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Jitter and Latency Characterization in Closed-Loop Neuromodulation during NREM Sleep in elderly and pathological population

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***Introduction**:* Neuromodulation based on EEG is a promising therapeutic approach to regulate brain activity. Particularly, Closed-Loop Auditory Stimulation (CLAS) can be used to manipulate slow oscillations in sleep to influence memory consolidation [1,2,3]. However, enhancing individual oscillations by presenting a tone at a precise moment in time requires a highly controlled understanding of the feedback loop parameters. ***Material, Methods and Results**:* We developed a testbed stimulation sleep-monitoring device [4] based on ESP32 and the Cython board from OpenBCI [1] to measure latency and jitter of various closed-loop configurations and its impact on slow oscillations. Results show that to exert the stimulus at precise timing of the slow-wave cycle [3] requires a very low jitter and, more importantly, stringent low latency. **Discussion**: Based on the idea that N3 is mostly characterised as an oscillatory process, phase-locked acoustic stimulation (PLAS) was successfully applied to enhance the naturally occurring oscillations characteristic of young adults. However, in elderly or pathological populations, individual transient slow waves are more prominent [3] and more accurate and precise systems are required. **Significance**: In young adults, results have shown that CLAS procedure enhances slow-wave amplitude and memory consolidation. However, this is not the case with elderly or pathological populations, where we show that understanding the CLAS device's jitter and latency is fundamental. **Disclosures:** RR and CF are co-founders of NeuroAcoustics Inc., DE, US.

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