3 billion was spent on mental illness in Australia (2). Although Schizophrenia has a lower prevalence than other mental health disorders, at 15% of the total spend on Mental Health (2), it costs more than other mental illnesses to address. A 2003 study of low prevalence disorders in Australia estimated the total direct and indirect costs of psychosis to the government to be at least $1.45 billion per annum, while societal costs were estimated to be about $2.25 billion per annum (including $1.44 billion for schizophrenia) (3).

The burden caused by mental illnesses will be reduced significantly when we understand why they develop, which will help us develop ways to treat and prevent them. Neuropsychiatric research, which harnesses knowledge across neuroscientific fields, holds the promise for attaining this goal.


Neuropsychiatry is:

• about people with disorders of the brain and mind
• the study of the brain in people suffering mental illness
• about understanding how treatments can change brain function and improve people’s lives.
With more than 80 people over three campuses, MNC has almost tripled its size in the past five years. Irrefutably, our people are our greatest asset.

Barbara Stachlewski
Office Manager and Personal Assistant
The image contains a page from a report, which appears to be discussing various aspects of a research or educational institution. The page is titled "Melbourne Neuropsychiatry Centre Report 2011." The text highlights the importance of culture, support, innovation, collaboration, adaptability, interdisciplinarity, and responsiveness to the wider research community. It emphasizes quality excellence, quality as well as quantity, objective performance indices, high impact discoveries, publication and presentation to the science community and clinical services, public engagement, and diversified funding streams.

The page also mentions the "MNC Executive Group" and notes the absence of Dr. Ramon Mocellin.

The image includes a photograph of a group of individuals, likely members of the executive group, with a focus on passion, effective recruitment of people, career progression, discoveries that invigorate passion, research agenda built around strong sustainable leadership direction, and diversified funding streams.

The text and image together suggest a focus on the institutional mission, achievements, and future directions, highlighting the commitment to mental health research and the associated priorities and strategies.
2003

Lancet paper is published on the social factors in the aetiology for the development of schizophrenia.

2004

Christos Pantelis appointed Professor of Neuropsychiatry at The University of Melbourne.

2005

MNC records first 1000 staff in history.

2006

MNC achieves the largest funding of any National Mental Health Facility, with the National Health and Med Sci Plan.

2007

MNC publishes 10 papers, with over 80% of 301 2007 publications from MNC. MNC research papers building a reputation in schizophrenia and specific disorders.

2008

MNC publishes 8 journal papers, with over 80% of 304 2008 publications from MNC. MNC research papers building a reputation in schizophrenia and specific disorders.

2009

MNC publications 18 journal papers, with over 80% of 307 2009 publications from MNC. MNC research papers building a reputation in schizophrenia and specific disorders.

2010

MNC publishes 11 journal papers, with over 80% of 309 2010 publications from MNC. MNC research papers building a reputation in schizophrenia and specific disorders.

2011

MNC achieves 2000 staff in history. MNC achieves the highest number of journal publications in 2011. MNC achieves 5030 publications in 2011.
Dr Dennis Velakoulis MB BS, FRANZCP, DipCrim
Director, Neuropsychiatry Unit, The Royal Melbourne Hospital
Clinical Director, Melbourne Neuropsychiatry Centre

Dr Dennis Velakoulis is a Consultant Neuropsychiatrist and Director of the Neuropsychiatry Unit at The Royal Melbourne Hospital. He was appointed Clinical Director of MNC in September 2004 and has been Director of the Neuropsychiatry Unit at Royal Melbourne Hospital since August 2001. Since 1994 he has been involved in the development of a programme of neuroimaging and cognitive research in neuropsychiatric disorders particularly schizophrenia and was instrumental in the establishment of the imaging laboratory within MNC. Dennis has published on the role of neuroimaging in clinical psychiatry, and on conditions including organic psychoses and dementia. He has been a chief investigator on six NHMRC grants since 1997 and has published 106 peer-reviewed journal publications since 1999, the majority directly related to research arising from the grants. Dennis’s work is recognised at an international level and provided strong international impetus to the investigation of brain structural changes in the early stages of psychosis. He has been an invited speaker at international conferences, symposia and workshops. Dennis’ clinical areas of expertise include neuropsychiatric aspects of schizophrenia, frontotemporal dementia, epilepsy, Huntington’s disease, younger onset dementias, movement disorders and other neurological disorders. Together with Dr Mark Walterfang he has published the NUCOG, a neuropsychiatric bedside cognitive screening tool.

Professor Christos Pantelis MB BS, MD, MRC Psychiat (UK), FRANZCP
Professor of Neuropsychiatry, The University of Melbourne
Scientific Director, Melbourne Neuropsychiatry Centre

Professor Christos Pantelis is Foundation Professor of Neuropsychiatry and Scientific Director of the Melbourne Neuropsychiatry Centre at The University of Melbourne and Melbourne Health. A University of Melbourne graduate, Christos undertook psychiatric and research training in London. He won Travelling Fellowships from the UK and undertook imaging research at the National Institute of Mental Health in Washington in 1992. After returning to Australia at the end of 1992 he established a research unit at the Mental Health Research Institute. He was subsequently appointed as Associate Professor with The University of Melbourne and established an active research and clinical facility (Cognitive Neuropsychiatry Research & Academic Unit) at Sunshine Hospital in 2000. His neuropsychological work in schizophrenia formed the basis of his doctoral (MD) thesis, which was awarded in 2005. Christos was appointed to the Foundation Chair in Neuropsychiatry in 2004 and established the Melbourne Neuropsychiatry Centre. He has received 11 NHMRC and 1 ARC project grants since 1994 and is co-chief investigator of two successive NHMRC Program Grants (2005-2009 >$7 Million; 2009-2013 >$10 Million), which have focused on the neurobiology of emerging severe mental illness (esp. schizophrenia and affective disorders) during late brain development. He is also a Chief Investigator on an NHMRC Enabling Grant, a national initiative to establish the Australian Schizophrenia Research Bank (ASRB), and two EU-NHMR grants that are international collaborative grants with EU partners.

Christos has published over 350 papers and chapters, including papers in high profile international psychiatry, neurology, radiology and medical journals, including papers in Lancet and Nature Genetics. He has also published one of the first books on the neuropsychology of schizophrenia and co-edited a book on Diffusion and the Brain and a recent volume entitled The Neuropsychology of Mental Disorders. He has won a number of national and international awards, most recently being recipient of the Selwyn-Smith Medical Research Prize of The University of Melbourne, was highly commended for the 2009 Victorian Public Healthcare Awards, Minister’s Award for Excellence in Mental Health, and was awarded an NHMRC Senior Principal Research Fellowship that commenced in 2010. He received a NARSAD Distinguished Investigator Grant from the National Alliance for Research on Schizophrenia and Depression (NARSAD) in 2011. Christos is a member of various national and international advisory boards and committees on early psychosis, cognition in psychosis, neuroimaging in psychiatry, and drug treatments in schizophrenia and on the editorial boards of a number of journals, including Biological Psychiatry, Schizophrenia Bulletin, Schizophrenia Research, Cognitive Neuropsychiatry, Psychiatrict, Brazilian Journal of Psychiatry, and Australian & NZ Journal of Psychiatry.

Dr Mark Walterfang MB BS, PhD, FRANZCP
Consultant Neuropsychiatrist and Honorary Associate Professor

A/Prof Mark Walterfang graduated in medicine from University of Queensland with honours in 1993, and completed his Fellowship of the Royal Australian and New Zealand College of Psychiatrists in 2000. He has been a Consultant Neuropsychiatrist at the Royal Melbourne Hospital Neuropsychiatry Unit since 2001. His past appointments have included Consultant Psychiatrist at the Adult Mental Health Rehabilitation Unit at Sunshine Hospital (2001-02), Academic Fellow at The University of Melbourne Department of Psychiatry (2001-02) and Senior Research Fellow at the Mental Health Research Institute as part of a Stanley Foundation Centre Grant (2003-05). Mark’s PhD investigated the corpus callosum in patients at different stages of psychosis in schizophrenia, and in a range of other major mental disorders. He received the Chancellor’s Prize and the Dean’s Award for his PhD thesis. His interest in white matter disorders has led to a number of clinical studies in neurological and neurodegenerative disorders such as Niemann-Pick Type C, where he published the first group neuroimaging analysis in this disorder, and obsessive-compulsion disorder. His neuroimaging work has expanded to include shape analysis of grey matter structures in neurodegenerative disorders. Mark has also played a leading role in the development and validation of a number of clinical tools for the assessment of cognition and behaviour, including the NUCOG.

Professor Murat Yücel BA (Hons), Clinical PhD (Neuropsychology)

Prof Murat Yücel is a Clinical Neuropsychologist who has been working in the field of neuropsychiatry. Broadly, Murat’s research tries to understand the neuropsychology and neurobiology of mental illness. More specifically, he is interested in researching the neural, psychological and pharmacological bases of impulsive and compulsive behaviours seen across substance related disorders, as well as psychiatric, neurological and personality disorders such as obsessive-compulsive disorder, schizophrenia, borderline personality disorder and Parkinson’s disease. He is also interested in the links between heavy cannabis use, neurocognition and psychosis. He is currently involved in managing >$5 million in project grant funding and has over 160 publications on these topics, and plays an active role in conveying science to the general community through media and public presentations. Murat was awarded the 2007 Young Tall Poppy Science Award from the Australian Institute of Policy and Science (AIPS), an NHMRC Clinical Career Development Award for 2008, the 2008 Paul Bourke Award from the Academy of Social Sciences in Australia (ASSA), and was awarded NHMRC Senior Research Fellowship commencing in 2012, and was awarded a 2012 NHMRC Achievement Award. He was also promoted to Professor at The University of Melbourne commencing in 2012.

Professor Christos Pantelis is Foundation Professor of Neuropsychiatry and Scientific Director of the Melbourne Neuropsychiatry Centre at The University of Melbourne and Melbourne Health. A University of Melbourne graduate, Christos undertook psychiatric and research training in London. He won Travelling Fellowships from the UK and undertook imaging research at the National Institute of Mental Health in Washington in 1992. After returning to Australia at the end of 1992 he established a research unit at the Mental Health Research Institute. He was subsequently appointed as Associate Professor with The University of Melbourne and established an active research and clinical facility (Cognitive Neuropsychiatry Research & Academic Unit) at Sunshine Hospital in 2000. His neuropsychological work in schizophrenia formed the basis of his doctoral (MD) thesis, which was awarded in 2005. Christos was appointed to the Foundation Chair in Neuropsychiatry in 2004 and established the Melbourne Neuropsychiatry Centre. He has received 11 NHMRC and 1 ARC project grants since 1994 and is co-chief investigator of two successive NHMRC Program Grants (2005-2009 >$7 Million; 2009-2013 >$10 Million), which have focused on the neurobiology of emerging severe mental illness (esp. schizophrenia and affective disorders) during late brain development. He is also a Chief Investigator on an NHMRC Enabling Grant, a national initiative to establish the Australian Schizophrenia Research Bank (ASRB), and two EU-NHMR grants that are international collaborative grants with EU partners.

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Dr Dennis Velakoulis MB BS, FRANZCP, DipCrim
Director, Neuropsychiatry Unit, The Royal Melbourne Hospital
Clinical Director, Melbourne Neuropsychiatry Centre

Dr Dennis Velakoulis is a Consultant Neuropsychiatrist and Director of the Neuropsychiatry Unit at The Royal Melbourne Hospital. He was appointed Clinical Director of MNC in September 2004 and has been Director of the Neuropsychiatry Unit at Royal Melbourne Hospital since August 2001. Since 1994 he has been involved in the development of a programme of neuroimaging and cognitive research in neuropsychiatric disorders particularly schizophrenia and was instrumental in the establishment of the imaging laboratory within MNC. Dennis has published on the role of neuroimaging in clinical psychiatry, and on conditions including organic psychoses and dementia. He has been a chief investigator on six NHMRC grants since 1997 and has published 106 peer-reviewed journal publications since 1999, the majority directly related to research arising from the grants. Dennis’s work is recognised at an international level and provided strong international impetus to the investigation of brain structural changes in the early stages of psychosis. He has been an
Dr Dr Ramon Mocellin MBBs, Msc, MPsych, FRA nZCP
Consultant Neuropsychiatrist

Dr Ramon Mocellin completed his medical training at the University of Melbourne in 1989. After completing a Master of Science in the Department of Medicine at the Royal Melbourne Hospital he worked as a registrar in neurology, general medicine and geriatric medicine. He obtained Fellowship of the Royal Australian and New Zealand College of Psychiatrists in 2004 whilst completing advanced training in Psychiatry of Old Age. He has been a Consultant Neuropsychiatrist at The Royal Melbourne Hospital Neuropsychiatry Unit since 2004. He is also a Consultant Psychopathologist with the Loddon-Campaspe/Southern Mallee Aged Person’s Mental Health Programme in Bendigo. Post appointments have included consultant psychiatrist for the Northern Aged Psychiatry Assessment and Treatment Team (2004-2009). Ramon has an interest in neuropsychiatric disorders of old age, younger onset dementias and medical co-morbidities associated with psychiatric disorders. More recently he has been involved in the development of a specialized multidisciplinary service for young people with dementia. He has published in areas of investigation-negative encephalopathies, hallucinatory phenomena, and autoimmune CNS states. Building on an extensive collection of case histories and video records from the Neuropsychiatry Unit, Ramon has also been involved in constructing a searchable electronic multimedia library of neuropsychiatric disorders. In 2009 Ramon was appointed the Melbourne Neuropsychiatry Centre Clinical Education and Research Translation Fellow. This important translational role involves working with clinical, research and academic staff to identify, develop and promote education programmes as a means of transferring new knowledge into clinical practice.

Dr Dr Alexander Fornito BA (Hons), MPsych (Clinical Neuropsychology), PhD
Senior Research Fellow

Dr Alex Fornito completed his Masters (Clinical Neuropsychology) and PhD in 2007 in the Departments of Psychiatry and Psychology at The University of Melbourne. Alex’s PhD work used neuroimaging to characterise the trajectory of anatomical brain changes across the course of psychiatric disorders such as schizophrenia and bipolar disorder. He then completed Post-Doctoral training in the Department of Psychiatry at the University of Cambridge, UK. Alex’s current work uses tools from complex network science to understand brain connectivity. This principally involves the application of graph analytic techniques to human structural and functional neuroimaging data, with a particular emphasis on understanding genetic influences on brain network organisation, how brain network interactions relate to cognition and emotion, and how disturbances in brain connectivity lead to psychiatric disorders. Alex has received young investigator awards from the European College of Neuropsychopharmacology (2008), Organisation for Human Brain Mapping (2008) and the Schizophrenia International Research Society (2010). In 2011 the Australasian Society for Psychiatric Research recognised his work with the Lundbeck Institute Early Career Researcher Award.

Dr Ben J. Harrison Bsc (Hons), PhD
NHMRC Clinical Research Fellow
Senior Research Fellow

Dr Ben Harrison is a NHMRC Clinical Research Fellow (2010-2014). He co-leads the Affective Neuropsychiatry group at MNC. His work principally involves the use of functional MRI to study large-scale brain networks related to attention, willed-action and emotion, and their corresponding impairment in common mood and anxiety disorders. His current projects seek to broadly address: 1) the “orbitofrontal-striatal” hypothesis of obsessive-compulsive disorder; 2) the “default mode network” hypothesis of depression; and 3) the “central autonomic network” hypothesis of anxiety. Ben has published extensively in the fields of biological psychiatry and imaging neuroscience (~60 research articles) and currently participates in several national and international competitively funded research projects (valued over $3 million AUD). He has been on the Editorial Board of PLoS ONE since mid 2010.

Dr Dr Sarah Whittle BSc (Hons), PhD
Senior Research Fellow

Dr Sarah Whittle completed her PhD at the University of Melbourne in 2007. Since then, she has worked as post-doctoral fellow at Oxygen Youth Health Research Centre and the Melbourne Neuropsychiatry Centre. Sarah will take up an NHMRC Biomedical Career Development Fellowship at MNC in 2012. Sarah’s main research interest involves understanding vulnerability processes for depression and other mood disorders in adolescence. In particular, Sarah’s notable work has been on furthering our understanding of how neurobiological and environmental factors interact to influence such problems in adolescents. In 2009 she was awarded the Research Australia Discovery Award for this work. This award recognises an early career researcher whose paper, patent or discovery has already demonstrated its importance or impact. She received the Wisconsin Symposium Scholar Travel Award in 2010, an Australian Rotary Health Geoffrey Betts Postdoctoral Fellowship in 2011, and the Coramien Regan Trust Professional Development Award from University of Melbourne in 2011. Sarah has particular expertise in structural and functional analysis of neuroimaging data, and she has a number of high-impact publications and grants.

Mr Mr Tony Dann BA Hons, PGDip Heal Mgt
Business Manager

Mr Tony Dann joined MNC in June 2011 and has taken up the role and responsibilities of Ms Bridget Soubby. Tony has healthcare operations management experience through a similar position at a private multidisciplinary injury rehabilitation provider in New Zealand. His responsibilities entailed financial control, HR functions, IT, oversight, business development and marketing. Achievements in this role included developing new interdisciplinary rehabilitation services, implementing an updated database and managing the growth of the company to shift to new premises in a private hospital campus. Tony handled a rebranding project at the time of the relocation. During this time Tony completed a postgraduate diploma in Health Management at the University of Otago, Christchurch School of Medicine and the University of Canterbury MBA Programme. More recently, before relocating to Melbourne, Tony worked in a business management role at a public art gallery in Christchurch. The priorities in this role were to increase financial control and grow funding to the gallery through commercial activities, philanthropy and grant funding for its art projects and exhibitions. Tony is working across a range of projects to help MNC to achieve its strategic goals.
6.0 FORMER MEMBERS OF MNC EXECUTIVE

Mrs Barbara Stachlewski
Office Manager & Personal Assistant

Mrs Stachlewski was appointed as Office manager in 2004. Barbara has been with MNC since 1997 following a career in providing administrative support for clinical and academic services at the Mental Health Research Institute (MHRI) and the Royal Park & Alfred Hospitals. Barbara’s expertise in academic and administrative support has been instrumental to the development of MNC, prior to and including the period of the Centre’s formal establishment, as well as leading into its expansion to the Sunshine Hospital and Parkville campuses. Her current interests and objectives are to further develop and establish the workflow systems and processes needed to run MNC, including human resources, in addition to staff, student and visitor coordination and support.

Professor Stephen J Wood MA (CAnTAB), PhD
Principal Research Fellow (1999–July 2010)

Prof Stephen Wood was the Head of the Adolescent Development and Illness Onset Group at the MNC until mid-2010. Stephen completed his undergraduate degree at Corpus Christi College, Cambridge, in 1994, followed by a PhD at the Institute of Child Health, London, in 1998. Since migrating to Australia at the end of 1997, he has worked with a number of research groups in Melbourne, but full time with MNC since early 1999. His primary research interest concerns brain development during adolescence, and how alterations to this developmental process contribute to the onset of mental illness. Most of his research work has been in early psychosis, and particularly in the ultra-high risk cohort (in collaboration with the PACE clinic, ORYGEN Youth Health Research Centre). Stephen was awarded an NHMRC Clinical Career Development Award in 2005 and has been the recipient of two Young Investigator Awards from NARSAD. In 2006 he received the Osgonon Award from the Australian Society for Psychiatric Research. He was on the NorthWestern Mental Health Research & Ethics Committee, and is on the Editorial Board of the journal Early Intervention in Psychiatry. In mid-2010, Stephen took up a new Chair at Birmingham University to head brain imaging research in early psychosis. He is an associate of MNC and our groups continue to collaborate closely.

Dr Marc Seal Bsc (Hons), PhD
Senior Research Fellow (2005–July 2010)

Dr Marc Seal was a member of the senior research team and MNC Executive at the MNC from 2005 until late 2010. Marc joined the MNC after completing a training fellowship in neuroimaging at the Institute of Psychiatry (IOP), London. Marc was awarded the three-year Ronald Philip Griffith Fellowship from The University of Melbourne between 2007 and 2009. He co-chaired the Cognitive Neuropsychiatry Research Group at MNC and his research interests involved describing how our environment, genes and development can result in the brain changes and functional deficits observed in neuropsychiatric disorders and as a result of cannabis use. During his time at the MNC Marc investigated abnormal white matter development in schizophrenia using a range of neuroimaging techniques. From 2006-2010 Marc was Victorian Coordinator of the Australian Schizophrenia Research Bank, the largest and most comprehensive study into the causes of schizophrenia conducted in Australia. Marc took up his new role as Group Leader of the Developmental Imaging Research Group at the Murdoch Children’s Research Institute in Dec 2010 and he continues to maintain close collaborations with the MNC.

Ms Bridget Soulsby Bsc

Ms Bridget Soulsby was appointed as Business Manager for MNC in 2008 and finished in 2010. Bridget was responsible for developing and implementing strategies and mechanisms to ensure the effective and efficient functioning of the Centre. Bridget oversees the management of financial, IT and physical resources of the Centre. Bridget started at the centre in 1998 as an undergraduate student from Swinburne University of Technology whilst completing her degree in Medical Biophysics and Instrumentation. She subsequently developed expertise in neuroimaging analysis techniques and has organised and developed the Centre’s data and information resources. In 2004 Bridget designed and installed the Neuropsychiatry Imaging Laboratory in the Parkville campus, providing storage for over 4,000 MRI scans already acquired, as well as the resources required for neuroimaging analyses. Bridget is currently undertaking her Masters in Information Management and Business Systems. She is also currently participating in a Graduate Degree in University Management. In mid-2010, Bridget took up a role with Institutional Planning, Evaluation and Quality at The University of Melbourne.
We are witnessing a revolution in ‘brain science’ that will unravel the most complex of systems that define who we are. Each day brings us closer to new discoveries about the neuroscience of mental illness.
Psychosis and Developmental Neuropsychiatry

Group Leader
Profs Chirstos Pantelis

Psychosis co-ordinators – Dr Cali Bartholomeusz & Dr Christina Phassoulitiss
Developmental disorders co-ordinators – Dr Sarah Whittle & Dr Renee Testa

Research Focus

Our goal is to understand the neurobiology of disorders emerging in childhood and adolescence, including psychiatric disorders, particularly schizophrenia. Our studies investigate these disorders longitudinally, and within the context of brain maturation. We examine the timing and pattern of brain changes as these disorders emerge (i.e. at the very beginning of the illness) and as they become established. We seek to identify neurobiological and genetic markers of these illnesses related to onset of the illness or its progression. This will improve early (pre-illness) detection and diagnosis, identify prognostic indices, and provide novel mechanisms for treatment.

Our work focuses on specific psychiatric conditions and developmental stages:

Psychotic disorders
Psychotic disorders including schizophrenia, first episode psychosis and bipolar disorders are extremely debilitating and traumatising for the individual and their families. Schizophrenia is characterised by the presence of hallucinations, delusions, bizarre behaviour, flat affect, cognitive impairment and decline in social and occupational functioning. Bipolar disorder is characterised by a disturbance of mood, with periods of elevated or depressed mood, and may be associated with psychotic symptoms.

Our group was the first to identify brain changes at the onset of psychotic disorders and we have now investigated these changes in detail. We have recently completed 7-10 year follow-up of our initial cohorts and will be examining the findings related to long-term outcomes of psychosis.

Individuals 'at risk' of developing psychosis
Psychotic disorders are most likely to develop in adolescence and early adulthood, and may be preceded by 'prodromal' symptoms. Prodromal symptoms typically appear during the teenage years and often include attenuated forms of the full-blown disorder. While the aetiology of psychotic disorders is not clear, a number of contributing factors have been identified. These include the pre-natal environment, infections, genetics, stress and associated hormones, psychostimulant drugs such as cannabis (see section on Addiction Neuropsychiatry), and disturbance in neurotransmitter systems, including dopamine.

Identifying markers and risk factors of developing psychosis has significant implications for illness prevention.

Other disorders emerging in adolescence - Adolescent Development Study (ADS)

MNC researchers are working closely with Prof Nick Allen's group at Oxygent Youth Health Research Centre (OYHRC) and Dept of Psychology at University of Melbourne. The Adolescent Development Study (ADS) is a prospective longitudinal study that aims to address core questions regarding biological and environmental risk factors for the development of depression and other psychopathologies with common onset during adolescence. The study began in 2003 and includes 237 Australian adolescents first assessed at ages 11-13 years. This group was selected from a wider sample (approximately 2500) to represent a range of temperamental risk for later emotional problems. Comprehensive assessments have been undertaken over the last decade, including measures of temperament, family history and family processes, psychopathology, diagnostic interviews, genetics, and MRI scans. These data are already helping us to identify the impact of genetic, neurobiological, psychological and environmental factors in explaining risk for the emergence of psychopathology during adolescence.

Childhood disorders

Childhood developmental disorders often present with delayed milestones, poor school performance, language difficulties, and social and behavioural disturbance. We are currently focusing on adolescents who were born preterm, adolescents at risk for depression, as well as studies on children with schizotypal features and autism. Genetic studies are examining whether we can better predict which children will develop autism and related disorders, and we will extend this approach to other developmental disorders.

Research Framework & Methods

Understanding disorders framed within a brain maturation perspective

Our studies focus on developmental changes across the lifespan from early childhood to late adulthood. Such a life-long developmental perspective helps to place our findings related to emerging psychiatric illnesses in the context of normal and abnormal neurodevelopmental trajectories.

Why is this important?
Significant developmental brain changes occur from gestation up until the mid 20s, when the rate of maturation slows down. Adolescence is a period of increased vulnerability to the development of many psychiatric illnesses, including schizophrenia and other psychotic disorders. Our work demonstrating progressive brain changes at the earliest stages of psychosis highlights the dynamic nature of brain changes as illness develops during this critical period of brain maturation.

We are now seeking to understand the nature and timing of brain changes as they occur throughout the development and emergence of psychiatric disorders. In conjunction with our collaborators from neuropsychology, neuroscience and bioengineering, we are attempting to identify the cellular and molecular basis of these changes, and how they affect an individual's ability to function. Our group is achieving this by adopting a multimodal approach incorporating analytic and assessment techniques from neuropsychology, neuroimaging, genetics and molecular science.
Progressive Brain Changes Found in Psychosis

What is psychosis?
Adolescence and young adulthood is a time of great changes in the brain when young people are most likely to develop severe mental disorders, like schizophrenia and other psychotic disorders. These conditions are characterised by the presence of hallucinations (e.g. hearing voices), delusions (false ideas or beliefs that are often fixed) and disordered thinking (thoughts seem disorganised, and illogical or incomprehensible to others). Those suffering severe mental disorders may also lose all motivation, become apathetic, withdraw from their friends and family, and their behavior can appear bizarre and unpredictable. It is a time of great stress for the young person and their families.

What have we found?
We wanted to know what was happening in the brain as young people develop these disorders. Using MRI scanning we found that the brain is changing dynamically from before the onset of psychosis, with loss of grey matter in key brain structures that normally continue to mature into early adulthood (mid 20’s). These structures include:

1. Frontal lobes (involved in higher level thinking, such as planning, holding and manipulating information in mind, strategising, and thinking flexibly).
2. Temporal lobes (important to memory, language and behaviour), and
3. Limbic structures that are the brain’s emotional centre (e.g. cingulate cortex, which is important to attention and motivation).

A developmental context provides some clues!
Importantly, the brain regions listed above are also changing during normal (and healthy) adolescent development. It seems that the normal process of brain maturation goes awry in psychosis. Our studies of normal and abnormal development are now focussed on the developing brain from childhood to adulthood.

We are examining how and why the brain develops abnormally with the onset of psychosis. Important factors we are examining include the use of cannabis and related drugs, the role of stress and stress hormones, and genetic factors relevant to how the brain matures.

Treatment can make a difference.
We have shown that less invasive treatments, including low dose lithium salt and fish oils, may modify the brain changes we have identified, and may help to delay or even prevent the onset of psychosis.

Major National Initiatives

- NHMRC Programme Grant: Emerging Severe Mental Illness in Young People: Clinical Staging, Neurobiology, Prediction & Intervention From Vulnerability to Recovery. This research programme is investigating the utility of a staging model for our understanding of severe mental disorders in young people. This is the second iteration of our programme (total for both grants > $17M) grant that is focused on emerging mental illness in young people. It is a close collaboration with colleagues in Orygen Research Centre, MNC at The University of Melbourne, and the Brain & Mind Research Institute (BMRRI) at University of Sydney.

- NHMRC Enabling Grant with additional funding support from the Pratt Foundation (almost $3.8M). The Australian Schizophrenia Research Bank (ASRB) is a multi-site Australian initiative that involves the establishment of a national research bank with comprehensive, cross-referenced data from a large sample of volunteers with schizophrenia and healthy volunteers, involving more than 2,000 people. Our team of clinical assessment officers based at Sunshine Hospital collect comprehensive clinical, cognitive, genetic and neuroimaging information from participants. The ASRB is the most ambitious and comprehensive study into the nature of schizophrenia ever carried out in Australia. The data collected will be available to researchers to help answer novel questions about schizophrenia.

- Cooperative Research Centre (CRC) for Mental Health represents a $70M investment over 7 years, with $23M from the Commonwealth of Australia. The aim of the CRC is to identify biomarkers of psychosis and dementia in order to improve early diagnosis, and possible new treatments. The CRC is headed by Prof Colin Masters, Mental Health Research Institute (MHRI). Prof Ian Everall (Dept of Psychiatry, University of Melbourne) heads the psychosis research programme of the CRC, with other lead investigators that include Prof Assen Jablensky (University of Western Australia), Prof Christos Pantelis (MNC), and Prof Brian Dean (MHRI). Christina Phassouliotis (PhD) was appointed in November 2011 as coordinator of the psychosis component of the CRC.

Recent International Initiatives

- Together with Prof Patrick McGorry at Orygen Research Centre, we were successful in attracting two NHMRC – European Union (EU) Collaborative Research Grants / EU Seventh Framework Programme, which commenced in 2010. These two grants (>1.8M in total) link us with our European colleagues to undertake novel work relevant to psychosis and schizophrenia.
  - The OPTIMISE Consortium: Optimising current therapeutic approaches to schizophrenia. The OPTIMISE study aims to optimise current treatments in schizophrenia and explore novel therapeutic options for individuals experiencing their first episode of psychosis. The clinical trial will test the efficacy of early administration of second generation antipsychotics within a unique treatment algorithm and further, provide outcome data for the application of clozapine in non-responding patients within the first 10 weeks of their treatment initiation. We are also examining longitudinal brain changes and biological predictors of treatment response through MRI scanning and genetic testing. The lead European investigator is Prof René Kahn from University Medical Center Utrecht (The Netherlands). The lead Australian investigator is Prof Christos Pantelis, MNC.
  - Gene-environment interactions as predictors of clinical outcome in the At Risk Mental State. This second study will look at individuals at high risk for psychosis prior to onset of illness and identify predictors relevant to illness onset and other outcomes. The lead European investigator is Prof Jim van Os from Maastricht University (The Netherlands). The lead Australian investigator is Prof Patrick McGorry, OYHRC.
We are now examining the effects of medication on the brain and we are also examining:

• Our studies have found that the pituitary gland is enlarged around the time that young people develop psychosis. Our group has demonstrated that early psychosis is a period of dynamic change, with evidence that the brain's grey and white matter is changing in the frontal and temporal lobes. These areas are important to higher level cognitive functions, social functioning and behaviour, which have been implicated in the symptoms of schizophrenia.

• We have also found that limbic structures (esp. cingulate cortex) and areas like the insular cortex are involved. These regions are important to emotion processing (see papers by Alex Fornito and Tsutomu Takahashi).

• Our group has assessed white matter changes in the brains of patients with early psychosis and schizophrenia. Marc Seal has identified evidence of reduced integrity of white matter tracts connecting frontal and temporal regions, which was also related to auditory hallucinations. In further work, Thomas Whitford has found that the 3-dimensional geometry of the white matter fibres is abnormal, which may arise during neurodevelopment (see papers by Seal and Whitford).

• Andrew Zalesky developed novel ways to assess the white matter tracts and found abnormal connectivity between frontal, temporal as well as parietal brain areas (see also section on Systems Neuropsychiatry).

• Mark Walterfang completed his PhD in 2010, for which he received the Chancellor's Prize and the Dean's Award. He detailed the corpus callosum across various disorders, including those at high risk for developing psychosis. He identified that this bundle of white matter connecting the two sides of the brain was regionally thinner and was predictive of those who would develop psychosis.

• Ashleigh Lin completed her PhD in 2011. She examined the medium to long-term outcome of patients who were in our original studies of those at ultra-high risk for developing psychosis. Her work exploring neurocognition and functional outcomes is shedding light on brain changes relevant to outcomes other than diagnosis alone.

• We have found that the ability to identify and name smells is impaired from before the onset of schizophrenia and bipolar disorder. Similalities and differences between these disorders are particularly topical. Our group has identified the anterior cingulate cortex (ACC) as important in these disorders. The ACC is important to attention and motivation, and we have identified volume differences in ACC subregions between these disorders (see papers by Alex Fornito and Paola Dazzan), which may be important for treatment.

• Thomas Whitford has been particularly interested to understand the hallucinations and delusions experienced by patients with schizophrenia. In a series of studies he has investigated the neurophysiological basis of self-suppression abnormalities as a way to understand the experience of hallucinations and of the feeling of being controlled by others (see papers in 2011).

• Luca Cocchi was a SNSF Research Fellow (2008-2011) at MNC. Using various neuroimaging techniques, Luca undertook a series of studies that examined cognitive control mechanisms and how they interacted with perceptual processes in healthy and psychiatric populations. His recent works examines how the brain multitasks, the functional brain dynamics of human reasoning, and the functional brain changes in psychiatric disorders (see papers by Cocchi).

• As part of the ASRB national initiative and in collaboration with groups overseas, Christos Pantelis is a co-author on the largest (GWAS) genetic study of schizophrenia, published in Nature Genetics. This study identified novel genetic markers and has generated a great deal of excitement in the field. These markers will lead to new understanding of the cellular mechanisms underlying the illness.

• Together with colleagues at Orygen Research Centre (esp. Debra Foley), and Department of Psychiatry (Chad Bousman), we have identified a genetic marker that appears to predict psychosis onset. We are currently examining the findings in detail and how they may be relevant to observed brain changes.
Understanding brain changes in disorders of childhood and adolescence

Why look at mental illness in children and adolescents? It is estimated that up to 20% of children and adolescents suffer from a disabling mental illness. Further, suicide is a leading cause of death among adolescents, and up to 50% of all adult mental disorders have their onset in adolescence (ABS, 2008, 2011).

We also know that, while mental illness is common in childhood and adolescence, mentally ill children and adolescents are far less likely to receive help than those developing mental illness as adults. Having a mental illness early in life is likely to have negative consequences throughout the lifespan.

These facts underscore the importance of research that improves our understanding of the causes of mental illnesses developing in childhood and adolescence.

What have we learnt about adolescent depression?

During adolescence there is a sharp rise in the onset of depressive disorders. We have conducted studies to investigate what some of the biological and environmental risk factors might be. Our research has shown that biological and environmental factors interact in complex ways to create risk for depression. In particular, adolescents with alterations in the size of limbic brain structures (e.g. the amygdala and hippocampus) appear to be at higher risk for developing depression if they also experience negative home environments.

Our research has also shown that early adverse environments can result in altered brain development, which can then put adolescents at risk for developing depression. Our current research is focused on understanding these complex relationships between environmental factors, brain development and the onset of adolescent depression.

What are we learning about childhood disorders?

Several childhood neurodevelopmental disorders including Autism Spectrum Disorders, Pervasive Developmental Disorders, and Child Onset Schizophrenia (COS) can present with similar clinical features that make diagnosis a challenging prospect. It has been suggested that a subgroup of these children who engage in magical thinking and odd and unusual ideas may suffer from Schizotypal Disorder (SD). Given the relatively unknown occurrence of this disorder in childhood, our research aims to characterise the clinical features of these children presenting with SD symptoms. We also aim to assess the clinical utility of an assessment tool that has been developed to identify and characterise children with SD features. Finally, we aim to examine the brain function of these children given their intense pre-occupation with an internal imaginative and fantasy world.
changes from childhood to adulthood and studies in children with schizophrenia. This will include MRI brain scanning to assess the trajectory of brain changes, and will include studies to assess if there are differences in brain connectivity that explain their intense preoccupation with an internal imaginative and fantasy world.

A study of neuroinflammation in patients with acute psychosis
While we have identified dynamic structural brain abnormalities within the early stages of psychosis, the biological processes underlying these changes remain unclear. There is evidence to suggest that inflammation in certain brain regions may be important and may explain the brain changes we identified. We are commencing a project that will examine markers of neuroinflammation in early psychosis and in those with an exacerbation of their illness. Dr Vanessa Copley who has expertise in PET imaging is co-ordinating the study together with colleagues at the Brain & Mind Research Institute in Sydney.

We will use novel brain scanning to measure special brain cells involved in inflammation, called microglia. Using positron emission tomography (PET) and a marker of microglia, we will examine if the microglia have become activated in acute psychosis. Evidence of microglial activation at illness onset and relapse will suggest that the brain is inflamed when psychosis develops and worsens. If so, novel treatments to reduce inflammation in the brain may help resolve the psychotic episode and prevent progressive damage to the brain.

Collaboration with Centre for Neural Engineering
We are working closely with Prof Stan Skafidas and Dr Jeremy Crook in the Centre for Neural Engineering to grow neurons in a petri dish that have been derived from fibroblasts of patients with various disorders. This exciting initiative will inform our understanding of schizophrenia, bipolar disorder and childhood disorders including autism.

Key Collaborations
Collaborators are flagged above and a detailed list appears in a later section of our report. Working closely with teams across Australia and internationally as well as across different disciplines has been exciting and has allowed us to progress the research in novel ways.

Locally & Nationally
- Our major collaborations have been with Prof Patrick McGorry, Prof Alison Yung and their colleagues at the Orygen Youth Health Research Centre (OY-HRC), and Prof Ian Hickie and colleagues at the Brain & Mind Research Institute (BMRI), with whom we have had major joint funding through NHMRC. This continues to be a unique and exceptionally fruitful collaboration.
- Work with Prof Michael Berk, Dr Seetal Dodd and colleagues (Deakin University) is examining brain maturation during normal adolescence and brain changes with onset of depression and other disorders.
- Longitudinal work with Prof Nick Allen from OY-HRC and Department of Psychology (University of Melbourne) is examining brain maturation during normal adolescence and brain changes with onset of depression and other disorders.
- We have worked closely with colleagues at the Murdoch Children’s Research Institute (esp. Prof Vicki Anderson, Dr Marc Seal) in supervision of students as well as continuing imaging work.
- Professor Lex Doyle, Royal Women’s Hospital, Melbourne.
- Prof Ian Everall recently joined the Royal Melbourne Hospital as Cato Head of the Dept of Psychiatry. His joint expertise in psychiatry and neuropathology provides a unique nexus between basic and clinical psychiatric neurosciences. We are working with Ian and his team to evolve new research directions.
- We are working closely with Prof Stan Skafidas and his group in the newly established Centre for Neural Engineering to explore the neural and genetic basis of neuropsychiatric disorders.
- Our linkages with NHMRC and Florey Neurosciences, now co-located in the new Melbourne Brain Centre, continue to grow, again providing a nexus between basic and clinical research.
- Our collaboration on the NHMRC ASRB has established a unique resource of clinical, neuromaging, cognitive and genetic information about patients with schizophrenia. This is headed by Prof Vaughan Carr (Schizophrenia Research Institute) with other CIs from across Australia.
- Professor Cyndi Shannon Weickert, Schizophrenia Research Institute and Neuroscience Research Australia, Sydney. We are collaborating with Cyndi and her colleagues on studies in primates to assess brain trajectories using MRI scanning.
- Dr Thomas Weickert, Neuroscience Research Australia, Sydney. We are working with Tom on studies in schizotypal disorder and early psychosis.
- Dr Michael Valenzuela and colleagues, University of NSW. We are collaborating on studies assessing neurogenesis using magnetic resonance spectroscopy (MRS).
- Prof Bryan Mowry, Dr David Reynolds and colleagues at Queensland Brain Institute (QBI). Ongoing collaboration on NHMRC-funded studies examining genetics and brain structure and function.
- Prof Graeme Jackson at Melbourne Brain Centre, Austin Hospital. In ongoing imaging studies we will be working with Graeme and his team in a study of Lithium in HIV infected individuals (led by Prof Everall, RMH).
- Prof Chris Rowe and colleagues at Austin Hospital PET Centre. We will explore inflammatory processes in patients with psychosis.
- Prof Bruce Tonge from Monash University. This work focuses on children with autism and children with schizotypal features.

Internationally
- Our collaboration with the Institute of Psychiatry (IOP) in London has been ongoing for almost 2 decades. We have close links particularly with Prof Philip McGuire, Prof Sophia Frangou, Dr Paola Dazzan, Prof Carmine Pariante and their colleagues at IOP.
- We have worked closely with researchers from Japan who have visited our centre from various periods of time. A/Prof Tsutomu Takahashi from Prof Michio Suzuki’s department at Toyama University was particularly productive during his 2-year fellowship. Dr Hirohori Fujimura was also a Visiting Fellow from Japan, who worked on imaging analyses.
- Dr Daqing Sun who undertook his PhD with us has developed his work further at UCLA in the lab of Prof Tyrone Cannon and working closely with Dr Paul Thompson and their colleagues at UCLA. This led to more detailed examination of cortical brain changes using novel imaging analysis methods.
- Prof Stephen Wood is now establishing a research group at University of Birmingham, UK. We are developing strong links with his group and we will continue collaborative research in early psychosis.
- Dr Thomas Whitford undertook part of his fellowship in Boston, and we established collaborative links with Dr Robert McCarley and Dr Martha Shenton and their colleagues.

Melbourne Neuropsychiatry Centre
Report 2011
Psychosis and Developmental Neuropsychiatry (cont.)

• We are collaborating with Prof Siow Ann Chong, Dr Mike Chee and colleagues in Singapore and Professor Richard Keefe and colleagues from Duke University (North Carolina, USA) on a major project on those at risk for psychosis, funded by a Singapore A* research initiative.

• Associate Professor Bea Luna, University of Pittsburgh, Pennsylvania.

• Dr Gregor Berger, Switzerland. Ongoing studies commenced when Gregor was in Melbourne. This work focuses on intervention in early psychosis (e.g. using fish oils or low dose lithium).

• Dr Nitin Gogtay, National Institute of Health, Washington, DC. A recent collaboration to study children with schizotypal symptoms in Melbourne and Washington.

Other achievements

• Selwyn-Smith Medical Research Prize, The University of Melbourne to Christos Pantelis

• Christos Pantelis appointed Foundation Professor of Neuropsychiatry at University of Melbourne in 2004

• 2005 NHMRC Clinical Career Development Award to Stephen Wood

• 2006 Endeavour Award to Emre Bora from Turkey to work in MNC

• 2006 Organon Award from the Australian Society for Psychiatric Research to Stephen Wood

• 2007 Japan Society for the Promotion of Science Postdoctoral Fellowships in Japan

• Awards to Assistant Professor Takehashi from Toyama University to work in MNC

• Award to Christos Pantelis - Highly Commended, 2009 Victorian Minister of Health Award for Outstanding Individual Achievement in Mental Health

• 2008 Swiss National Science Foundation Fellowship to Luca Cocco to join MNC

• 2008 NHMRC CJ Martin Training Fellowship to Thomas Whitford

• 2009 NHMRC Clinical Research Fellowship to Cali Bartholomeusz

• Renewal of NHMRC Programme Grant in 2009

• 2009 Research Australia Discovery Award to Sarah Whittle

• 2009 Early Career Researcher Award to Sarah Whittle

• NARSAD Investigator Awards to Stephen Wood, Ben Harrison, and Thomas Whitford (2011)

• University of Melbourne Early Career Researcher (ECR) awards to Cali Bartholomeusz (2010) and Vanessa Cropley (2011)

• Travel Awards to Thomas Whitford from Harvard Medical School (2009) and Schizophrenia International Research Society to Cali Bartholomeusz

• 2010 Travel Award to attend the 2nd Biennial Schizophrenia International Research Conference, Schizophrenia International Research Society to Cali Bartholomeusz

• 2010 Schizophrenia International Research Society-Elsevier-Schizophrenia Research, Young investigator award to Emre Bora

• 2010 Wisconsin Symposium Scholar Travel Award to Sarah Whittle

• 2010 NHMRC Clinical Career Development Award Level 2 to Stephen Wood (relinquished mid-2010, following promotion to position in UK)

• 2010 NHMRC Senior Principal Research Fellowship to Christos Pantelis

• 2010 Endeavour Award to Leonardo Fontenelle from Brazil to work in MNC

• 2010 Travel Awards to Ian Harding (PhD student), including Trainee Abstract Travel Award, Organisation for Human Brain Mapping (OHBM), Annual Conference (Quebec City, June 2011), and Melbourne Abroad Travel Scholarship, University of Melbourne, June 2010

• 2011 International society of Bipolar Disorders-Eli Lilly Young Investigator Fellowship Bipolar Disorder, to Emre Bora

• 2011 Melbourne Health Research Week, Best Oral Presentation Award- Clinical Sciences to Cali Bartholomeusz

• 2011 NHMRC Training Fellowship to Vanessa Cropley

• 2011, Australian Rotary Health Geoffrey Betts Postdoctoral Fellowship to Sarah Whittle (relinquished to take NHMRC fellowship)

• NHMRC Career Development Fellow to Sarah Whittle, commencing in 2012

• 2011 Cornelian Regan Trust Professional Development Award, University of Melbourne, to Sarah Whittle

• 2011 NARSAD Distinguished Investigator Grant from the Brain & Behaviour Research Foundation (US) awarded to Christos Pantelis

• 2012 Travel Award to attend the 3rd Biennial Schizophrenia International Research Conference, Schizophrenia International Research Society to Emre Bora.
Adolescence is a key maturational period when the interplay between factors including genetics and environment may determine whether young people develop a mental illness.
Addiction Neuropsychiatry

Group Leader
Professor Murat Yücel

"It is much easier to suppress a first desire than to satisfy those that follow”
— Benjamin Franklin

Research Focus:
Drug addiction is a common condition with high personal impact and societal costs. Those who engage in excessive drug taking have increased impulsive and compulsive tendencies. Biologically, there is converging evidence that failures in the cortical control of fronto-subcortical brain circuits and alterations in levels of the brain neurotransmitters, dopamine and serotonin, underpin both impulsive and compulsive tendencies. Intriguingly, these same behavioural traits and biological characteristics are thought to underlie the symptoms of many diverse non-substance related addictions such as problem gambling, excessive eating and impulsive violence, as well as common psychiatric (e.g., obsessive-compulsive disorder), and neurological disorders (e.g., Parkinson’s disease). As such, many apparently different disorders may be underpinned by the same behavioural tendencies and brain substrates, and may respond to similar treatments and interventions.

Based on this knowledge, the broad goals of the Addiction Neuropsychiatry group are to:
1. Understand the long-term effects of chronic drug use on brain and behaviour (including mental health).
2. Investigate the neurobiological and psychological factors involved in addictive behaviour and associated conditions.
3. Understand how impulsivity and compulsivity relate to these conditions.
4. Use neuroscientific discoveries to increase public and professional knowledge of these conditions, and help identify improved treatments.

Research Methods:
We have established a highly motivated and skilled team of students, neuroscientists and clinicians. Together we combine detailed psychological assessments (using behavioural, neurocognitive and personality measures) with neurobiological (e.g., MRI measures of brain anatomy, function, biochemistry, and connectivity) and genetic measures. These measures allow us to understand the factors that underpin and drive addictive behaviours.

Understanding drug addiction: what science is telling us

What is Drug Addiction?
Drug addiction is a significant health problem in Australia with many adverse consequences for the individual and society. Drugs of abuse are used in a variety of ways ranging from experimental/social use, through to physical dependence and addiction. The addiction stage is characterised by preoccupation with drugs and anticipation of use, bingeing and intoxication, as well as withdrawal effects and negative affect.

Individuals suffering addiction are often described as being 'compulsive users' and 'out-of-control’. It is these psychological components that have the most significant impact for the individual and their community. Some people shift from an initial reward-based (i.e. enjoyment oriented, autonomous) use of drugs, to a harm avoidance based use (i.e. avoiding withdrawal and other unpleasant symptoms, which are less autonomous). We seek to understand the mechanisms leading to this change in behaviour.

What have we learnt about Addiction?
Our imaging work from inhalant, cannabis and heroin users has helped us understand some of the brain mechanisms underlying addiction. This includes the ‘risk’ and ‘resilience’ factors for drug addiction. For example, our recent work suggests that heavy cannabis use is associated with learning and memory problems, brain changes in the hippocampus (important for memory) and increased risk for psychotic symptoms. We have also identified that cannabis use affects the brain in a dose-dependent manner, with the risks being even greater if cannabis exposure occurs during adolescence. Our recent findings raise important questions about the use of drugs during adolescence when the brain is still maturing.

How does this knowledge help?
These findings will inform our understanding of the relationship between drug use, brain development and mental health. Such knowledge raises awareness in parents, teachers and young people themselves of the potentially hazardous associations between drug use, brain injury and mental health. Health educators and mental health workers can use this knowledge to educate and inform young people. This knowledge also indicates that early intervention strategies are invaluable in order to reduce the likelihood of subsequent problematic drug use, and the potential adverse effects on the developing brain.

Prevention is our goal
There are still many unanswered questions. We are now examining if we can use our knowledge to predict which individuals are at greatest risk of drug misuse or relapse. We are examining to what extent abstinence repairs or reverses the impairments in brain and behaviour, and how long this may take. We hope that by developing ways to prevent substance addiction and the associated brain and mental health consequences we will make a difference to the lives of these individuals and their families.
Addiction Neuropsychiatry (cont.)

Research Discoveries

Neurobiology of reduced self-control in drug addiction

The psychological aspects of addiction (i.e., poor decision-making and diminished ability to control impulsive tendencies) have the most significant impact on affected individuals and the wider community. In a world-first study, published in the most prestigious international psychiatry journal, Molecular Psychiatry, we have shown that:

- Long-term exposure to substances such as opiates can lead to disruptions in the brain’s ‘control’ systems, leading to difficulties of self-control. Specifically, individuals who have used heroin heavily, or for extended periods of time, perform poorly on cognitive tasks of executive (self)-control, have biochemical deficiencies (e.g., N-acetylaspartate, glutamate/glutamine) in brain regions involved in these executive processes, and place excessive physiological demand on their executive brain networks to resist impulses (i.e., they have to work hard to control those impulses).

- For the first time, we have also found that after prolonged use of substances such as heroin, neurobiological changes occur within the brain’s dopamine-controlled reward system that makes drugs and drug-taking behaviours highly pleasurable. At the same time, there is a decrease in pleasure derived from other “normally pleasurable” activities, making it difficult for the addicted person to engage in non-drug-taking pursuits. In this way, drugs take over a person’s life and they lose interest in other previously enjoyable pursuits. Our findings have major implications for drug treatment programmes and the general public, who often grapple with an addict’s inability to stop using substances.

- Our findings have been presented on many national radio broadcasts and almost all of the major national television networks as a part of the evening news including live interviews.

The long-term effects of heavy cannabis use on the brain, cognition and mental health

There is a clear link between psychotic disorder and exposure to cannabis. However, controversy remains about whether cannabis use can actually cause schizophrenia or other functional psychotic illness in the long term. It has also been unclear if and how cannabis might affect the brain. In another world-first, which was published in one of the top international psychiatry journals, Archives of General Psychiatry, we showed that:

- Long-term and heavy cannabis use is associated with excessive loss of brain volume, memory impairments, and psychotic symptoms. Specifically, we observed loss of brain volume in two key regions, the hippocampus and the amygdala, which are part of the brain’s emotional and reward-related learning and memory systems.

- Disruptions of these systems lead to symptoms like paranoia and can evolve to psychosis. Importantly, these associations were dose-dependent (i.e., the more cannabis use, the greater the memory impairment and psychotic symptoms), suggesting that they are intricately linked.

- This work attracted national and international media attention, and raised awareness about the impact of cannabis on the brain and mental health.

- In further work to be published, we found that exposure to cannabis in early adolescence is more damaging compared to later exposure.

- Our findings challenge the widespread perception that cannabis has no harmful effects on brain and behaviour.

We aim to educate clinicians and the public about the brain-related harms of drugs like cannabis, particularly during the critical period of brain maturation in adolescence, and inform public health and policy regarding the effects of cannabis on the brain.

New initiatives and projects

The role of self-control and reward in clinical recovery:

We are now conducting a large study to identify those at greatest risk of drug abuse, or who are most vulnerable to suffer neurobiological harms from chronic drug use. We are investigating how diminished self-control and an altered reward system leads to relapse and mental health problems. Our findings will help clinicians identify and treat affected people at an early stage of their drug use, which will help prevent adverse outcomes in the long term.

The role of genes and adolescent exposure to cannabis in the risk for psychosis:

We are investigating whether specific genes linked to increased or decreased levels of neurotransmitters relevant to addiction (e.g., dopamine and serotonin) increase the vulnerability to psychosis following cannabis exposure during adolescence. We are also studying how abstinence from cannabis use may help the brain structure and function to recover and whether this improves mental health outcomes.

The neuropsychology of compulsive behaviour:

We are examining the neural and psychological basis of impulsive and compulsive behaviours in obsessive-compulsive disorder, problem gambling and Parkinson’s disease. The repetitive (or compulsive) behaviour seen in these conditions, and their underlying neural correlates will help us to better understand why people engage in addictive behaviour.

What are the next steps?

The next steps in this research aim to address the following key questions:

- What are the long-term effects of chronic drugs on the brain and behaviour (including mental health)?
- Does abstinence lead to recovery? If so, how much recovery and over how long?
- Are all addictions (e.g., substance dependence, problem gambling, excessive eating) the same, similar or different, and how?
- How do individual differences in biology, cognition, personality, genes, and environment modify risk for substance use related harms and mental health problems?
- Answers to these questions will help us develop targeted interventions for substance use and inform public awareness and policy-making.

Currently, there is very little neuroscience research into addictive behaviour in humans within Australia, despite the apparent link between problems of addiction and adverse personal, psychological and social outcomes. We seek to improve our neuroscience understanding of addictive behaviour to help individuals, their families and society, and to inform public health policy.

We are ideally placed to develop this line of research. The Addiction Neuropsychiatry group will help bring together high-calibre interdisciplinary researchers from Australia and abroad with complimentary perspectives (neuroscientific, psychological, psychiatric, social, ethical & public policy) on these common and disabling behaviours (including substance abuse, excessive eating, problem gambling).

Prof Murat Yucel and his team will continue to play an active role in translating research findings to the academic and public community in many forms including research publications for the primary sector, workshops and conference presentations, public lectures, talks to schools, and the media.
Researchers at MNC have identified the disruption to white matter connectivity in schizophrenia, cannabis use, and attention deficit hyperactivity disorder (ADHD) using novel brain mapping.
Within the culture of innovation and nurturing at MNC I have explored my research interests. It has provided me with the skills to contribute to our understanding of mental disorders.
Affective Neuropsychiatry

Group Leaders
Dr Ben Harrison & Dr Chris Davey

Research Goals
Our aim is to better understand the neurobiological factors that contribute to the development and treatment of mood and anxiety disorders, which are the most common and costly form of mental illness.

A Focus on Functional Magnetic Resonance Imaging (fMRI) and Brain Networks
Adopting a systems neuroscience perspective, our goal is to characterise how changes within large-scale brain networks may account for the clinical manifestation of these disorders and the broad range of social and emotional impairments that they engender.

To do so, we primarily use functional MRI to map the activity of brain networks to group and individual differences in observed behaviour and mental state, as well as more enduring measures linked to personality and temperament.

Our research has two main objectives: firstly, to generate important new leads as to the neurobiological basis of these common psychiatric disorders; and secondly, identify more objective “brain-based” markers of illness vulnerability to help optimise their effective treatment, for instance, by being able to predict with brain imaging which individuals may respond to one treatment versus another. In collaboration with Orygen Youth Health, Headspace and Western Health we are preparing new imaging research projects that will commence in 2012 and focus on young people with emerging mood and anxiety disorders living in the North Western region of Melbourne.

Primary Research Methods
* Functional MRI: brain activation and brain connectivity mapping
* Psychophysiological monitoring (fMRI-compatible)
* Psychological, psychiatric and genetic assessment

Research Highlights
* In a landmark investigation published in the prestigious Archives of General Psychiatry (2009), Harrison et al. confirmed the hypothesis that obsessive-compulsive disorder (OCD) is associated with prominent disturbances of the so-called “brain cortico-striatal loops”. A disturbance of these circuits, which link higher cognitive functions in the cortex with deep brain structures involved in the brain’s action systems, are considered to be important to the compulsions and obsessions seen in OCD. This study, already highly cited, has advanced understanding of the neurobiology of OCD and was featured by the Director of the NIMH, Thomas Insel, in an 8-page Scientific American editorial entitled “Faulty Circuits” (April 2010). Our new research on this topic seeks to demonstrate exactly how disturbances of these brain systems underpin the different symptom dimensions of OCD.

* In a review article published in 2008 in Neuroscience & Biobehavioural Reviews, Davey et al. proposed a neurobiological theory for the onset of depression in adolescence. This theory has attempted to reconcile how brain development interacts with social processes to create vulnerability to depression. Importantly, it represents one of the first attempts to explain how biological and psychological processes, and their interaction, are important for depression. We are now investigating these ideas in our new studies in youth depression.

Depressed mood and changes in brain function

Depression in young people
Depression is the chronic illness of adolescence and young adulthood, and the most burdensome of all illnesses throughout adult life in developed nations such as Australia. For most people its onset occurs between puberty and the age of 30. Frequent recurrence of depression after the first episode causes significant disability for both the person affected and the wider community. Depression involves the experience of lowered mood and lack of energy and motivation, but also disturbances of bodily processes (such as sleep, appetite and motor function), and difficulties with thinking (such as poor concentration and negative rumination). Young people often become detached from their social networks, and find it difficult to engage with education and work. There are a number of brain maturational processes that occur after puberty that make people vulnerable to depression, and understanding the nature of these changes has been a focus of our neuroimaging work.

What we have found
We have used functional Magnetic Resonance Imaging (fMRI) to investigate brain processes that are associated with depression. fMRI measures changes in brain activity while a person engages with particular tasks, or simply rests in the scanner and is particularly suitable for investigating mood-related processes. We have used fMRI to show that brain regions that are important for social processes, such as the amygdala, are abnormally activated when depressed young people receive social feedback. We have shown that areas of the brain that are important for regulating bodily processes (ventral cingulate regions) show abnormal connectivity with other mood-related brain regions. We have shown that abnormal connectivity with these brain regions affect the way young people engage with tasks that require attention and concentration. Our future work will aim to examine how these changes in brain function predict the response of depressed young people to treatment, including psychotherapy and medication.
In 2011, Davey et al. published the first brain imaging evidence of a positive social emotional processing bias in young people with major depressive disorder. The study, published in *Biological Psychiatry*, reported that depressed individuals responded to such feedback with increased amygdala activation, demonstrating that amygdala hypersensitivity in depression is not restricted to negative emotional stimuli. The amygdala is a structure deep in the brain linked to emotion processing and regulation, including fear and anxiety responses. The heightened sensitivity of this structure in depressed participants to social evaluation may help explain symptoms of depression, such as social withdrawal.

As a final highlight, Harrison et al., reported on a comprehensive and innovative study of the human “default mode brain network” published in *PNAS* in 2008 – the flagship journal of the American Academy of Sciences. The default mode network is a large-scale brain system that is thought to be closely related to conscious self-awareness. The study provided strong support for the idea that the default mode network is functionally devoted to emotional self-referential processes in humans. Upon publication, this work received national and international media attention and led to an invited presentation at the “International Congress of the Default Mode Network” in 2010. It has since been a highly cited study whose findings also appear to be relevant for understanding other disorders, including depression.

Key Collaborators
Our work is enhanced by strong local and international collaborations; in particular, our studies in young people with major depressive disorder are supported through links with Orygen Youth Health and Headspace Western and Northern clinics; and with colleagues in Barcelona we participate in a large neuroimaging research project in people with obsessive-compulsive disorder.

- Orygen Youth Health, Melbourne
- Headspace (National Youth Mental Health Foundation)
- MRI Research Unit, Hospital Del Mar-PRBB, Barcelona
- Bellvitge University Hospital-ICS, Barcelona
- Australian Twin Registry
- Murdoch Children’s Research Institute, Melbourne
- Western Health Medical Imaging Services.

Achievements
- More than 50 peer-reviewed research articles published in leading international psychiatry and science journals since 2006
- Involvement in competitively funded national and international research grants (>$3 M in funding)
- Dr Harrison and Dr Davey awarded NHMRC Clinical Research Fellowships
- At time of going to press, Drs Harrison and Davey awarded two NHMRC project grants (total almost $1.5 M) to commence in 2012
- Dr. Harrison invited to join Editorial Board of PLoS ONE in 2010.

Fellowships, Honours & Awards
- Organization for Human Brain Mapping Travel Award (2011; Dr. Davey)
- University of Melbourne Early Career Researcher Award (2011; Dr. Davey)
- University of Melbourne Early Career Researcher Award (2010; Dr. Harrison)
- NHMRC Clinical Career Development Award (2010-14; Dr. Harrison)
- NHMRC Early Career Fellowship (2010-13; Dr. Davey)
- The Rosa Marti-Sensat Research Prize (2009; Dr. Harrison)
- RANZCP Young Psychiatrist Award (2008; Dr. Davey)
- Wisconsin Symposium on Emotion Travel Award (2008; Dr. Davey)
- Ciber-BBN Young Investigator Award (2007; Dr. Harrison)
- NHMRC Postgraduate Medical Scholarship (2006-09; Dr. Davey)
- NHMRC CJ Martin Fellowship (2006-10; Dr. Harrison).

Predicting Treatment Response in Young People with Major Depression
While antidepressant medications are an effective treatment for adolescent depression, only about two thirds of patients will demonstrate a clinical response, and less than a third will reach remission. The identification of valid biomarkers to assist in the prediction of treatment response is therefore of great clinical relevance. This project will use fMRI combined with novel emotional provocation tasks to test the hypothesis that individual differences in pre-treatment activity of the medial frontal cortex will predict treatment response in young people experiencing a first episode of depression.

Towards a Brain-Based Measure of Human Anxiety Sensitivity
We currently lack a clear understanding of the biological mechanisms that give rise to the symptoms of clinical anxiety disorders. This project will test the hypothesis that human anterior insular cortex activity underlies individual differences in trait “anxiety sensitivity”: an established psychological risk factor for anxiety disorders. We will assess a large group of adolescent and young adult participants with fMRI and detailed psychophysiological monitoring. As well as characterising the brain basis of human anxiety sensitivity, this project will aim to identify a novel biological risk marker of clinical anxiety disorders, in particular, panic disorder.
We use the latest brain imaging technologies to understand how brains develop in health and disease, and how personal experiences can shape their structure and function.
What is the connectome?

The human brain is an extraordinarily complex network made of 100 billion neurons interconnected by trillions of fibres. Accurately mapping this network, termed the human connectome, has become a major goal of neuroscience, and has been compared in scale to the Human Genome Project. The importance of this effort was recently highlighted by a new $40M multi-centre brain imaging initiative of the National Institute of Mental Health, USA called the Human Connectome Project.

What have we found?

Our work has been at the forefront of connectomic science, developing new methods for brain network mapping, generating some of the first brain-wide maps of connectivity disturbances in people with schizophrenia, and being the first to quantify genetic influences on brain network organisation.

Assessing social connections and brain connectivity in schools

In an exciting new initiative we will combine brain imaging and social network analysis techniques to understand how brain function influences the social connections that we make, and how these in turn impact brain development throughout adolescence. This work has important implications for illnesses such as autism, depression and schizophrenia.

Linking the genome to the connectome

Our research has provided the first evidence to suggest that certain properties of brain network organisation are under genetic control. We are now collaborating with geneticists and engineers to identify which specific genes and physiological pathways are involved in determining how brain networks are configured.
New methods for mapping brain networks

Our group has played a central role in developing new methods for mapping the large-scale structure of brain networks. This is a very challenging and rapidly developing field. Our work has been at the forefront, with our articles being among the most downloaded by other scientists in the past year and having already been applied by other groups to map brain network changes in disorders as diverse as schizophrenia, depression and amyotrophic lateral sclerosis (ALS). These methods have provided researchers with new ways of measuring brain connectivity, new statistics for characterising differences in brain networks, and novel procedures for measuring genetic influences on brain network organisation. These methods include:

- The network-based statistic: a novel and powerful means for identifying significant effects on specific sub-networks of connections distributed throughout the brain. This method has been rapidly taken up by the research community and is being applied in diverse contexts by a range of international scientists.
- Spatial pair-wise clustering: a data-driven technique for identifying pairs of regions showing connectivity differences between patient and healthy populations. We have applied this method to generate new insights into the brain connectivity disturbances associated with schizophrenia.
- Brain network heritability: we have adapted traditional statistical techniques to quantify genetic influences on different properties of brain network organisation.
- Event-related fMRI network mapping: Mapping brain network connectivity during specified psychological tasks has proven a difficult challenge. Our group has led the way in developing new techniques for mapping task-related changes in large-scale brain networks, allowing detailed analysis of how brain networks dynamically reconfigure themselves in response to changing environmental circumstances.
- Globally optimal tractography: We have developed a new method for tracking anatomical connections throughout the brain that overcomes many of the limitations associated with existing methods. This technique allows for accurate, high-fidelity reconstruction of anatomical fibre pathways in the brain.

Mapping brain network disturbances in schizophrenia

There is now a growing consensus among scientists that schizophrenia does not arise from isolated damage to one or a few brain regions but rather, that it is caused by disturbances in how different brain regions communicate with each other; that is, schizophrenia is a disorder of brain connectivity. Mapping precisely which brain connections the disease affects is a challenging task that we are tackling. We have developed new brain imaging techniques to quantify these differences, and have used them to generate some of the first brain-wide maps of disturbed brain connectivity in schizophrenia. Our analyses have led to the following breakthroughs:

- Accurate mapping of specific sub-networks affected by schizophrenia: Our group has been among the first to pinpoint which structural and functional connections are affected in schizophrenia.
- Understanding the relationship between regional and inter-regional dysfunction in schizophrenia: In the first study of its kind, we found that dysfunction of specific brain regions is intimately related to how different brain regions communicate with each other, providing important clues into the nature of local and distributed brain abnormalities in schizophrenia.

- Understanding how brain networks relate to cognitive deficits in schizophrenia: Our group was the first to construct detailed whole-brain maps of connectivity disturbances in schizophrenia as they performed challenging cognitive tasks, allowing us to develop integrated, network-based theories of the cognitive difficulties associated with the disorder.

Mapping genetic influences on brain network organisation

In another world-first study we examined the functional properties of the connectome in healthy monozygotic (identical) and dizygotic (non-identical) healthy twins. We have demonstrated that certain properties of brain network organisation are under strong genetic control and we are now investigating which specific genes influences brain network organisation, and how these changes relate to genetic risk for schizophrenia.

Other achievements

Our group has achieved considerable success in attracting competitive funding, including a National Health and Medical Research Council CI (E) Martin Fellowship, two Early Career Researcher Grants as well as other honours and awards, and invitations to speak at major national and international conferences.

Honours & Awards

Alex Fornito

- 1999 Seymour Kety Award, National Institutes of Mental Health, USA
- 2002 Dwight Final Examination Prize, Department of Psychology, University of Melbourne
- 2002 The Australian Psychological Society Prize
- 2006 National Health & Medical Research Council (NHMRC) C.J.Martin Fellowship
- 2008 European College of Neuropsychopharmacology Poster Award
- 2008 European College of Neuropsychopharmacology Travel Award
- 2008 Organization for Human Brain Mapping Young Investigator Award
- 2010 Schizophrenia International Research Society Young Investigator Award
- 2011 National Association of Research Fellows Invited Speaker
- 2011 Lundbeck Institute Early Career Researcher Award, awarded by the Australasian Society for Psychiatric Research
- 2011 CR Roper Fellowship, University of Melbourne.

Andrew Tzakos

- 2007 American Australian Association Education Fellow
- 2008 University of Melbourne Early Career Researcher Grant
- 2008 Australian Academy of Science Exchange Grant
- 2008 Australian Research Council (ARC) Linkage International Scheme Fellowship
- Developed techniques for white matter tractography to assess the integrity of brain connections in neuropsychiatric and other disorders.
- 2009 Australian Research Council Postdoctoral Fellow (APD) “Charting connectivity in the healthy and diseased brain”, Discovery Project, 2009 - 2011
- 2011 Inaugural Melbourne Neuroscience Fellowship in 2012 to enhance interdisciplinary collaboration between psychiatry and the neurosciences at the University of Melbourne.
Future Directions

We are currently undertaking research on three broad fronts:

• The genetic architecture of the human connectome. This work examines the degree to which different structural and functional properties of the connectome are under genetic influence, and which specific genes and genetic pathways are involved.
  — This work has far-reaching implications, given that almost every major mental illness is associated with disturbed brain connectivity.
  — Identifying which specific genes influence connectome development will allow us to understand the genetic basis of brain disturbances in psychiatric disorders.

• The neural network basis of human cognition. The brain functions as a highly integrated network, and understanding interactions within this system is critical for mapping how neural processes relate to our thoughts and behaviour.
  — Using techniques developed by our group, we are now able to generate detailed, whole-brain maps of how these interactions change as people perform different cognitive tasks.
  — This work will lead to new insights into how mental processes are represented in the brain.

• New methods for connectome mapping. Connectome science is a new and rapidly developing field. We are constantly working on developing new and improved techniques to allow us to generate more accurate maps of brain connectivity.
  — We are developing new statistical techniques that provide increased power for detecting significant effects within highly complex connectomic data.
  — We are combining brain network measures with machine learning algorithms to identify clinically informative biomarkers of outcome in psychiatric disease. This work has important implications for being able to determine an individual patient’s risk of remission or ongoing illness, which can then be used to plan appropriate treatment strategies.

External Collaborators

• Prof Edward T Bullmore (University of Cambridge)
• Dr Jon S Simons (University of Cambridge)
• Prof Cameron Carter (University of California, Davis)
• A/Prof Jong Yoon (University of California, Davis)
• Dr Marjorie Solomon (University of California, Davis)
• A/Prof Michael Milham (New York University)
• Prof Bryan Mowry (University of Queensland)
• Dr Paul Klauser (University of Zurich)
• Dr Paul Klauser (University of Zurich)
• Prof Sin Jeong Chong (Institute of Mental Health, Singapore)
• Prof Stephen Wood, (University of Birmingham)
• Prof Michael Chee (Duke University, Singapore)
MNC has one of the largest collections of neuropsychiatric research MRI scans in the world. From 2012, we will be using one of the world’s fastest supercomputers to analyse these scans.
Clinical Neuropsychiatry

Group Leaders
Dr Dennis Velakoulis & Associate Professor Mark Walterfang

Group Objectives
The Neuropsychiatry Unit at the Royal Melbourne Hospital (RMH) is an eight-bed statewide specialist mental health service that offers neuropsychiatric assessment and advice to patients referred from psychiatrists, neurological and other medical and mental health services. Our multidisciplinary team, including consultant neuropsychiatrists, neuropsychologists, occupational therapists, social workers, behavioural neurologists, training psychiatrists, resident medical officers and mental health and general medical nurses, ensures that all patients receive a comprehensive assessment that covers all aspects of their illness.

In addition to inpatient services, our outpatient clinics includes a dedicated younger-onset dementia clinic, the world's oldest Huntington's disease clinic and a predictive neurogenetic clinic which is run in concert with genetic counsellors and general neuropsychiatry clinics. We provide neuropsychiatric assessments for patients in the RMH Comprehensive Epilepsy Programme and the RMH neuro-oncology (brain tumour) clinic. Through the Neuropsychiatry Unit neurologist we have direct links to the RMH Movement Disorders Clinic and the Deep Brain Stimulation programme at the RMH.

The Neuropsychiatry Unit has expertise in early onset dementia (i.e. dementia in people younger than 65), Huntington's disease, epilepsy, neuroimaging in mental illness, chronic psychiatric disorders, movement disorders, ECT and deep brain stimulation. The unit is involved in research endeavours, educational programmes, and training of mental health clinicians to meet the future mental health needs of the community.

The Neuropsychiatry Unit is committed to meeting its goals, with a philosophy that embraces the needs of the patient and their family. Our goals are to:

- Consistently deliver and build upon the high level of specialist assessment and care provided to patients and their families.
- Employ a multidisciplinary approach in comprehensively assessing the impact of mental illness on the patient's daily function and lifestyle.
- Create a supportive environment for patients, their families and friends, and staff.
- Provide ongoing observation of the patient, which may facilitate diagnosis and direction for future care.

We provide detailed multi-disciplinary summaries to our patients’ doctors and those referring to our service have consistently rated these summaries as excellent. Our assessments provide guidance to clinicians who are helping patients with very complex clinical problems.

Clinical-Research Interface

Neurodegenerative and neurometabolic disorders

Frontotemporal dementia (FTD)
Patients with FTD will often first come to the attention of psychiatrists due to changes in personality, behaviour and mood. About one quarter of patients who develop FTD before the age of 40 will be diagnosed and treated for schizophrenia. Based on these observations we have undertaken research work to investigate the link between schizophrenia and FTD.

A case of fronto-temporal dementia

What is FTD?
Frontotemporal dementia is the third most common cause of dementia, the commonest being Alzheimer’s dementia. The first symptoms of FTD are usually changes in personality, behaviour and mood rather than changes in memory. This means that many patients with FTD, especially those who are young, will be initially diagnosed with a psychiatric disorder such as depression or psychosis.

What have we found?
We have found that the younger the person develops FTD the more likely that the earliest symptoms are psychiatric ones, including schizophrenia-like psychosis.

The case of John
John is a 45-year old man, with a family history of early onset Parkinson’s disease in his mother and aunt. He presented with poor work performance, lowered mood and lack of motivation. He was initially treated for depression with some improvement. One year later the family and work colleagues noted that he was forgetful and not his normal self. He had been making poor decisions financially and struggling to keep up at work. He was reviewed by a neurologist and then referred for neuropsychiatric opinion. Brain imaging showed some mild atrophy of the frontal lobes and SPECT scanning showed a reduction of blood flow in the same regions. Neuropsychological testing identified problems with organisation, planning and memory. Further information obtained from the mother’s and aunt’s doctors revealed that they had a history of Parkinson’s disease followed by a dementia. A diagnosis of a frontotemporal dementia was made based on the history and testing.

Further neurogenetic opinions were sought and genetic testing was undertaken, which showed that John and his mother had a genetic form of frontotemporal dementia.

The ongoing management for John and his family involved organising supports in the community, linking them into the Alzheimer’s Association and providing counselling for the genetic implications of the diagnosis for John’s children and siblings.

Are treatments available?
While there are not yet any treatments for FTD, a number of new drugs have become available for use in research studies. Our group will be exploring these drugs over the next few years.
Clinical Neuropsychiatry (cont.)

- High rates of schizophrenia and bipolar-like disorders in young patients with frontotemporal dementia. We were the first group to demonstrate the link between this form of dementia and psychosis, and also the first group to specifically examine the role of abnormalities of proteins normally associated with this disorder in schizophrenia. These “first to market” findings have since been widely cited by other groups, and have seeded a new field of research exploring the links between these disorders. The findings also have important implications for clinicians and for our understanding of the neuropsychology of chronic mental disorders.

- Treatment in Niemann-Pick type C: to trial two novel compounds targeting neurodegeneration in this illness, as well as modeling the hypothesis that heterozygotes develop late-life illness.

Niemann-Pick type C targets two novel compounds targeting neurodegeneration in this illness, as well as modeling the hypothesis that heterozygotes develop late-life illness.

- Eye movement changes as a marker in Niemann-Pick type C. We have shown that abnormalities in eye movements parallel the brain changes in this disorder.

- Neuroimaging changes in Niemann Pick type C. We have the largest single-clinician cohort of patients with the rare cholesterol storage disorder Niemann Pick type C (NPC), which presents with psychosis in up to 40% of adults. In NPC there is abnormal accumulation of cholesterol in brain cells leading to their slow degeneration.

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- Neuroimaging changes in Niemann Pick type C. We have conducted the only group clinical and neuroimaging analyses on this group, which highlighted the role of white matter microstructure as a substrate for psychosis. Up until this time NPC was considered to be a disorder of the brain’s grey matter. This work has led to new directions in our NPC research, including work in mice. This has involved collaborations with the Murdoch Children’s Research Institute, Australian National University, Stanford University, USA, and the Institute of Neurology, UK.

- Eye movement changes as a marker in Niemann-Pick type C. With Dr Larry Abel from the University of Melbourne, we have developed and published a comprehensive set of frontal and brainstem measures of eye movement functioning in this patient group. We have shown that abnormalities in eye movements parallel the brain changes in this disorder.

- Treatment in Niemann-Pick type C. We have examined the role of a novel mino sugar, miglustat, in adult patients with this disease, and are working with international groups in developing new treatment paradigms using novel compounds for intrathecal and parenteral delivery.

- Animal models of novel treatments in Niemann-Pick type C: in collaboration with Professor Ashley Bush from the Mental Health Research Institute and Professor Terry O’Brien, Department of Medicine, we are utilising murine models of both childhood and adulthood

- Shape analysis in cortical and subcortical dementias. In collaboration with Professor Paul Thompson from the University of California, Los Angeles, and Professor Jeff Looi, from the Australian National University, we have examined the shape of the caudate and putamen, which are part of the subcortical structures of the brain. We confirmed our hypothesis that the shape of these structures was most abnormal in patients with HD, followed by patients with FTD and then patients with Alzheimer’s disease. The most important finding of this study was that patients with FTD, previously thought to have only cortical brain changes, also exhibit significant changes in subcortical structures.

- Sodium selenate is a novel drug, which reduces the accumulation of tau into tau ‘tangles’ and has been shown to reduce tau load in animal models of dementia.

- Together with Professor Terry O’Brien we have commenced a world first $1.8 M trial of sodium selenate in the treatment of Alzheimer’s disease.

- A future study is also planned that will look at sodium selenate in the tauopathies - frontotemporal dementia, corticobasal ganglionic degeneration and progressive supra nuclear palsy.

Neuroimaging of neurodegenerative disorders

- We have worked with Professor Patricia Desmond, Royal Melbourne Hospital Neuroradiology Department, to establish a database of over 200 MRI scans in patients with young onset dementia. This is one of the largest available databases of its kind and has formed the basis of more recent analyses and publications. This dataset includes patients with Alzheimer’s disease, Huntington’s disease, frontotemporal dementia, chronic schizophrenia and controls matched for age and gender. Examples of some of the work currently being undertaken from this resource are as follows:

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Neuroimaging of neurodegenerative disorders

- We have worked with Professor Patricia Desmond, Royal Melbourne Hospital Neuroradiology Department, to establish a database of over 200 MRI scans in patients with young onset dementia. This is one of the largest available databases of its kind and has formed the basis of more recent analyses and publications. This dataset includes patients with Alzheimer’s disease, Huntington’s disease, frontotemporal dementia, chronic schizophrenia and controls matched for age and gender. Examples of some of the work currently being undertaken from this resource are as follows:

- Shape analysis in cortical and subcortical dementias. In collaboration with Professor Paul Thompson from the University of California, Los Angeles, and Professor Jeff Looi, from the Australian National University, we have examined the shape of the caudate and putamen, which are part of the subcortical structures of the brain. We confirmed our hypothesis that the shape of these structures was most abnormal in patients with HD, followed by patients with FTD and then patients with Alzheimer’s disease. The most important finding of this study was that patients with FTD, previously thought to have only cortical brain changes, also exhibit significant changes in subcortical structures.

- Sodium selenate is a novel drug, which reduces the accumulation of tau into tau ‘tangles’ and has been shown to reduce tau load in animal models of dementia.

- Together with Professor Terry O’Brien we have commenced a world first $1.8 M trial of sodium selenate in the treatment of Alzheimer’s disease.

- A future study is also planned that will look at sodium selenate in the tauopathies - frontotemporal dementia, corticobasal ganglionic degeneration and progressive supra nuclear palsy.

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Clinical Neuropsychiatry (cont.)

Development of clinical rating tools
The clinical assessment of patients in the Neuropsychiatry Unit includes assessments that have been standardised to facilitate our clinical and research work. These include:

- NUCOG – a cognitive screening tool that has found widespread applications across psychology, neurology and aged care. In addition to psychology, it has been utilised in large datasets in epilepsy and multiple sclerosis. It has now been validated in English, Malay and Persian, with Mandarin, Spanish, Croatian, Greek and Italian versions being developed. An iPad version of the NUCOG is in development.

- Cognis and BATCH – We have developed these standardised instruments to provide cognitive ratings based on the observations made by carers and nursing staff, respectively. This is particularly helpful for those patients that cannot be assessed with standard tests of cognitive ability. For these patients, observations by others provide the most informative measures to aid in diagnosis.

Focal epilepsy and psychogenic non-epileptic seizures
In collaboration with the Comprehensive Epilepsy Programme, Royal Melbourne Hospital, we have established a Neuropsychiatry Epilepsy Fellow position in 2005. We have developed a standardised neuropsychiatric assessment battery that includes neuropsychiatric clinical assessment, the MINI (diagnostic classification), HADS (anxiety and depression scale), NUCOG (cognitive screening), CDLIE-89 (quality of life scale) and the Neo-FI (personality inventory).

These assessments are incorporated into the comprehensive epilepsy assessment of all patients who are seen in the Comprehensive Epilepsy Programme at the RMH. We have collated over 700 patients with such data and have used these data across a variety of studies in this population. This collaboration has led to a series of animal studies in epilepsy that incorporate cognitive and behavioural outcomes.

- Neuropsychiatry of focal epilepsy, PhD Dr Sophie Adams - Dr Adams has established a database of over 500 patients with focal epilepsy who have had clinical assessments and MRI brain scans. She has followed up 100 of these patients and assessed them using the SCID and other rating tools. This is one of largest such follow up studies of such a population. Dr Adam's first paper from her PhD, published in The British Journal of Psychiatry, identified higher rates of depression in patients with non-lesional focal epilepsy but not temporal lobe epilepsy. This important finding (subsequently replicated) has led to a re-examination of the traditional teaching that temporal lobe epilepsy is more likely to be associated with psychiatric co-morbidity.

- Psychogenic non-epileptic seizures (PNES) - Dr Simon Jones (Epilepsy Fellow 2005) reviewed the patients with PNES assessed in the video telemetry unit over a 10-year period and obtained follow up information on about 30% of these patients. A high proportion of patients with psychogenic non-epileptic seizures continue to have such seizures many years after the initial diagnosis. This finding has led to a re-examination of the service needs of this neglected clinical population.

- Quality of life in focal epilepsy and PNES - We have assessed quality of life in patients with epilepsy and in their carers. Depression and anxiety are the most important predictors of quality of life in patients with focal epilepsy, psychogenic non-epileptic seizures and in carers of patients with epilepsy. This knowledge means that it is important to identify depression and anxiety in patients and carers as early as possible. Depression and anxiety can be readily treated and their alleviation can improve the quality of life of patients.

- Autonomic measures in focal epilepsy and PNES - Dr Chris Turnbull has used the Life Vest to measure autonomic correlates (such as heart rate and respiratory rate) of focal epilepsy and PNES. This ongoing study incorporates measures of salivary cortisol and the dexamethasone suppression test to assess the brain’s stress system (Hypothalamic-pituitary axis [HPA] function). This is part of an ongoing programme of work that is looking at the relationship between stress, depression, anxiety and epilepsy. While it has long been known that patients with epilepsy have high rates of depression, it has only become clear recently that a history of depression can precede the development of epilepsy. This bi-directional relationship further highlights the importance of identifying and treating depression early.

- Identifying neurogenesis in patients with temporal lobe resection - In collaboration with Dr Michael Valenzuela at the University of NSW, we are undertaking an imaging-pathological study to identify markers of neurogenesis using MRIs (pre-surgery) and pathological markers (post-resection). Neurogenesis is the birth of new neurons in the brain that may be important in epilepsy and psychiatric disorders like depression. This may lead to new treatments that target neurogenesis specifically.

- Targeting tau phosphorylation to treat and prevent acquired epilepsy, neurodegeneration and neuropsychiatric disease following a brain injury – In this NHMRC funded animal study we are investigating the role of sodium selenate in the prevention of acquired epilepsy through its role in the inhibition of tau phosphorylation.

The Neuropsychiatry Digital Archive as a teaching tool
With the assistance of funding from the Department of Human Services (DHS), we have digitalised old VHS videos of patients that have common as well as rare neuropsychiatric signs and symptoms. As part of this study we also continue to collect videos in a prospective manner.

- Clinical Neuropsychiatry Resource - The videos have become part of a larger clinical database, which includes diagnostic information, brain images, neuropathology images and other investigations.

- A unique teaching tool - video data are being developed into a “You-Tube” like interface, which will allow searching of the video database. Each video will then be linked to relevant, de-identified, patient information and investigations together with links to on-line relevant literature through the Mental Health library.

Deep Brain Stimulation
In collaboration with neurosurgical, neurological and psychiatric collaborators we have begun a programme of deep brain stimulation for the treatment of severe obsessive-compulsive disorder (OCD).

- We undertook the first two such procedures in Australia in early 2011 with two further procedures planned for 2012. The early clinical outcomes in both patients have been promising.

Teaching and educational activities
A key role for the Neuropsychiatry Unit is the provision of teaching and education to students, clinicians and visitors to our unit. Selected teaching and educational activities include:

- Mental Health Teaching and Development Programme - The Neuropsychiatry Unit has regularly provided workshops for mental health clinicians on subjects including cognitive assessment, ECT, medical issues in psychiatry, and the neuropsychiatric assessment of cognitive function.

- The Neuropsychiatry Spring Lecture series - this series of 10 lectures over five weeks has been running since 2009. In 2010, 40 psychiatry trainees and psychiatrists attended the lecture series; their evaluations rated the lecture series as excellent.

- Cognitive Assessment for Mental Health Clinicians - this one-day workshop was over subscribed when delivered at a local area mental health service in 2011.

- Neuropsychiatric assessment for neurologists - This half day workshop was run for visiting Chinese Neurologists attending the Neurology Training Course (a joint initiative of The University of Melbourne and University of Shanghai).
• Visiting psychiatry trainees and fellows - We have regularly hosted international clinical observers who have sought out our clinical neuropsychiatry unit from various parts of the world (including Spain, Canada, the USA, the UK, Portugal, Mexico, Singapore, Malaysia, Iran and Qatar). During 2011, Dr Kok Yoon Chee, a Malaysian psychiatrist, was working as a senior neuropsychiatry trainee, fully funded by the Malaysian Government to train as a neuropsychiatrist in our unit.

• Neuropsychiatry training - the Neuropsychiatry training positions in the Neuropsychiatry Unit are highly sought positions for local and international trainees. While most successful applicants have come from Melbourne, past registrars have applied successfully from Perth, Brisbane, the UK and Ireland.

Selected Achievements

• Our paper linking frontotemporal dementia to schizophrenia is the first to identify this association and has been followed by a number of studies from other research groups confirming this link.

• The Neuropsychiatry Unit (NPU) published the first group of neuroimaging studies of Niemann-Pick type C disease patients in major neurology journals, and has been running a treatment trial using miglustat in this patient population.

• The clinical rating tool (NUCOG) developed by NPU has been published by the Australian Council for educational research and has been used widely not only within psychiatry settings but also in geriatrics, neurology, rehabilitation and brain injury. A portable touchscreen version is currently being developed.

• The epilepsy data collection programme has gathered detailed clinical and imaging data on over 700 patients. We have created a unique Neuropsychiatry Epilepsy Fellow position for psychiatry trainees, which has nurtured and mentored five senior psychiatry trainees over the last five years.

• Associate Professor Mark Walterfang was awarded the 2011 University of Melbourne Chancellor’s Prize for the best PhD in the Faculty of Medicine, Dentistry and Health Sciences.

Future Directions

We are currently continuing to explore the following key strands of research:

• Brain-behaviour relationships in neurodegenerative disorders – by examining neurobiological markers in neurodegenerative illnesses that present with elevated rates of major mental illness, we hope to continue to highlight new pathological and molecular models for understanding psychiatric illness, whilst also expanding the knowledge base on the neurodegenerative disorders themselves.

• Novel treatments in neurodegenerative disorders – through the cross-fertilisation of methodology, models and knowledge between neurodegenerative and major mental illness, we hope to translate novel pathological and molecular models of each group of illnesses into treatments that can be applied into the other.

Key External Collaborators

Department of Medicine, University of Melbourne
Murdoch Children’s Research Institute
Mental Health Research Institute
Australian National University
Karolinska Institute, Sweden
University of Lund, Sweden
University of California: Los Angeles, USA
Mount Sinai Medical School, USA
University of North Carolina, USA
Stanford University, USA
Institute of Neurology, UK
By working with international collaborators, MNC has progressed understanding and new treatment avenues for complex neuropsychiatric and neurometabolic disorders.
7.6 Data, Imaging and Methods Platform (DIMP)

Group Leader
Sarah Whittle, PhD

DIMP is responsible for the operation of the MNC’s imaging laboratory including:

- Implementing data management strategies
- Development of database systems that integrate neuroimaging, neuropsychological and clinical and other data
- Linking data across collaborating sites
- Maintenance and development of imaging laboratory
- Development of manual and automated methods for neuroimaging analysis
- Induction and training of staff and students in neuroimaging analysis methodologies

Research Projects & Initiatives
DIMP enables the processing of neuroimaging data collected by projects conducted by MNC researchers and collaborators. Examples of the work being conducted in the MNC Imaging Laboratory include:

- Manual measurement of brain structure (e.g., Region of Interest [ROI] tracing), such as the hippocampus, amygdala, pituitary gland, caudate nucleus, and anterior cingulate cortex
- Automated measurement of brain structures (e.g., voxel based methods)
- Processing and analysis of data from functional MRI scans (fMRI, to assess brain function and connectivity), Diffusion Tensor Imaging (DTI, to assess white matter tracts in the brain), Magnetization Transfer Imaging (MTI, to assess myelination), and Positron Emission Tomography scanning (PET, to assess metabolism, indices of inflammation, or neurotransmitters).

Computing Cluster Facilities
MNC, through DIMP, is now collaborating with the Experimental Particle Physics (EPP) Group, School of Physics at The University of Melbourne. This collaboration was developed to help the two research groups to acquire computing infrastructure to conduct computation intensive research analyses.

MNC Research Databank
MNC has been establishing a data resource containing information about neuroimaging data currently stored at MNC (in excess of 4,500 brain scans) and associated clinical research data (with Research and Ethics approval granted in 2009). The researchers at MNC have been actively conducting research projects in mental health and neurosciences since 1994 and have collected clinical research data and brain imaging data in over 4,000 research participants. The MNC Research Databank aims to aggregate these data using a properly developed data model and database tools. The data model has been designed specifically to address the complex nature of neuroscientific and clinical research information.

This data resource will be used to examine pathophysiological markers across disorders using data from many more participants (e.g., hundreds or thousands) than is normally possible in a single research study. This includes work investigating schizophrenia, bipolar disorder, depression, substance abuse disorders, borderline personality disorder, obsessive-compulsive disorder, developmental disorders of adolescence, and other neuropsychiatric conditions.

In 2010, MNC received a grant from the Australian National Data Service (ANDS) to link the MNC databank to the Australian Research Data Commons: a cohesive collection of research resources from all research institutions. The aim of this initiative is to make better use of Australia’s research outputs. This will facilitate a greater number of people knowing about MNC’s research, and will provide opportunity for collaboration and further use of MNC’s data to answer broader scientific questions.

7.7 Business and Administration Platform

Responsible for the effective and efficient functioning of MNC, the Business and Administration Platform oversees financial, administration, IT and physical resources.

Jim Murray was initially appointed as Business Manager to MNC in 2005 and helped establish the business structure for the centre. Bridget Soulsby took up Jim’s role in 2008 and continued to help grow the centre. More recently, following Bridget’s promotion to a role at the university, Tony Dann was appointed in June 2011.

Thetis Sardo, Unit Secretary played a major part in supporting all aspects within Business and Administration. Thetis left us on maternity leave creating the opportunity to welcome Lisa Gallo to our team, who was subsequently appointed to the MidWest Area Mental Health Executive team; Stephanie Leota has worked with us in this capacity during 2011.

Chester Kang joined MNC in August 2008 and has played a significant role in supporting the IT needs of the centre, across all sites.

Barbara Stachlewski was awarded the 2009 Faculty of Medicine Dentistry and Health Sciences (MDHS) Excellence Award for Contribution to Equity and Staff Development.

As part of the 2009 MDHS Equity and Staff Development Forum held in November, Barbara accepted the award and delivered a speech. As part of her presentation the following phrase was highlighted: “I believe above all, our most precious assets are our people, our leaders, researchers, students and professional staff, their knowledge and experience and their ability to work together”.

Melbourne Neuropsychiatry Centre Report 2011
Current Students

Many of the students are co-supervised across the groups reflecting the close links between the streams at MNC.

1. Dr Sophie Adams (PhD) is studying neuropsychiatric and neuroimaging aspects of patients with focal epilepsy.
2. Simon Blaker (PhD) is investigating how white matter development from mid- to late-adolescence contributes to the development of substance-use problems during adolescence.
3. Anna Barrett (PhD) is investigating how early adolescent brain structure mediates the relationship between childhood maltreatment and the development of depressive symptoms during adolescence.
4. Elizabeth Bowman (PhD) is using functional MRI and goal-directed eye movement tasks to examine longitudinal changes in cortical activity in young people at ultra-high risk of psychotic illness.
5. Alice Burnett (MPsych(Clin Neuro)/PhD) is examining the psychiatric outcomes (including anxiety, mood disorder) and structural MRI brain changes in adolescents who were part of the Victorian Infant Cohort Study (VICS; infants born extremely low birth weight and preterm).
6. Felicity Butselaar (DPsych(Clin Neuro)) is investigating the role of hippocampal structure and memory function, and the role of stress and impaired HPA axis functioning (i.e. the bodies stress system), in the onset and early phase of psychosis.
7. Hui-Minn Chan (DPSYCH Neuro) is examining social cognition in frontotemporal dementia and patients with chronic schizophrenia.
8. Alison Cheetham (PhD) is investigating how early-adolescent temperament and neuroanatomy predict the onset of substance use problems in adolescence.
9. Dr Phyllis Chua (PhD) has been investigating Huntington’s disease using neuroimaging (structural, spectroscopic) and cognitive measures.
10. Rohanthe Daglas (PhD) is investigating the neuropsychological correlates of mania in youth and the effects of lithium and quetiapine on the progression of neuropsychological functioning in the early stages of mania.
11. Orwa Dandash (PhD) is examining whether measures of brain connectivity can be used to predict who will develop psychosis before the illness takes hold.
12. Marije de Graaf (MA) is investigating impulsivity and compulsive behaviours in Parkinson’s patients and the role of dopamine agonist medications and deep brain stimulation.
13. Meg Dennisson (MPsych(Clinical)/PhD) is investigating the development of subcortical neuroanatomy from early to mid adolescence and its association with positive affect, anhedonia and depression.
15. Susie Dwyer (Honours) is investigating pituitary gland development as a mediator of the relationship between environmental stress and depressive symptoms during adolescence.
16. Ian Harding (PhD) is modeling cortical connectivity using functional MRI to investigate the neurobiology underlying executive control systems in healthy individuals, and links to schizophrenia.
17. Jennifer Jackson (PhD) is investigating adolescent brain development as a mediator of the relationship between family environmental factors and the onset of depression and psychotic symptoms during adolescence.
18. Harvey Jones (DPSYCH Neuro) is examining the pervasive, social and interpersonal difficulties present in Schizotypal Disorder in childhood.
19. Alexandra Klein (Honours) is investigating amygdala development as a mediator of the relationship between environmental stress and depressive symptoms during adolescence.
20. Felicity Klopper (DPSYCH Neuro) is examining high-functioning children with Autism Spectrum Disorders (ASD) and will assess cognitive, behavioural, developmental, and medical variables. She will also explore different genetic markers relevant to this ASD subgroup.
21. Marni Kras (DPSYCH Neuro) is investigating the nature of impulse control impairments in opiate dependent individuals and their clinical implications.
22. Amy Lee (DPSYCH Neuro) is examining the importance of cognition to language. She is assessing a large group of children referred to a learning difficulties clinic at Sunshine Hospital, and will explore how cognition contributes to single word decoding and the occurrence of reading disabilities.
23. Renee Lichter (PhD) is investigating how environmental risk factors such as stressful life events, family history of psychopathology, and socioeconomic factors (SES), might moderate the relationship between temperamental and neuroanatomical risk factors, and the emergence of depression during adolescence.
24. Valentina Lorenzetii (PhD) is investigating the impact of heavy cannabis use on the brain and mental health.
25. Virginia Liu (PhD) is examining the functional relation between cognitive control and sensory-perceptual processes, in healthy control participants. She seeks to characterize how saturation of working memory functions influences mechanisms of attention and perception.
26. Margaret Nelson (Clinical PhD) is investigating the relationship between the features of schizotypy and cortical connectivity in an otherwise psychologically healthy population.
27. Karissa Searle (PhD) is examining the consequences of extremely premature birth on brain function and attention outcomes in adolescents who were part of the Victorian Infant Cohort Study (VICS; infants born extremely low birth weight and preterm).
28. Katerina Stephanou (PhD) is using functional MRI to predict treatment response in young people with major depression.
29. Nandita Vijayakumar (MPsych(Clin Neuro)/PhD) is investigating the development of prefrontal cortical thickness from early to mid adolescence and its relationship with the development of executive control and depression.
30. George Youssef (MPsych(Clin Neuro)/PhD) is investigating the role of temperament and cognitive control in risk taking behaviour and psychopathology during adolescence.
8.0 MNC OPERATIONS

8.1 Governance and Management

The Melbourne Neuropsychiatry Centre is a joint Centre of The University of Melbourne and Melbourne Health who each have an interest and expertise in the field of neuropsychiatry and have agreed to collaborate and jointly operate the Melbourne Neuropsychiatry Centre. This arrangement was officially recognised with an agreement between the two organisations.

MNC is overseen by a Management Committee that includes representatives from the NorthWestern Mental Health Programme, Melbourne Health and the Department of Psychiatry, The University of Melbourne, MNC Directors and the Business Manager.

Management Committee

Current
Prof Ian Everall, Department of Psychiatry, The University of Melbourne (since 2010)
A/Prof Alex Cockram, NorthWestern Mental Health, Melbourne Health (since 2007)
Prof Christos Pantelis, Scientific Director and Chair of Neuropsychiatry (since 2004)
Dr Dennis Velakoulis, Clinical Director (since 2004)
Mr Tony Dann (since 2011)

Past
Prof Bruce Singh (2004-2007), Department of Psychiatry, The University of Melbourne
Mr Chris Gibbs, NorthWestern Mental Health, Melbourne Health (2004-2006)
Prof John Tiller (2008-2009), Department of Psychiatry, The University of Melbourne
Mr Jim Murray (2004-2006)
Ms Bridget Soutby (2008-2010)

The Melbourne Neuropsychiatry Centre has almost tripled in size since 2006. MNC has over 80 people working at the Centre including researchers, professional staff, students, clinicians and visiting researchers. The number of MNC publications and level of research funding continues to grow and the Centre has built a large portfolio of innovative, high impact research programmes.

The Executive Group manages the day-to-day research activities and operations of MNC.

Business Group
Prof Christos Pantelis, Scientific Director and Chair of Neuropsychiatry
Dr Dennis Velakoulis, Clinical Director
Prof Murat Yücel
Mr Tony Dann

Executive Group

Current
Prof Christos Pantelis, Scientific Director and Chair of Neuropsychiatry
Dr Dennis Velakoulis, Clinical Director
Prof Murat Yücel
Mr Tony Dann

Dr Alex Forrest
Dr Benjamin Harrison
Dr Sarah Whittle
A/Prof Mark Watterlang
Dr Radonjic
Mrs Barbara Stachlewski

Research Streams

Psychosocial and Developmental Neuropsychiatry
Prof Christos Pantelis

Addiction Neuropsychiatry
Dr Mark Harrison
Dr Elesis Davy

Addiction Neuropsychiatry
Prof Mark Harrison

Systems Neuropsychiatry
Dr Alexander Fornito
Dr Andrew Zalesky

Clinical Neuropsychiatry
Dr Dennis Velakoulis

MNC Business Group
Prof Christos Pantelis, Dr Dennis Velakoulis,
Prof Mark Harrison, Tony Dann

MNC Executive
Prof Christos Pantelis, Dr Dennis Velakoulis,
Prof Mark Harrison, Dr Alessandro Mainenti,
Dr Sarah Whittle, Tony Dann

Data, Imaging & Methods Platform (DIMP)
Led by Sarah Whittle

Business & Administration Platform (BAP)
Led by Tony Dann

Locations
Sunshine Hospital & The University of Melbourne
NorthWestern Mental Health
Royal Melbourne Hospital
The University of Melbourne (Parkville)
National Neuroscience Faculty, MNC Imaging Laboratory
MNC promotes a multi-disciplinary approach to research that includes a team with expertise across various clinical and scientific disciplines. These include neuropsychiatry, engineering, neuropsychology, physics, neurosciences, computer sciences, and neuroimaging.
Our work on olfaction (the sense of smell) as a possible predictor of impending psychiatric illness in psychosis and attention deficit disorder received national attention. This work, by Prof Christos Pantelis (MNC) and A/Prof Warrick Brewer (Orygen Youth Health) and colleagues, included reports in all local as well as national TV and radio News programmes and newspapers across Australia, including the Greek language newspaper Neos Kosmos. It was also featured on the ABC Catalyst Programme. Their book on Olfaction and The Brain was published in 2008.

Our research findings in opiate addiction received a great deal of national and international media attention. Indeed, our findings with respect to the long-term harms of opiate abuse were presented on three of the four major television networks (ABC, Nine & Ten) as a part of the evening news including a live cross for ABC Midday News. Media monitors estimate that there were approximately two million viewers. Many more print and radio interviews were conducted including approximately 20 live radio interviews across Australia and New Zealand. The findings were also incorporated into the University of Melbourne’s Visions programme - a fortnightly video magazine.

In 2006, Jonica Newby won the Eureka Award for Science Journalism. One of her winning stories was on The Adolescent Brain for the ABC programme Catalyst, which included MNC researchers and our work.

Our more recent research findings include the world’s first study to show how long-term cannabis use can lead to adverse effects on the human brain and mental health – an area of significant debate and controversy. The findings had an international impact with very strong national and international media attention (including live television & radio interviews). The findings have potential implications for: (i) energising research in the area; (ii) educating adolescents, parents, researchers and clinicians about the harms of cannabis use; (iii) treatment and management of affected individuals; and, (iv) public policy development.

Prof Murat Yücel featured in the television programme “Scope” - a show for children demonstrating how science works and why it affects our world. He discussed how the adolescent brain develops and how this in turn affects adolescent thought processes, emotional experiences and behaviour.

During 2011, Prof Christos Pantelis featured in news articles in North Western Melbourne on schizophrenia and work related to the Australian Schizophrenia Research Bank (ASRB). In 2011, there was national and international media attention related to the largest genetics study yet undertaken, which identified new genes relevant to schizophrenia. This work was directly linked to the work with the ASRB.

Our work on genetic influences on brain networks, led by Dr Alex Fornito, was featured in ABC News Radio, in two separate columns in the The Age, and popular science magazines such as Cosmos and Australasian Science.

Our group, led by Prof Murat Yücel and Prof Stephen Wood, had extensive involvement working with the producers of the ABC commissioned science documentary entitled “Whatever! The Science of Teenagers” (aired August 2009) - a documentary for public education on the topic of teenage behaviour.

MNC has been successful in attracting research funding from federal, state and philanthropic organisations.

MNC has received ongoing support from, Melbourne Health, specifically the NorthWestern Mental Health programme. The University of Melbourne has provided operating support and the Foundation Chair of Neuropsychiatry in the Department of Psychiatry. The Centre also receives continuing support from the Department of Human Services, Victoria and has received support from the Howard Florey Institute.

MNC has received over $4.8M in core operating funding (since 2004), including:

- Over $1.2M from Department of Human Services, Mental Health Branch
- $250,000 from the Howard Florey Institute (2004 – 2009)
- Over $2.6M from NorthWestern Mental Health, Melbourne Health and
- Over $1.7M from The University of Melbourne.

MNC has been successful in obtaining funding for its research activities. More than $42M in principal and collaborative research funding (since 2003), including:

- More than $9.3M in direct research funding from 2003.
- A total of $9.4M in Australian Competitive Grants (ACG), with direct funding to MNC of over $6.8M since 2003
- Greater than $4.9M in Research Fellowships endowed to Post-Doctoral Fellows and Senior Staff.

MNC continues to pursue a financial sustainability strategy based on:

- Continued increases in MNC research activity and related funding income
- Continued negotiations with The University of Melbourne to secure an appropriate share of the research infrastructure funding generated by the work of MNC
- Continued improvements to business systems to maximise efficiency of research resources and refined project costing
- Forming enduring relationships with philanthropic organisations and industry partners.
$9.3 million
Amount of direct research funding from 2003.

$42 million
Funding received in principal and collaborative research funding.
MNC’s cost per publication has decreased by $39,465 since 2004.
Students
Awarded 2006
Simon Baxter, Honours
Clare Horne, Honours
Evelyn Lindsay, MClinNeuro
Natalia Nointin, AMS - MMEdSci
Sharan Randhawa, AMS - MMEdSci
Awarded 2007
Alexander Fornito, PhD
Damien Kennedy, Honours
Penny Koutroumani, DPsych
Jessica Purnama, AMS – MMedSci
Michael Takagi, PhD
Awarded 2008
Yasmin Baliz, DPsych
Antoinette Boima, AMS, MMedSci
Linda Mcleod, Honours
Margaret Nelson, Honours
John – Paul Nicolo, AMS, MMedSci
Daniel Ong, AMS, MMedSci
Michael Takagi, PhD
Awarded 2009
Reza Arpandi, AMS, MMedSci
Susan Bullock, Honours
Antoinette Boima, AMS, MMedSci
Linda Mcleod, Honours
Margaret Nelson, Honours
Nicholas Wei, AMS, MMedSci
Awarded 2010
Shalinda Kekulawala, AMS, MMEdSci
Nihong Lou, AMS, MMEdSci
Lionel Sohn, AMS, MMEdSci
Nicholas Wei, AMS, MMEdSci
Awarded 2011
Brendan Ansell, UROP
Brian Chee, AMS, MMedSci
Charles Li, UROP
Ashleigh Lin, PhD
Peter Wu, AMS, MMEdSci
Anish Modak, AMS, MMEdSci
Michael Zhong, AMS, MMEdSci
Current Students
Sophie Adams
Simon Baker
Elizabeth Bowman
Alex Bryson
Alice Burnett
Felicity Butselaar
Hui-Minh Chan
Ali Cheetham
Phyllis Chua
Rothmani Dagtas
Orwa Dandash
Marie de Graag
Meg Demnison
Dominic Dryer
Susie Dryer
Rachel Elks
Ian Harding
Jennifer Jackson
Harvey Jones
Alexandra Kline
Felicity Kopper
Mami Kras
Amy Lee
Renee Lichter
Virgina Liu
Valentina Lorenzetti
Margaret Nelson
Katarina Seere
Katarina Stephanou
Nandita Vijayakumar
George Youssouf
Past students
Seyed Assadi (*2008)
David Griffiths (*2011)
Visiting fellows & students
Paul Allen (UK)
Seyed Assadi (Iran)
Philip Bauman (Switzerland)
Gregor Berger (Switzerland)
Bill Blessing (SA)
Esther Blessing (Vic)
Enre Bora (Turkey)
Denise Chang (USA)
Kok Yoon Chee (Malaysia)
Xavier Chinis (UK)
Luca Cocchi (Switzerland)
Nick Cordato (PhD student, QBI)
Richard Coppola (US)
Benno Gollhofer (Germany)
Vladimir Gogtay (USA)
Takanori Hashimoto (Japan)
Ian Hickie (NSW)
Terrie Inder (USA)
Tom Insel (USA)
Tom Weickert (Sydney)
Hélène Wilquin (France)
Past students
Seyed Assadi (*2008)
David Griffiths (*2011)
Visiting fellows & students
Paul Allen (UK)
Seyed Assadi (Iran)
Philip Bauman (Switzerland)
Gregor Berger (Switzerland)
Bill Blessing (SA)
Esther Blessing (Vic)
Enre Bora (Turkey)
Denise Chang (USA)
Kok Yoon Chee (Malaysia)
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Tom Insel (USA)
Tom Weickert (Sydney)
Hélène Wilquin (France)

Special thanks

We thank past members, students and visiting fellows of MNC who have contributed enormously to the life and research of the centre. We send a special thanks to a few people who have been with us for a long period:

Prof. Stephen Wood came to MNC in 1998 as a young postdoctoral fellow from Cambridge. Stephen worked closely with us on the psychosis studies and established a developmental group at MNC. His enthusiasm and talent as a researcher added enormously to our centre and he nurtured many young minds in neuropsychiatric research. Stephen returned to the UK in mid-2010 to take up a Chair in Psychology at the University of Birmingham. We have established strong collaborative links with him in Birmingham and we are establishing joint research across our two universities. We wish him all the very best for his future.

Ms. Bridget Soulby joined MNC in 1988 as a work experience student from Swinburne University. She continued her work with us after this initial student placement, became our IT Manager and later was appointed as our Business Manager. She was instrumental in setting up the imaging labs at Sunshine Hospital (in 2000) and in the Alan Gilbert Building when we moved there in 2004. She left MNC in mid-2010 to take up a position as Planning Analyst with the Institutional Planning, Evaluation and Quality, Finance & Planning Group in The University of Melbourne. Bridget has had a very impressive trajectory, which reflects her talent and ability. She has been instrumental in establishing the infrastructure and analytic systems at MNC and in forging links with various other departments at the university, particularly those relevant to computational analysis of our imaging data. We wish her continued success in the future and thank her for her invaluable and dedicated input to our centre.

Dr. Marc Seal joined us in 2005 after spending a number of years at the Institute of Psychiatry in London. Marc worked closely with us on white matter imaging in schizophrenia as well as imaging work in addiction. He held a number of fellowships during his time with us. In mid-2010 he was appointed as Group Leader of the Developmental and Functional Brain Imaging, Critical Care and Neurosciences group at the Murdoch Children’s Research Institute (MCRI). We are delighted to continue working closely with Marc on a number of collaborative projects; in particular, many of our imaging studies are run through the brain scanners at MCRI. We congratulate Marc and wish him every success in his endeavours.

There are many people to thank who have left us recently, including Jim Murray (Business Manager) and Julie Doyle (accounts), and Lisa Gallo (admin assistant) who helped get MNC on its feet. We thank Katherine Manson for all her work on establishing database systems for MNC’s growing database. We also take this opportunity to thank Anthony Ang for all his work on the MNC data. Anthony will be taking up a new position at the Royal Melbourne Hospital from January 2012. We also express warm thanks to Dr. Luca Cocchi and Dr. Thomas Whitford who left during 2011 to take up positions in Queensland Brain Institute and the University of NSW, respectively.

Collaborators

National Collaborations
- Australian Nuclear Science & Technology Organisation (ANSTO) 2006 -
- Australian Schizophrenia Research Bank (ASRB): 2007 -
- Austin PEIT Centre, Vic
- Barwon Health, Vic: 2006 -
- Black Dog Institute, NSW: 2002 -
- Brain and Mind Research Institute, NSW: 2003 -
- Brain Research Institute, Vic: 2000 -
- Centre for Neural Engineering, The University of Melbourne
- Department of Medicine; Department of Radiology; Department of Psychology; Department of Computer Science and Software Engineering & Department of Optometry and Vision Sciences; Faculty of Music; Department of Economics, The University of Melbourne: 1993 -
- Department of Medicine; Department of Psychology, Monash University: 2005 -
- Department of Psychology & Department of Psychiatry, The University of Queensland: 1999 -
- Florey Neurosciences Institute: 2002 -
- School of Psychological Science, La Trobe University: 2008 -
- Mental Health Research Institute: 1992 -
- Murdoch Children’s Research Institute & Royal Children's Hospital: 1998 - current
- National Neurotissue Resource Centre: 2007 -
- Orygen Youth Health Research Centre: 1994 -
- Queensland Brain Institute
- Queensland Centre for Mental Health Research: 1999 -
- Queensland University of Technology: 2000 -
- Research Centre for Neurosciences of Ageing, Australian National University, 2007
- Royal Women’s Hospital: 2008 -
- Schizophrenia Research Institute, NSW: 2006 -
- Sunshine Hospital: 2000 -
- Orygen Youth Health Research Centre: 1994 -
- University of Newcastle: 2006 -
- University of Wollongong: 2006 -

International Collaborations
- Cambridge University, UK: 1998 -
- Clinical Neurosciences Lab, University of California, Los Angeles, USA: 2004 -
- Barcelona Biomedical Research Park, Spain: 2006 -
- Duke University, North Carolina, USA: 2007 -
- Hamburg University, Germany
- Imperial College, London, UK
- Institute of Mental Health, Singapore: 2007 -
- Institute of Psychiatry, London, UK: 1997 -
- Karolinska Institute, Stockholm, Sweden: 2007 -
- Ludwig-Maximilians University, Munich, Germany: 2008 -
- Massachusetts General Hospital / Harvard Medical School, USA: 2008 -
- Mount Sinai School of Medicine, New York, USA: 2008 -
- Tohoku Medical and Pharmaceutical University, Japan: 2006 -
- University of Athens, Greece: 2003 -
- University Hospital Basel, & Dept. Universitaire de Psychiatrie Adulte, Clinique de Cen, Switzerland: 2005 -
- University of Pittsburgh, USA: 2002 -
- University of Singapore
- Utrecht University, Netherlands: 2007 -
- Vanderbilt University, USA
- Washington University School of Medicine, St Louis, USA: 2006 -
My experience at MNC as a visiting collaborator has provided me with a unique opportunity to understand what occurs in the brain at different stages of psychosis and to advance my own skills and knowledge.
The Melbourne Neuropsychiatry Centre publishes in many high-ranking journals, with over 40% of publications during 2011 in journals with an impact factor of 5 or above.
9.1 Peer-reviewed Journal Publications

Publications 2006


Publications 2009


MNC gratefully acknowledges the following for their support:

Establishment and support of the Centre: The University of Melbourne, Department of Psychiatry, Melbourne Health, Department of Human Services, Florey Neuroscience Institutes, Neurosciences Victoria and The Department of Innovation, Industry and Regional Development.

Grant bodies: National Health & Medical Research Council (NHMRC), Australian Research Council (ARC), Brain & Behavior Research Foundation (formerly NARSAD, US), Wellcome Trust (UK), and the National Institute of Drug Abuse (US), Theodore & Vada Stanley Foundation (USA), Victoria Neurotrauma Initiative (VNI), The University of Melbourne (Early Career Researcher grants).

Other philanthropic organisations: Clive & Vera Ramaciotti Foundation, The Pratt Foundation (ASRB), Ian Potter Foundation, Australian Rotary Health Foundation, and the Essendon Daylight Masonic Lodge.

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MNC thanks the clinical staff who have helped with the research endeavour. We also send a special thanks to the patients and their families and other people that have generously given their time to undertake the research. This work would not have been possible without their support.

We thank Lee Flanagan for his support of the Centre.

MNC can provide Deductible Recipient status through The University of Melbourne. All donations made by taxpayers qualify as deductions from assessable income. All such donations are used solely for the purpose of supporting medical research in neuropsychiatry.

It is possible to specify the manner in which your donation will contribute towards the work of the Centre. Your donation can then assist in achieving specific research and clinical goals and/or developments in any field that may be important to you. MNC will be pleased to accept directions from donors arising from a will or bequest. To provide a bequest to the Centre the following wording is suggested: I ........ bequeath to the Melbourne Neuropsychiatry the sum of $........ to be applied for the purposes of supporting medical research in neuropsychiatry.
The Melbourne Neuropsychiatry Centre is a joint centre of
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The University of Melbourne
and
NorthWestern Mental Health
Melbourne Health

http://www.psychiatry.unimelb.edu.au/
centres-units/mnc/
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