PROGRAM

ANRES 2021: 10th Aalborg Symposium on the Advances in Neurophysiology and Neural Rehabilitation Engineering of Movement – Aalborg University

Physical location: *Niels Jernes Vej 14, Room 4-111, 9220 Aalborg Ø, Denmark*

Friday 8 October 2021

8:50 – 9:00   **Welcome**
Associate Professors Erika G. Spaich & Andrew J. T. Stevenson, Department of Health Science and Technology Aalborg University, Denmark

THEME: BIOMARKERS IN STROKE

9:00 – 10:00   **Biomarkers to predict motor recovery and outcomes after stroke**
Professor Cathy Stinear, Faculty of Medical and Health Sciences, University of Auckland, New Zealand – *virtual*

10.00 – 10.30   **Prediction of upper limb function after stroke**
Camilla B. Lundquist, Ph.D., Hammel Neurocenter, Denmark

10:30 – 11:00   **Coffee Break**

THEME: BIOFEEDBACK IN STROKE

11:00 – 12:00   **The role of music and music technology in the rehabilitation of hemiparetic upper limb following stroke**
Dr. Alex Street, Music for Health Research Centre and Music and Performing Arts, Anglia Ruskin University – *virtual*

12:00 – 12:15   **The challenge of quantifying movement quality in rhythmic music performance**
Associate Professor Sofia Dahl, Department of Architecture, Design and Media Technology, Aalborg University Copenhagen, Denmark – *virtual*

12:15 – 12:30   **Exploiting tactile stimulation for biofeedback**
Jakob Lund Dideriksen, Department of Health Science and Technology, Aalborg University.

12:30 – 13:30   **Lunch Break**

THEME: FUNCTIONAL ELECTRICAL STIMULATION (FES) IN STROKE

13:30 – 13:45   **Brain Computer Interface training combined with functional electrical stimulation for patients with severe upper limb paresis after stroke**
Iris Brunner, PhD, University of Aarhus, Hammel Neurocenter, Denmark

13:45 – 14:00   **FES-evoked and BCI-controlled nociceptive withdrawal reflex for gait training: principles and feasibility**
Associate Professor Erika G. Spaich, Department of Health Science and Technology, Aalborg University, Denmark

14:00 – 15:00   **Neuroplasticity: Twenty-five years of empirical research and guesstimations that led to several clinically valuable discoveries**
Professor Milos Popovic, Institute of Biomedical Engineering, University of Toronto, Director of KITE Research Institute at the Toronto Rehabilitation Institute - University Health Network, Canada – *virtual*

15:00 – 16:00   Ph.D. Student Poster Presentations
                      (Including coffee and cake)

Keynote Speaker Abstracts

Biomarkers to predict motor recovery and outcomes after stroke
Professor Cathy Stinear, Faculty of Medical and Health Sciences, University of Auckland, New Zealand

Motor impairment is common after stroke, and recovery of movement is important for regaining independence in daily activities. Motor recovery and outcomes can be difficult to predict for individual patients, and variability in response to treatment can hamper trials of new interventions. There is a growing evidence base for neurophysiological and neuroimaging biomarkers that can be used in both clinical practice and research. TMS and MRI biomarkers can provide simple and accurate measures of motor system function and structure. This talk will outline what makes a good biomarker, and how TMS and MRI can be applied in both practice and research to improve outcomes for people with stroke.

The role of music and music technology in the rehabilitation of hemiparetic upper limb following stroke
Dr. Alex Street, Music for Health Research Centre and Music and Performing Arts, Anglia Ruskin University

Upper limb (UL) rehabilitation for stroke hemiparesis is under-delivered and there is a need to increase treatment dosage. More motivating, task specific interventions facilitating high repetition of target movements are needed, that could be delivered by clinicians, used independently by patients, and that might more rapidly exploit neuroplasticity to improve UL function. Access to such treatment would inevitably reduce treatment costs too.
An increasing number of studies have demonstrated the neural mechanisms and functional improvement in UL from playing musical instruments, facilitating the required level of motivation and repetition to promote neuroplastic change in a unique way due to the auditory and tactile feedback and temporal frameworks of music that support the priming and timing of movements.
iPads have been used with commercially available music software in a pilot home-based music therapy feasibility study and on an acute stroke ward, delivered by a neurologic music therapist and by rehabilitation assistants. Current research will be presented in order to demonstrate the use of existing and developing technology to facilitate clinician delivered and self-administered UL exercises using music.

Neuroplasticity: Twenty-five years of empirical research and guesstimations that led to several clinically valuable discoveries
Professor Milos Popovic, Institute of Biomedical Engineering, University of Toronto, Director of KITE Research Institute at the Toronto Rehabilitation Institute - University Health Network, Canada

In this lecture, I will present a journey my trainees, colleagues and I took to create several clinically relevant therapies in the last twenty-five years. First, I will talk about FES therapy and how it can be used to restore motor functions. Then I will present how brain-machine interfaces can be used to augment the FES therapies. Following that, I will present how electrical fields can be used to increase the production of stem cells and how these electrical fields can direct the movement of the stem cells. Finally, I will present how facial stimulation can be used to treat depression. Except for stem cell therapy, all other interventions have been tested and demonstrated in patients, and some of them are already commercially viable products.