

The Influence of Neural Synchrony on Auditory Middle Latency and Late Latency Responses and Its Correlation with Audiological Profile in Individuals with Auditory Neuropathy

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Abstract : Auditory neuropathy spectrum disorder (ANSD) is an auditory disorder with normal cochlear outer hair cell function and disrupted auditory nerve function. It results in unique clinical characteristic with absent auditory brainstem response (ABR), absent acoustic reflex and the presence of otoacoustic emissions (OAE) and cochlear microphonics. The lesion site could be at cochlear inner hair cells, the synapse between the inner hair cells and type I auditory nerve fibers, and/or the auditory nerve itself. But the literatures on synchrony at higher auditory system are sporadic and are less understood. It might be interesting to see if there is a recovery of neural synchrony at higher auditory centers. Also, does the level at which the auditory system recovers with adequate synchrony to the extent of observable evoke response potentials (ERPs) can predict speech perception? In the current study, eight ANSD participants and healthy controls underwent detailed audiological assessment including ABR, auditory middle latency response (AMLR), and auditory late latency response (ALLR). AMLR was recorded for clicks and ALLR was evoked using 500Hz and 2 kHz tone bursts. Analysis revealed that the participant could be categorized into three groups. Group I (2/8) where ALLR was present only for 2kHz tone burst. Group II (4/8), where AMLR was absent and ALLR was seen for both the stimuli. Group III (2/8) consisted individuals with identifiable AMLR and ALLR for all the stimuli. The highest speech identification score observed in ANSD group was 30% and hence considered having poor speech perception. Overall test result indicates that the site of neural synchrony recovery could be varying across individuals with ANSD. Some individuals show recovery of neural synchrony at the thalamocortical level while others show the same only at the cortical level. Within ALLR itself there could be variation across stimuli again could be related to neural synchrony. Nevertheless, none of these patterns could possible explain the speech perception ability of the individuals. Hence, it could be concluded that neural synchrony as measured by evoked potentials could not be a good clinical predictor speech perception.

Keywords : auditory late latency response, auditory middle latency response, auditory neuropathy spectrum disorder, correlation with speech identification score

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