RESTORATION OF TASTE AND SMELL AFTER A POST-COVID 19 INDUCED LOSS BY MRI-TRACKED TRANSCRANIAL PULSE STIMULATION (TPS): A CASE REPORT

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INTRODUCTION

The loss of smell and taste is one of the most intrusive and long-lasting symptoms of a Covid 19 infection. Up to 80% of all patients affected by Covid 19 experience significant impairments or even loss of smell or taste. About 5% oft he patients suffer from long or persistent symptoms. Seen worldwide, this is about 27 million people. So far, the therapy of these symptoms has often been unsuccessful and patients subsequently suffer from additional psychological symptoms and problems.

Regenerative effects of transcranial pulse stimulation (TPS) through mechanotransduction of shock waves have already been shown in various disorders. The method has a CE certification for use in Alzheimer's disease. In this case, the TPS - procedure was applied off-label in a 42-year-old woman with complete loss of smell and taste a spart of a Long-Covid-Syndrome [post Covid-19 infection - Delta type]. The loss of taste and anosmia persited for more than a year before treatment.

Fig. 1 Noninvasive TPS-technology can administer stimulation-pulses on the surface and in deeper structures of the brain.

Fig. 2 The number and the exact individual location of the administered pulses can be seen on the screen in real time mode.

Fig. 3 TPS was administered using a special 3D-equipment (infrared camera, calibrated body track).

METHODS

Shock waves were administered bilaterally by individual MRI-tracking into the temporal lobe, the fronto- and the parietal lobe. The patient received 6.000 pulses of TPS (0.2 mJ/mm2 per single pulse, with a frequency of 4 Hz) in total per session. The application of the pulses with Neurolith by Storz Medical was inividually navigated by use of current MRT-images of the patient. TPS-pulses were administered bilaterally into the frontal, parietal and temporal cortex. Pulses were applicated over a period of 2 weeks (3 sessions per week). Smell and taste were tested by sniffin sticks and a taste battery.

RESULTS

After 6 stimulations over a period of only 2 weeks the patient regained her ability to smell and taste. No side effects oft he tratment were observed. 6 weeks after treatment the patient told us, that she had been able to part in a wine tasting session with great success. The patient had even been able to recognize different sorts of wines from taste and smell.

DISKUSSION

This case shows that the regenerative effects of TPS found in other diseases like Alzheimer's dementia could also be achieved in a patient with post-Covid symptoms. The fact that the patient's symptoms of losses of smell and taste, which had existed for more than a year post covid, were eliminated after 6 stimulations over a period of only 2 weeks is particularly impressive. The exact mechanisms of action of TPS are currently under research. Various factors are discussed. Mechanical effects of TPS on neuronal membranes influence ion channels and induce porations of cell walls in neurons as well as in glial cells. Changes in various neurotransmitter levels have been observed after TPS-treatment. An increase of dopamine and serotonin levels and a reduction of GABA were described in the literature after TPS-treatments. In addition brain stimulation with TPS may lead to an induction of the neurotrophic factor (BDNF) or the glial cell line-derived neurotrophic factor (GDNF) or the vascular endothelial growth factor (VEGF). BDNF might contribute to a neurogenesis and proliferation of neurons, especially in the hippocampus, the entorhinal cortex and the olfactory brain. VEGF typically leads to a significant amplification of vascularisation. All these mechanisms have in common that they induce neuroplastic changes.

Literature:

Beisteiner, R., Matt, E., Fan, C., Baldysiak, H., Schönfeld, M., Philippi Novak, T., Amini, A., Aslan, T., Reinecke, R., Lehmer, J., Weber, A., Reime, U., Goldenstedt, C., Marlinghaus, E., Hallett, M and Lohse-Busch, H. Transcranial pulse stimulation with ultrasound in Alzheimer's disease – A new navigated focal brain therapy, 2019, doi: 10.1002/advs.201902583.

Boscolo-Rizzo, P., Polesel, J. and Vaira, L. A. Smell and taste dysfunction after covid-19, BMJ 2022; 378 doi: https://doi.org/10.1136/bmj.o1653 (Published 27 July 2022) Cite this as: BMJ 2022;378:o1653.

Matt, E., Dörl, G., and Beisteiner, R. Transcranial pulse stimulation (TPS) improves depression in AD patients on state-of-the-art treatment, Alzheimer's Dement., 2022, 8:e, 12245, https://doi.org(10.1002/trc2.12245.

Min, P., Yang, M., Bohlke, S., Park, D., Vago, T., Maher T. and Yoo, S. Focused ultrasound modulates the level of cortical neurotransmitters: Potential as a new functional brain mapping technique, International Journal of Imaging Systems and Technology, 21, 2011, pp. 232-240.

Sprick, U. and Köhne, M., Brain Stimulation by noninvasive Transcranial Pulse Stimulation (TPS) improves cognitive Deficits and Mood in Alzheimer's Disease, 2022 International Conference on Electrical, Computer, Communications and Mechatronics Engineering (ICECCME), Maldives, Maldives, 2022, pp. 1-6, doi: 10.1109/ICECCME55909.2022.9988704.

Wess, O., Physikalische Grundlagen der extrakorporalen Stoßwellentherapie, J. für Mineralstoffwechsel, 2004, pp. 4-7.

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