significant outcomes following standardized treatment protocols. However, in naturalistic settings physicians adapt treatment protocols to individual clinical considerations achieving better outcomes. These varied therapeutic strategies may inform other physicians in designing improved treatment paradigms. In the current design, we present a review of response and remission rates to dTMS in MDD patients.

**Methods:** 39 patients (25% male) with chronic MDD, ages 24-84 years (mean=46.85), previously failing 1-8 medication regimens (mean=4.23) received dTMS using H-coil technology. Symptom severity was assessed using PHQ-9 scores at baseline and every 5 treatments subsequently. Patients received an acute phase dTMS treatment (20 sessions), after which 8 patients discontinued. 31 patients received further maintenance treatment (10 sessions). dTMS efficacy was evaluated using Repeated Measure ANOVA to contrast baseline, acute and maintenance paradigms. Response ($\leq$10 or $\geq$50% from baseline) and remission ($\leq$5) were calculated.

**Results:** A significant treatment effect (p=0.000) of symptom severity was observed in both paradigms. Post-acute symptom severity average score, decreased 59 percent (Means=19.12 vs. 9.15) with 28 patients responding and 17 remitting (7 responders including 3 remitters didn't begin maintenance). Additionally, post-maintenance average scores, decreased 8 percent more (Means=19.12 vs. 6.50) with 30 patients responding and 17 remitting.

**Conclusion:** These results suggest that, both acute and maintenance dTMS treatment paradigms are effective in treatment of MDD symptom severity. However, extending the treatment paradigm from 20 to 30 sessions proves significantly beneficial.

## 7

### Comparison of superficial TMS and deep TMS for major depression

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**Background:** Traditionally TMS treatment sessions for MDD were administered over the DLPFC using a focal superficial figure-8 coil. Recently the FDA has cleared deep TMS treatment for MDD using Brainsway H-coil, following a large DBPC multi-center study. The induced electric field characteristics, stimulated brain structures and clinical outcomes are very disparate between the two methods.

**Methods:** Electric field characteristics of figure-8 coil and of the H1-coil were measured in a realistic head model filled with physiologic saline concentration, and maps of field distribution were produced. We review several studies discussing brain structures and networks which are relevant for clinical outcome in MDD, and discuss the implications of the spatial characteristics of each TMS coil.

**Results:** Where using 120% of MT the H1-coil induces supra-threshold fields at depth of 1.8 cm and significant sub-threshold field at depth of 3.2 cm, compared to 0.7 cm and 0.7 cm for the figure-8 coil. Various studies have shown that deeper PFC structures have significantly more connections with other reward system sites compared to superficial PFC. The H1-coil induces also significantly wider stimulation compared to the figure-8 coil. Recent studies suggest that stimulation of PFC structures with extensive connections to the subgenual cingulate may be crucial for the antidepressant action of standard TMS. It was shown that the exact location of these structures varies greatly between individuals

**Disclosure:** Dr. Roth and Prof. Zangen are key-inventors of Deep TMS, have financial interests in Brainsway, Inc and receive financial support from this company. Mr. Amit Ginou is employee of Brainsway, Inc.

**Conclusions:** Since standard TMS coils exert a focal and superficial stimulation, optimal stimulation targets may be easily missed with standard coils. This and the depth differences might contribute to the large efficacy differences found in DBPC multi-center studies with Deep TMS compared to standard TMS.

## 8

### Safety and characterization of a novel multi-channel TMS stimulator

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**Background:** Currently available TMS stimulators have a single channel operating a single coil. This study presents benefits of a novel multi-channel stimulator, comprising five channels with independently controllable stimulation parameters.

**Methods:** Simultaneous and sequential operation of various channels was tested in healthy volunteers. Paired pulses schemes with various inter-stimulus intervals (ISIs) were studied for the hand APB and the leg AH muscles. Energy consumption and coil heating rates with simultaneous operation of 4 channels was compared to a figure-8 coil.

**Results:** Repetitive operation of separate channels with different stimulation parameters is demonstrated. The operations of various channels can be combined simultaneously or sequentially to induce multiple pulses with ISIs of μs resolution. A universal pattern of inhibition and facilitation as a function of ISI was found, with some dependence on coils configurations and on pulse widths. A strong dependence of the induced inhibition on the relative orientation of the conditioning and test pulses was discovered. The ability of this method to induce inhibition in shallow brain region but not in deeper region is demonstrated. Significant reductions in energy consumption and coil heating were demonstrated for several channels operated simultaneously compared to a standard figure-8 coil.

**Conclusions:** The multi-channel stimulator enables the synchronized induction of different excitability modulations to different brain regions using different stimulation patterns in various channels. Multiple pulses operation with coils with various depth profiles can increase the focality of TMS effect in deep brain regions.

**Disclosure:** Dr. Roth and Prof. Zangen are key-inventors on patent applications on multi-channel TMS stimulator technology, have financial interests in Brainsway, Inc and receive financial support from this company, which supported this study. Prof. Levkovitz is consultant for and have financial interests in Brainsway Inc. Mr. Amit Ginou, Dr. Gaby S Pell and Moria Ankry are employees of Brainsway, Inc.

## 9

### Transcranial magnetic stimulation treatment frequency during induction is associated with higher rates of remission in patients with depression

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**Background:** Treatment frequency with repetitive transcranial magnetic stimulation (rTMS) during induction is often administered five times weekly. Compliance with this recommendation can