

Noninvasive High-resolution Pediatric Surface EMG

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Country

USA

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Noninvasive High-resolution Pediatric Surface EMG

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2

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Spinal Muscular Atrophy, Needles, Neuromuscular Diseases, Childhood, Electrodes

Research Abstract

? DESCRIPTION (provided by applicant): The objective of this proposal is to develop noninvasive surface electromyogram (EMG) examination methods to overcome disadvantages of routine invasive needle EMG for examination of spinal muscular atrophy (SMA) and other pediatric neuromuscular diseases. There are two planned aims for the proposed study. The first aim is to develop and test noninvasive surface EMG decomposition methods using flexible surface electrode arrays, thus laying the foundation for their broad clinical applications,

particularly for pediatric population. This includes validating and refining the developed methods using both computational and experimental approaches. The second aim is to perform a surface EMG examination of the pathological changes in SMA patients, mainly at the motor unit level, using the newly developed noninvasive methods. The approach utilized in the proposed project lie in recent advances in both surface EMG recording and signal processing methods. Our research design is based on 2-dimensional high resolution flexible electrode arrays suitable for pediatric surface EMG recording. Taking advantage of the spatial information and multi-channel recording of the electrode arrays, we will use the most appropriate EMG signal processing methods, particularly blind source separation techniques, to extract single motor unit activities from surface EMG. Toward clinical application, we will focus on efficient, robust, automatic and user-friendly implementation of the developed methods. A high resolution surface EMG examination of SMA patients will then be performed, with a view to determining whether the key electrodiagnostic findings of SMA can be made from the surface of examined muscles. The proposed activities will do much to improve the tolerability of pediatric EMG examination while maintaining/enhancing diagnostic sensitivity and specificity, thus benefiting a large number of infants, children and adolescents with neuromuscular diseases who may need EMG examination.

Further information available at:

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