

HIGH-DENSITY SURFACE EMG: TECHNIQUES AND APPLICATIONS AT A MOTOR UNIT LEVEL

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Abstract

Surface EMG comprises a variety of widely applied experimental tools in basic neuroscience, biomechanics and exercise physiology, but also in applied disciplines like clinical neurophysiology, ergonomics and sports sciences. To increase the usefulness of surface EMG, we contributed to the introduction and application of a spatiotemporal variant of the usual single channel surface EMG techniques, called high-density surface EMG (HD-sEMG). In the present paper, we first discuss the background of the HD-sEMG technique and basic principles of recording and analysis. In a second part, we illustrate the usefulness of the technique on the basis of studies in which the analysis of HD-sEMG at a motor unit level is at hand. It concerns a precise analysis of the activity of the facial musculature that leads to a map of muscle fibre directions and the positions of motor endplate zones. Two other applications refer to neuromuscular pathology, being motor unit number estimation and the quantification of spontaneous motor unit activity, known as fasciculations.

Keywords: high density surface EMG, motor unit number estimation, fasciculations, spatiotemporal EMG activity, facial musculature