Comparing The Patterns Of Excitation Of Tinnitus And Tinnitus-Like Sound

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Objectives: The main goal of the present study was to validate a new method to measure minimum masking level and residual inhibition of tinnitus.

Background: While masking and residual inhibition (RI) may provide diagnostic and prognostic valuable information, these measures are rarely performed in clinics, as they are not adapted to clinical constraints.

Methods: The new method used an acoustic sequence made of pulsed acoustic stimulation of fixed duration and inter-stimulus interval. Firstly, the level of the stimulus was raised until the tinnitus was masked during the stimulus presentation (measurement of the minimum masking level - MML). Secondly, the level of the stimulus was raised further (from the MML) until tinnitus is suppressed during the silence interval between the acoustic pulses. A total of 68 participants with continuous tinnitus (either unilateral or bilateral) including large variety of hearing loss configurations were tested in two different sites with two different teams: Marseille (n=34) and Lyon (n=34). Different parameters such as the stimulation duration (1 sec, 3 sec and 5 sec) and frequency of the center noise were tested.

Results: Overall, tinnitus masking was obtained in at least one condition for all of the 64 tinnitus patients tested except one (98.5%) and some level of residual inhibition was obtained for 59 participants (86.7%). In terms of stimulation durations, the 3 and 5 seconds stimulations provided both, optimal masking and inhibition, compared to the 1 sec stimulation. The RI was found stronger (lower MRIL from this new approach) within the frequency region close to the tinnitus frequency.

Conclusions: Our study confirms that, from this new approach, MML and MRIL can be easily, quickly and reliably obtained from a wide variety of patients displaying different hearing loss configurations such as presbycusis, flat hearing loss and even normal hearing. More so, this approach allows the categorization of tinnitus patients into different sub-groups based on the properties of their MRIL. Thus, MRIL may provide crucial prognostic information on clinical approaches based on acoustic stimulation and could even be used as a treatment approach.