

Special Editor Introduction

In the field of Ergonomics, researchers and practitioners are increasingly using surface electromyography amplitude to estimate muscle load in order to compare and evaluate the muscular demands of jobs, tasks, tools, and workstations. Surface electromyography is invoked as an objective tool that can complement subjective measures of muscle fatigue and discomfort. In its application to the workplace it has been suggested that minimizing surface electromyography amplitude may improve human performance or prevent muscle discomfort and injury.

However, many factors, well known to readers of the Journal, may limit the ability of surface electromyography amplitude to accurately and reliably estimate muscle activity. Examples include poor signal-to-noise, crosstalk, motion artifact, and high within and between subject variability. These problems may also limit the sensitivity of surface electromyography to detect changes in muscle activity due to changes in task or tool design. Furthermore, at least in the Ergonomics literature, there is little consistency in the methodologies applied for signal acquisition and interpretation. Although there are general guidelines for the use of surface electromyography in occupational biomechanics [1], specific consensus derived guidelines for the use of surface electromyography to estimate muscle activity are missing.

In 1999, twenty researchers with extensive experience in this topic met for two days at the Marconi Conference Center in Northern California to discuss the following question, "Under what circumstances can surface electromyography be used to estimate upper extremity and neck muscle load during the performance of precision tasks?" Precision tasks in this case refer to work involving static loading and fine motor movement (e.g., com-

puter or assembly work). The conference was organized by the Ergonomics Program at the University of California at Berkeley.

The group's review of the literature and consensus findings led to the development of five papers whose topics include electrode selection and location, normalization methods, signal sampling and filtering, sampling strategies in the field, and interpretation of findings. The paper in this issue by C.M. Sommerich and colleagues is the first installment of these five papers. Sommerich and colleagues reviewed methodologic issues surrounding the difficult topic of the use of surface electromyography to measure neck muscle activity and propose methods to improve accuracy, reliability, and sensitivity. This is an important topic for the Ergonomics community. Surface electromyography has been used to address workplace questions such as where should the computer monitor be located to minimize neck fatigue and pain. The other papers will appear in future issues of the Journal.

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Reference

- [1] Soderberg GL, editor. Selected topics in surface electromyography for use in the occupational setting: expert perspectives. National Institute for Occupational Safety and Health, Centers for Disease Control: DHHS (NIOSH) Publication No. 91-100, 1992.