

A new measure of spasticity and disordered muscle function in the context of motor control theory

Friday, April 14, 2023 at 17:00 h

Summary of the Lecture

The measurement of spasticity is an important clinical problem. Spasticity often occurs after neurological lesions, such as those occurring due to stroke resulting in hemiparesis. Neurological motor impairments are characterized by deficits in agonist-antagonist muscle activation in specific joints that may be explained by the inability of the damaged nervous system to regulate Tonic Stretch Reflex Thresholds (TSRTs) throughout the entire biomechanical ranges of muscles acting around a joint. In the upper limb, limitations in the regulation of TSRTs result in the subdivision of all-possible elbow or shoulder-elbow arm configurations into different spatial zones in which spasticity or weakness occur. They also describe the joint ranges in which intentional movements can be produced by the typical pattern of reciprocal activation of agonist and antagonist muscles, or only by the abnormal pattern of agonist-antagonist coactivation of antagonist muscles. Deficits in TSRT regulation also have implications for motor learning and recovery after neurological injury or disease. Remediation of these deficits is essential for the effective rehabilitation of upper limb movement. The TSRT is a biomarker of the angular location at which muscles are unable to relax and is a complementary measure of spasticity. The TSRT measure discriminates between different types of hypertonic disorders such as spasticity and rigidity. Deficits in TSRT regulation in specific joints may also be related to limitations in the ability of the CNS to find multiple adaptive solutions for tasks involving multiple degrees of freedom. This new method of determining the location of the TSRT in the angular range of the joint may provide additional information about spasticity to that obtained by muscle resistance measures commonly used in rehabilitation.

This lecture is framed under the Stroke-Poc project (ERA-NET Neuron call, funded by ISCIII (AES2022-PRTR) and FRO5).

Speaker:

Mindy F. Levin, PT, PhD

Affiliation and CV:

Mindy Levin is a Physical Therapist, Researcher and Professor in the School of Physical and Occupational Therapy (SPOT), Faculty of Medicine and Health Sciences at McGill University in Montreal, Canada. She was Research Scholar of the Quebec Health Research Fund (1992-2004) and held a Tier 1 Canada Research Chair in Motor Recovery and Rehabilitation (2005-2019). She is currently a Distinguished James McGill Professor. She has over 200 peer-reviewed publications. Her research focuses on elucidating the mechanisms underlying sensorimotor deficits and their recovery in patients with central nervous system lesions. She has a strong background in motor control theory and the translation of motor control and motor learning principles into clinical rehabilitation applications to improve the lives of people with neurological lesions. Amongst her research methodologies are new technologies such as virtual reality and robotics.

Organizers:

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Spasticity Disordered Motor Control

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Spasticity Disordered Motor Control:

Spasticity, Disordered Motor Control Robert G. Feldman, Robert R. Young, Werner Paul Koella, 1980 **Spasticity**
Feldman, 1980-08-01 *Functional Electrical Stimulation* Alojz R. Kralj, Tadej Bajd, 1989-01-31 This reference text covers the fundamental knowledge and principles of functional electrical stimulation FES as applied to the spinal cord injured SCI patient The principles of FES application and basic biomechanical issues related to FES in SCI are stressed The fundamentals regarding patient selection criteria indication contraindications and descriptions of procedures are clearly presented Also included are the fundamentals and rationale of gait restoration with patient selection control strategies and the synthesis of gait sequences with trends in the field Each chapter contains numerous references to the FES literature for the reader to easily evaluate and extend his knowledge in the area of interest Biomedical and rehabilitation engineering professionals and researchers for medical doctors physical therapists and orthotists will find this publication invaluable

Brain Injury Medicine Nathan D. Zasler, Douglas I. Katz, Ross Zafonte, DO, 2007 Covers the full continuum from early diagnosis and evaluation through rehabilitation post acute care and community re entry Includes assessment and treatment epidemiology pathophysiology neuroanatomy neuroimaging the neuroscientific basis for rehabilitation ethical and medicolegal issues life care planning and more **A Physiological Approach to Clinical Neurology** James W. Lance, James G. McLeod, 2013-10-22 A Physiological Approach to Clinical Neurology Third Edition is a 13 chapter book that first describes pain and other sensations weakness neuromuscular disorders spinal reflexes as well as muscle tone and movement This text also explores the disordered muscle tone a term used to describe the sensation of resistance felt by the clinician as he manipulates a joint through a range of movement with the subject attempting to relax Other chapters discuss the basal ganglia and their disorders and the cerebellum and its disorders The anatomy and physiology of the special senses cranial nerves and autonomic nervous system are also explained The last three chapters elucidate consciousness unconsciousness epilepsy and the relationship between brain and mind This book will be useful to those in the field of clinical neurology **Experimental Techniques in Human Neuropsychology** H. Julia Hannay, 1986 This unique sourcebook describes the research methods used to study human brain function and brain behavior relationships These range from relatively simple approaches such as dichotic listening and tachistoscopic presentation to computerized techniques such as cerebral blood flow measurements The description of each method covers the underlying theory variations on the basic paradigm dependent measures reliability and validity and the equipment required The authors also critically review research with normal and clinical populations Because of the rapid expansion of the field of human neuropsychology and accompanying technological advances this volume will be valued as much by experienced researchers as by newcomers seeking an introduction to the variety of available procedures Motor Disorders David S. Younger, 2021-12-22 The fourth edition of Motor Disorders reinforces the reputation gained by earlier editions The book gives a detailed and practical

account of motor disorders that will appeal to specialists as well as to general physicians and trainees while providing a convenient but thorough summary of advances in the field The book brings together the entire spectrum of motor disorders and thereby aids in the evaluation diagnosis and distinction of these various disorders Through the perspectives of many subspecialties this book provides accounts of all disorders with motor manifestations providing a truly comprehensive but concise account of the subject matter

Spasticity Allison Brashear, Elie Elovic, Elie P. Elovic, 2010-08-31 A Doody's Core Title 2012 Spasticity Diagnosis and Management is the first book solely dedicated to the diagnosis and treatment of spasticity This pioneering work defines spasticity in the broad context of Upper Motor Neuron Syndrome and focuses not on a single component but on the entire constellation of conditions that make up the UMNS and often lead to disability Spasticity Diagnosis and Management clearly defines the process for the diagnosis of spasticity the basic science behind its pathophysiology the measurement tools used for evaluation and reviews the available treatment options Divided into five sections this comprehensive clinical resource provides a roadmap for assessing the complicated picture of spasticity and choosing the appropriate interventions Therapies including oral medications intrathecal baclofen botulinum toxin and phenol and surgical options are thoroughly discussed as are non medical therapies and the role of the emerging technologies The full spectrum of diseases involving spasticity in adults and children and the unique diagnostic and management challenges they present is addressed by experienced clinicians This text is a one stop source for physicians therapists and other members of the spasticity management team tasked with the goal of improving patient care and outcomes Special Features of Spasticity Diagnosis and Management include In depth coverage of diagnoses interventions and outcomes across multiple pathologies Tools and clinical measurements for patient assessment Treatment focused chapters outlining current medical and other therapeutic options Illustrated review of limb anatomy Hands on guidance to chemodenervation techniques with botulinum toxin and phenol and ITB management Disease based chapters devoted to the full range of clinical conditions involving spasticity in adults and children Multidisciplinary perspective supporting a team approach to care

Neurological Disorders Thomas Brandt, 2003-01-03 This single volume reference covers the natural course treatment and management of all neurological diseases affecting the brain spinal cord nerves and muscles This comprehensive text reference seeks to assist physicians with treatment by providing an easy to use compendium covering the treatment and management of all neurological diseases along with details on the natural course of these diseases Organized for ease of use and quick reference each chapter presents a neurological disorder or key symptoms and systematically discusses the clinical syndrome and differential diagnosis natural course principles of therapy and practical management of each Covers wide range of neurological conditions and potential treatments including the evidence for and against each treatment Describes the spontaneous course of neurological diseases along with discussion of the management of different stages and variants of a disorder Presents special situations and exceptional cases in which alternative therapies should be considered *Physical*

Therapy and the Stroke Patient Susan S Rose, Eleanor F Branch, 2014-09-19 Experts address the symptoms diagnosis and treatment alternatives available in the care of stroke patients They discuss the various challenges occurred in the management of stroke patients who are commonly encountered in hospitals nursing homes and rehabilitation settings

Upper Motor Neuron Functions and Dysfunctions John Carew Eccles, 1985 *The Practical Management of Spasticity in Children and Adults* Mel B. Glenn, John Whyte, 1990 Casting Protocols for the Upper and Lower Extremities

Paula Goga-Eppenstein, 1999 Practitioners at the Institute draw on their own experience and that of others to offer a guide for rehabilitation professionals primarily occupational and physical therapists to using casts to manage upper and lower extremity contractures and hypertonicity They describe new types of casts refin **Electromyography in CNS Disorders** Bhagwan T. Shahani, 1984 *Electromyography in CNS Disorders* **The Origin and Treatment of Spasticity** R.

Benecke, Murat Emre, Robert A. Davidoff, 1990 **Parenteral Drug Therapy in Spasticity and Parkinson's Disease** J. P. W. F. Lakke, E. M. Delhaas, A. W. F. Rutgers, 1992 The proceedings of the 8th Meeting of the European Association of Neuropharmacology held in Groningen the Netherlands in September 1990 present a concise survey of the problems of parenteral drug delivery for the central nervous system from technical pharmaceutical and pharmacological and clinical points of view Annotation c by Book News Inc Portland Or Motor Disturbances I International Medical Society of Motor Disturbances. Congress, 1987 **Critical Reviews in Physical and Rehabilitation Medicine**, 1989 **Stroke**

Rehabilitation Glen Gillen, Ann Burkhardt, 2004 This 2nd edition remains the only comprehensive evidence based text on the Occupational Therapy management of the stroke patient The book is based on the most up to date research on stroke rehabilitation and presents its content in a holistic fashion combining aspects of background medical information samples of functionally based evaluations and treatment techniques and interventions There are chapters on specific functional aspects of living after stroke such as driving sexuality mobility and gait and self care Instructor resources are available please contact your Elsevier sales representative for details Case studies are featured in every chapter to help the reader understand how concepts apply to the real world 2 chapters that feature the true stories of stroke victims presenting occupational therapy situations from the point of view of the patient Key terms chapter objectives and review questions help students better understand and remember important information 7 new chapters make this text more comprehensive than ever Psychological Aspects of Stroke Rehabilitation Improving Participation and Quality of Life Through Occupation The Task Oriented Approach to Stroke Rehabilitation Approaches to Motor Control Dysfunction An Evidence Based Review Vestibular Rehabilitation and Stroke How Therapists Think Exploring Clinician s Reasoning When Working With Clients Who Have Cognitive and Perceptual Problems Following Stroke A Survivor s Perspective II Stroke Reflects the current terminology and categorization used by the WHO and the new AOTA Practice Framework so students will be equipped with the latest standards when they enter the workforce Updated medication chart presents the latest drugs used in stroke rehabilitation

Unveiling the Magic of Words: A Review of "**Spasticity Disordered Motor Control**"

In some sort of defined by information and interconnectivity, the enchanting power of words has acquired unparalleled significance. Their ability to kindle emotions, provoke contemplation, and ignite transformative change is really awe-inspiring. Enter the realm of "**Spasticity Disordered Motor Control**," a mesmerizing literary masterpiece penned with a distinguished author, guiding readers on a profound journey to unravel the secrets and potential hidden within every word. In this critique, we shall delve in to the book is central themes, examine its distinctive writing style, and assess its profound impact on the souls of its readers.

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Spasticity Disordered Motor Control Introduction

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