

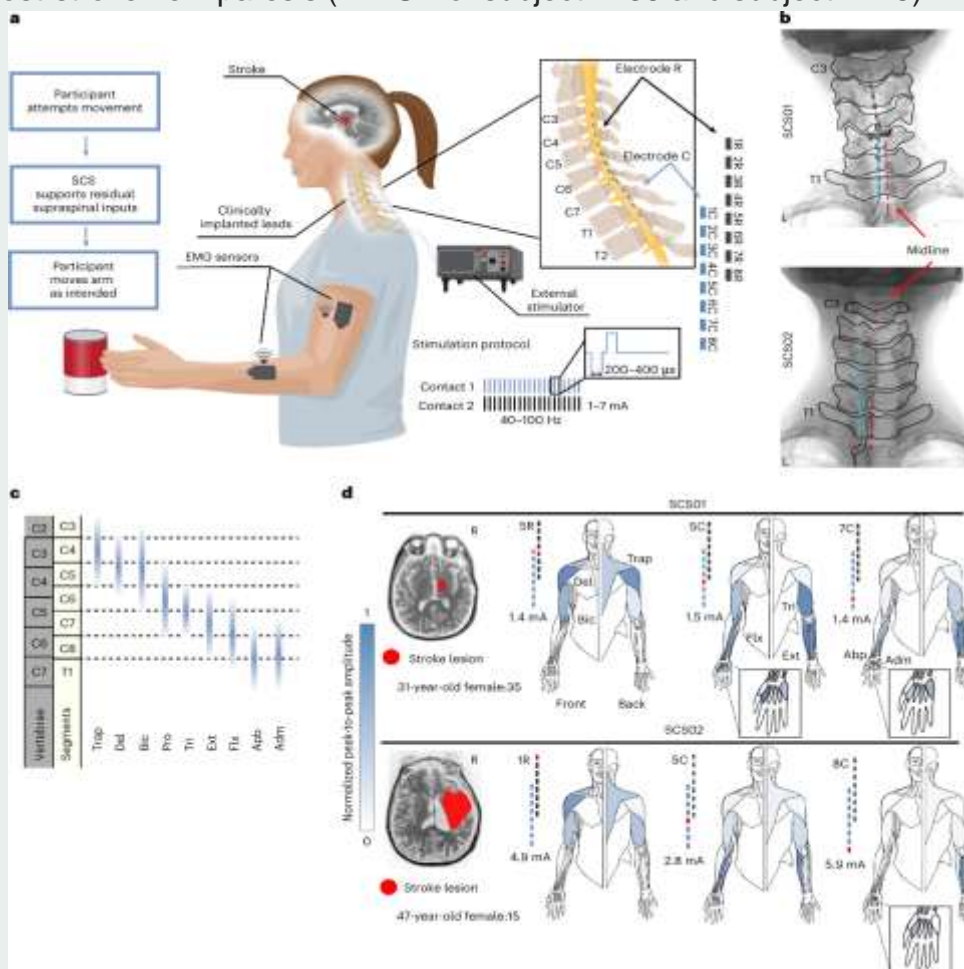
## RESEARCH SPOTLIGHT

## BRAIN MODULATION FOR NEURORECOVERY

Single pulses of electrical spinal cord stimulation (SCS) are approved technology by the FDA for certain medical applications.: Powell *et al.* in February's *Nature Medicine* show that continuous SCS targeting cervical dorsal roots resulted in immediate improvement in upper-limb strength, motor control and function in two individuals with moderate-to-severe post-stroke hemiparesis (FM-UE of subject 1: 35 and subject 2: 15).

They found that SCS activate spinal motoneurons by recruiting primary afferents, which provide excitatory input to motoneurons and interneurons that are directly connected to these afferents.

In addition, the methodology used in this publication quantifies the immediate ability of SCS to recruit arm and hand muscles and produce distinct kinematic movements during two-dimensional and 3D reaching and grasping tasks.



Powell, M. P., et al. (2023). Epidural stimulation of the cervical spinal cord for post-stroke upper-limb palsy. *Nature Medicine*, 1-11.

### Upcoming Events

#### Cognitive Neuroscience Society 30th Annual Meeting

25-28 March 2023, San Francisco, USA  
[www.cogneurosociety.org](http://www.cogneurosociety.org)

#### Fourth International Congress on Neurorehabilitation and Neural Repair

31 May - 2 June 2023  
Maastricht, The Netherlands  
[www.neurorehabrepair.eu](http://www.neurorehabrepair.eu)

#### Organisation for Psychological Research in Stroke Annual Conference

4 July 2023, Nottingham, UK  
<http://opsyris.org/>

#### International society for Physical Medicine Rehabilitation

4 June to 8 June, Cartagena, Columbia  
<https://isprm2023.org/>

#### European Congress of Neurorehabilitation

30 August - 2 September 2023  
Lyon, France  
<https://efnr-congress.org/>

## Young WFNR

Join the Young WFNR SIG by contacting the Chair of the WFNR Young WFNR Special Interest Group, Dr Elia Fischer,  
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## Select Recent Publications of Brainmodulation for Neurorehabilitation

ID	TYPE*	TOOL	DISEASE	CITATION
1	1	tDCS	Stroke	Unger, R. H., Lowe, M. J., Beall, E., Bethoux, F., Jones, S. E., Machado, A., ... & Cunningham, D. A. (2023). Stimulation of the premotor cortex enhances inter-hemispheric functional connectivity in association with upper limb motor recovery in moderate-to-severe chronic stroke. <i>Brain Connectivity</i> .
2	1	rTMS	Stroke	Wang, T., Liu, Z., Gu, J., Tan, J., & Hu, T. (2022). Effectiveness of soft robotic glove versus repetitive transcranial magnetic stimulation in post-stroke patients with severe upper limb dysfunction: A randomised controlled trial. <i>Frontiers in Neurology</i> , 13.
3	1	tDCS	Stroke	Wessel, M. J., Draaisma, L. R., Durand-Ruel, M., Maceira-Elvira, P., Moyne, M., Turlan, J. L., ... & Hummel, F. C. (2023). Multi-focal stimulation of the cortico-cerebellar loop during the acquisition of a novel hand motor skill in chronic stroke survivors. <i>The Cerebellum</i> , 1-14.
4	1	tDCS	Stroke	Garrido, M., Álvarez, E., Acevedo, F., Moyano, Á., Castillo, N., & Ch, G. C. (2023). Early transcranial direct current stimulation with modified constraint-induced movement therapy for motor and functional upper limb recovery in hospitalized patients with stroke: A randomized, multicentre, double-blind, clinical trial. <i>Brain Stimulation</i> , 16(1), 40-47.
5	1	rTMS	Stroke	Katai, S., Maeda, M., Katsuyama, S., Maruyama, Y., Midorikawa, M., Okushima, T., & Yoshida, K. (2023). Cortical reorganization correlates with motor recovery after low-frequency repetitive transcranial magnetic stimulation combined with occupational therapy in chronic subcortical stroke patients. <i>Neuroimage: Reports</i> , 3(1), 100156.
6	1	DBS	Parkinson's disease	Trenado, C., Boschheidgen, M., N'Diaye, K., Schnitzler, A., Mallet, L., & Wojtecki, L. (2023). No effect of subthalamic deep brain stimulation on metacognition in Parkinson's disease. <i>Scientific Reports</i> , 13(1), 10.
7	1	TUS	Healthy	Ren, L., Zhai, Z., Xiang, Q., Zhuo, K., Zhang, S., Zhang, Y., ... & Sun, J. (2023). Transcranial ultrasound stimulation modulates the interhemispheric balance of excitability in human motor cortex. <i>Journal of Neural Engineering</i> .
8	1	TMS	SCI	Grover, F. M., Chen, B., & Perez, M. A. (2023). Increased Paired Stimuli Enhances Corticospinal-Motoneuronal Plasticity in Humans with Spinal Cord Injury. <i>Journal of Neurophysiology</i> .
9	1	rTMS	Stroke (PTSD)	Jiang, C., Li, Z., Wang, J., Liu, L., Luo, G., & Zheng, X. (2023). Effectiveness of repetitive transcranial magnetic stimulation combined with a brief exposure procedure for post-stroke posttraumatic stress disorder. <i>Journal of Affective Disorders</i> .
10	1	rTMS	Stroke	Huo, C., Xu, G., Xie, H., Zhao, H., Zhang, X., Li, W., ... & Li, Z. (2023). Effect of High-Frequency rTMS Combined with Bilateral Arm Training on Brain Functional Network in Patients with Chronic Stroke: An fNIRS study. <i>Brain Research</i> , 148357.
11	2	NIBS	Stroke	Chen, Y., Yang, L., Li, X., Tang, L., Pi, Y., & Bai, D. (2023). Non-invasive brain stimulation for limb motor function and daily living activity improvement in acute stroke: A meta-analysis. <i>Journal of Stroke and Cerebrovascular Diseases</i> , 32(4), 106982.
12	2	NIBS+CIMT	Stroke	Abdullahi, A., Wong, T. W., Van Criekinge, T., & Ng, S. S. (2023). Combination of Non-invasive Brain Stimulation and Constraint Induced Movement Therapy in patients with Stroke: A Systematic Review and Meta-analysis. <i>Expert Review of Neurotherapeutics</i> .
13	2	tDCS	Stroke	Xie, J., Zhou, C., Ngaruwenayo, G., Wu, M., Jiang, X., & Li, X. (2023). Dosage consideration for transcranial direct current stimulation in post-stroke dysphagia: A systematic review and network meta-analysis. <i>Frontiers in Neurology</i> , 14.
14	2	MRI	Stroke	Liew, S. L., Schweighofer, N., Cole, J. H., Zavaliangos-Petropulu, A., Lo, B. P., Han, L. K., ... & Thompson, P. M. (2023). Association of Brain Age, Lesion Volume, and Functional Outcome in Patients With Stroke. <i>Neurology</i> .
15	2	TMS	Neurological disorders	Vucic, S., Chen, K. H. S., Kiernan, M. C., Hallett, M., Benninger, D., Di Lazzaro, V., ... & Chen, R. (2023). Clinical diagnostic utility of transcranial magnetic stimulation in neurological disorders. Updated report of an IFCN committee. <i>Clinical Neurophysiology</i> .
16	3	rTMS	Method	Brihmat, N., Allexandre, D., Bayram, M. B., Saleh, S., Guan, X., Yue, G. H., ... & Forrest, G. F. (2023). Safety and effects of a therapeutic 15 Hz rTMS protocol administered at different suprathreshold intensities in able-bodied individuals. <i>Journal of Neurophysiology</i> , 129(1), 56-65.
17	3	NIBS	Method	Therrien-Blanchet, J. M., Ferland, M. C., Badri, M., Rousseau, M. A., Merabtime, A., Boucher, E., ... & Théoret, H. (2023). The neurophysiological aftereffects of brain stimulation in human primary motor cortex: a Sham-controlled comparison of three protocols. <i>Cerebral Cortex</i> , bhad021.

1 = Experimental, 2 = Review, 3 = Methodology