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Auditory Middle Latency Responses recorded at High Stimulation Rates using Randomized Stimulation and Averaging

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Background: Auditory middle latency responses (AMLRs) are commonly used for the assessment of the auditory pathway above the level of the brainstem. The recording of these signals at high stimulation rates may help study neural adaptation and reduce test time. The recently developed randomized stimulation and averaging (RSA) methodology allows the recording of auditory evoked potentials (AEPs) at high stimulation rates using jittered stimuli whose interstimulus interval varies randomly with a uniform probability distribution.

Aims: The present study analyzes AMLRs obtained with RSA at different stimulation rates.
Methods: AMLRs were obtained from four normal hearing adults using the RSA technique at the mean stimulation rates of 8, 20, 40, 67, 100, and 125 Hz. A jitter of 16 ms was used in all stimulation sequences. Ipsilateral stimulation was provided by short duration clicks at an intensity level of 70 dBnHL.

Results: The components V, Na, Pa, Nb, and Pb could be recorded in all subjects at all stimulation rates. The latencies of these components and the peak-to-peak amplitudes P a (Na - Pa) and Pb (Nb - Pb) are consistent with previous literature. The amplitudes of the Pa and Pb components reach a maximum value at 40 Hz, which is in accordance with the phenomenon 40-Hz event related potential described by Galambos in 1981.

Conclusions and Significance: The results of this study suggest that the RSA technique could be used to obtain AMLRs at high stimulation rates. In comparison with other related methodologies that allow the recording of AEPs at high stimulation rates, RSA provides an immediate mechanism for generating stimulation sequences, the distribution of the jitter can be easily controlled, and allows a separate processing of auditory responses. These advantages could be useful in certain research applications, such as analyzing the underlying mechanisms of neural adaptation and habituation.