FROM THE EDITOR

Advances in Surface Electromyography

Editor in Chief: Donald Moss, PhD, BCB, BCN
Guest Editor: Randy Neblett, MA, LPC, BCB

The cover of this issue shows an example of a straight leg raise exercise for strengthening knee muscles, accompanied by a raw surface electromyographic (EMG) signal (from a J&J I-330-C2+ biofeedback system). Thank you to Pam Neblett for modeling and to Nancy Medlin for photography and image production.

Observant readers will notice the initials BCB, BCN, and/or BCB-PMD behind the names of many of the authors and Biofeedback editorial board members. These initials have been newly adopted by the Biofeedback Certification Institute of America (BCIA) to designate BCIA board certification, replacing the older designation BCIA-C.

In addition, a new option for obtaining continuing education credit for BCIA recertification is now being offered. BCIA certificants can earn 1 hour of continuing education (CE) credit by reading specific blueprint-related articles and successfully passing the associated quiz at http://www.bcia.org/ce. This issue of Biofeedback is the first publication in which CE credits are available for first-run articles. Relevant articles can be identified by a special version of the BCIA logo, which will appear at the top of the first page of the article.

This special issue is dedicated to advances in surface electromyography (SEMG). My special thanks to guest editor Randy Neblett, who has recruited an impressive and diverse collection of articles on SEMG, ranging in focus from the anatomy and physiology of the neuromuscular system to discussions of future trends such as telemetry to detailed discussion of the use of SEMG in rehabilitation.

Special Issue Articles: Advances in Surface Electromyography (SEMG)

With this issue of Biofeedback, Fred Shaffer and Randy Neblett begin a new series on practical anatomy and physiology. This inaugural article overviews essential concepts of the skeletal muscle system that everyone should know before beginning clinical use of SEMG. Their text describes the skeletal muscle system, the types of skeletal muscle fibers, motor units, muscle action potentials, the SEMG signal, muscle contraction, sensorimotor integration, and practical recommendations for beginning biofeedback professionals.

Jeffrey Bolek provides a fascinating and successful case study of “uncommon” SEMG training with Joey, an 18-month-old toddler with multiple genetically based motor impairments. An unlikely biofeedback candidate, Joey responded to a careful strategic plan to shape the activity of the bilateral gluteus maximus and quadriceps into a “tall kneeling” function. Joey responded positively to a video reward, with the thresholds selected to allow him a reward 80% of the time, contingent on coordinated use of the gluteus maximus and quadriceps as a functional myotatic unit.

Randy Neblett and Yoheli Perez describe their use of SEMG to optimize rehabilitation after knee injury and surgery. Following knee injury and surgery, pain-related and fear-related muscle inhibitions often interfere with rehabilitation and contribute to the development of chronic pain. Randy and Yoheli provide a detailed discussion of strategies applying biofeedback to help patients identify and overcome muscle inhibition during physical therapy exercises so that normal muscle strength and range of motion can be regained.

Gabriel Sella introduces his static SEMG protocol for standing postural assessment and provides useful information to guide SEMG biofeedback training to improve resting muscle tonus deficits in those with postural dysfunctions. His discussion of such issues as postural sway, muscular splinting, and “chronic protective guarding,” as well as laterality and asymmetry, will prove useful for many in neuromuscular rehabilitation work.

Professional Issues

An article by Fred Shaffer, Randy Neblett, and Judy Crawford describes several new developments for BCIA, including the new credentials for each certified individual: Board Certified in Biofeedback (BCB), Board Certified in Neurofeedback (BCN), and Board Certified in Biofeedback–Pelvic Floor Dysfunction (BCB-PMD). The article follows a question-and-answer format and addresses many frequently asked questions about BCIA certification.

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In his article, Ronald Rosenthal calls to mind the hubris of biofeedback researchers entering the field of rehabilitation 35 years ago. If John Basmajian could teach human subjects to achieve voluntary control of a single motor unit, it seemed that it would be a simple task to utilize SEMG and “turn the control back on” for stroke patients. Unfortunately, the realities of the motor control system of the human body are not as simple as an on-off switch. This article reviews how the neural organization of motor control systems is disrupted following stroke, resulting in both opportunities and limits for the biofeedback clinician with the kinds of functional gains that stroke patients can achieve with SEMG training. The author provides an impressive case history of a 25-year-old woman who had multiple strokes and describes both what she has accomplished in her rehabilitation and the limits on her progress.

John G. Arena, the current president of the Association for Applied Psychophysiology and Biofeedback, provides a discussion of future directions in SEMG—the latest and the hottest trends. He discusses three areas: (a) the uses of SEMG in telehealth—delivery of services to remote sites via video links, (b) the use of telemetry and ambulatory monitoring—electronically facilitated monitoring of the musculature while the client goes about everyday life, and (c) the temporal stability or reliability of the SEMG and other psychophysiological measures—the trustworthiness of SEMG as an assessment measure. John suggests that these are critical areas that must develop further if SEMG is to flourish, and he delivers a positive prognosis in each area.

Proposal and Abstracts
Authors are invited to submit manuscripts on any topic in applied psychophysiology and biofeedback. Articles are welcome presently for three special issues: a Neal Miller Memorial Issue for Fall 2010, Optimal Performance in Sports and the Arts for Winter 2010, and The Psychophysiology of Yoga, Meditation, and Spiritual Practices for Spring 2011. Proposals and abstracts are also invited for additional topics for future special issues of *Biofeedback*. 