BRK21: BRIDGING THE GAP BETWEEN NEUROSCIENCE AND CLINICAL RESEARCH IN UNILATERAL CEREBRAL PALSY
Ellen Jaspers, PT, MSc, PhD; Katrijn Klingels, PT, MSc, PhD; Cristina Simon-Martinez, PT, MSc; Adam Kirton, MD, MSc, FRCPCH

Purpose: To bridge the gap between neuroscience and clinical research in unilateral CP and discuss the added value of understanding the reorganisation of the brain in these children, based on mirror movements and neuroimaging, and how this knowledge can contribute to treatment optimisation.

Target Audience: occupational therapists, physiotherapists, paediatric neurologists

Course Summary: Children with unilateral cerebral palsy (CP) are characterised by a large heterogeneity in upper limb function and treatment response. Due to the early nature of the brain lesion, these children present with a unique “re-wiring” of the sensorimotor system, i.e., the corticospinal tract (CST). Structural reorganisation of the CST has been proposed to play a crucial role in the clinical heterogeneity and might offer a valuable therapeutic target. However, the CST-wiring pattern is not immediately apparent from the child’s clinical presentation. During this course, we will provide a concise overview of the role of mirror movements in typically developing children and unilateral CP (Prof. Dr. K. Klingels). Next, we will discuss various ways to probe the motor system and identify the CST-wiring pattern in these children, based on transcranial magnetic stimulation, a quantitative mirror movement assessment, and different neuroimaging techniques including diffusion imaging and resting state fMRI (Dr. E. Jaspers, MSc C. Simon-Martinez). Finally, most recent work will be presented on the added value of non-invasive brain stimulation to improve upper limb function in children with unilateral CP (Prof. Dr. med. A. Kirton).

Learning Objectives:
1. Understand the role of mirror movements in typically developing children and unilateral cerebral palsy
2. Describe different ways of probing the motor system, based on behavioral, neurophysiological and neuroimaging assessments
3. Understand how the different behavioral, neurophysiological and neuroimaging assessments can be implemented in clinical practice
4. Understand the added value of non-invasive brain stimulation in upper limb rehabilitation

BRK22: CHALLENGING CLINICAL SCENARIOS WHERE RETINAL SCANNING FOR COMMUNICATION CAN BE SUCCESSFUL
Aloysia Schwabe, MD; Betsy Furler, MS, CCC-LP; Rochelle Dy, MD

Purpose: Many individuals utilize retinal scanning technology for communication, but there are challenging clinical scenarios where retinal scanning may not be considered. Individuals with dyskinetic movements, limited volitional control of eye movements and those with apraxia may be initially viewed as ineligible for this technology. With appropriate supports and training many individuals not previously considered candidates for this type of technology can demonstrate success using retinal scanning devices.

Target Audience: SLP/PT/OT and physicians, nurses and social workers.
**Course Summary:** Case presentations will illustrate different clinical scenarios where retinal scanning was proven successful. Strategies for optimizing device access and motivating the client will be reviewed as well as teaching methods to enhance mastery. Screening tools for candidacy will also be reviewed.

**Learning Objectives:**
1. Identify atypical clients who are candidates for augmentative communication devices
2. Categorize barriers to successful use of augmentative communication
3. Recognize the importance of adaptations and training to ensure success
4. Utilize resources to facilitate acquiring a device

**BRK23: DYSTONIA, SPASTICITY AND CHOREOATHETOSIS: HOW TO RECOGNIZE, DISCRIMINATE AND MEASURE THEM IN CEREBRAL PALSY?**
Elegast Monbaliu, PhD; Josse Decat, MSc; Bernard Dan, MD, PhD

**Purpose:** This instructional course overviews definitions, classification, pathophysiology and clinical presentation of dystonia (D), spasticity (S) and choreoathetosis (CA) in cerebral palsy (CP). Participants will leave the session with an up-to-date clinical picture and a practical framework for recognizing and discriminating D/S/CA. The instructional course is built up as a practical and interactive session based on the current scientific findings and illustrated with clinical cases.

**Target Audience:** medical doctors, therapists, kinesiologists, orthotics

**Course Summary:** Dystonia, spasticity and choreoathetosis predominate in spastic and dyskinetic CP but are present globally in 95% of individuals with CP. Over the last decade, consensus specific definitions, increasing insights in pathophysiology and measurements have been suggested. However, because D/S/CA are often simultaneously present in CP, clinical discrimination is often experienced as difficult and challenging. Yet, good recognition of the condition is vital for targeted medical interventions and rehabilitation in order to improve daily life activities and quality of life. In the first part, participants will be introduced to the definitions and classification of D/S/CA and pathophysiology will be overviewed based on recent neuroimaging findings. In the second part clinical discrimination and measurement of dystonia, spasticity and choreoathetosis will be overviewed. In the final part, cases of D/S/CA will be interactively discussed.

**Learning Objectives:**
1. Describe definitions and classification of Dystonia/Spasticity/Choreoathetosis
2. Understand the pathophysiology of Dystonia/Spasticity/Choreoathetosis
3. Recognize clinical characteristics of Dystonia/Spasticity/Choreoathetosis
4. Acquire a practical framework for discriminating and evaluating Dystonia/Spasticity/Choreoathetosis

**BRK24: FACILITATING PARENT PARTICIPATION IN INTENSIVE THERAPIES: THE PARENTS AS PARTNERS APPROACH**
Amy Darragh, PhD, OTR/L, FAOTA; Elizabeth Koss, MOT; Sharon Ramey, PhD; Stephanie DeLuca, PhD

**Purpose:** Describe a Parent as Partner Approach to promote parent participation in and satisfaction with therapist-recommended home programs for intensive therapies. The seminar will educate clinicians and scientists about key ingredients for a successful therapist-parent partnership and discuss strategies to integrate the practice of highly specific and complex interventions into everyday family life.
**Target Audience:** Research scientists, therapists, physicians, other clinicians

**Course Summary:** Shaping is a core component of intensive therapies such as pediatric constraint induced movement therapy. Shaping requires that therapist and parent provide a child with well-planned and deliberate opportunities for repeated practice. Practicing new skills in natural environments promotes generalization of skills and preservation of newly learned behaviors. Parent involvement in the delivery of intensive therapy, therefore, is a powerful tool to both increase repetition and enhance generalization. However, providing this type of intervention may prove challenging for busy families balancing multiple demands on their time. Parent practice is a crucial component of our current multisite clinical trial evaluating the effect of an intensive intervention on UE motor performance in infants and toddlers with hemiplegia. Participants receive in-home, intensive therapy 5 days/week for 4 weeks. Parents provide an additional 45 minutes of practice/day, 7 days/week using activity recommendations provided by their child’s therapist. All parents receive a 2 – 3 hours of in-home training prior to initiation of treatment, engage in shared goal setting, and communicate with therapists in-person and through a Parents as Partners Worksheet at least several times a week. Therapists provide individualized, daily recommendations for home-based activities using Parents as Partners Worksheets and communicate with parents about integrating these activities into everyday life. This approach has been very successful. To date, parents have provided almost 300 hours of therapy practice to 16 infants and toddlers, for an average of 47 minutes per day. Parents typically implement therapist recommendations in the context of play and mealtime activities. Practice is often organized into small blocks of time, 5 – 15 minutes, during typical family activities (e.g. mealtime, play time). Participants will learn about this process and participate in a discussion of benefits and challenges in research and clinical settings. From a scientific perspective, this approach ensures adequate practice of new skills, generalization of learning, and integration of activities into a family routine. From a clinical perspective, this approach fosters communication between therapist and parent, empowers parents in the delivery of a complex intervention, and supports a successful transition between therapy sessions and family life.

**Learning Objectives:**

1. Articulate the supports for and challenges of parent participation in home therapy programs
2. Define the essential elements of parent-therapist partnerships
3. Apply strategies for enhancing the parent-therapist partnership to their clinical practice
4. Discuss benefits and challenges of parent and/or family responsibility for implementing complex therapies outside therapy visits

**BRK25: INCORPORATING RESISTANCE TRAINING INTO EPISODIC CARE IMPROVES FUNCTION AND PARTICIPATION IN YOUTH WITH CEREBRAL PALSY**

*James Hedgecock, PT, DPT, PCS; Nicole Harris, PT, PCS, BOCO*

**Purpose:** The purpose of this presentation is to describe successful implementation and outcomes of an individualized resistance and functional skill training program in a large, pediatric hospital based setting.

**Target Audience:** This presentation is targeted for clinicians interested in successful application of evidence surrounding resistance and functional skill training for youth with cerebral palsy across a large hospital system.
Course Summary: Functional independence in youth with cerebral palsy (CP) is expected to plateau after the age of 7-8 years depending on severity. This expectation is based on standard treatment dosing of weekly therapy. Strength impairments in youth with CP have been shown to be one of the most significant factors impacting function, and the previous conventional approach does not provide appropriate stimulus to increase strength to improved functional independence. Recent evidence, however, has shown that power-based strengthening results in improved strength, function and participation.

Dr. Hedgecock and Ms. Harris will discuss a new physical therapy service delivery model which targets individualized patient goals and incorporates appropriately dosed resistance training and intensive functional skill practice into brief episodes of care. Evidence about the importance of strength for functional independence in youth with CP, the use of resistance training as an intervention in this population, and appropriate dosing using current training parameters will be reviewed. The process of implementing the new program across a large, pediatric hospital system will be discussed including clinician training, systematic use of outcome measures to monitor progress, and transitioning patients to episodic models of care. Additionally, aggregated patient outcomes of 40 participants will be presented demonstrating improvements in impairment, function and participation due to this intervention. Case studies and family testimonials will also be presented.

Learning Objectives:
1. Demonstrate understanding of the role of muscular strength in determining functional independence in youth with cerebral palsy
2. Complete a clinical assessment to select the most ideal training parameters to achieve a patient's specific functional goals
3. Design a resistance and functional skill training program using appropriate dosing and outcomes assessment to address individualized goals for youth with cerebral palsy
4. Develop a plan to initiate a resistance training program for youth with cerebral palsy at their institution

BRK26: MOTOR LEARNING IN PEDIATRIC REHABILITATION: THEORY, RESEARCH AND PRACTICE
Rachel Toovey, MPHTM, PT; Jennifer Ryan, PT; Virginia Wright, BSc(PT), MSc, PhD

Purpose: To describe motor learning (ML) theory, give an update on the evidence and current ML research in pediatric rehabilitation, and explore application of ML approaches in clinical practice.

Target Audience: Physical therapists, occupational therapists, scientists, specialists in pediatric rehabilitation

Course Summary: There is growing awareness of the potential for neuroplastic change and functional improvement through application of ML principles in therapeutic intervention. ML is the acquisition of new motor skills that can be generalized to new learning situations. Application of ML principles in a treatment session may be an important factor in goal attainment in children with neuromotor disorders such as cerebral palsy (CP). ML research is well represented in scientific fields such as exercise sciences, neuroscience, and psychology, but despite growing interest in ML theory application in rehabilitation science, the extent to which it has been studied in pediatric rehabilitation is limited.
There is potential to optimize ML content within therapeutic intervention by applying motor learning strategies (MLS) best suited to a child’s characteristics and type of intervention. MLS are observable actions of the therapist during an intervention, involving selection, manipulation, and application of motor learning variables based on child- and task-specific factors. MLS that a therapist can apply include practice, feedback, mental imagery and strategies targeting implicit and explicit learning processes. Each of these MLS is modifiable in dosage, specificity and variability. The presenters will describe ML theory and evidence for application of ML principles in pediatric rehabilitation. A case will be made for use of consistent terminology in the literature and practice. Current research projects exploring ML for children with CP will be highlighted (i.e., two-wheel bicycle skills training, robotic assisted gait training, and use of a dynamic functional electrical stimulation device). Practical application of ML, including MLS selection and reflective evaluation, will be discussed.

Learning Objectives:
1. Understand motor learning theory
2. Become up-to-date on motor learning evidence and current motor learning research in pediatric rehabilitation
3. Reflect on ways to increase the application of motor learning strategies in their own clinical practice
4. Access resources to improve their literacy in motor learning terminology

BRK27: NEUROPATHIC PAIN IN CHILDREN WITH CEREBRAL PALSY
Deepak Sharan, MD; Shyam Kishan, MD

Purpose: The diagnosis of NP is established by quantitative or qualitative sensory assessments, which is often a challenge in children with CP because of issues with communication, cooperation and cognitive functioning. This presentation will include an overview of NP including the definition, prevalence and incidence rates, causes, clinical symptoms and signs of NP in children with CP; Diagnostic criteria for NP; Difference between nociceptive pain and NP. Description of SEMLS; Listing out the possible risk factors for NP; Possible mechanisms for the progression of an acute NP to a chronic NP; A review of quantitative and qualitative assessment methods available for diagnosis of NP in children with CP; Comorbidities of NP in children with CP (depression, sleep disturbance, fatigue); Differential diagnosis; Assessment methods followed in our centre with examples and case studies; Outcome measures to monitor the progress of treatment in NP; Factors affecting prognosis of NP in children with CP, The treatment of NP in children with CP requires a protocol based, staged, systematic, intensive multidisciplinary and multimodal rehabilitation. Self or parental management strategies and home program to be followed.

Target Audience: Orthopedic surgeons, Rehabilitation physicians, Pain Physicians, Neurologists, Physiotherapists, Occupational therapists and other professionals involved in management of CP.
Course Summary: Neuropathic pain (NP) is a pain that results from direct consequence of a lesion or disease affecting the somatosensory system (International Association for the Study of Pain). NP is not well documented or researched in children. NP is a clinical diagnosis that can be difficult, especially in younger children and non-communicative children with CP. Nevertheless, it is important to recognise NP, as pain mechanisms and consequently management and prognosis differ from other types of chronic pain. Recent studies indicate that the incidence of NP in children with CP is on the rise, especially in non-ambulatory children with severe CP (GMFCS levels IV and V) and after musculoskeletal surgical approaches. NP affects the child’s ability to function physically (e.g., weight bearing) and mentally and hence reduction in their performance or activity level. This has severe implications in the rehabilitation phase post Single Event Multi Level Surgery (SEMLS). Høiness PR, et al (2014) reported 5 children with CP, who developed Complex Regional Pain Syndrome after osteotomies of ankle and feet. In spite of highly specialized multidisciplinary care, all had poor functional outcomes 5 years after surgery. Lauder GR and White MC (2005), reported NP in 6 of 40 children with CP who underwent SEMLS. Five children improved in pain and functioning with physiotherapy. The authors recommended that the possibility of NP should be included in informed consent for SEMLS and NP should be considered as a differential diagnosis when managing postoperative pain in children with CP. Sharan D (2016), the presenter of this workshop, reported that 16% of 500 children with CP post SEMLS developed NP. This course is aimed at presenting an overview of NP in children with CP and would cover the causes, assessment and diagnostic methods, and prevention and management strategies of NP.

Learning Objectives:
1. Understand the causes and predisposing factors for neuropathic pain in children with cerebral palsy
2. Learn the diagnostic features of neuropathic pain in children with cerebral palsy
3. Know the preventive measures for neuropathic pain in children with cerebral palsy and the factors affecting the prognosis
4. Appreciate the role of a multidisciplinary team and the management strategies for neuropathic pain in children with cerebral palsy

BRK28: STEP INTO THEIR SHOES: BURNOUT WITHIN FAMILIES CARING FOR CHILDREN WITH SPECIAL NEEDS
Mackenzie Brown, DO; Sarah Evans, MD; Morozova Olga, MD

Purpose: To bring awareness to the dilemma of burnout within families caring for the pediatric complex care population. To identify the features of burnout and the impact it has on the family unit. To educate on addressing burnout and supporting healthy family functioning in the busy clinic setting.

Target Audience: Clinicians, Therapists, Educators, Social Workers, Psychologists

Course Summary: Caring for a medically complex child can be physically, emotionally, economically and spiritually demanding. Our medical system is becoming increasingly cumbersome and difficult to navigate. The challenge of living with a functional impairment is shared among the patient, the caregivers and family unit. This course will explore the impact that disability has on the family experience. The speakers will identify the risk that caregiver burnout places on the families caring for children with special needs. The discussion will cover what tools are currently available to evaluate for burnout. The speakers will additionally explore what practices health professionals can implement to support healthy family functioning when caring for children with special needs.
Learning Objectives:
1. Identify and describe the features of burnout within the family unit of children with special needs
2. Recognize the importance of burnout prevention to protect both the child and the family from associated risks
3. Describe currently available tools to screen, intervene and provide support to the families caring for children with special needs
4. Understand what can be done in the future to improve support for families caring for children with special needs in the clinical setting

BRK29: TACTILE INTERVENTION FOR CHILDREN WITH CEREBRAL PALSY: A FRAMEWORK TO GUIDE CLINICAL REASONING AND FUTURE RESEARCH
Megan Auld, PhD, BPhty (Hons I); Leanne Johnston, PhD, BPhty(Hons I)

Purpose: This course aims to review what is currently known about tactile intervention in children with cerebral palsy and provide therapists with a framework to guide both clinical reasoning and future research into tactile interventions.

Target Audience: Occupational therapists and physiotherapists working with children with cerebral palsy.

Course Summary: Many children with cerebral palsy are known to experience tactile impairments, however research evaluating specific interventions to manage this is minimal. This course seeks to consolidate current literature and provide a framework to help clinicians and researchers think strategically about tactile treatment selection and future research planning. The framework is described via a novel analogy - ‘The Apartment Block Theory’. The theory describes the relative effectiveness of three intervention strategies aimed at overcoming a poorly responsive tactile system: 1) Pressing the buzzer – providing repeated passive tactile stimulation at the periphery; 2) Sneaking in the door – providing active tactile-enhanced motor training that capitalises on the opportunity to provide high-dose tactile input during motor interventions; and 3) Connecting another way – providing visually enhanced touch strategies with the aim of enhancing tactile function, which can be compared to phoning the apartment as an alternative to using the buzzer. Using this theory, the course will then discuss which sub-groups of children with CP may benefit from each intervention strategy when considering their capabilities in visual, motor and attention domains. This course aims to assist clinicians to provide effective interventions and researchers to make informed future research decisions to optimise tactile function for children with cerebral palsy.

Learning Objectives:
1. Describe a simple framework for treating tactile deficits (Apartment Block Theory) based on thorough assessment
2. Share ideas for tactile treatment based on current literature and practice
3. Work through a series of cases and develop appropriate treatment plans for tactile impairment according to evidence-based frameworks for assessment and treatment
4. Utilise a toolbox of systematic tactile treatment ideas based on discussion of the framework and current literature
Purpose: To identify key issues in the transition experience of young adults with cerebral palsy through the use of videotaped interviews of actual young adult patients.

Target Audience: Healthcare Providers MD, NP, RN, etc

Course Summary: The transition from pediatric to adult care can be a challenging time for young adults with cerebral palsy. After graduating high school, many young peoples experience numerous obstacles including increasing workload, social adjustment, and integration into the work force. Studies have shown that these issues can be especially anxiety-provoking for young people with physical disabilities. In this course, the audience will hear from young adults with cerebral palsy firsthand (via videotaped interview) in the midst of this transition period. The audience will learn how these patients have navigated the various systems, of which they are now a part. Drs. Nimec and West will discuss with participants the issues and problems facing young adults and providers in the transition from pediatric to adult care and strategies for how to address them.

Learning Objectives:
1. Identify the challenges from transitioning from high school to college-level work and acquiring academic accommodations
2. Identify beneficial opportunities to optimize success for integration into the workforce, school, and social groups
3. Identify the benefits of work and volunteering for young adults with cerebral palsy
4. Understand what young adults with cerebral palsy value when discussing and planning transition of care