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PROGRAM & ABSTRACTS

Recording auditory brainstem responses with randomized stimulation level

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Background: Auditory evoked potential (AEP) recording in a conventional way consists in averaging auditory responses, corresponding to a burst of stimuli all of them with the same stimulation level and with a constant inter-stimulus interval (ISI). The protocol may start in descending sequential order, (i.e. starting with the highest stimulation level -typically 80 dB hearing level (HL)- and ending with the lowest one -typically 20 dB HL-), or in ascending sequential order. This work presents a novel modality of ABR recording based on randomized stimulation level (RSL). This means that stimuli with different intensity levels will be presented with a randomized pattern and averaged separately according to their respective intensity. In this work we compare the proposed RSL technique with the conventional one regarding: i) the morphology of the obtained evoked response ; ii) the degree of comfort of the subject while performing the test; and iii) how difficult is the identification of the evoked response for the audiologist in the proposed procedure compared with the conventional one, since in the conventional procedure the responses are obtained sequentially, while in the proposed one all the responses are simultaneously observed with improving quality as more responses are averaged.

Methods: Six subjects with no self-reported history of auditory dysfunction (3 females, aged from 25 to 29 years) participated in this study. AEPs were elicited using both the conventional and the RSL procedures. In both cases, 100 μ s rarefaction clicks presented ipsilaterally following an ISI with a uniform distribution in the range [38-48] ms were used. In the conventional acquisition four stimulation levels were used (i.e. 80-60-40-20 dB HL), being 16 minutes the total recording time. In RSL, the four different stimulation levels were mixed up to form a unique stimulation signal in which each stimulus presents a randomized intensity. The recording time was also 16 minutes.

A survey evaluating the degree of comfort of the subject under study compared the conventional procedure (in both ascending and descending sequential order) with the randomized procedure: http://sl.ugr.es/subjective_evaluation_sound_stimulus.

In addition, a different survey compared both techniques from the audiologist point of view: http://sl.ugr.es/comparing_ABR_recording_techniques.

Results: Results showed auditory brainstem responses to be very similar between the two techniques. In the 10-30 ms (early MLR portion) there were important differences in some subjects. The most notable was one subject in which it was appreciated what could be a post-auricular muscle response, associated with a high stimulation level only for conventional stimulation.

The survey evaluating the degree of comfort of the subject under study (n>100) showed that RSL is preferred to the conventional stimulation procedure.

The survey assessing audiologists' satisfaction showed that the evoked response can be identified with RSL earlier than with the conventional procedure.

Conclusion: Our results indicate that RSL provides evoked responses similar to the conventional method using the entire recording time. However, RSL has advantages in clinical practice. On the one hand, the subject feels more comfortable while the test is being carried out. On the other hand, with RSL the audiologist is able to quickly appreciate whether there is an evoked response in the auditory pathway of the patient, and therefore the proposed RSL technique seems to be a promising procedure for saving time in ABR explorations.

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