Book of Abstracts

2013, New Orleans

Automatic Quality Assessment and Response Detection of Auditory Evoked Potentials based on Response Tracking

Valderrama, J. T.[1], Morales, J. M.[1], Alvarez, I.[1], de la Torre, A.[1], Segura, J. C.[1], Sainz, M.[2,3], and Vargas, J. L.[2]

[1] Department of Signal Theory, Telematics and Communications, CITIC-UGR, University of Granada. Granada, Spain
[2] San Cecilio University Hospital, ENT Service. Granada, Spain
[3] Department of Surgery and its Specialties, University of Granada. Granada, Spain.

Background: Most of the hospitals and clinics worldwide use subjective (visual) methodologies for detecting auditory evoked potential (AEP) responses. These techniques can be based on (a) response judgment by one or multiple evaluators, (b) response replication, and (c) response tracking, which analyzes the changes on the morphology of auditory responses according to gradual modifications of any stimulation setting (i.e., intensity level, stimulation rate, etc.). Objective (automated) detection methods remove the need of subjective interpretations, reduce human errors, and ensure consistency among patients, recording conditions and screening personnel. The use of automated response detection methodologies is being promoted to help the operator interpretation and the human decision making.

Aims: The present work describes and evaluates a novel technique that automatically evaluates the quality and detects AEPs based on response tracking.

Methods: The fundamentals and the mathematical procedure of the aforementioned technique are described. A set of auditory brainstem response (ABR) signals obtained at stimulation intensity levels ranging from 5 to 80 dBnHL (in 5 dB steps) were recorded from 2 normal hearing adults. An additional set of responses with no stimulation provided were recorded from each subject, thus no auditory response could be detected in those recordings.

Results: The sets of ABR signals were correctly categorized according to the presence or absence of response applying this methodology. In addition, this methodology modeled the shift of the response determined by the stimulation intensity.

Conclusions and Significance: The described technique implements for the first time an auditory response detection algorithm based on response tracking. The encouraging results of this study suggest that the described methodology can be appropriate for automatically assessing the quality and detecting auditory responses. Moreover, we believe that the use of the described technique along with other automatic methodologies could improve significantly the accuracy in automatic response detection.