



Neuromechanics of Human Movement - 4th Edition

By Roger Enoka

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Drawing on the disciplines of neurophysiology and physics, *Neuromechanics of Human Movement, Fourth Edition*, explores how the nervous system controls the actions of muscles to produce human motion in relation to biomechanical principles. This contemporary approach is much different from the traditional approach, which focuses solely on mechanics and does not consider the role of the sensory system in the control of human movement.

Neuromechanics of Human Movement, Fourth Edition, provides a scientific foundation to the study of human movement, and as such it uses precise terms and definitions when discussing ideas and utilizing the international metric system (SI). Readers will find an appendix that helps in identifying the SI metric units as well as other learning tools, including a glossary of terms and two other appendixes that cover conversion factors and equations. Throughout the text, the content is visually reinforced with more than 750 illustrations, many of which are new or upgraded from the previous edition and include specific illustrations of the neuromechanics involved in sport and rehabilitation movements. Finally, the text contains more than 1,500 updated references and suggested reading lists for each chapter.

To further enhance this fourth edition, significant content updates have been made to ensure the latest information is presented for both research and clinical environments:

- New coverage regarding electromyography (EMG) that demonstrates the connection between the nervous system and the muscle by measuring the activation signal, allowing readers to better understand how motion is activated
- Additional examples that underscore recent research developments in reaching and grasping activities for rehabilitation
- In-depth coverage of the motor system that addresses excitable membranes, muscle and motor units, and voluntary movement

-Expanded discussion of neuromuscular system adaptations to the aging process

-Neuromuscular system adaptations with particular application to rehabilitation

To encourage a comprehensive learning experience, this updated edition follows a logical progression where each part builds on the material from the previous section. It begins with an introduction to the biomechanical terms and concepts commonly used to describe movement, focusing on the relation between force and motion. Once readers have grasped the basic laws of motion, the text continues by considering the essential neurophysiological concepts that help to explain movement produced by the nervous system and muscle. The author uses a “bottom-up” approach for this explanation that begins with the principles of electricity and extends up to connections within the cerebral cortex. This approach encompasses the essentials of electricity responsible for the excitability of cell membranes and explains the relations between spinal neurons and muscle fibers.

The third and final part of the text concludes by describing the ways in which the motor system adapts to various types of physical stress. These adaptive capabilities include altering core temperature, phenomena such as strength and power training, adaptations that occur after periods of reduced activity, motor recovery from injury; and changes that occur with aging. Readers will understand how acute adjustments can be made to the motor system through interventions such as warm-up, flexibility, muscle soreness, and muscle fatigue.

The fourth edition of *Neuromechanics of Human Movement* provides a scientific basis for the study of human movement while continuing to expand current knowledge in the fields of biomechanics and neurophysiology. By integrating these fields in a unique framework, this text offers professionals and students both valuable clinical information and inspiration to deepen their study of human movement.

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Roger M. Enoka, PhD, is a professor and chair in the department of integrative physiology at the University of Colorado at Boulder. He is also a professor in the Health Sciences Center, department of medicine, geriatrics, at the University of Colorado. Previously, Enoka was a biomechanist in the department of biomedical engineering at the Cleveland Clinic Foundation and a professor in the department of physiology at the University of Arizona.

For more than 30 years, Enoka has focused his research and teaching on the combination of biomechanics and neurophysiology of movement. He conducts an interdisciplinary research program, which has received continuous funding by the National Institutes of Health for almost two decades. Internationally known for his achievements as a teacher and researcher, Enoka is the author of about 350 journal articles, books, chapters, reviews, and abstracts related to his research. He is also a reviewer for numerous journals and serves on the editorial board for the *Journal of Applied Physiology*, *Journal of Electromyography and Kinesiology*, *Motor Control*, *Sports Medicine*, *Muscle and Nerve*, and the *Scandinavian Journal of Medicine and Science in Sports*.

Enoka's professional affiliations include the American College of Sports Medicine, the American Physiological Society, International Society of Biomechanics, and the Society for Neuroscience. He is a former member of the Advisory Panel on Research for the American Physical Therapy Association and the Respiratory and Applied Physiology Study Section of the National Institutes of Health. Enoka is also a past president and current member of the American Society of Biomechanics.

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