APPENDIX

The overall current flow caused by any transcranial electric stimulation is complex, and the convergence of factors influences variation among individuals. To elucidate how the cerebellum was stimulated in this study, we simulated the electrical field produced by tACS using MRI-derived finite-element models of transcranial electrical stimulation. We calculated the current flow using the workflow of commercial simulation packages (COMSOL Multiphysics, Burlington, MA, USA; Simpleware, Synopsys, Mountain View, CA, USA) and customized algorithms. T1-weighted MRI of one of the participants (68 years, Yahr scale=3) was segmented into tissues with varying electrical conductivities. Two electrode configurations were modeled according to the procedure used in this study (right cerebellum – right neck). Tetrahedral meshes were generated using Simpleware and imported into the finite element package (COMSOL 5.1). The electrical properties of the tissues were assigned representative isotropic average values (in S/m): gray matter = 0.276, white matter = 0.126, CSF = 1.65, skull = 0.11, fat = 0.025; and scalp = 0.465. The muscle, eyes, and blood vessel compartments were assigned the same tissue properties as those of the scalp. The sponge electrodes were assigned the electrical conductivity of saline (σ= 1.4 S/m), and the stimulation electrodes were modelled as conductors (σ= 5.8 * 107 S/m). Physics were assumed to be quasi-static (∇·(σ∇V) =0). Boundary conditions were applied as electrical insulation on all external surfaces (n · J = 0), excluding the ground (V = 0) on the...
reference electrode and an inward current density equal to 1 mA on the active electrode. Finally, we calculated the induced electric fields in the brain and spinal cord resulting from a total current of 1 mA.

The prediction of brain current flow was shown in tACS on the cerebellum with the counter electrode at the opposite neck. A peak electric field was produced in the cerebellum at the counter electrode positions used in this study. The montages were designed with the cerebellum on the severe side as the common stimulated region.

FIGURE LEGEND

Spatial distribution of the normalized electric field calculated using the SimNIBS pipeline. A 5 × 5 cm electrode, 3 cm right/left lateral from the inion, and the reference electrode were placed on the posterior neck on the opposite side of the stimulus electrode.
