

Auditory brainstem response Wave I enhancement with the use of an ear canal electrode

Xuan Nhi Nguyen (1), Alexis Pinsonnault (1), Wei Qiu (2), Adrian Fuente (1)

(1) Université de Montréal and Centre de recherche de l'Institut universitaire de gériatrie de Montréal (CRIUGM), (2) State University of New York at Plattsburgh

Objectives: To determine the effects of the use of an ear canal electrode on the amplitude and latencies of the auditory brainstem response (ABR).

Background: The successful identification of ABR Wave I and V is particularly important for the differential diagnosis of otoneurological lesions. However, with conventional surface electrodes, challenges in Wave I identification commonly arise. Currently, much attention has focused on identifying Wave I and its amplitude with the aim to obtain a ratio between the amplitudes of Waves I and V.

Methods: Seventy-two male young adults with normal hearing thresholds were selected. Rarefaction clicks presented at a rate of 27.7 at 80 dBnHL were monaurally presented. Recordings were initially obtained using a Lilly TM-Wick Electrode placed in the ear canal close to the tympanic membrane (inverting electrode), surface electrodes for Fz (noninverting) and ground electrode. Then, the inverting electrode was replaced with a surface electrode placed on the ipsilateral mastoid and a new recording was obtained. For analysis purposes, latencies and amplitudes of waves I, III and V were calculated.

Results: Wave I amplitude obtained with the ear canal electrode was significantly larger than with the surface electrode. A significant decrease in Wave V/Wave I amplitude ratio was thus noted. No significant differences for absolute latencies of Waves I, III and V and interpeak latencies were found between both types of electrodes. Significant correlations between wave amplitudes were observed.

Conclusions: Using an ear canal electrode for ABR recording allows a better identification of wave I and a significant enhancement of its amplitude. Additionally, absolute and interpeak latencies for ABR components are not affected when using an ear canal electrode. Initial normative data for ABR components (amplitudes and latencies) are proposed with the data of this study.