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# Sleep Medicine

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## Letter to the Editor

### Letter to the editor of “Sleep Medicine” regarding the publication entitled “Acoustic stimulation time-locked to the beginning of sleep apnea events reduces oxygen desaturations: a pilot-study”, by Waeber et al



Dear editors, we read with a great interest the Brief Communication entitled “Acoustic stimulation time-locked to the beginning of sleep apnea events reduces oxygen desaturations: a pilot-study”, by Waeber et al.

We thank the authors for citing our work [1] and would like to provide “Sleep Medicine” readers with additional information regarding design and technical aspects of our original kinesthetic stimulation technique.

Our end-to-end solution is a closed-loop, real-time device that performs personalized, adaptive kinesthetic stimulation for the treatment of sleep apnea. The kinesthetic stimulation is performed on the mastoid region, using a stimulation signal that has been optimized (within the audible frequency band) in order to evoke a response, both from the activation of mechanoreceptors on the skin and through bone-conducted acoustic stimulation. A first description of our system and our preliminary results showing reduction in apneas duration and desaturations were described in Ref. [2]. In Ref. [1], we studied 24 patients from 5 centers, compared to 8 patients in a single center in the work by Waeber et al. Our results in a larger population extended the knowledge by demonstrating that responses to stimulation therapy are clearly patient-specific, requiring to adapt stimulation intensity over time.

Further development of our solution was based on the optimal, patient-specific and adaptive mechanical stimulation. A coupled Proportional, Integral, Derivative (PID) closed-loop method was published in Ref. [3]. 6 patent families have been filed with different criteria for therapy adaptation (see for example [4,5]).

We do agree with the authors that real-time, adaptive mechanical stimulation, including kinesthetic and/or acoustic stimulation, may be an interesting alternative or adjunctive therapy for sleep apnea syndromes. Further collaborative clinical research is warranted in this field.

### Conflict of interest

The ICMJE Uniform Disclosure Forms for Potential Conflicts of Interest associated with this article can be viewed by clicking on the following link: <https://doi.org/10.1016/j.sleep.2021.10.036>.

### References

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29 October 2021

Available online 7 November 2021