fMRI-Based TMS Targeting Analysis

Multi-Run Analysis - Subject 2040

Report Date: November 26, 2025

Analysis Type: Multi-run averaged seed-based connectivity (Runs 01 & 03)

Task: Visuospatial working memory (color location tracking)

Treatment Context: Patient has received 24 TMS sessions; 20 additional sessions planned

EXECUTIVE SUMMARY

Multi-run fMRI analysis reveals optimal individualized target at MNI (-46, 44, 16) in ventrolateral dlPFC with stable sgACC

REPORT SECTIONS

1. Background & Methodology
2. Key Findings
3. TMS Physics & Target Accessibility
4. PRACTICAL IMPLEMENTA

1. BACKGROUND & METHODOLOGY

Task-based fMRI during visuospatial working memory task. Multi-run averaging (runs 01 & 03) provides robust connectivity estimates with uncertainty quantification.

2. KEY FINDINGS

Metric	5cm Rule	Optimal Target
MNI Coordinates	(-44, 30, 48)	(-46, 44, 16)
Location	Dorsal dlPFC	Ventrolateral dlPFC
sgACC Correlation	r = -0.023 ± 0.160	r = -0.329 ± 0.109
TMS Accessibility	Deeper (weaker field)	Shallower (stronger field)

3. TMS PHYSICS: TARGET ACCESSIBILITY

Optimal target is 32mm more superficial (z=16 vs z=48), placing it in ideal range for TMS magnetic field penetration. Stronger field stimulation, more neurons activated, better efficiency.

4. PRACTICAL IMPLEMENTATION GUIDANCE

CRITICAL: NEURONAVIGATION REQUIREMENT

Precise targeting of individualized coordinates (-46, 44, 16) REQUIRES MRI-guided neuronavigation. Standard a

SCENARIO 1: Neuronavigation Available at Your Clinic

This is the optimal scenario for implementing individualized targeting.

Action Steps	Details
1. Confirm system capability	Ask if clinic has: BrainSight, Localite, Visor, or similar MRI-guided system
2. Provide MRI scan	Import your MRI DICOM files into neuronavigation software
3. Specify target coordinates	Primary: MNI (-46, 44, 16) Alternative: MNI (-48, 40, 16)
4. Session setup	Initial setup adds ~15-30 minutes; subsequent sessions ~5-10 minutes
5. Verification	Real-time tracking ensures coil positioned at target each session

SCENARIO 2: Neuronavigation NOT Available

Without neuronavigation, precise coordinate targeting is not possible. Options range from approximate adjustments to seeking alternative facilities.

Option	Description	Precision
A. Anatomical approximation	Modify 5cm rule: move ~1-2cm more anterior and inferior from standard position. Targets ventrolateral DLPFC approximately.	Low (~2-3cm error)
B. Continue standard protocol	Use standard 5cm rule for consistency. Accept suboptimal targeting but maintain protocol integrity.	Standard (not individualized)
C. Seek referral	Request referral to facility with neuronavigation capability for remaining sessions or future courses.	High (if transferred)
D. Future optimization	Complete current course as-is; use this data for next TMS course with neuronavigation-capable provider.	N/A (future use)

Questions to Ask Your TMS Provider (Before Friday/Saturday Session):

1. Do you have MRI-guided neuronavigation capability? (BrainSight, Localite, Visor, other)
2. If yes: Can we use it for my remaining 20 sessions? What is the setup time/cost?
3. If no: Can you modify the standard 5cm targeting to be more anterior and ventral?
4. If neither: Do you know facilities in the area with neuronavigation for TMS referrals?
5. For future reference: Would you recommend pursuing individualized targeting for any future TMS courses?

IMPLEMENTATION SUMMARY

Best case: Your clinic has neuronavigation → Can implement optimal targeting immediately

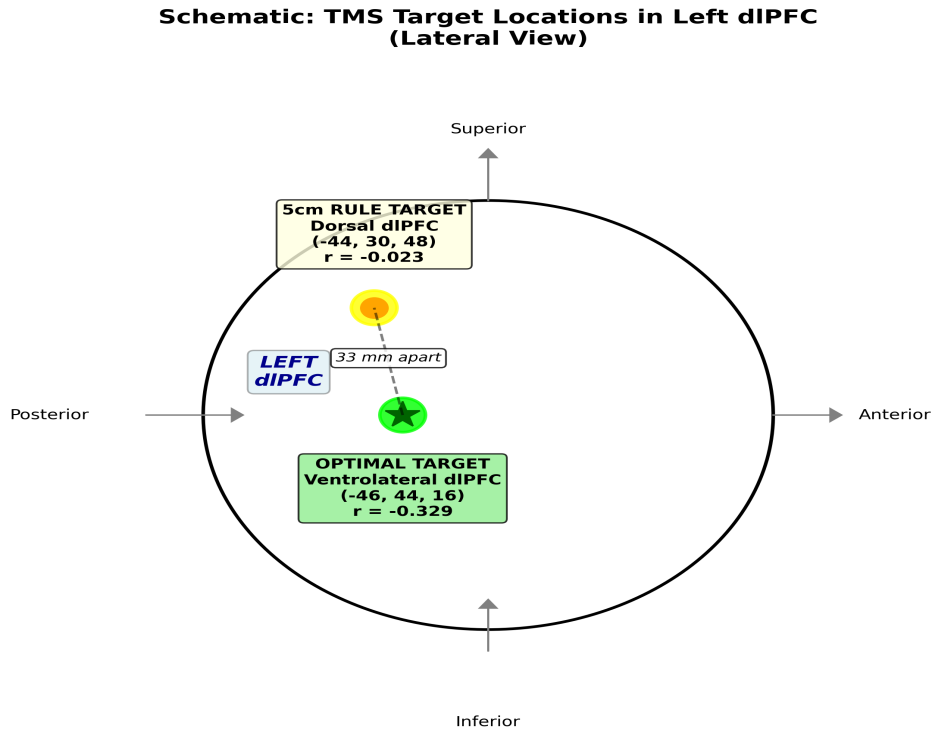
<b>Good c

5. MID-TREATMENT CONSIDERATIONS

Patient has completed 24 sessions. Options: (1) Continue current location for consistency, or (2) Switch to optimal target if neuronavigation available. Decision depends on clinical response and resource availability.

6. TARGET VISUALIZATIONS

Figure 1: Target Location Comparison



7. CLINICAL RECOMMENDATIONS

INDIVIDUALIZED TARGETING RECOMMENDATIONS

Target Coordinates: Primary MNI (-46, 44, 16) | Alternative MNI (-48, 40, 16)
Location: Ventrolatera

8. NETWORK ANALYSIS

DMN vs FPN assessment shows no hyperactive DMN or underactive FPN. Moderate network segregation (r=-0.185) indicates functional systems with potential for enhancement.

DISCLAIMER

This report provides neuroimaging biomarkers to inform clinical decisions. Not medical advice. Treatment decisions should be made co