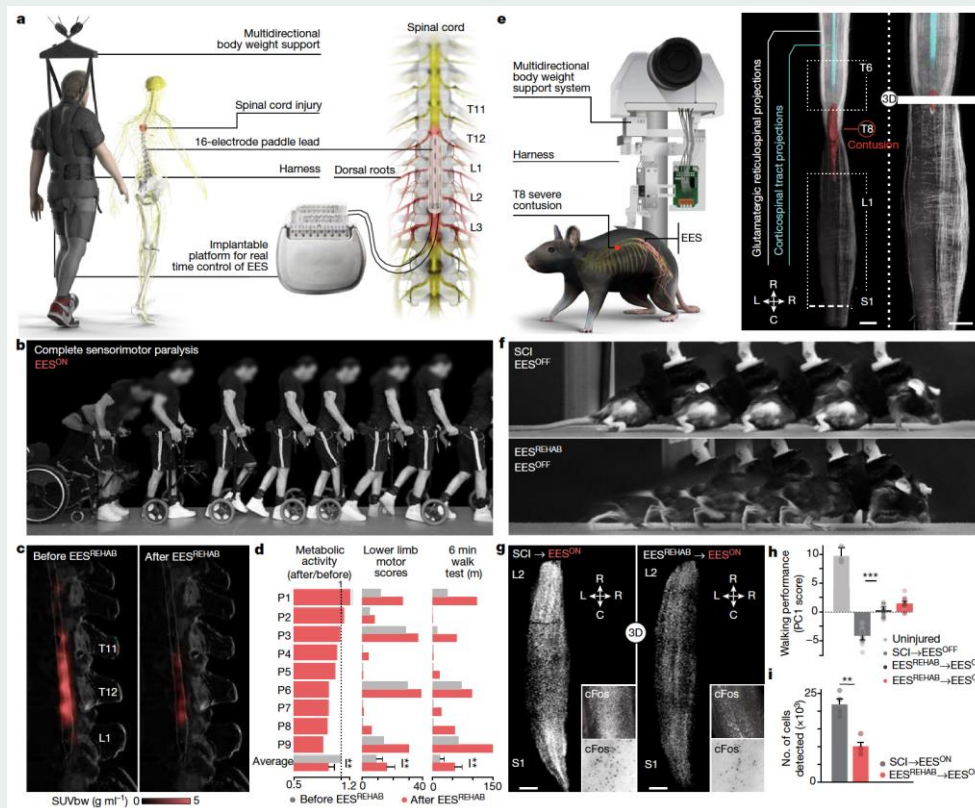


## Quarterly Newsletter

## BRAIN MODULATION FOR NEURORECOVERY

**Recovery-organizing neuronal subpopulation in the spinal cord that is necessary and sufficient to regain walking after paralysis:** Kathe *et al.* in November's Nature journal show that spatiotemporal epidural electrical stimulation (EES) of the lumbar spinal cord applied during neurorehabilitation (EES<sup>REHAB</sup>) restored walking in nine individuals with chronic spinal cord injury, that involved a reduction in neuronal activity in the lumbar spinal cord of humans during walking. They found that a single population of excitatory interneurons nested within intermediate laminae are essential for the recovery of walking with EES following spinal cord injury. Augmenting the activity of these neurons

phenocopied the recovery of walking enabled by EES<sup>REHAB</sup>, whereas ablating them prevented the recovery of walking that occurs spontaneously after moderate spinal cord injury. Additionally, the methodology used in this publication establishes a framework for using molecular cartography to identify the neurons that produce complex behaviors.



Kathe C, Skinnider MA, Hutson TH, Regazzi N, Gautier M, Demesmaeker R, et al. The neurons that restore walking after paralysis. *Nature*. 2022;611:540-547

### Upcoming events

#### 12th World Congress for Neurorehabilitation

14-17 December 2022, Vienna, Austria

<http://www.wfnr-congress.org>

#### the 5<sup>th</sup> international brain stimulation conference

18-22, February, Lisbon, Portugal

<https://www.elsevier.com/events/conferences/international-brain-stimulation-conference>

#### Advances in Stroke Recovery - Scientific Conference

23-25 January 2023, Digital

<https://strokerecoveryconference.ca/>

#### First WFNR International Global Neurosurgery Conference

10-12 March 2023, Peshawar, Pakistan

[www.gnc2023.pk](http://www.gnc2023.pk)

#### ASNR Annual Meeting

14-16 March 2023, Charleston, USA

[www.asnr.com](http://www.asnr.com)

#### World Coma Day

22 March 2023

<https://www.neurocriticalcare.org/events/worldcomaday>

#### The 17th World Congress on Controversies in Neurology (Cony)

23-25 March 2023, Dubrovnik, Croatia

<https://cony2023.comtecmed.com/>

#### Cognitive Neuroscience Society (CNS) 30th Annual Meeting

25-28 March 2023, San Francisco, USA

[www.cogneurosociety.org](http://www.cogneurosociety.org)

## Select Recent Publications of Brainmodulation for Neurorehabilitation

ID	TYPE*	TOOL	DISEASE	CITATION
1	1	HD-tiPNS	Back pain	Adhia, D. B. et al. High-Definition Transcranial Infralow Pink-Noise Stimulation Can Influence Functional and Effective Cortical Connectivity in Individuals With Chronic Low Back Pain: A Pilot Randomized Placebo-Controlled Study. <i>Neuromodulation</i> , doi:10.1016/j.neurom.2022.08.450 (2022).
2	1	Nerve stim. + rTMS	MS	Atak Cakir, P., Mutluay, F., Hanoglu, L. & Guzelburc, V. Effect of transcutaneous posterior tibial nerve stimulation and repetitive transcranial magnetic stimulation on neurogenic overactive bladder symptoms in female patients with multiple sclerosis: The study protocol of a randomized controlled study. <i>Front Neurol</i> 13, 1011502, doi:10.3389/fneur.2022.1011502 (2022).
3	2	SCS	Neuropathic pain	Bakr, S. M. et al. Spinal cord stimulation for treatment of chronic neuropathic pain in adolescent patients: a single-institution series, systematic review, and individual participant data meta-analysis. <i>Neurosurg Focus</i> 53, E13, doi:10.3171/2022.7.FOCUS22330 (2022).
4	2	NIBS	Back pain	Chang, T. T., Chang, Y. H., Du, S. H., Chen, P. J. & Wang, X. Q. Non-invasive brain neuromodulation techniques for chronic low back pain. <i>Front Mol Neurosci</i> 15, 1032617, doi:10.3389/fnmol.2022.1032617 (2022).
5	2	PNS	Neuropathic pain	Char, S. et al. Implantable Peripheral Nerve Stimulation for Peripheral Neuropathic Pain: A Systematic Review of Prospective Studies. <i>Biomedicines</i> 10, doi:10.3390/biomedicines10102606 (2022).
6	1	US + NMES	Lumbar disc herniation	Chen, J., Han, B., Du, J. & Lu, Y. Clinical Evaluation of Efficacy on Ultrasound Combined with Neuromuscular Electrical Stimulation in Treating Lumbar Disc Herniation. <i>Comput Math Methods Med</i> 2022, 1822262, doi:10.1155/2022/1822262 (2022).
7	1	NM + tDCS	Cervical radiculopathy	Chen, Z., Zhang, W., Yu, Y. & Tan, T. A retrospective comparative cohort study of the effects of neural mobilization (NM) alone and NM combined with transcranial direct current stimulation in patients with cervical radiculopathy. <i>Ann Palliat Med</i> 11, 2961-2967, doi:10.21037/apm-22-746 (2022).
8	1	VNS + Rehab	Stroke	Dawson, J. et al. Vagus Nerve Stimulation Paired With Rehabilitation for Upper Limb Motor Impairment and Function After Chronic Ischemic Stroke: Subgroup Analysis of the Randomized, Blinded, Pivotal, VNS-REHAB Device Trial. <i>Neurorehabil Neural Repair</i> , 15459683221129274, doi:10.1177/15459683221129274 (2022).
9	2	NIBS	Movement disorders	Grippe, T., Desai, N., Arora, T. & Chen, R. Use of non-invasive neurostimulation for rehabilitation in functional movement disorders. <i>Front Rehabil Sci</i> 3, 1031272, doi:10.3389/fresc.2022.1031272 (2022).
10	2	rTMS	Stroke	Hildesheim, F. E. et al. Predicting Individual Treatment Response to rTMS for Motor Recovery After Stroke: A Review and the CanStim Perspective. <i>Front Rehabil Sci</i> 3, 795335, doi:10.3389/fresc.2022.795335 (2022).
11	1	tPBM	MCI	Papi, S. et al. The effect of transcranial photobiomodulation on cognitive function and attentional performance of older women with mild cognitive impairment: a randomized controlled trial. <i>Prz Menopauzalny</i> 21, 157-164, doi:10.5114/pm.2022.119794 (2022).
12	1	TMS + SCS	SCI	Pulverenti, T. S., Zaaya, M., Grabowski, E., Grabowski, M. & Knikou, M. Brain and spinal cord paired stimulation coupled with locomotor training facilitates motor output in human spinal cord injury. <i>Front Neurol</i> 13, 1000940, doi:10.3389/fneur.2022.1000940 (2022).
13	2	TMS	Stroke	Qi, S. et al. Applying transcranial magnetic stimulation to rehabilitation of poststroke lower extremity function and an improvement: Individual-target TMS. <i>Wiley Interdiscip Rev Cogn Sci</i> , e1636, doi:10.1002/wcs.1636 (2022).
14	2	rTMS	Alzheimer's	Saitoh, Y. et al. Randomized, sham-controlled, clinical trial of repetitive transcranial magnetic stimulation for patients with Alzheimer's dementia in Japan. <i>Front Aging Neurosci</i> 14, 993306, doi:10.3389/fnagi.2022.993306 (2022).
15	2	SCS	SCI	Shackleton, C. et al. When the whole is greater than the sum of its parts: a scoping review of activity-based therapy paired with spinal cord stimulation following spinal cord injury. <i>J Neurophysiol</i> 128, 1292-1306, doi:10.1152/jn.00367.2022 (2022).
16	2	DRG Stim.	Phantom limb pain	Srinivasan, N., Zhou, B. & Park, E. Dorsal Root Ganglion Stimulation for the Management of Phantom Limb Pain: A Scoping Review. <i>Pain Physician</i> 25, E1174-E1182 (2022).
17	2	tDCS	Fibromyalgia	Teixeira, P. E. P. et al. The Analgesic Effect of Transcranial Direct Current Stimulation in Fibromyalgia: A Systematic Review, Meta-Analysis, and Meta-Regression of Potential Influencers of Clinical Effect. <i>Neuromodulation</i> , doi:10.1016/j.neurom.2022.10.044 (2022).
18	2	Various	Painful diabetic neuropathy	Wang, E. J., Berninger, L. E., Komargodski, O. & Smith, T. J. Painful Diabetic Neuropathy - Spinal Cord Stimulation, Peripheral Nerve Stimulation, Transcutaneous Electrical Nerve Stimulation, and Scrambler Therapy: A Narrative Review. <i>Pain Physician</i> 25, E1163-E1173 (2022).

\* 1 = Experimental, 2 = Review

# Open position for a post-doctor fellow

- Opening at Neuromodulation and Stroke Recovery Lab at Duke University School of Medicine.
- Salary follows National Institute of Health guideline
- Candidate should meet at least 3 out of 5 the following qualifications
  - *Proficient English in both oral and writing*
  - *Good communication skill with experience working with stroke patients*
  - *Experience with non-invasive brain stimulation tools, including but not limit to transcranial direct current stimulation, transcranial magnetic stimulation or ultrasonic stimulation.*
  - *Experience with imaging research either in structural or function MRI*
  - *Experience with EEG*
- If interested, Please contact [wayne.feng@musc.edu](mailto:wayne.feng@musc.edu)

