

Table S1: Statistical summary of power spectral density changes after each tDCS cycle for responder and non-responder patients in each frequency band (theta, alpha, beta and gamma). Statistical analysis was conducted using Student t-tests with Bonferroni correction for multiple comparisons. Effect size measures are reported, including confidence intervals (CI) for Cohen's d estimates.

	Theta	Alpha	Beta	Gamma
	t(dF) pval d(95% CI)	t(dF) pval d(95% CI)	t(dF) pval d(95% CI)	t(dF) pval d(95% CI)
Responder vs Non-Responders				
C1	NS	t(1902) = 10.092 p < 0.0001 d = 0.44 [0.35 – 0.53]	t(1965) = -9.5252 p < 0.0001 d = -0.38 [-0.47 – -0.29]	t(1901) = -8.8476 p < 0.0001 d = -0.38 [-0.48 – -0.29]
C2	t(1602) = -15.203 p < 0.0001 d = -0.7 [-0.79 – -0.61]	t(1139) = 27.383 p < 0.0001 d = 1.39 [1.29 – 1.49]	t(1147) = -2.5447 p = 0.011 d = -0.13 [-0.22 – -0.04]	NS
C3	t(1334) = -16.055 p < 0.0001 d = -0.83 [-0.94 – -0.73]	t(1514) = 6.56 p < 0.0001 d = 0.31 [0.21 – 0.41]	t(1224) = 22.201 p < 0.0001 d = 1.18 [1.07– 1.29]	t(1330) = 6.7123 p < 0.0001 d = 0.35 [0.25 – 0.45]
Responders				
C1 vs C2	NS	t(773) = -21.438 p < 0.0001 d = -0.77 [-0.85 – -0.69]	NS	NS
C1 vs C3	t(618) = 11.563 p < 0.0001 d = 0.46 [0.38 – 0.55]	t(618) = -7.8357 p < 0.0001 d = -0.31 [-0.4 – -0.23]	t(618) = -11.186 p < 0.0001 d = -0.45 [-0.53 – -0.37]	NS
C2 vs C3	t(618) = 7.68 p < 0.0001 d = 0.31 [0.23 – 0.39]	NS	t(618) = -14.742 p < 0.0001 d = -0.59 [-0.68 – -0.51]	t(618) = -6.7187 p < 0.0001 d = -0.27 [-0.35 – -0.19]
Non-responders				
C1 vs C2	t(1084) = -19.54 p < 0.0001 d = -0.59 [-0.66 – -0.53]	t(1084) = -5.4989 p < 0.0001 d = -0.17 [-0.23 – -0.11]	t(1084) = 22.434 p < 0.0001 d = 0.68 [0.61 – 0.75]	t(1084) = 12.256 p < 0.0001 d = 0.37 [0.31 – 0.43]
C1 vs C3	t(772) = -11.035 p < 0.0001 d = -0.4 [-0.47 – -0.32]	t(772) = -12.324 p < 0.0001 d = -0.44 [-0.52 – -0.37]	t(772) = 15.48 p < 0.0001 d = 0.56 [0.48 – 0.63]	t(772) = 10.996 p < 0.0001 d = 0.40 [0.32 – 0.47]
C2 vs C3	t(772) = -8.2263 p < 0.0001 d = -0.3 [-0.37 – -0.22]	t(772) = -3.2237 p = 0.0118 d = -0.12 [-0.19 – -0.05]	t(772) = 13.812 p < 0.0001 d = 0.5 [0.42 – 0.57]	t(772) = 19.408 p < 0.0001 d = 0.7 [0.62 – 0.78]

Table S2: Statistical summary of functional connectivity changes after each tDCS cycle for responder and non-responder patients in each frequency band. Statistical analysis was conducted using Student t-tests with Bonferroni correction for multiple comparisons. Effect size measures are reported, including confidence intervals (CI) for Cohen's d estimates.

	Broadband	Theta	Alpha	Beta	Gamma
	t(dF) pval d(95% CI)	t(dF) pval d(95% CI)	t(dF) pval d(95% CI)	t(dF) pval d(95% CI)	t(dF) pval d(95% CI)
Responder vs Non-Responders					
C1	NS	NS	t(1796) = 3.58 p = 0.003 d = 0.16 [0.07 – 0.25]	t(1505) = -3.53 p = 0.004 d = -0.17 [-0.26 – -0.08]	t(1586) = -7.8 p < 0.0001 d = -0.36 [-0.45 – -0.27]
C2	t(1445) = -16.51 p < 0.0001 d = -0.78 [-0.88 – -0.69]	t(1115) = -9.83 p < 0.0001 d = -0.5 [-0.59 – -0.41]	t(1082) = -10.33 p < 0.0001 d = -0.53 [-0.63 – -0.44]	t(1580) = -22.28 p < 0.0001 d = -1.03 [-1.13 – -0.94]	t(1954) = -4.23 p < 0.0001 d = -0.18 [-0.27 – -0.09]
C3	t(1452) = -8.34 p < 0.0001 d = -0.42 [-0.52 – -0.32]	t(1504) = -16.329 p < 0.0001 d = -0.81 [-1.05 – -0.7]	NS	t(1504) = -4.07 p < 0.001 d = -0.2 [-0.3 – -0.1]	NS
Responders					
C1 vs C2	t(773) = 18.56 p < 0.0001 d = 0.67 [0.59 – 0.74]	t(773) = 6.2 p < 0.0001 d = 0.22 [0.15 – 0.29]	t(773) = 19.33 p < 0.0001 d = 0.69 [0.62 – 0.77]	t(773) = 25.02 p < 0.0001 d = 0.9 [0.82 – 0.98]	NS
C1 vs C3	t(618) = 6.0064 p < 0.0001 d = 0.24 [0.16 – 0.32]	t(618) = 14.05 p < 0.0001 d = 0.56 [0.48 – 0.65]	t(618) = 5.025 p < 0.0001 d = 0.2 [0.12 – 0.28]	NS	NS
C2 vs C3	NS	t(618) = 3.3747 p < 0.0001 d = 0.14 [0.06 – 0.21]	t(618) = -9.559 p < 0.0001 d = -0.38 [-0.47 – -0.3]	t(618) = -10.55 p < 0.0001 d = -0.42 [-0.51 – -0.34]	t(618) = 3.34 p = 0.0078 d = 0.13 [0.06 – 0.21]
Non-responders					
C1 vs C2	NS	t(1084) = -12.19 p < 0.0001 d = -0.37 [-0.43 – -0.31]	NS	t(1084) = 4.48 p < 0.0001 d = 0.14 [0.08 – 0.2]	t(1084) = 4.48 p < 0.0001 d = 0.14 [0.08 – 0.2]
C1 vs C3	t(772) = 8.2 p < 0.0001 d = 0.29 [0.22 – 0.37]	NS	t(772) = 13.818 p < 0.0001 d = 0.5 [0.42 – 0.57]	t(772) = 8.32 p < 0.0001 d = 0.3 [0.23 – 0.37]	t(772) = 8.41 p < 0.0001 d = 0.3 [0.23 – 0.37]
C2 vs C3	t(772) = -6.88 p < 0.0001	t(772) = -10.97 p < 0.0001	t(772) = -5.73 p < 0.0001	t(772) = -6.84 p < 0.0001	t(772) = 4.78 p < 0.0001

$d = -0.25 [-0.32 - -0.18]$	$d = -0.39 [-0.47 - -0.32]$	$d = -0.21 [-0.28 - -0.13]$	$d = -0.25 [-0.32 - -0.17]$	$d = 0.17 [0.1 - 0.24]$
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Figure S1: Head model creation, target identification and montage optimization for one of the patients in the study. (a) Triangulated surfaces of the head model, generated from the segmentation of a head structural T1w-MRI. (b) Identification of Ez and the propagation network in the MRI of the patient. (c) Target to inhibit in the GM surface of the personalized head model of the patient, performed by mapping the target in the MRI to the surface. Regions in blue are assigned to a negative target En-field (-0.25 V/m), with a high weight. Regions in grey are assigned to a 0 V/m target En with a low weight. (d) En-field distribution induced by the optimized montage (electrode currents and positions) in the GM surface (units of V/m). Anodes are shown in red and cathodes in blue.

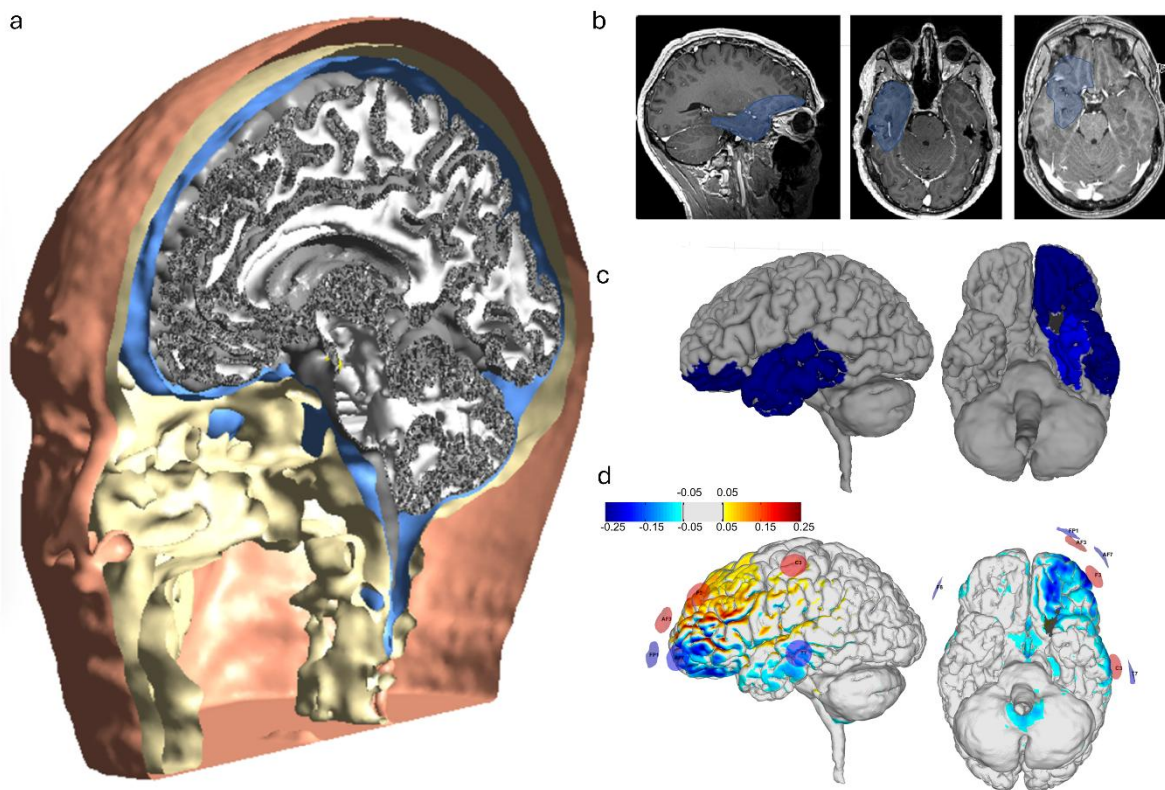
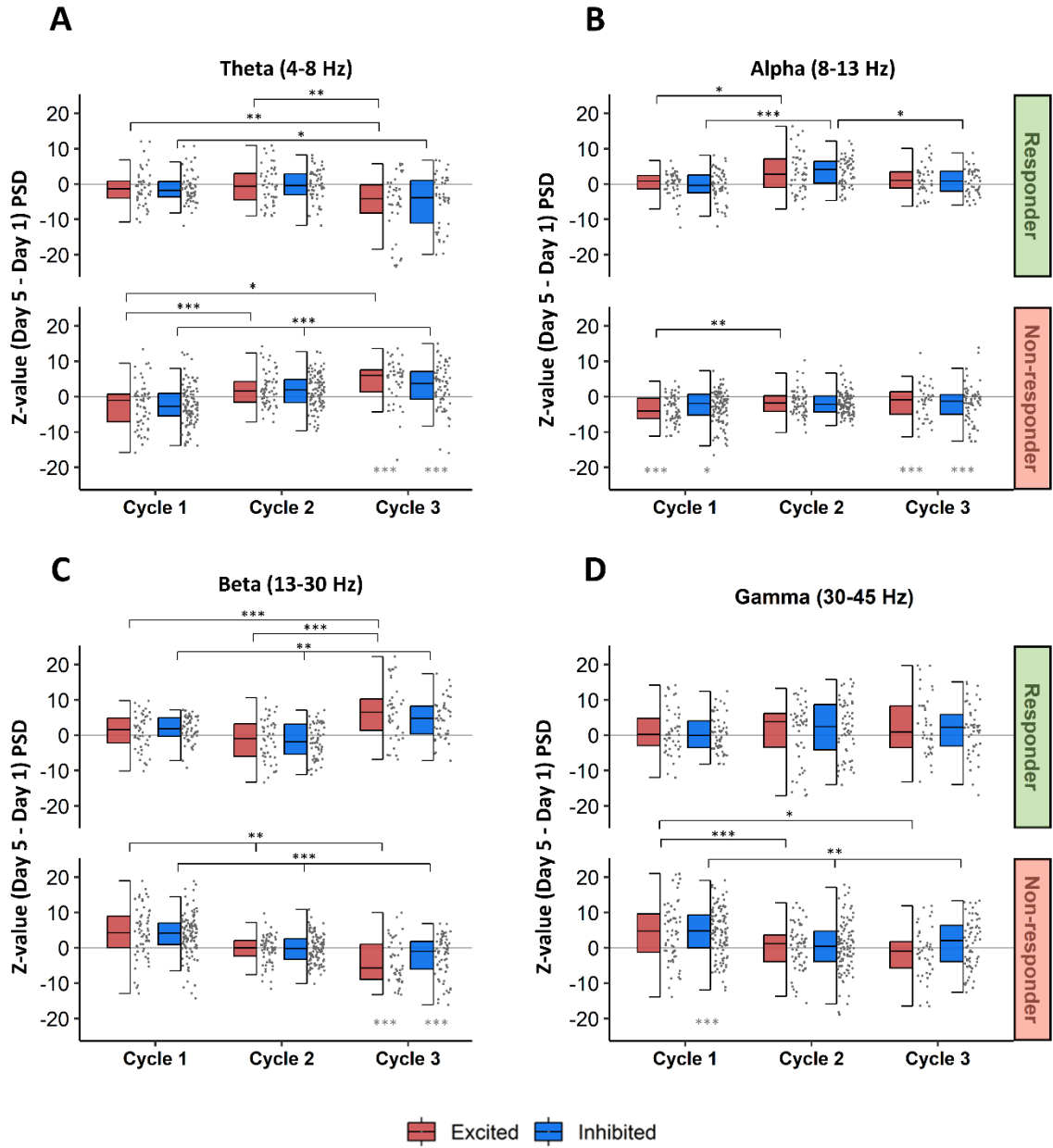


Figure S2. Power spectral changes in specific targeted brain regions under cathodal (inhibited) and anodal (excited) tDCS electrodes: Responder vs. Non-responder patients across tDCS cycles. A. Half-boxplots illustrate PSD induced changes in the theta band after each tDCS cycle at the source level within inhibited brain regions (under cathodal tDCS electrodes in blue) and within excited brain regions (under anodal tDCS electrodes in red) for responder (in green) and non-responder patients (in orange). B. In alpha band. C. In beta band. D. In gamma band. Each data point represents the Z-value of one source region (zero: no spectral power change after tDCS cycle; negative/positive Z-value: decrease/increase of spectral power after tDCS cycle). Grey asterisks represent differences between responder and non-responder groups. P-values were corrected using Bonferroni correction and black bars with asterisks represent the differences between PSD changes occurring in cycles (* $p < 0.01$, ** $p < 0.001$, *** $p < 0.0001$).



FigureS3. Functional connectivity (FC) changes in responder and non-responder patients in sub frequency bands. In panel A violin plots represent FC changes after each tDCS cycle in all brain regions in responder (in green) and non-responder patients (in orange) in alpha, beta and gamma frequency bands. In panel B, half-boxplots illustrate FC changes in alpha, beta and gamma frequency bands after each tDCS cycle within inhibited brain regions (under cathodal tDCS electrodes in blue) and within excited brain regions (under anodal tDCS electrodes in red) for responder and non-responder patients. Each data point represents the Z-value of one source region (zero: no FC change after tDCS cycle; negative/positive Z-value: decrease/increase of FC after tDCS cycle). Grey asterisks represent differences between responder and non-responder groups. P-values were corrected using Bonferroni correction and black bars with asterisks represent the differences between FC changes occurring in cycles (* p < 0.01, ** p < 0.001, *** p < 0.0001).

