

## **Trevor A. Dyson-Hudson, M.D.**

Neuromusculoskeletal disorders have become the major cause of severe, long-term pain and disability throughout the world and have a substantial impact on health, community participation, and quality of life, as well as an enormous cost on healthcare systems. The last decade has seen remarkable advancements in biomechanics and movement sciences research that allow us to better understand the effect of these disorders on human movement. The last decade has also seen endorsement of the World Health Organization International Classification of Functioning, Disability, and Health (ICF) as the international standard to describe and measure health and disability. The ICF has put the notions of 'health- and 'disability' in a new light, seeing disability not only as a 'medical' or 'bio logical' dysfunction, but also as a condition that effects "activity" and '-participation". The field of Biomechanics is well poised to advance research in neuromuscular disorders that is trans-domain and translation, integrating the domains of cells and tissues, joints and limbs, and whole body movements with the higher-order ICF domains of body function and structure and activity and participation in order to understand and treat neuromusculoskeletal disorders.

### **RECOMMENDATION 1: Improve knowledge in biomechanics of mobility compensation.**

In order to devise effective interventions and to understand the long-term implications of these interventions on activity and participation, there needs to be a better understanding of the effects of mobility compensation in neuromuscular disorders, such as mobility aids (e.g. wheelchairs, orthotic and electrophysiological devices) and pharmacologic agents on human movement (e.g. joint and limb and whole body movements).

### **RECOMMENDATION 2: Improve knowledge in biomechanics of mobility recovery.**

In order to devise effective treatment "cures" of neuromusculoskeletal disorders and to understand the long-term implications of these interventions on activity and participation, there needs to be a better understanding of the effects of curative-type interventions for neuromuscular disorders on human movement (e.g. joint and limb and whole body movements).

### **RECOMMENDATION 3: Identify and/or establish outcomes and assessment tools that can be used in the clinic and community that are practical and meaningful.**

Historically, biomechanics research has advanced our knowledge of human movement through the use of tools and techniques that are either unavailable or are not practical for use in a clinic or community setting. Such tools include motion capture systems, ergometers, dynamometers, treadmills, custom force and moment sensing devices, and electromyography collection devices. Additionally, these tools generate data that require time-intensive processing to produce results. Consequently, clinicians have been unable to use research protocols, tools, or findings to evaluate their clients with neuromuscular disorders.

**In summary,** I believe the fields of biomechanics and movement sciences research are well poised to enhance the understanding and treatment of neuromusculoskeletal disorders through the context of the ICF model. A Conference such as this provides an opportunity to translate what is seen clinically at the "bedside" to the "laboratory" for evaluation and solutions back to the "bedside" in the form of treatments.