

Contribution: Poster presentation at the XXIX International Evoked Response Audiometry Study Group (IERASG-2025) Biennial Symposium, Boulder, Colorado, EEUU (June 14-18, 2025)

Title: Auditory evoked responses of the complete auditory pathway using structured stimulation sequences.

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Topics: ABR; MLR/ALR

Keywords: Multi-response deconvolution, auditory evoked potential (AEP), auditory brainstem response (ABR), middle latency response (MLR), auditory late response (ALR).

ABSTRACT:

Background: Based on advanced deconvolution methods, we have demonstrated the viability of simultaneous recording of transient responses of the complete auditory pathway (including ABR, MLR and ALR). However, the simultaneous deconvolution of early and late responses is limited by the small amplitude of the ALR components when they are elicited at high stimulation rates, and also by statistical constraints related to the properties of the matrix involved in the deconvolution.

Methods: In order to overcome the previous limitations and with the aim of obtaining simultaneously good quality early and late transient responses, we propose the use of structured stimulation sequences, involving different time-scale events. In particular, the stimulation pattern consists in click bursts, with configurable stimulation amplitude, inter-stimulus interval, burst duration and inter-burst interval. The stimulation sequence is deconvolved under a multi-response paradigm, using independent response models for the click events and for the burst events for the different stimulation levels.

Results: This study includes responses from 8 subjects. Consistent responses are obtained for both clicks and bursts events, with a clear predominance of peripheral response to clicks and central response to bursts. The amplitude of the MLR/ALR responses to bursts is substantially larger than that elicited by clicks, and a strong dependence with the subject attention is also observed.

Conclusions: The experimental results provide a better understanding of the difficulty associated to the simultaneous recording of the early and late responses, as well as a better understanding of the auditory processing at different levels of the auditory pathway.