MR-NAVIGATED TRANSCRANIAL PULSED SHOCKWAVE STIMULATION (TPS) IN ALZHEIMER‘S PATIENTS: ENOUGH EVIDENCE FOR CLINICAL USE?

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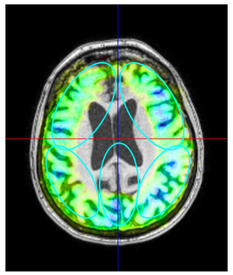
Aims

Transcranial Pulse Stimulation (TPS) uses shockwaves for the treatment of Alzheimer´s patients and is CE-marked. Data from uncontrolled trials is available and a placebo-controlled trial was just finished but data is not published. Many aspects remain unclear concerning patient selection and treatment protocols. We discuss our local real-world experience with this technique.

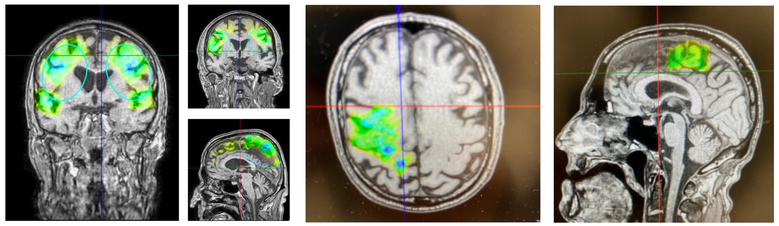
Methods

24 patients received TPS using the Neurolith © System (Storz Medical AG, Trägerwilen, Switzerland). After the initial treatment cycle over 2 weeks patients were monthly boostered. Safety data and different cognitive scores were assessed up to 12 months. Individual symptomology, MRI- and CSF biomarker, disease stages, inclusion / exclusion criteria and treatment protocols were registered.

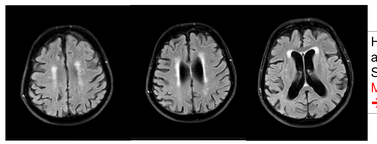


Results

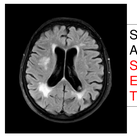
- Standard protocol was 6000 pulses with 4 Hz stimulation of precuneus, bilateral frontal and parietal cortex but was extended to bitemporal cortex and / or motor areas such as SMA, M1, PMC to treat concomitant tremor or hypokinesia.



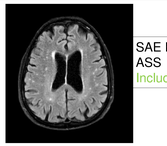
- The treatment was well tolerable with low number of only transient and not severe ADE even in selective patients with minor vascular lesions and platelet aggregation inhibitors.
(1.6% drowsiness, 0.8% nausea and headache, and 0.4% jaw pain and earache.)



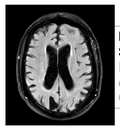
History of TIA and aggressive behavior , SAE Fazekas 2, ASS
Multiple KI, EXCLUDED ➔ TMS



SAE Fazekas 3, ASS
SAE as KI EXCLUDED ➔ TMS



SAE Fazekas 1-2, ASS
Included for TPS

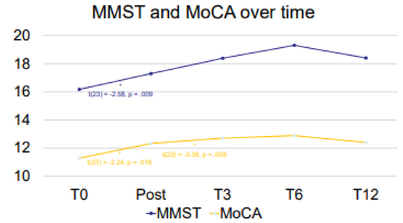


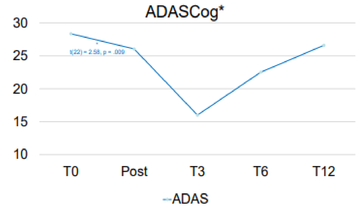
History PCA stroke, SAE Fazekas 1, ASS, Ginkgo
Included for TPS with sparing of occipital area and without Ginkgo

- Cognitive and affective scores improved significantly after the first treatment cycle regardless of symptom severity at baseline and CSF biomarker.

	n	M	SD	Df	T	P	Cohens d
MMST- T0	24	16.17	8.042	23	-2.58	.009*	.53
MMST-Post	24	17.29	7.123				
MoCA – T0	24	11.29	6.517	23	-2.24	.018*	.46
MoCA – Post	24	12.33	6.611				
ADAS – T0	23	28.35	13.217	22	2.58	.009*	.54
ADAS - Post	23	26.04	13.227				

- Preliminary long-term data showed stable effects over months with the selected booster interval.





Whereas the t-tests comparing T0 and post stimulation show a significant improvement, a Pearson correlation with MMST for the whole time span (T0, Post, T3, T6, T12) revealed no significant change, thus patients show stable performance (p = 3.21 with r = .057)

Discussion

TPS might be an option for Alzheimer´s, not only in mild cases and regardless of the biomarker constellation, and thus maybe for other dementia types. Minor vascular pathology and platelet aggregation inhibitors is generally acceptable. Treatment protocols can extend standard patterns and include e.g. motor areas to address concomitant hypokinesia or tremor.

Conclusions

Imaging and electrophysiology biomarkers need to be established. Systematic treatment protocols should be tested with a translational approach including basic neuroscience techniques and in comparison to other methods such as ultrasound and electric / magnetic stimulation. Last but not least placebo-controlled trials need to be conducted.

Learning Objectives

TPS might be an option for Alzheimer´s as it shows first positive effects without major complications. Before it can be suggested as general treatment option without scientific evaluation, placebo-controlled data need to be published.

Reference

Cont, C., Stute, N., Galli, A., Schulte, C., Logmin, K., Trenado, C., & Wojtecki, L. (2022). Retrospective real-world pilot data on transcranial pulse stimulation in mild to severe Alzheimer's patients. Frontiers in neurology, 13, 948204. https://doi.org/10.3389/fneur.2022.948204