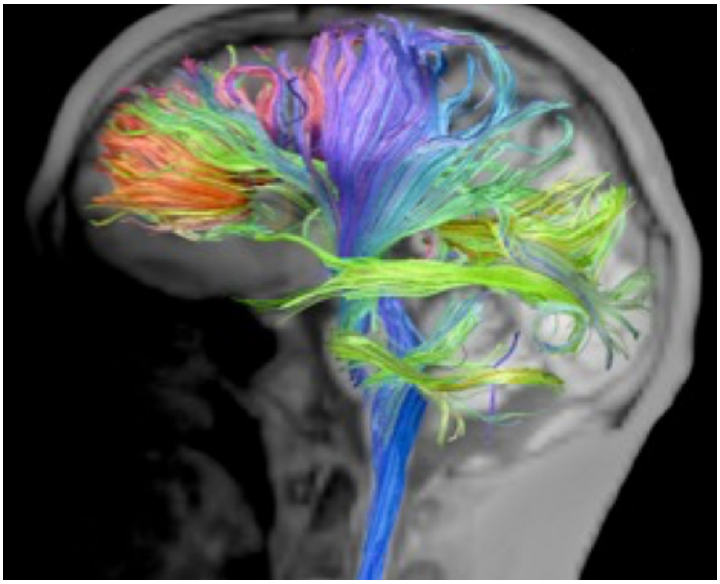
Cortical Connections 2017



Melbourne Children's

A world leader in child and adolescent health

The Royal Children's Hospital Melbourne

Murdoch Childrens Research Institute

THE UNIVERSITY OF MELBOURNE

A Symposium on Brain Development

March 5th, 2017, 0900-1700

Ella Latham Lecture Theatre

Royal Children's Hospital

Introduction

Welcome to Cortical Connections 2017! Thank you for attending.

This is the second Cortical Connections Symposium after the highly successful initial meeting held at the Queensland Brain Institute in 2015. The aim of the symposium is to bring together clinicians and scientists working in the field of early brain development to present their work and facilitate discussion regarding developing clinical and research collaborations. The program is divided in four sections: basic science, genetics, neuropsychology and neuroimaging. The speakers are all experts in their fields and come from Australia, the United States, France and Brazil, and we would like to thank those who have given up their time and traveled long distances to participate. Many of the speakers are also members of the newly formed International Research Consortium for the Corpus Callosum and Cerebral Connectivity (IRC5 –www.irc5.org).

We would like to thank Professor Kathryn North, the Director of the MCRI for her encouragement and generous support of the symposium and Dr. Leanne Mills for her tireless organisational efforts, all done with a smile. We would also like to thank the team from Australian Disorders of the Corpus Callosum (AusDoCC - www.ausdocc.org.au) for their efforts, and welcome patients, parents and caregivers who are in attendance.

We encourage audience questions and discussion, with ample time allocated at the end of each session, at the lunch and tea breaks and in the final session of the symposium. We request that audience members refrain from taking photographs of the presentations.

A/Prof Rick Leventer, A/Prof Paul Lockhart, A/Prof Simone Mandelstam, Dr George McGillivray

CC 2017 Organising Committee

Program

0900 - 0910	**Welcome and introduction**
	Prof John Christodoulou
0910 - 1045	***Basic Sciences Theme. Chair: Prof. John Christodoulou***
0910 - 0955	**Prof Linda Richards**
	Developmental mechanisms underlying dysgenesis of the corpus callosum
0955 - 1015	**A/Prof Julian Heng**
	Interpreting the genetic architecture of de novo mutations in structural brain disorders
1015 - 1035	**A/Prof Paul Lockhart**
	Dominant mutations in DCC cause isolated agenesis of the corpus callosum and/or mirror movements
1035 – 1045	**Questions and Discussion**
1045 – 1115	***Morning Tea Break***
1115 – 1225	***Genetics Theme. Chair: Dr George McGillivray***
1115 - 1135	**A/Prof Christel Depienne**
	Disorders of brain development: looking for phenotype determinants while genetic overlap is the rule
1135 - 1155	**Prof Tania Attie-Bitach**
	Elucidating the genetic basis of fetal corpus callosum anomalies by targeted or whole exome sequencing
1155 - 1215	**Prof Ingrid Scheffer**
	Overlap between the genetic epilepsies and malformations of cortical development
1215 –1225	**Questions and Discussion**
1225 - 1325	***Lunch Break***

1325 – 1435	***Neuropsychology Theme. Chair: Prof Elliott Sherr***

1325 - 1345	**Prof Warren Brown**
	Cognitive and Psychosocial Consequences of Primary Agenesis of the Corpus Callosum
1345 - 1405	**Dr Lynn Paul**
	Callosal Dysgenesis: Models for Understanding and Addressing the Behavioral Phenotype
1405 - 1425	**Prof Vicki Anderson**
	Nature or nurture: What predicts child outcomes after early brain insult?
1425 - 1435	**Questions and Discussion**

1435 – 1505	***Afternoon Tea Break***

1505 – 1615	***Neuroimaging Theme. Chair: A/Prof Simone Mandelstam***

1505 - 1525	**Prof Fernanda Tovar Moll**
	Mapping and modelling cortical connections.
1525 - 1545	**Dr Robert Smith**
	The state-of-the-art in diffusion MRI tractography and analysis
1545 - 1605	**Dr Joseph Yang**
	Clinical applications of advanced neuroimaging techniques
1605 -1615	**Questions and Discussion**

1615 – 1700	***Wrap up and general discussion***

1615 - 1635	**A/Prof Rick Leventer**
	Challenges and opportunities for the future
1635 – 1700	**Questions and Discussion**

Speakers

Professor Linda Richards

Linda J. Richards, PhD, FAA, FAHMS is a Professor of Neuroscience and Deputy Director of the Queensland Brain Institute at The University of Queensland, Brisbane, Australia. She is a Fellow of both the Australian Academy of Science and the Australian Academy of Health and Medical Sciences and is a National Health and Medical Research Council Principal Research Fellow. She is President of the Australasian Neuroscience Society and co-chair of the Australian Brain Alliance. Professor Richards is head of the brain development and disorders laboratory at QBI. Her laboratory team strives to understand how the brain forms during development and how these processes are disrupted causing human developmental brain disorders and brain cancer. Professor Richards is a leading expert on the formation of the corpus callosum and is scientific advisor and patron for AusDoCC.

A/Professor Julian Heng

Julian attained his Bachelors of Science from UWA (1993-1996) then undertook a PhD in developmental neuroscience at the University of Melbourne (1998-2002), working at the Howard Florey Institute. He next trained as a CJ Martin Fellow and then as an MRC Career Development Fellow at the National Institute for Medical Research (Mill Hill, UK) from 2004 to 2008. In 2010, Julian was appointed Group Leader at the Australian Regenerative Medicine Institute and received a NHMRC Career Development Award. He then relocated his research to the Harry Perkins Institute of Medical Research (Perth) to establish the Brain Growth and Disease Laboratory. In March 2017, Julian was appointed group leader within Curtin University's Neuroscience Laboratories with the goal to apply functional genomics to support the accurate diagnosis and treatment of brain developmental disorders and early onset neurodegeneration.

A/Professor Paul Lockhart

Associate Professor Lockhart is a molecular geneticist/cell biologist. He was awarded his PhD in 2000 after completing a CJ Martin Fellowship at the Mayo Clinic (USA), returning to Australia in 2004. He was appointed group leader of Neurogenetics Research at the MCRI in 2005 and co-Director of the Bruce Lefroy Centre in 2009. The Centre has a focus on research into genetic diseases that affect the nervous system as well as research into genetic testing, ethics in clinical genetics and study of genetic syndromes. A major focus of his research is gene discovery using powerful modern genomic technologies and functional characterisation of proteins contributing to neurodevelopmental and neurogenetic disorders such as autism, brain malformations, Parkinson's disease and ataxia. Dr Lockhart works closely with national and international clinician-scientists to leverage the outstanding clinical resources and patient material available through his location at the Melbourne Children's, with the goal of improving child health outcomes.

A/Professor Christel Depienne

Christel Depienne is Associate Professor at the University Hospital of Strasbourg, France. She received a PhD in molecular and cellular biology in 2000 and has been working on genetics of brain disorders since 2002. She has been responsible for genetic testing of neurological disorders (hereditary spastic paraplegia, epilepsy, intellectual disability) and, in parallel, has developed research projects as principal investigator focusing on the identification of genes involved in several neurodevelopmental disorders (epilepsies, intellectual disability, autism spectrum disorders, mirror movements and more recently agenesis of the corpus callosum) and establishment of genotype-phenotype correlations.

Professor Tania Attie Bitach

Tania Attié-Bitach, professor at Paris Descartes University is a human geneticist specialising in molecular genetics of congenital malformations and fetal pathology. She developed clinical and genetic research on human fetal disorders at Imagine institute, in the Necker Medical School. She has driven several projects leading to the identification of genes responsible for Meckel syndrome, related ciliopathies and other lethal disorders such as Matthew-Wood and Fowler syndromes. She has recently lead a national project (ANR Cilaxal) aiming to characterize the genetic causes of isolated and syndromic causes of corpus callosum anomalies in humans.

Professor Ingrid Scheffer

Laureate Professor Ingrid Scheffer is a physician-scientist whose work as a paediatric neurologist and epileptologist at the University of Melbourne has led the field of epilepsy genetics over more than 20 years, in collaboration with Professor Samuel Berkovic and molecular geneticists. This resulted in identification of the first epilepsy gene and many more genes subsequently. Professor Scheffer has described many novel epilepsy syndromes and refined genotype–phenotype correlation of many disorders. Her major interests are in the genetics of the epilepsies, epilepsy syndromology and classification, and translational research. She also collaborates on research focused on the genetics of speech and language disorders, autism spectrum disorders, cortical malformations and intellectual disability. She led the first major reclassification of the epilepsies in three decades, published in March 2017, for the International League Against Epilepsy Commission for Classification and Terminology. She has received many awards: 2007 American Epilepsy Society Clinical Research Recognition Award, 2009 RACP Eric Susman Prize, 2013 GSK Award for Research Excellence, ILAE Ambassador for Epilepsy Award, 2013 Australian Neuroscience Medallion, 2013 Emil Becker Prize for child neurology and the L'Oréal-UNESCO Women in Science Laureate for the Asia-Pacific region for 2012. In 2014, she was elected as a Fellow of the Australian Academy of Science and also elected as Vice-President and Foundation Fellow of the Australian Academy of Health and Medical Sciences. She was a co-recipient of the 2014 Prime Minister's Prize for Science and she was awarded the Order of Australia in 2014.

Professor Warren Brown

Warren S. Brown is Professor of Psychology and Director of the Lee Travis Research Institute at the Fuller Graduate School of Psychology. He is research neuropsychologist/neuroscientist who has coauthored over 80 peer-reviewed scientific publications. He is currently most interested in the cognitive and psychosocial impact of agenesis of the corpus callosum in older children and adults, and the impact of childhood hemispherectomy on adult cognitive and social functioning. He has also studied callosal function in dyslexia, attention deficit hyperactivity disorder, multiple sclerosis, and Alzheimer's disease. In addition, he has also done research on brain wave changes associated with aging and dementia, language comprehension, dialysis treatment for kidney disease, and attention deficits in schizophrenia. Most recently, Brown and colleagues from other institutions have been involved in research into the psychology and neuroscience of exemplars of the virtues of compassion and generosity. He is also author or editor of four books on neuroscience and philosophy/religion (Whatever Happened to the Soul, edited with Nancey Murphy and H. Newton Malony; Did My Neurons Make Me Do It? with Nancey Murphy; Neuroscience, Psychology and Religion, with Malcolm Jeeves; and Physical Nature of Christian Life with Brad Strawn).

Dr Lynne Paul

Lynn K. Paul, Ph.D. is a Senior Research Scientist at California Institute of Technology, where she is directing a research program studying brain-structure, cognition and social processing in Dysgenesis of the Corpus Callosum (DCC). Dr. Paul received a Ph.D. in Clinical Psychology from Fuller Graduate School of Psychology and completed a post-doctoral fellowship in clinical neuropsychology from the Department of Neurology, UCLA. In graduate school, Dr. Paul 's began working with Dr. Warren Brown to describe the cognitive and behavioral profile of individuals with agenesis of the corpus callosum. Currently, she is an Associate Research Professor at Fuller Graduate School of Psychology, where she continues to collaborate with Dr. Brown on research describing the AgCC profile.

In 2002, Dr. Paul collaborated with other professionals and family members to found the National Organization for Disorders of the Corpus Callosum (NODCC). The NODCC is a 501c3 not-for-profit that brings families, clinicians, and scientists together in the effort to improve quality of life for people with callosal disorders. During her tenure as NODCC president, she co-authored « ACC and Me,» a children's book about a boy with callosal agenesis.

Dr. Paul is also more broadly interested in understanding the role cortical connectivity plays in development of higher-order social cognition. In addition to research on AgCC, she collaborates with Dr. Ralph Adolphs on studies of social processing and brain structure in high functioning adults with autism spectrum disorders and individuals with congenital bilateral amygdala lesions. She is also the Director of the Psychological Assessment for Research Laboratory at Caltech and principle investigator for the Psychological Assessment Core of the NIH-funded Conte Center for Social Decision Making. Finally, Dr. Paul maintains a clinical psychology practice (L.K.Paul and Associates) in Pasadena, where she sees adult outpatient psychotherapy clients and conducts neuropsychological assessments on individuals with callosal agenesis.

Professor Vicki Anderson

Dr Anderson is Director, Clinical Sciences Research, Murdoch Childrens Research Institute, Head, Psychology, The RCH, Professorial Fellow, Paediatrics & Psychology, UoM and a NHMRC Senior Practitioner Fellow. She leads the Australian Centre for Child Neuropsychology Studies. She is a Fellow of the Academy of Social Sciences of Australia, the Aust Psychological Society and the Aust Academy of Health and Medical Sciences.

Dr Anderson has 350+ peer reviewed publications and $30M in competitive grant funding. She is an Associate Editor for Neuropsychology (APA) and the J Neuropsychology (BPS, UK). She has been a member of the NIH Common Data Elements Working groups for concussion and child TBI, the NIH National Children's Study, the Canadian Institute for Advanced Research and the International Consensus on Concussion in Sports.

Her research and clinical interests are in disorders of childhood that impact on the brain, including both developmental and acquired disorders. Her recent work has focused on translating her early career findings into clinical practice to optimise child outcomes from brain injury. Major translational achievements include: i) publication of the Test of Everyday Attention for Children, used by psychologists across the world; ii) development of easily accessed, low burden, e-health approaches to parent-focused psychosocial treatments as a means of maximising child outcomes and improving family function; iii) development of a novel, comprehensive iPad delivered assessment tool for social competence (PEERs: patent pending); iv) digital health tools for monitoring child post concussion symptoms (endorsed in a partnership with the Australian Football league); and v) authorship of the first-ever international paediatric sports concussion guidelines of the International Consensus on Sports Concussion.

Professor Fernanda Tova-Moll

Fernanda Tovar-Moll earned her MD degree from the Federal University of Rio de Janeiro (1999, UFRJ), Brazil. She completed a Medical Residency program in Radiology (2003), with an emphasis in Neuroradiology, and obtained a PhD in Morphological Sciences at UFRJ (2007). She was a postdoctoral Fellow at the National Institute of Neurological Diseases and Stroke, National Institutes of Health (USA), from 2004-2007. Dr. Tovar-Moll is currently an adjunct professor at the Institute of Biomedical Sciences and the vice-director of the National Center of Structural Biology and Bioimaging (CENABIO) at UFRJ. In addition, she also holds a position as the vice-president of the D'Or Institute for Research and Education (IDOR), a private not-for-profit research institute, which she co-founded in 2009. She is affiliated member of the Brazilian Academy of Sciences and has been working in projects related to basic, clinical and translational research in neurodegenerative and neurodevelopmental conditions. Her main research interest is to employ novel in vivo imaging techniques in human and rodents to map brain circuits in order to improve the understanding of pathophysiological mechanisms related to functional and structural brain connectivity and brain plasticity, in normal and pathological conditions. Another focus of interest is to employ neuromodulatory techniques, such as tDCS, TMS and MRI neurofeedback to induce changes in brain circuits to improve neurological function in stroke and other abnormal conditions.

Dr Robert Smith

After undergraduate degrees in Applied Physics and Electronic Engineering, Dr Smith completed his PhD under the supervision of Prof Alan Connelly at the Florey Institute of Neuroscience and Mental Health. His post-doctoral research has continued along a similar path to the methods he conceived and developed during his candidature: Mechanisms for improving the biological accuracy of diffusion MRI streamlines tractography for reconstructing white matter connections in vivo. This includes major contributions to the free and open-source MRtrix3 software package, which provides advanced tools for the analysis of diffusion MRI data.

Dr Joseph Yang

Dr. Joseph Yang has a joint appointment as honorary neurosurgery research fellow at the Royal Children's Hospital and imaging scientist at the co-located Murdoch Childrens Research Institute. He previously completed five years of clinical training as a neurosurgical education trainee. His PhD, completed in December 2015, systematically evaluated applications of both perioperative and intraoperative diffusion MRI tractography in paediatric epilepsy surgery. Together with his clinical neurosurgical background, the knowledge acquired from this PhD has helped improve both epilepsy and brain tumour surgical care at the RCH. His current research focuses on translational use of advanced diffusion MRI techniques to aid investigations of brain structural and functional network changes in different paediatric neurological and neurosurgical disease states.

A/Professor Rick Leventer

A/Prof. Richard Leventer is a consultant paediatric neurologist at the Royal Children's Hospital and Group Leader of Neuroscience Research within the Clinical Sciences theme of the Murdoch Children's Research Institute. A/Prof. Leventer was awarded his PhD on the topic of cortical malformations in 2007 which included research commenced whilst doing a Fellowship in the Brain Malformation Program at the University of Chicago. He was president of the Australia and New Zealand Child Neurology Society from 2002 - 2007. He has authored over 100 peer-reviewed publications and six book chapters.

A/Prof. Leventer is Director of the RCH/MCRI Brain Malformation Program and Clinic, which is the referral centre for children with brain malformations from Australia and New Zealand. He is responsible for a brain malformation database of over 1350 patients, which includes a repository of DNA and brain tissue samples stored within the MCRI. He is a Chief Investigator on the MCRI Accelerated Gene Identification Program within the MCRI Bruce Lefroy Centre. A/Prof. Leventer is a founding member of the Global Leukodystrophy Initiative, the International Research Consortium for the Corpus Callosum and Cerebral Connectivity and the International Cerebral Palsy Genomics Consortium. He is currently supervising three PhD students in the field of neurogenetics. A/Prof. Leventer has recently been an advisor to the World Health Organisation to help develop guidelines for the management of congenital Zika virus syndrome.