LETTER TO THE EDITOR
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Earlier Peak Latencies May Not Fully Reflect the Robustness of Cervical Vestibular Evoked Myogenic Potential to CE-Chirp Stimulus

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Dear Editor,

We read with great interest the article by Ocal, et al. [1] that studied cervical vestibular evoked myogenic potential (cVEMP) results elicited by the conventional 500 Hz tone burst (TB) and narrow band Claus Elberling (CE)-chirp stimulus (360−720 Hz) among heathy adults. The chirp stimulus was found to produce significantly earlier P1 and N1 latencies, but P1N1 amplitudes were comparable between the two stimuli. The authors then concluded that "the chirp stimulus produces robust but earlier cVEMP than TB does" [1]. In this regard, we wish to highlight several issues worthy of consideration.

The cVEMP latencies are influenced by the rise times of stimuli [2,3]. That is, stimuli with short rise times (such as clicks) would produce cVEMP with earlier latencies [2,3]. This is possibly because the otolith organs are sensitive to changes in acceleration over time [4]. The earlier cVEMP latencies for the chirp stimulus reported by Ocal, et al. [1] appear "insensible" and a further consideration is needed. The narrow band CE-chirp stimulus was designed with a specific envelope (and its onset is not steep) [5]. As such, it is expected that the chirp-evoked cVEMP would produce longer P1 and N1 latencies than the click-evoked cVEMP. This contemplation, in fact, has been demonstrated by Walther and Cebulla [6]. Since the commercially available CE-chirp stimuli were designed to optimally record auditory brainstem response (ABR), Walther and Cebulla [6] designed a band limited chirp stimulus (250−1,000 Hz) to record cVEMP and ocular vestibular evoked myogenic potential (oVEMP). As reported, cVEMP and oVEMP latencies were the longest for the chirp stimulus (relative to click and 500 Hz TB). Indeed, the earliest latencies were produced by the click stimulus [6].

In the study by Ocal, et al. [1], the earlier P1 and N1 latencies found with the narrow band CE-chirp stimulus (relative to the 500 Hz TB) were "unexpected" given the waveform and envelope of the two stimuli (i.e., the onset of both stimuli is not "equally" steep). Furthermore, the P1 latency was curiously early (around 10 ms), which is not consistent with studies utilizing clicks (stimuli with the steepest onset) [3,6]. Taken together, it appears that caution is advisable when using the CE-chirp stimulus in cVEMP recording. This stimulus was constructed to optimize ABR recording [5], and it may not "work" similarly in cVEMP recording. Moreover, the onset and offset times of CE-chirp stimulus were temporally "adjusted" during its construction so that it appears earlier than the conventional stimulus [7,8]. As such, the offset of chirp is the onset of click (0 ms) [7]. Therefore, it is not surprising to see earlier cVEMP latencies when tested with the CE-chirp stimulus. In contrast, using the custom-built chirp stimulus (without the temporal adjustment), cVEMP latencies were at least comparable to those of 500 Hz TB [6].

Collectively, the earlier cVEMP latencies elicited by the commercially available narrow band CE-chirp stimulus may not fully reflect the response robustness. When recording cVEMP

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with this stimulus, perhaps the amplitude is a better indicator for the robustness of cVEMP waveforms.

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Conflicts of interest

The authors have no financial conflicts of interest.

Author Contributions

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