

Supporting Information

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SI Text 1

According to our measured range of peak magnetic field strength (0.2–0.5 T at a distance of ~15 mm from the coil), the peak induced electric field would be 55–130 V·m⁻¹ in the human brain (1). Importantly, measurements in spherical models of different sizes demonstrated decreasing electric field strength with decreasing brain sizes (2). In this study (2), using a circular coil with similar properties to the one used here, the authors have shown that the electric field strength in a brain of the size of a cat was ~30–50 V·m⁻¹ lower compared with the human brain size (compare their figure 1). Thus, under the given constraints of a sphere, we induced an electric field of 25–80 V·m⁻¹.

Electric fields at 60% Magstim Rapid² output, corresponding to 900 V capacitor voltage (3), were also found to induce motor evoked potentials when transcranial magnetic stimulation (TMS) was applied to cat motor cortex (4).

SI Text 2

To account for variation in signal-to-noise ratio across the image frames and to preserve units (in $\Delta F/F$) across spatial averages,

TMS-induced activity was calculated for each pixel of the region of interest (ROI) as

$$R_i^c = \frac{R_i}{m \cdot std(B_i)} \sum_{i=1}^m std(B_i),$$

where R_i is relative signal of fluorescence in the i th pixel of the TMS condition (mean across trials), m is the number of pixels within the ROI, and $std(B_i)$ is the SD of the relative signal in the i th pixel of the blank condition (first blank subtracted by the mean of the first two blanks) calculated across $f = 100$ frames:

$$std(B_i) = \sqrt{\frac{1}{99} \cdot \sum_{f=1}^{100} (B_f - \bar{B}_i)^2}.$$

Finally, a low-pass Gaussian filter with $\sigma = 250 \mu\text{m}$ was used for spatial smoothing of the activation distributions.

1. Hovey C, Jalinous R (2006) *The Guide to Magnetic Stimulation* (The Magstim Company, Whitland, UK).
2. Weissman JD, Epstein CM, Davey KR (1992) Magnetic brain stimulation and brain size: Relevance to animal studies. *Electroencephalogr Clin Neurophysiol* 85(3):215–219.

3. The Magstim Company, Ltd. (2011) *MAGSTIM RAPID² PIN MOP03-EN-01 Operating Manual* (The Magstim Company, Whitland, UK).
4. Fujiki M, Isono M, Hori S (1990) Spinal and muscle motor evoked potentials following magnetic stimulation in cats. *Neuro Med Chir* 30(4):234–241.

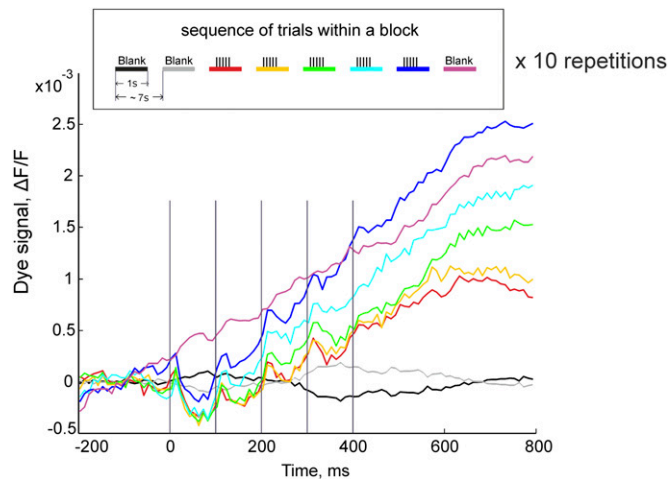


Fig. S1. Seconds to minutes buildup of TMS-induced excitatory cortical state upon 10 Hz repetitive TMS (rTMS). Data shown in Fig. 1D were averaged separately for each consecutive trial (different colors) and across 10 block repetitions (one experiment). Vertical lines depict time of TMS pulses. Data were normalized to the first two blanks. Note that induced cortical activity increased with every trial (interstimulus time ~7 s). The last blank (final trial without TMS pulses) showed monotonous increase of spontaneous activity reaching levels comparable to the preceding TMS-induced activity.

