NEW Postgraduate Opportunities for 2015-2016
Queensland Cerebral Palsy and Rehabilitation Research Centre
Centre for Children’s Health Research, School of Medicine,
The University of Queensland
Website: www.som.uq.edu.au/cerebralpalsy

Our Research Team
The Queensland Cerebral Palsy and Rehabilitation Research Centre (QCPRRC) is an internationally recognised multidisciplinary research centre based at the Centre for Children’s Health Research (CCHR) and the Lady Cilento Children’s Hospital (LCCH), in the School of Medicine, Faculty of Medicine and Biomedical Sciences at The University of Queensland. The QCPRRC has an impressive funding track record of national and international grants with 12 funded National Health and Medical Research Council funded clinical trials, an Australian Research Council trial, two major program grants from Queensland Government Smart Futures Co-investment and the Merchant Charitable Foundation, and support from Foundations including the Financial Markets Foundation for Children, Research Foundation of the Cerebral Palsy Alliance, Perpetual Trustees and Cerebral Palsy International.

Since commencement in 2007 at UQ, the QCPRRC post graduate students have achieved 6 NHMRC funded scholarships, 10 APA’s and 3 UQ PhD scholarships. Our PhD students have published between 5-9 publications during their PhD and have achieved numerous international travel scholarships (to attend international conferences in the USA) and prestigious international awards (Best paper at the American and Australian Academies of Cerebral Palsy and Developmental Medicine). Ourhonours students in Medicine and Physiotherapy have consistently achieved 1st class or 2nd class honours and 1-2 publications. Our post-doctoral fellows have achieved competitive national scholarships (4 Early Career Researcher scholarships and two Career Development awards from the NHMRC).

The mission of the QCPRRC is to advance the health of infants, children with cerebral palsy and related disabilities, supporting them and their families across their lifespan. We are closely linked with clinical services provided at the Lady Cilento Children’s Hospital, providing research leadership to the state-wide Queensland Paediatric Rehabilitation Service (QPRS), and the Queensland Children’s Gait Laboratory (QCGL). The QCPRRC has close collaborations with the UQ Perinatal Research Centre at the Royal Brisbane Womens Hospital, the Neonatal team at the Mater Mothers Hospital, UQ Children’s Nutrition Research Centre, Advanced Magnetic Resonance Imaging group in CSIRO, the Centre for Online Health, The School of Human Movement Science, the School of Health and Rehabilitation Sciences (Occupational, Physiotherapy and Speech Therapy) and the Neurosciences group at Queensland Brain Institute, among other national (CP Alliance) and international collaborations (The University of Pisa, The University of Virginia).

The QCPRRC has comprehensive research themes including:
1) Early brain development and the impact of early interventions;
2) Novel therapies: including the potential of neuroprotection strategies (Stem Cells, Sulphate);
3) Advanced Brain Imaging: including brain structure and the link to outcomes & measuring neuroplasticity in response to therapy;
4) Neuro-rehabilitation including web-based rehabilitation for children (eBRAIN) and infants (Caretoy);
5) Muscle and Tendon Mechanics and the impact of interventions (intramuscular BoNT-A, Orthopaedic Surgery, Exercise);
6) Growth, Nutrition, Oropharyngeal Dysphagia , Physical Activity and Bone Health in children with CP;
7) Psychological interventions to enhance family outcomes (Parenting Acceptance & Commitment Therapy);
8) Translational research: Implementation of evidence based clinical interventions
PhD, MPhil and Honours Opportunities at QCPRRC

All PhD opportunities involve supervision from a supportive team of experts in the field and the opportunity to be part of a multidisciplinary research team. Honours, MPhil and PhD students select topics imbedded in current clinical trials and population based cohort studies. They are closely supported by senior staff and postdoctoral fellows, and have the opportunity for practical clinical data collection, clinical experience linked to the relevant studies or a program of being embedded in clinical teams in the state-wide clinical Queensland Paediatric Rehabilitation Service. All postgraduate students have the opportunity be involved in our annual training course on systematic reviews and meta-analysis (8 sessions), which will assist them in developing skills for their literature search and systematic review of the literature or the psychometric properties of measures that they will use in their research project.

Available Projects

1. Early Detection of Cerebral Palsy and Interventions to optimise neuroplasticity in infants at risk of cerebral palsy

Opportunities exist for PhD students (medical, physiotherapy, occupational therapy and psychology) to be involved in studies of early detection of cerebral palsy in infants born preterm (PREMO/PREBO study NHMRC funded) and infants born at term (NEMO: Neonatal encephalopathy motor outcomes) and very early interventions for infants at high risk of CP. These projects involve collaboration between QCPRRC, Perinatal Research Centre at UQ Centre for Clinical Research, Royal Brisbane and Women’s Hospital, the Mater Mothers Hospital, and Australian e-Health Research Centre, CSIRO. Research methods include use of General Movements Assessments (GMA) trained by our international partners at the University of Pisa; Advanced Brain Imaging to study the effects of early brain injury on motor and behavioural development. Novel very early neurorehabilitation models designed to optimise neuroplasticity are being developed ready for testing of efficacy in randomised controlled trials in (i) Infants with early asymmetric brain injury (REACH, NHMRC funded); and (ii) bilateral Cerebral Palsy with Goal directed Active Motor Training (GAME) and (iii) Parenting to enhance environmental enrichment.

Student Opportunities:

1. Rehabilitation EARly for Upper Limb therapy in Congenital Hemiplegia (REACH, NHMRC funded). (see below)
2. Early Detection of Cerebral Palsy using General Movements and biomarkers of brain development in infants at risk of cerebral palsy (Early detection of Cerebral Palsy in High risk Term Born infants NEMO Trial (Neonatal Encephalopathy Motor Outcomes).
3. Relationship between advanced brain structure and function school age children with cerebral palsy including diffusion imaging, quantitative brain structure classification, Functional Connectivity (FC) and specific motor, sensory and executive function outcomes.

Supervisory Team

Professor Roslyn Boyd
Scientific Director, QCPRRC
Email: r.boyd@uq.edu.au
Phone: 07 3069 7372
Mobile: 0434 608 443

Professor Paul Colditz
Director, Perinatal Research Centre
Email: p.colditz@uq.edu.au
Phone: 07 3346 6014

Professor Stephen Rose
Science Leader, CSIRO
Email: stephen.rose@csiro.au
Phone: 07 3253 3620

Email: r.boyd@uq.edu.au
Phone: 07 3069 7372
Mobile: 0434 608 443

Email: p.colditz@uq.edu.au
Phone: 07 3346 6014

Email: stephen.rose@csiro.au
Phone: 07 3253 3620
2. Increasing the Quality, Dose and Density of upper limb therapy provided by occupational therapists to children with unilateral cerebral palsy

Cluster randomised trial will compare the impact of a multifaceted implementation program incorporating audit/feedback, barrier identification and interactive training to a single faceted implementation strategy incorporating audit and feedback alone on the quality and dose of upper limb therapy for children with unilateral CP, provided by occupational therapists across 4 regional areas (clusters) in Queensland.

PhD Opportunities

Occupational Therapist: To examine the effect of two implementation methods on the uptake of a best evidenced based approach to upper limb therapy for children with unilateral cerebral palsy. Secondly, client outcomes will be investigated including the achievement of individualised goals and improvements in upper limb function.

Supervisory Team

Dr Leanne Sakzewski
NHMRC Early Career Fellow
Email: l.sakzewski1@uq.edu.au
Phone: 07 3069 7345
Mobile: 0417 758 565

Professor Roslyn Boyd
Scientific Director, QCPRRC
Email: r.boyd@uq.edu.au
Phone: 07 3069 7372
Mobile: 0434 608 443

Professor Jenny Ziviani
Professor of Allied Health
Email: j.ziviani@uq.edu.au
Phone: 07 3069 7411

3. Neuroimaging projects with the Australian e-Health Research Centre (CSIRO) and UQ

One exciting area of research currently underway at the QCPRRC is the use of advanced neuroimaging technology to measure brain injury and neuroplasticity in newborn babies at high risk of abnormal neurodevelopment and in children with cerebral palsy. Within the next few months there will be a new state-of-the-art Herston Imaging Research Facility (HIRF) dedicated to clinical imaging research.

PhD Opportunities

1. Integrating functional MRI (fMRI) with diffusion MRI and tractography to measure brain plasticity using advanced connectivity analyses in preterm babies and children with cerebral palsy.

2. Develop a novel, automated brain MRI classification program (iAssess CP) for cerebral palsy based on structural and connectivity MRI information.

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Professor Stephen Rose
Science Leader, CSIRO
Email: Stephen.Rose@csiro.au
Phone: 07 3253 3620

Professor Roslyn Boyd
Scientific Director, QCPRRC
Email: r.boyd@uq.edu.au
Phone: 07 3069 7372
Mobile: 0434 608 443
4. PREDICT: Prospective population based study of school aged children with cerebral palsy to PREDICT outcomes for children with CP (NHMRC Partnership study)

**CIs:** Roslyn N Boyd, Peter Davies, Jenny Ziviani, Stephen Rose; Stewart Trost, Rob Ware, Lee Barber, Koa Whittingham, Leanne Sakzewski, Kristie Bell.

The PREDICT CP study will investigate the relationship between brain structure (at 3T), body composition, bone density, dietary intake, oropharyngeal swallowing, habitual physical activity, musculoskeletal development, and muscle performance on gross motor function, cognition, executive function, communication, participation, QOL, child sleep, pain, child psychological adjustment, parental psychological adjustment and health resource use costs in a population based cohort of 245 children with CP at 8-9 years. Earlier preschool age (2-5 years) data from two longitudinal NHMRC cohorts will be combined to build prediction models of outcome to inform parents and health care providers (Disability Care, Australia).

The PREDICT offers a range of opportunities suitable for new graduates as well as experienced clinicians. Opportunities exist for candidates with a range of backgrounds including Medicine, Allied Health (physiotherapy, occupational therapy, speech pathology, nutrition and dietetics and psychology), nursing, human movement studies, exercise science and/or health economists to undertake a PhD or Honors projects.

**Physiotherapy PhD Opportunities:** (with Dr Barber, Prof Boyd, Mr Steve Obst)

1. Relationship between muscle and tendon mechanics of the lower limb muscles (3DUS), functional capacity, performance, habitual physical activity, sedentary behaviour and health outcomes in a representative population of school age children with CP.
2. Impact of Interventions (intramuscular Botulinum toxin A (BoNT-A), surgery, exercise) on these relationships.

**OT student opportunities:** (with Dr Sakzewski, Prof Boyd, Prof Jenny Ziviani)

1. Relationship between bilateral hand function, self-care and cognition in children with bilateral UL impairment and pilot an intervention to improve UL motor outcomes in Bilateral CP.

**Speech Pathologist/Dietician PhD opportunities:** (with Dr Katherine Benfer, Dr Kelly Weir, Dr Kristie Bell)

1. Feeding and swallowing problems are common in children with cerebral palsy, often adversely impacting growth and nutrition, and may cause children to require tube feeding to meet their nutrition and hydration needs. Little is known about the prevalence of feeding and swallowing problems in children with milder motor impairments or, at which severity level of oral-motor/swallowing dysfunction starts to affect a child's ability to meet their nutritional requirements orally.
2. Communication ability in relation to brain structure & function in children with CP at 8-9 years old
3. Communication skills of children with CP at 8-9 years in relation to early demographic & comorbidities
4. Oropharyngeal dysphagia in children with CP at 8-9 in relation to brain structure & other comorbidities.

**Research Opportunities PhD for students with an interest in clinical/developmental/health psychology and a desire to break new ground:** (with Dr Whittingham, Dr Adina Piovesana, Prof Ros Boyd)

1. Examining relationships between sleep, pain, psychological functioning and quality of life in this population.
2. Exploring the relationships between child outcomes and parental and family functioning.

**Targeting Pain, Sleep and Quality of Life in children with Cerebral Palsy**

Cerebral Palsy (CP) is the most common physical disability in childhood and is caused by an early brain lesion. Chronic pain, fatigue and sleeping difficulties are common (3 in 4 children with CP are in pain; 1 in 5 have a sleep disorder). Pain is linked to emotional difficulties and quality of life. Yet, pain is often unrecognised and untreated in this population and more research needs to be done. In the context of an
NHMRC-funded state-wide cohort study examining outcomes at 8-9 years (PREDICT), we still be collecting data on pain, sleep, psychological functioning, quality of life, and family functioning as well as brain structure, mobility, cognition and nutrition. Opportunities exist to scope out student research projects examining these variables. In addition, a keen PhD scholar could conduct an RCT of Acceptance and Commitment Therapy (ACT) for chronic pain with adolescents with CP, examining impact on pain, sleep, psychological symptoms and quality of life.

**Dietician, Human Movement Scientist, Physiotherapist (with Prof Stewart Trost, Dr Kristie Bell, Prof Peter Davies)**

Bone health across the spectrum of CP and relationship to functional capacity, performance, sedentary time, fatigue, patterns of Habitual Physical Activity, Vitamin D status and Growth hormone in 8-9 year old children with CP across all levels of Gross Motor Function Classification system (GMFCS)

**Health Economics in Cerebral Palsy**

Cost and Consequences of Medical and Allied Health Resource use in a population of children with CP.

**Supervised by A/Professor Jenny Whitty from the School of Pharmacy and Professor Roslyn Boyd.**

1. To examine the relationship between the costs of medical and Allied Health Resource use and outcomes (QoL, Gross Motor Capacity, Functional performance, Social and cognitive abilities of children with CP across all levels of Gross Motor Function Classification system (GMFCS), Manual Ability Classification System (MACS)). The student will work with a qualified Health Economist in the School of Pharmacy and the PREDICT team to examine these relationships in a large population cohort (n=245).

2. To examine the association between QoL and the “utility” of different health states, for both children with Cerebral Palsy and their carers, assessed using a range of different QoL instruments (CHU-9D and CPQoL-Child for children; EQ-5D-5L, CPQoL-Parent and CES for parents).

3. To explore the impact of incorporating carer QoL alongside child QoL in the economic evaluation of Cerebral Palsy interventions.

4. To investigate the impact of the National Disability Insurance Scheme (NDIS) on the health care system and families. This will involve evaluating the health-related costs to manage CP before and after the introduction of the NDIS scheme, and/or some qualitative research with families to explore their understanding, perceptions and impact of the NDIS.

Cerebral Palsy carries a high burden in terms of healthcare costs and reduced quality of life for individuals, their families and for society. Aspects of these projects will explore and measure some of the costs and consequences of living with and treating Cerebral Palsy. Projects will explore associations between increased health care expenditure and improved health outcomes, including QoL (#1). They will be developing algorithms for mapping QoL between different instruments - an important consideration when evaluating the impact of CP interventions on QoL between studies. They will extend methods for evaluating cost-effectiveness of CP interventions to consider carer and well as child QoL. Further, the Government’s National Disability Insurance Scheme (NDIS) is planned for implementation in Queensland in 2016, and will radically change the funding model for families supporting a child with CP. Understanding the patient and family perspective on this scheme as well as the scheme’s impact on their wellbeing is an important consideration.

**Supervisory Team**

**Professor Roslyn Boyd**  
Scientific Director, QCPRRC  
Email: r.boyd@uq.edu.au  
Phone: 07 3069 7372  
Mobile: 0434 608 443

**Dr Lee Barber**  
Postdoctoral Fellow, Physiotherapist  
Email: l.barber@uq.edu.au  
Phone: 07 3069 7334
5. **REACH: Randomised trial of Rehabilitation EARly in Congenital Hemiplegia (NHMRC)**

**CIs:** R Boyd, J Ziviani, L Sakzewski, I Novak, N Badawi, C Elliott, J Valentine, S Greaves, K Whittingham.

**Aims:** Efficacy of modified CIMT compared to an equal dose of traditional bimanual training (BIM) on early reaching and grasping and brain (re)organisation in 150 infants with asymmetric brain lesions (aBL) identified on neonatal ultrasound or MRI (75 per group). Both interventions will commence at 3 months C.A. with a graduated intensity of training up till 12 months (total 84 hours), delivered at home by the parent supported by a paediatric OT with Telehealth support. Opportunities exist for PhD students (OT and PT) to collaborate on the trial evaluating the relationship between vision and the longitudinal development of hand skills, treatment fidelity and the impact of the REACH intervention on mother-infant attachment.

**Supervisory Team**

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<th>Name</th>
<th>Position</th>
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<tr>
<td>Professor Roslyn Boyd</td>
<td>Scientific Director, QCPRRC</td>
<td><a href="mailto:r.boyd@uq.edu.au">r.boyd@uq.edu.au</a></td>
<td>07 3069 7372</td>
</tr>
<tr>
<td>Professor Jenny Ziviani</td>
<td>Professor of Allied Health</td>
<td><a href="mailto:j.ziviani@uq.edu.au">j.ziviani@uq.edu.au</a></td>
<td>07 3069 7411</td>
</tr>
<tr>
<td>Dr Leanne Sakzewski</td>
<td>NHMRC ECR Fellow</td>
<td><a href="mailto:l.sakzewski1@uq.edu.au">l.sakzewski1@uq.edu.au</a></td>
<td>07 3069 7345</td>
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