

**Could trans-auricular vagus stimulation modulate STN activity in Parkinson's disease? Study design and pilot data by a sham-controlled intervention**

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*Introduction:* Vagus nerve stimulation (VNS) is a valuable potential treatment for Parkinson's disease (PD). Our group successfully tested the non-invasive left VNS in PD: cervical VNS alleviated the subthalamic beta activity [1], while auricular VNS improved gait troubles [2].

*Objective:* Given the low experimental and clinical reliability of non-invasive cervical VNS, we want to investigate deep neurophysiological and clinical biomarkers of auricular VNS toward more robust continuous stimulation trials.

*Methods:* 15 PD patients with recording subthalamic deep brain stimulation devices (Percept, Medtronic) have been enrolled in a prospective interventional trial with non-invasive left ear auricular VNS. Data on med-OFF/stim-OFF neurophysiological and clinical (gait) parameters have been tested in a sham controlled cross over design of 4 trials of 120s of 20Hz left ear VNS with 60s intervals.

*Results:* 4 out of 15 patients completed both conditions in February 2023. There was a clear-cut modulation of beta band amplitude and stability over the contralateral right STN on 3 out of 4 subjects, only after the real stimulation condition, and prominent after 4 trials of VNS.

*Conclusions:* Preliminary results partially confirm what was observed with cervical VNS but showing a prominent contralateral effect. Gait parameters are currently under investigation, due to low numbers. If confirmed on a larger sample, our pilot results would help in design further robust trials for such a promising therapy [3].

**References:**

- [1] Torrecillos F, Tan H, Brown P, Capone F, Ricciuti R, Di Lazzaro V, Marano M. Non-invasive vagus nerve stimulation modulates subthalamic beta activity in Parkinson's disease. *Brain Stimul.* 2022 Nov;15(6):1513-1516. doi: 10.1016/j.brs.2022.11.006. PMID: 36518556; PMCID: PMC7613925.
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