SCITrialsFinder.net - SCI Trials of Rehabilitation and Technological Interventions to Improve Functional Outcomes

Revised June 1, 2022 - Listing of 151 Trials

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT05390853	Montecatone Rehabilitation Institute S.p.A.	Active tDCS Versus Sham tDCS for Upper Limb Recovery in Incomplete Tetraplegic Patients	Age 18-74 years AIS B-D Sci level C3-C7 Traumatic SCI NO implanted devices NO history of epilepsy NO mechanical ventilation NO history of psychotic disorders	Not yet recruiting	30	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Parallel Assignment Masking: Triple (Participant, Investigator, Outcome Assessor)	Technology	Arm/hand function	• MAS • GRASSP F/U 10 weeks	September 2022	May 25, 2022	May 31, 2022	Imola, BO, Italy
NCT05386537	Kessler Foundation	Combining Wearable Robotic Orthosis With Visual and Haptic Feedback to Enhance the Recovery of Upper Extremity Motor Function and ADL in Persons With Acute SCI	Age 18-80 years AIS C-D <3 months after SCI ability to activate forearm muscles medically stable NO excessive spasticity in elbow NO history of neurologic disorder other than SCI NO severe psychiatric disorders NO history of tinnitus	Recruiting	20	Phase: Early Phase 1 Primary Purpose: Treatment Intervention Model: Factorial Assignment Masking: Single (Participant)	Technology	Arm/hand function	• Range of motion arms and hands • sEMG • GRASSP F/U 10 weeks	April 2021	May 23, 2022	May 27, 2022	West Orange, NJ, USA
NCT05376449	HealthPartners Institute	The Effect of an Adaptive Exercise Program on Chronic Inflammation in Spinal Cord Injury	Age 18-70 >6 months after SCI adequate ramge of motion in elbow and wrist NO cognitive impairement NO causes for shortness of breath NO severe/unstable/uncontrolled autonomic dysreflexia	Recruiting	20	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Parallel Assignment Masking: None (Open Label)	Rehabilitation	General health	• Inflammatory biomarkers (CRP, IL-6, TNF-alpha) F/U 12 weeks	May 2022	May 17, 2022	June 21, 2022	Saint Paul, MN, USA
NCT05369520	University of British Columbia	Noninvasive Spinal Cord Stimulation for Recovery of Autonomic Function After Spinal Cord Injury	Age 18-60 SCI level C1-T6 AIS A-B Traumatic SCI >1 year impaired lower urinary tract, bowel, sexual function NO History of cardiovascular, respiratory, bladder, or renal disease unrelated to SCI or presence of hydronephrosis or presence of obstructive renal stones NO history of seizures/epilepsy or recurring headache NO history of GI atresia or stenosis NO implanted metal (other than dental)	Not yet recruiting	30	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Parallel Assignment Masking: None (Open Label)	Technology	General health	• sEMG • HUTT • DARS • ARM • CBF • VFT • SCW F/U 30 weeks	October 2022	May 11, 2022	May 11, 2022	Vancouver, BC, Canada
NCT05337982	Ohio State University	Treadmill walking in combination with electrical stimulation applied to the trunk and legs	• Age 18-85 years • AIS A-D • SCI level C1-T10 • Discharched from inpatient rehabilitation • NO other neurological condition • NO implanted medical devices F/U: 16 weeks	Recruiting	49	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double (Care Provider, Outcomes Assessor)	Technology	Standing/ Walking/ Mobility	• 10 MWT • 6MWT • ISNCSCI • SCIM • NPSI • ISAFSCI • strength • range of motion • AIS F/U 16 weeks	May 2022	April 20, 2022	April 20, 2022	Columbus, OH, USA
NCT05333770	Kessler Foundation	Evaluate the safety, efficacy and feasibility of high-frequency repetitive transcranial magnetic stimulation (HF-rTMS) in patients with subacute spinal cord injury.	Age 18-55 years inpatient: SCI < 8 weeks outpatient: SCI >= 6 months SCI level C2-C6 AIS A-D NO pacemaker NO metal in the skull NO history of seizures or brain inury	Recruiting	20	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• GRASSP • Neuro Recovery Scale [NRS] F/U: 6 months	June 2022	April 19, 2022	April 19, 2022	West Orange, NJ, USA
NCT05321017	Medical University of South Carolina	Effect of transcranial magnetic stimulation (TMS) on upper extreminity function.	Age > =18 years SCI level at or above C6 SCI > 6 months weak wrist extension NO cognitive impairment NO implanted device	Recruiting	5	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Arat • MAS • BBT • GRASSP • MMT • FMA F/U 2.5 months	October 2021	April 11, 2022	April 11, 2022	Charleston, SC, USA
NCT05317832	Temple University	Evaluate a sensor-enabled, just-in-time adaptive intervention (JITAI) strategy to increase and sustain physical activity levels among individuals with spinal cord injury (SCI) in their communities.	Age 18-75 SCI >= 6 months SCI C5 or below	Not yet recruiting	196	Phase: Phase 2, Primary Purpose: Prevention, Intervention Model: Parallel Assignment, Masking: Single (Participant)	Alternative/Complementary	General Health	• Physical activity: Para-SCI • Pain • Quality of Life F&U 24 weeks	July 2022	April 8, 2022	June 27, 2022	Philadelphia, PA, USA

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NCT05305118	Icahn School of Medicine at Mount Sinai	Safety and feasibility of applying Transcutaneous spinal cord stimulation in acute SCI to prevent the development of BP instability	• Age 18-89 years • traumatic SCI • SCI level NS • AIS NS • SCI <= 1 year	Not yet recruiting	50	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Single Group Assignment Masking: None (Open Label)	Technology	General health	• Sit-up Test - Blood Pressure (BP) • Severity of Dizziness Scale • Sit-up Test - Heart Rate (HR) • Sit-Up Test - Cerebral Blood Flow velocity (CBFv) • Pain Numeric Rating Scale (NPRS) • International SCI Pain Basic Data Set (ISCIPBDS) • Spinal Cord Injury Pain Instrument (SCIPI) • Autonomic Dysreflexia (AD) Symptoms Survey • Orthostatic Hypotension (OH) Symptoms Survey • Number of treatment sessions • Number of exercise sessions in which TSCS is omitted during therapy • Upper Extremity Muscle Strength (UEMS) Testing • Lower Extremity Muscle Strength (LEMS) Testing F/U: 3 weeks	March 2022	March 31, 2022	March 31, 2022	New York, NY, USA
NCT05284201	ONWARD Medical, Inc.	The LIFT Home Study to assess the safety of non-invasive electrical spinal stimulation (ARC Therapy) administered by the LIFT System to treat upper extremity functional deficits in people with chronic tetraplegia	• Age 22-75 years • SCI level C2-C8 • AIS C-D • SCI >= 1 year	Recruiting	25	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Sequential Assignment Masking: None (Open Label)	Technology	General health	• Safety F/U: 6 months	Marh 2022	March 16, 2022	March 31, 2022	Multicenter: USA,
NCT05267951	University of Washington	Assess the efficacy of non-invasive (transcutaneous) closed-loop electrical spinal cord stimulation for recovery of upper limb function (Aim 1) and spasticity (Aim 2) following spinal cord injury.	• Age: 21-70 years • SCI level >= C8 • AIS C-D • SCI >= 1 year	Not yet recruiting	9	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking:Single (Outcome Assessor)	Technology	Arm/Hand Function	• GRASSP • Capabilities of Upper Extremity Test • Grip and Pinch Force • Modified Ashworth Scale F/U: 10 months	March 2022	March 7, 2022	March 7, 2022	Seattle, Washington, USA
NCT05265377	MarsiBionics	analyse the usability of the STELO modular exoskeleton in people with ABI and SCI	• Age 18-85 years • SCI level NS • AIS NS	Not yet recruiting	20	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Single Group Assignment Masking: None (Open Label)	Rehabilitation	General health	• Heart rate • Oxygen saturation • Blood pressure • Skin integrity • Pain (Visual Analogic Scale) • Fall prevalence • Kinematic gait analysis • Muscular activation • Functional Ambulation Categories • WISCI • Timed Up and Go (TUG) • 6MWT • 10MWT • Device malfunction • User perception of the device (QUEST 2.0) • Participant's satisfaction of the device F/U: 6 weeks	August 2022	March 3, 2022	June 2, 2022	Madrid, Spain
NCT05262816	Second Affiliated Hospital of Wenzhou Medical University	The purpose of this study is to clarify the therapeutic effects of different acupoints on different types of bladder	• Age 18-80 years • SCI level suprasacral • AIS NS • voiding dysfunction	Recruiting	34	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Single (Outcome Assessor)	Technology	Bladder health	• Perianal surface electromyography • Detrusor overactivity • Bladder compliance • Maximum cystometric capacity • Maximum urinary flow rate • Maximum detrusor pressure	August 2021	March 2, 2022	March 2, 2022	Wenzhou, Zhejiang, China
NCT05255679	University of Alberta	Effect of early FES cycling on muscle wasting, pain or spasticity after spinal cord injury	• Age 18-85 years • SCI C1-L5 • AIS A-C • acute SCI	Recruiting	36	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single (Participant)	Technology	Standing/ Walking/ Mobility	• ISNCSCI • quality of life • PHQ-9 • WISCI F/U: 3 months	April 2021	February 24, 2022	February 24, 2022	Edmonton, Alberta, Canada
NCT05249595	North Carolina State University	Electromyography-ultrasound imaging-based technique to sense residual voluntary strength in ankle muscles for individuals with neuromuscular disorders	• Age 18-64 years • SCI level: Cervical, thoracic, or lumbar • AIS C-D • sub-acute or chornic SCI	Recruiting	25	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• volitional effort • kinematic • reaction forcees • muscle activation	February 2020	February 16, 2022	February 21, 2022	Raleigh, NC, USA
NCT05221723	Arkansas Colleges of Health Education	6-months of twice weekly group exercise classes aimed and hypothesized to increase physical activity levels, muscular strength, social support for exercise, functional mobility, peak power output, aerobic capacity, and quality of life for people with spinal cord injury	• Age ≥ 18 years • SCI level C5 • AIS A-D	Recruiting	50	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Single Group Assignment Masking: None (Open Label)	Rehabilitation	Arm/Hand Function	• sit-to-stand • short form 36 • 6-MAT • SCI functional index	February 2022	February 3, 2022	April 19, 2022	Fort Smith, Arkansas, USA
NCT05214378	VA Office of Research and Development	The purpose of this study is to determine if bladder emptying can be achieved using stimulation of the sacral roots at certain frequencies.	• Age ≥ 18 years • SCI C1-L5 • Already have a sacral anterior root stimulation (SARS) device implanted	Not yet recruiting	8	Phase: Early Phase 1, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Bladder health	• Urethral sphincter pressure in response to stimulation compared to pressure in absence of stimulation during bladder emptying F/U: 1 day	June 2022	January 28, 2022	March 2, 2022	Cleveland, OH, USA
NCT05210166	University of Castilla-La Mancha	Transcutaneous Spinal Cord Stimulation Combined With Robot-assisted Therapy in Incomplete Spinal Cord Injury Patients.	• Age 18-80 years • AIS C-D • SCI level C4-T11 • SCI 2-6 months	Recruiting	30	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double (Participant, Outcome Assessor)	Technology	Standing/ Walking/ Mobility	• 10 MWT • 6 MinWT • LEMS • Modified Ashworth Test • Contraction strength (dynamometry) • Motor evoked potentials • SCIM • TUG • WISCI II F/U: 4 weeks	March 2021	January 27, 2022	January 27, 2022	Toledo, Spain

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NCT05200091	Centre for Interdisciplinary Research in Rehabilitation of Greater Montreal	4-week mixed training paradigm consisting of explosive strength training and balance perturbation training efficacy on balance control during standing and locomotion, and to understand the mechanisms of neuroplasticity	• Age ≥ 18 years • SCI: C5-T12 • AIS: C-D • SCI ≥ 6 months • be able to stand without support for 15 seconds	Recruiting	36	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Rehabilitation	Standing/ Walking/ Mobility	• EMG responses following balance perturbation • Ankle muscle strength • Transcranial magnetic stimulation (TMS) • Modulation of the H reflex	July 2018	January 20, 2022	January 20, 2022	Montréal, QC, Canada
NCT05196204	Centre for Interdisciplinary Research in Rehabilitation of Greater Montreal	Evaluate trunk task-oriented training (12 weeks) combined with function electrical stimulation (FES/T-TOT) efficacy on sitting balance and functional independence, and to understand the mechanisms of neuroplasticity that would improve functional independence following FES/T-TOT	• Age 18-65 years • SCI C6-T10 • AIS A-D • SCI ≥ 6 months • be able to sit without support for 15 seconds • NOT wear a corset	Recruiting	45	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Rehabilitation	Standing/ Walking/ Mobility	• Function in Sitting Test • Modified Functional Reach Test (lateral and anterior trunk flexion) • EMG activation pattern of electromyographic activity of muscles in the trunk • Center of pressure excursion • Modification of the excitability of the reticulospinal pathway using the acoustic startle response • Modification of the excitability of the vestibulospinal pathway using galvanic vestibular stimulation F/U: 1 month	May 2021	January 19, 2022	January 19, 2022	Montréal, QC, Canada
NCT05183152	University of Texas at Austin	Non-invasive Brain-computer Interfaces (BCI) for Control of Assistive Devices	• Age 18-80 years	Recruiting	40	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Arm/hand function	• BCI command delivery accuracy • fMRI activation for different imagined movements • Stability and separability of Motor Imagery features • Motor-evoked potential amplitude • Electroencephalography functional connectivity	June 2021	January 10, 2022	January 10, 2022	Austin, TX, USA
NCT05180227	VA Office of Research and Development	Targeted Transcutaneous Stimulation of the Spinal Cord to Restore Autonomic Cardiovascular Health in Veterans With Spinal Cord Injury	• Age 21-70 years • Traumatic SCI • SCI: at or above T6 • AIS: A,B or C • SCI ≥ 1 year	Recruiting	10	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Single Group Assignment Masking: Single (Participant)	Technology	General health	• Electrode placement • Amplitude of TSCS to normalize blood pressure • Systolic blood pressure • Concentration of Norepinephrine • Velocity of Arterial stiffness • Concentration of Renin • Concentration of Aldosterone F/U: 2 years	April 2022	January 6, 2022	April 26, 2022	West Orange, NJ, USA; Bronx, New York, USA
NCT05178056	University of Louisville	Spinal Cord Epidural Stimulation (scES) will be administered by a multi-electrode array (5-6-5 SpecifyTM electrode, MEDTRONIC, Minneapolis, MN, USA) previously implanted in the epidural space over the dorsum of the spinal cord. Additionally, respiratory training sessions are performed (eighty 45-minute sessions during 16 weeks)	• Age ≥ 18 years • AIS A • SCI ≥ 24 months • have at least a 15%-deficit in pulmonary function outcomes	Recruiting	30	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Parallel Assignment, Masking: Single	Technology	General health	• Maximum Inspiratory Pressure • Maximum Expiratory Pressure • Surface electromyography (sEMG) Magnitude • Surface electromyography (sEMG) Similarity Index • Forced Vital Capacity • Forced Expiratory Volume in 1 second • Baroreflex sensitivity • Baroreflex Effectiveness Index	December 2021	January 5, 2022	February 7, 2022	Louisville, KY, USA
NCT05176327	The University of Hong Kong	Assess the effects of exoskeleton training on neurogenic bowel disorders in spinal cord injury/ disease.	• Age ≥ 18 years • SCI C4-L3 • AIS D • SCI ≥ 12 months • have a bowel opening via anal route or stoma	Recruiting	10	Phase: Early Phase 1, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Bowel health	• Neurogenic Bowel Dysfunction (NBD) score • Defaecation time (DT) • Frequency of bowel incontinence episodes F/U: 24 weeks	January 2022	January 4, 2022	May 18, 2022	Hong Kong
NCT05167032	University of Minnesota	This is a mechanistic Phase I randomized pilot clinical trial in 16 adults with SCI/D. The investigators will compare the effects of Cognitive Multisensory Rehabilitation (CMR) vs. adaptive fitness on sensorimotor function.	• Age 18-75 years	Recruiting	16	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double (Investigator, Outcome Assessor)	Rehabilitation	Arm/Hand function	• ISNCSCI • Neuromuscular Recovery Scale (NRS) • Spinal Cord Injury Functional Index/Assistive Technology (SCI-FI/AT) • Pain Basic Set • Sleep Quality Index • Anxiety • Patient Health Questionnaire (PHQ-9) • World Health Organization Quality of Life Instruments (WHOQOL-BREF) • Body Awareness Rating Questionnaire • Kinesthetic and Visual Imagery Questionnaire (KVIQ) • Moorong Self-Efficacy Scale (MSES) • Tampa Scale for Fear of Re-Injury • Patient-Specific Functional Scale • Craig Handicap Assessment and Reporting Technique-Short Form (CHART-SF) F/U: 3 months	June 2022	December 22, 2021	June 22, 2022	Minneapolis, Minnesota, USA
NCT05163639	Columbia University	Spinal cord associative plasticity (SCAP) is a combined cortical and spinal electrical stimulation technique developed to induce recovery of arm and hand function in spinal cord injury.	• Age 18-80 years	Recruiting	92	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Arm/Hand function	• hand muscle response to brain stimulation during combined brain and spinal stimulation • pinch force F/U: 30 minutes	September 2021	December 20, 2021	June 3, 2022	New York, NY, USA
NCT05157282	VA Office of Research and Development	Examine the behavioral and physiological effects of TESS on upper-limb muscles after cervical SCI; and 2) Maximize the recovery of reaching and grasping potential by using tailored TESS in a task-specific manner with motor training.	• Age 18-70years • SCI > 1 year • SCI level C8 and above	Recruiting	86	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Single (Participant)	Technology	Arm/Hand function	• GRASSP • MEPs F/U: 6 months	January 2022	December 14, 2021	February 7, 2022	Chicago, IL, USA; Hines, IL, USA
NCT05142943	University of Valencia	The objective of this study is to analyze the effectiveness of visual illusion therapies in combination with conventional exercises on the symptoms and signs related to different pathologies of the nervous and musculoskeletal system that affect the upper limb.	• Age 18-99 years • AIS C-E	Recruiting	80	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double (Participant, Outcome Assessor)	Rehabilitation	Arm/Hand function	• motor function and motor skills • hand coordination • Upper limb isometric force • muscel activation • Pain • Muscle tone • Spasticity • Quality of life • Independence (SCIM)	July 2022	December 3, 2021	January 12, 2022	Valencia, Spain

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NCT05141487	VA Office of Research and Development	This project will demonstrate the feasibility of a new type of nerve stimulation-triggered sacral neuromodulation-to treat NDO in Veterans. A wireless bladder sensor will be inserted into the bladder to transmit a feedback signal enabling stimulation from a percutaneous lead.	• Age >18 years • SCI > 6 months • tolerate lying prone > 1 hour	Not yet recruiting	NA	Phase: Not Applicable, Primary Purpose: NA, Intervention Model: NA, Masking: NA	Technology	Bladder Health	• Time between voids during conditional SNM • Detrusor contraction period during conditional SNM • Voided urine volume during conditional SNM • Urinary incontinence symptom F/U: 2 weeks	October 2022	December 2, 2021	May 6, 2022	Cleveland, OH, USA
NCT05128994	Battelle Memorial Institute	The objective of this study is to advance personalized, portable, and non-invasive hand-grasp neuro-orthoses that restore naturalistic grasp functions for those with tetraplegia due to spinal cord injury (SCI), designed around their needs and preferences.	• Age ≥ 18 years • ≥ 12 months post-SCI and medically/neurologically stable • SCI level C1-C8 • Unable to grasp objects independently with both hands (tetraplegia)	Recruiting	8	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand function	• Feasibility of FES sleeve as a functional orthosis for activities of daily living • Quadriplegia Index of Function (QIF) • System Usability Scale (SUS) • GRASSP • Psychosocial Impact of Assistive Devices Scale (PIADS) • Electromyography (EMG) signal metrics • Number of serious adverse events F/U: 10 weeks	April 2022	November 22, 2021	April 7, 2022	Columbus, OH, USA
NCT05115149	Skolkovo Institute of Science and Technology	The research will jointly use a prototype neurorehabilitation orthosis, in which a robotic device moves a paralyzed arm at the command of a non-invasive brain-computer interface to perform a game life-like task augmented using a virtual-reality display, as well as an electrical stimulation device that activates the spinal cord and/or muscles of the paralyzed arm.	• Age 18-70 years • SCI: C3-C7 • AIS: A or B • After a first occurred acute cerebrovascular accident or in the recovery period after injury of the cervical and upper thoracic spinal cord. • Early or late rehabilitation period of acute cerebrovascular accident by the type of ischemic stroke or the consequences of SCI in the late recovery period	Recruiting	60	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double (Participant, Outcome Assessor)	Technology	Arm/Hand function	• Fugl-Meyer scale for the upper limb • Action Research Arm Test • Accuracy of BCI tasks • Rivermead Mobility Index • Ashworth Spasticity Scale • The Capabilities of Upper Extremity Test • Spinal Cord Independence Measure III • American Spinal Injury Association Impairment Scale • 36-Item Short Form Survey F/U: 6 weeks	October 2021	November 10, 2021	November 10, 2021	Multicenter, Russian Federation
NCT05111093	Ecole Polytechnique Fédérale de Lausanne	The HemON study aims to evaluate the safety and preliminary efficacy of ARC-IM Therapy (Epidural Electrical Stimulation) to improve hemodynamic management and trunk control in people with sub-acute or chronic spinal cord injury (>= 1 month post injury) between C3 and T6 inclusive, who suffer from orthostatic hypotension.	• Age 18-70 years • SCI C3-T6 (inclusive) • SCI ≥ 1month • Confirmed orthostatic hypotension	Recruiting	16	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General health	• Occurrence of Serious Adverse Events and Adverse Events • Orthostatic head-up tilt test • Trunk stability measurement • Modified Ashworth Scale (MAS) • SCIM III F/U: 26 months	November 2021	November 8, 2021	May 6, 2022	Lausanne, Vaud, Switzerland
NCT05103436	University of Alberta	This study examines the immediate and long-term effects of lumbosacral TENS on spasticity and residual voluntary force control in spinal cord injury in comparison to no TENS. Participants in the intervention group will receive 2 months of TENS.	• Age ≥ 18 years • SCI: C5-T12	Not yet recruiting	40	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Spasticity	• Modified Ashworth Score • Knee Pendulum Angle • Manual Muscle Testing • EMG • ISNCSI F/U: 4 months	May 2022	November 2, 2021	April 15, 2022	Alberta, Canada
NCT05094752	Assistance Publique - Hôpitaux de Paris	Effect of tendon vibrations with the Vibramoov™ system on spasticity and sensorimotor recovery in tetraplegic and high paraplegic patients.	• afiliated to the French social security system • Age > 18 years • traumatic SCI at or above T6	Recruiting	40	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double (Participant, Investigator)	Technology	Spasticity	• modified Asworth scale (MAS) • Muscle reaction in the modified Tardieu scale (MTS) • Spinal cord assesment tool for spastic relfexes • Pain • ISNCSCI • SCIM • Montreal conitive assessment (MoCA) F/U: 1 year	October 2012	October 26, 2021	October 26, 2021	Le Kremlin-Bicêtre, France
NCT05094362	Medical University of South Carolina	Validate the capacity of a reflex training system to change the size of the targeted reflex.	• Age >= 18 years • SCI level above T11 • SCI > 1 year • ability to ambulate at least 10 meters with/without assistive device	Not yet recruiting	25	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 10MWT • 6MWT • WISCI • MAS • Berg Balance Scale • FIM • SCI-QOL • muscle strength • Tardieu Scale F/U: 3 months	March 2023	October 26, 2021	May 12, 2022	Charleston, South Carolina, USA
NCT05091463	University of Louisville	Multi-modal training combining activity-based locomotor training and transcutaneous spinal stimulation (ABLT+scTS) to improve sitting posture and trunk control in children with a chronic spinal cord injury.	vAge 3-12 years • SCI > 1year • SCI level T10 or above • moderate to severe trunk control • NO baclofen pump	Enrolling by invitation	12	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Trunk control • Modified Function Reach • Center of Pressure displacement • Angular Excursions of the trunk F/U: 3 months	August 2021	October 25, 2021	October 25, 2021	Louisville, KY, USA
NCT05095454	Kristin Zhao, PhD	A study comparing short-term delivery of epidural spinal stimulation versus transcutaneous spinal stimulation.	• Age >=22 years • trauamtic SCI at or above T10 • AIS A-D • SCI >= 1 year	Recruiting	8	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Kinematics • EMG • Foot pressure • SEPs • MEPs • ISCNSCI • Bowel Function • Bladder function • Sexual function • Spasticity • trunk stability F/U: 5 months	March 2022	October 17, 2021	March 23, 2022	Rochester, MIN, USA
NCT05071885	University of Manitoba	The purpose of this research proposal is the further development and validation of a multipurpose plug-n-play rehab gaming system for use in community centers, in particular, at First Step Wellness center	• Age 20-70 years • 6months < SCI > 2 years • Actively extend at least ten degrees at the metacarpophalangeal and interphalangeal joints, extend ten degrees at the wrist and had at least 30 degrees of active flexion-extension of the elbow and shoulder	Not yet recruiting	64	Phase: Early Phase 1, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Rehabilitation	Arm/Hand function	• Computer game-based Upper Extremity (CUE) assessment of manual dexterity • Wolf motor function test (WMFT) F/U: 10 weeks	October 2021	October 8, 2021	October 8, 2021	Manitoba, Canada

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NCT05061160	Riphah International University	To determine the Acute effects of continuous verses interval aerobic training on autonomic dysreflexia in Spinal Cord injury Patient. To Determine the Acute effects of these training on, Exercise Self efficacy and pain.	• Age 20-50 years • SCI below T10 • acute SCI (<=12 weeks)	Recruiting	26	Phase: Not Applicable, Primary Purpose: Supportive Case, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Rehabilitation	General Health	• Baroreflex sensitivity • Heart rate reserve • Blood pressure • Oxygen saturation • pain • QOL Index - SCI version F/U: 4 weeks	October 2021	September 29, 2021	June 1, 2022	Punjab, Pakistan
NCT05044923	Aaron Phillips	Targeted Epidural Spinal Stimulation. Epidural implantation of two lead electrodes over the dorsal aspect of the spinal cord through two laminotomies. Two implantable pulse generators will be connected to the lead electrodes and implanted in the upper buttocks of the participant.	• Age 18-70y • Level C3-T6 • AIS A-B • SCI > 1y • Confirmed orthostatic hypotension and autonomic dysreflexia	Recruiting	8	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Occurrence of Adverse Events and Serious Adverse Events • Orthostatic head-up tilt test • Daily stimulation log • Echocardiogram (Ejection Fraction, Strain) • Vascular ultrasound • Autonomic Dysfunction Following Spinal Cord Injury (ADFSCI) • ISNCSCI • Respiratory function evaluation (Volume, Flow) • Quality of life questionnaire (WHOQOL-BREF) F/U: 9 months	December 2021	September 16, 2021	December 21, 2021	Calgary, Alberta, Canada
NCT05035823	Synchron Medical, Inc	COMMAND Early Feasibility Study (EFS)	Age 21-75 SCI level C1-C8 severe quadriparesis Have a study partner No allergy to nickel NO history of pulmonary embolism No psychiatric or psychological disorder	Recruiting	6	Phase: Not Applicable Primary Purpose: Device Feasability Intervention Model: Single Group Assignment Masking: None (Open Label)	Technology	General health	• Serious AEs F/U 12 months	April 2022	September 5, 2021	May 18, 2022	New York, NY, USA
NCT04994886	Jocelyne Bloch	Targeted Epidural Spinal Stimulation to manage blood pressure instability	• Age 18 to 70 yrs • SCI level C3 and T6 • AIS A or B • SCI > 1 year • confirmed orthostatic hypotension and autonomic dysreflexia • NO mental illness	Recruiting	8	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Adverse Events and Serious Adverse Events • ISNCSCI • Modified Ashworth Scale (MAS) • Trunk stability • Respiratory function evaluation • Orthostatic head-up tilt test • Autonomic Dysfunction Following Spinal cord injury (ADFSCI) • Quality of Life questionnaire WHOQOL-BREF • Daily Stimulation Log (DSL) F/U: 7 months	June 2021	August 6, 2021	May 26, 2022	Lausanne, Vaud, Switzerland
NCT04977284	University of British Columbia	Non-surgical spinal cord stimulation (DS7R, Digitimer) will be applied and electrical activity of muscles will be recorded.	• Age: 18-65 years • Resident of British Columbia • SCI > 1y • Traumatic SCI • Level above T10 • AIS A or B • NOT be ventilator dependent • NO recent treatment with OnabotulinumtoxinA into the detrusor muscle (relative contraindication). •NO Intrathecal baclofen pump	Not yet recruiting	5	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Activation of spinal circuits (presence of motor evoked potentials or free run surface electromyography) • Safety and efficacy during Urodynamic Testing (UDS) • Safety and efficacy during Anorectal Manometry (ARM) F/U: 4 weeks	September 2021	July 26, 2021	July 26, 2021	No known locations
NCT04977037	The University of Texas Health Science Center, Houston	Transcranial direct current stimulation (tDCS) electrodes will be placed over the primary motor cortex and delivered 20 minutes. Immediately after stimulation ceases, participants will continue with unilateral repetitive arm and finger exercises. Exercise difficulty will gradually be increased and adjusted per participant's tolerance.	• Age: 18-70years • AIS B-D • SCI > 6m • Level C1-C8 • NO contradiction to tDCS • NO chronic use of neuroactive medication (e.g., neurostimulants, anticonvulsants, or antidepressants);	Recruiting	36	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double	Rehabilitation	Arm/Hand Function	• Graded Redefined Assessment of Strength, Sensibility and Prehension (GRASSP) • Adherence with the therapy (attended sessions; drop-outs) • Feasibility of home intervention • Grip Strength • Spinal Cord Injury Independence Measure (SCIM III)-Self Care • Incidence of adverse events F/U: 1 month	July 2021	July 26, 2021	July 26, 2021	Houston, TX, USA
NCT04973852	The University of Texas Health Science Center, Houston	High Intensity Training Using Overground Exoskeletons (Ekso). The locomotor training will be performed with a focus on cardiovascular training parameters	• Age > 18years • AIS C or D • NO uncontrolled spasticity • NO use of mechanical ventilation for respiratory support	Recruiting	20	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Percentage of Heart Rate Reserve Achieved During HIT Gait Training Session • Self Selected Gait Speed as Assessed by the 10 Meter Walk Test (10MWT) • Fast Gait Speed as Assessed by the 10 Meter Walk Test (10MWT) • Walking Endurance as Assessed by the 6 Minute Walk Test (6MWT) • Seated Dynamic Reach as Assessed by the Modified Functional Reach Test • Spatial-Temporal Gait Parameters as assessed by the GAITRite pressure map (step legth, stride length, single support, double support, swing time, stance time) • Metabolic Expenditure during 10MWT and 6MWT, as Assessed by Oxygen Consumption F/U: 12 weeks	August 2021	July 21, 2021	January 21, 2022	Houston, TX, USA
NCT04969042	Luming Li	Implanted of a spinal cord stimulation device (Pins Medical G122 RS) which could give closed-loop functional stimulation in the epidural space	• Age 18-70 years • AIS A, B, C or D • Level T10 and above • SCI > 3 months • Cognitive impairment	Recruiting	10	Phase: Phase 1, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• WISCI III • 10-meter Walking Test • Weight Bearing Capacity F/U: 8 months	August 2021	July 20, 2021	July 20, 2021	Beijing, China
NCT04965727	Jocelyne Bloch	Deep brain stimulation (DBS) surgery: Implanting the lead electrodes (Medtronic SenSight DIrectional Lead) in the right and left lateral hypothalamus through craniotomy and an implantable pulse generator (Medtronic Model B35200 Percept™ PC) in the upper part of the pectoralis major (under the clavicle).	• Age: 18-65 years • AIS C or D • Traumatic SCI • SCI > 12 months • NO cognitive/brain damage • NO epilepsy • NO use of an intrathecal baclofen pump • NO implanted cardiac device such as pacemaker or defibrillator	Recruiting	3	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Occurence of all SAEs and AEs • Lower Extremity Motor Strength • Walking Index for Spinal Cord Injury (WISCI II) • Walking speed (10MWT/6MWT) F/U: 6 months	June 2021	July 16, 2021	October 28, 2021	Lausanne, Switzerland

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04964635	Bournemouth University	Evaluate the performance of the TetraGrip II system in improving the upper limb functions in people with C4-C7 tetraplegia. The Tetragrip system uses a technique called Functional Electrical Stimulation (FES) in which small electrical impulses are used to activate paralysed muscles and hence provide movement. The stimulation is controlled by sensors which measure the movement of the other shoulder and enable the person to regain the use of their hand via stimulating electrodes placed on the skin over the relevant muscles.	• Age > 18years • Level C1-C8 • Able to do shoulder elevation • NO cardiac pacemaker, defibrillator or other sensitive implanted device	Enrolling by invitation	10	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Grasp Release Test (GRT) • Measurement of palmar grip • Measurement of pinch grip • Two Point Discrimination Test F/U: 18 weeks	October 2021	July 16, 2021	November 4, 2021	Salisbury, UK
NCT04921592	Kessler Foundation	transcutaneous stimulation of the upper extremities	• Age >= 18 years • SCI >= 6 months • cervical neurologic level of injury • NOT be ventilator dependent. • NO history of fractures • history of illicit drug abuse • history of cardiac, respiratory, bladder, renal or other medical disorder unrelated to spinal cord injury • NO implanted pump (i.e., baclofen pump, pain pump, etc)	Not yet recruiting	36	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Neuro recovery scale F/U 6 months	June 2021	July 10, 2021	June 14, 2021	No known locations
NCT04914975	Swiss Paraplegic Centre Nottwil	Neuromuscular electrical stimulation will be conducted at home or at the SPC for half an hour about 30 minutes before the usual bowel emptying time. Four adhesive electrodes are attached to the abdominal wall for the neuromuscular electrical stimulation. The abdominal muscles are stimulated in such a way that activation occurs, i.e. the muscle alternately contracts and relaxes again. The stimulation sessions will be documented with a defined protocol. In addition, the stool consistency is rated according to the Bristol Stool Form Scale.	• Traumatic and non-traumatic SCI; > 1 year • SCI C2 - L5 • AIS A/B/C/D • Age ≥ 18 years • NO bladder stimulator • NO Autonomic dysreflexia by application of ES of the abdominal wall • Pregnancy: test in women of childbearing age (15 - 49 years) • NO Opioid use • NO inflammatory bowel disease • NO cancerous tissue in abdominal region • NO inability to follow the study, e.g. mental-health problems, language problems, dementia etc.	Recruiting	20	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Bowel Health	• Neurogenic Bowel Dysfunction Score • Corn Test • Bristol stool form scale • Qualiveen Short Form • ISAFSCI F/U 24 weeks	July 2021	July 7, 2021	February 17, 2022	Nottwil, Switzerland
NCT04910204	University Health Network, Toronto	FES Therapy combined with task-specific training (FEST+TST), Description: The FEST+TST protocol consists of a 1-hour session, 3 to 5 days a week, for up to 12 weeks (40 sessions total) in addition to conventional occupational and physical therapies according to the standard of care.	• Age >18 years • subacute SCI (<3 months) • AIS C or D • cervical SCI	Not yet recruiting	18	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• SCIM • UEMS, UESS • GRASSP • needle EMG • Nerve conduction studies • SSEPs • MEPs • fMRI • laboratory assessments: BDNF, NFT-3	February 2022	July 2, 2021	June 2, 2021	Toronto, Canada
NCT04902482	University College, London	The iCycle Mark 3 is a cycle ergometer, designed to be used by people with SCI while they are seated in their own wheelchairs. The purpose of iCycle is to stimulate the leg muscles in the correct phase for cycling while motivating the person with a Virtual Reality cycling event, perhaps a race, to try to use their muscles.	• Age ≥18 years • SCI above T12 • Incomplete SCI • >12 months post injury • Marginal walker defined as able to rise from a chair, stand for 10 seconds and walk >10 steps without human help (but may use an aid including parallel bars). • NO cardiac pacemaker • NO pressure sores/skin problems • NO pregnancy • NO implanted metal work at electrode site (< 3/12)	Recruiting	6	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Rehabilitation	Standing/ Walking/ Mobility	• ISNCSCI motor score • Trunk Impairment Scale (TIS) score • Walking Index for Spinal Cord Injury (WISCI II) score • 6-minute walk test (6MWT) distance • Threshold of evoked responses to Transcranial Magnetic Stimulation (TMS) • Audio/transcribed feedback from participants from semi-structured interview F/U: 60 min	January 2022	May 26, 2021	February 11, 2022	Stanmore, Middlesex, UK
NCT04894734	Nandan Lad, M.D., Ph.D.	Epidural electrical stimulation (EES), also known as spinal cord stimulation (SCS), is a common FDA-approved therapy for chronic neuropathic pain of trunk and limb.	• Age between 22-65 years • Traumatic SCI • Level T1-T12 • AIS A • Chronic pain (i.e., Pain >3 for > 3 months, on > 50% of the days) • SCI between 1-5-years • NO active infection • NO severe autoimmune disease • NO comorbid neurodegenerative disease	Not yet recruiting	30	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Triple	Technology	General Health	• Multidimensional Pain Inventory (MPI)-SCI average activity score • Motor recovery as measured by EMG • Motor recovery as measured by dynamometry • Pain as measured by 10-point Numeric Rating Scales (NRS) • Quality of Life (QOL) as measured by the Patient-Reported Outcomes Measurement Information System (PROMIS) 29 • Number of prescriptions written as measured by Electronic Health Record abstraction • Overall improvement as measured by Guy/Farrar Patient Global Impression of Change (PGIC) scale • Motor recovery as measured by the Total American Spinal Injury Association (ASIA) motor score • Motor recovery as measured by the ASIA impairment grades • Independence of activities of daily living (ADLs) as measured by the Spinal Cord Independence Measure (SCIM) survey • Limb movement as measured by the Ashworth spasticity scale • Bladder control using urodynamics • Motor recovery as measured by Transcranial Magnetic Stimulation Motor Evoked Potentials (TMS MEPs) • Sensory recovery as measured by Somatosensory Evoked Potentials (SSEPs) F/U: 9 months	June 2022	May 20, 2021	March 31, 2022	No known locations

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04889092	VA Office of Research and Development	Exercise training will consist of blood flow restriction exercise. Specifically blood pressure cuff will be wrapped around the most proximal portion of the thigh and inflated to a pressure that is 80% of the pressure required to completely occlude femoral blood flow. With the cuff inflated the subject will perform a series of knee extension/flexion exercise protocol. This consists of 30 reps, 15 reps, 15 reps and 15 reps all separated by 1 minute of recovery. This will be preformed 20 times over 8 weeks.Comparison to traditional resistance exercise	• Age 18-70 years • AIS C-D • SCI > 1 year • Level between C3-L1 • NO pregnancy • NOT ventilator-dependent • NO chronic inflammatory disease	Recruiting	22	Phase: Not Applicable, Primary Purpose: Supportive Care, Intervention Model: Crossover Assignment, Masking: Single	Rehabilitation	General Health	• Muscle cross sectional area (CTscan) • Muscle strength (biodex dynamometer) • Vascular endothelial function (flow mediated dilation) • Muscle fatigue resistance (% decrease in maximal voluntary torque following fatigue protocol) • Muscle volume (CTscan) • Thrombin / antithrombin complex (blood samples) • Prothrombin fragment 1.2 (marker of coagulation) • Vessel stiffness in the lower limbs (pulse wave velocity) • Interleukin (IL)-Beta (marker of inflammation) • Neutrophil-platelet aggregates • Hypoxia-inducible factor 1-alpha (HIF-1) • Vascular endothelial growth factor (VEGF) • Reactive hyperemia (NIRS and Doppler/ultrasound imaging) • Interferon (marker for inflammation) • C-reactive protein (CRP, marker for inflammation) • Interleukin 6 (marker for inflammation) • NETosis F/U: 56 days	July 2021	May 17, 2021	August 2, 2021	Cleveland, OH, USA
NCT04883463	University of California, Los Angeles	Epidural electrical stimulation implant weekly sessions for 21 months.	• Age 18-75 years • SCI > 1 year • Non-progressive SCI • Level C2-C7 • AIS A-B • Ventilator dependency • NO history of severe autonomic dysreflexia	Recruiting	15	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Incidence of Treatment-Emergent Adverse Events as assessed by CTCAE v4 • ISNCSCI motor and sensory function • Resting Spontaneous Respiratory Activity • Blood Pressure (mm/Hg) • Evaluating Pulmonary Function Throughout the Duration of the Study F/U: 2.5 years	September 2021	May 12, 2021	November 24, 2021	Los Angeles, CA, USA
NCT04881565	University Health Network, Toronto	Reactive balance training. During each one-hour session, participants will experience 40-50 perturbations during standing and/or walking activities. The perturbations will be applied in any direction. To create a perturbation, the researcher will apply unexpected pushes or pulls to a safety harness at waist level. The perturbation will be sufficient in magnitude to elicit a stepping response from the participant. Throughout the session, participants will complete challenging balance tasks, customized to their ability level. Balance tasks will be organized into five categories: stable, quasi-mobile, mobile, unpredictable and participant-selected.	• Age ≥ 18 years • Traumatic SCI • AIS C-D • Level ≥ T12 • SCI > 1 year • Able to stand for >30 seconds without upper limb support or assistance • No contraindications to functional electrical stimulation (FES)	Recruiting	22	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• Berg Balance Scale • mini-Balance Evaluation Systems Test • Activities-specific Balance Confidence Scale • Falls Efficacy Scale - International • Isometric strength of lower extremity muscle groups • Proprioception of the ankle joints • Lean-and-Release Test • Tracking falls F/U: 6 months	September 2021	May 11, 2021	October 4, 2021	Toronto, Canada
NCT04879862	University of Louisville	Epidural stimulation + stand training. Participants will be encouraged to stand for as long as possible throughout the training session, with the goal to stand for 60 minutes with the least amount of assistance. Epidural stimulation + step training. Participants will step at various body weight load and speed. Participants will take a break and rest at any time they feel the need to during the session. Epidural stimulation + bladder capacity training. Daily training for capacity in a supervised on-site lab setting. Epidural stimulation + bladder voiding efficiency training. Voiding without catheterization will be attempted.	• Age > 18 years • Non-progressive SCI • SCI >1 year • Level T1-T10 • Inability to stand and step independently • Unable to voluntarily move all individual joints of the legs • NO current anti-spasticity medication • NOT have received botox injections in the prior six months • Bladder dysfunction as a result of SCI • NOT ventilator dependent	Recruiting	16	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Ambulation • Bladder storage/voiding F/U: 3 months	April 2022	May 10, 2021	May 10, 2022	Louisville, KY, USA
NCT04781621	Baylor Research Institute	Participants will wear an exoskeleton suit and receive robotic gait training with a physical therapist for 90 minutes each week. Robot gait training will include standing and walking activities while wearing a robot suit.	• Age 16 - 70 years • incomplete SCI • Acute/Subacute SCI • NO Traumatic Brain Injury • NO degenerative diagnoses	Recruiting	128	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• Walking Index for Spinal Cord Injury - II (WISCI-II) • Gait speed via 10-Meter Walk Test (10MWT) • Spinal Cord Independence Measure (SCIM) • Numerical Pain Rating Scale (NPRS) • Fatigue Severity Scale (FSS) • Penn Spasm Frequency Scale (PSFS) • Patient Health Questionnaire - 9 (PHQ-9) • General Anxiety Disorder (GAD-7) • International Spinal Cord Injury Quality of Life Basic Data Set • Heart Rate (HR) • Ratings of Perceived Exertion (RPE) • Number of Steps • Patient Perceptual Survey F/U within one week before discharge	April 2021	May 4, 2021	July 2, 2021	No known locations

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04858178	Spaulding Rehabilitation Hospital	This study looks to characterize autonomic nervous system dysfunction after spinal cord injury and identify the potential role that transcutaneous spinal cord stimulation may play at altering neuroregulation. experiments will utilize multiple parallel recordings to identify how the autonomic nervous system is able to inhibit and activate sympathetic signals.	• Age 18-30 years • traumatic SCI • SCI >=1 year • AIS A • SCI level T1-T6 • NO history of cardiovascular disease, hypertension, neurologic disorders, diabetes • NO pregnancy	Recruiting	10	Phase: Not Applicable, Primary Purpose: Diagnostic, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	General Health	• Valsalva Maneuver Phase II • Muscle sympathetic nerve activity • Heart rate • Blood pressure • Galvanic skin response • Autonomic Dysfunction Following Spinal Cord Injury questionnaire • Composite Autonomic Symptom Score F/U 3 months	February 2022	April 26, 2021	February 24, 2022	Charlestown, MA, USA
NCT04855812	Kessler Foundation	To evaluate the usefulness of an upper extremity assistive device, called (MyoPro) in improving upper extremity activities in people with incomplete spinal cord injury (iSCI)	• Age 18-80 years • AIS C-D • SCI >= 1 year • SCI level C1-C8 • NO history of other neurologic disorder or recurrent epilepsy, seizure or convulsion • NO history of treated ringing in the ears known as tinnitus or severe hearing problems	Recruiting	24	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Crossover Assignment, Masking: Quadruple	Rehabilitation	Arm/Hand Function	• Range of motion of hands and arms via double sticky tape. • Muscle strength measurement on the participant's skin via double stick tape. • GRASSP • Spasticity measurement (MAS) • CUE-Q F/U 10 weeks	October 2019	April 22, 2021	May 24, 2022	East Hanover, NJ, USA
NCT04849676	NHS Greater Glasgow and Clyde	Neurofeedback is a neuromodulatory intervention that does not require applying external stimuli. It relies on displaying participants' brain activity in real time, with the aim of modifying it. Electrical activity (EEG) will be recorded from participants and displayed in real time on a computer screen, in the form of three bars. They will be asked to increase the middle bar, while keeping the side bars low. The intervention requires training to achieve voluntary control of the targeted brain activity.	• Aged > 18 years • AIS C-D • SCI <= 6 months and SCI level C3-C7 • SCI <= 6 months and SCI level T1-L1 • SCI >= 1 year and SCI level C3-C7 and live inside Greater Glasgow and Clyde area • SCI >= 1 year and SCI level T1-L1 and live inside Greater Glasgow and Clyde area • NO history of epilepsy	Recruiting	20	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Spasticity	• Modified Ashworth Scale • Functional improvements • SCIM F/U 4 weeks	August 2021	April 19, 2021	April 18, 2022	Glasgow, UK
NCT04821635	UGECAM Rhône-Alpes	Training on a rower with solicitation of the electrostimulated lower limbs and upper limbs	• Paraplegia with traumatic origin • AIS A-B • SCI >= 12 months • NO other associated neurological pathologies (stroke, peripheral neuropathy, myopathy, head trauma, ...)	Recruiting	35	Phase: Not Applicable, Primary Purpose: Prevention, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Rehabilitation	General Health	• VO2 peak at 6 months (L/min) • Ashworth scale • osteotendinous reflexes • Goal Attainment Scaling (GAS) • AIS F/U 9 months	April 2021	March 29, 2021	March 29, 2021	Saint-Didier-au-Mont-d'Or, France
NCT04809987	University of Valencia	Virtual Gait vs. Physical Exercise	• AIS C, D or E	Recruiting	80	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• Gait: 10 meters Walking Test • Functionality: FallSkip • Strength: Load Cell • Spasticity: MyotonPRO Secondary • Neuropathic Pain: Brief Pain Inventory • Muscle Activation: EMG F/U 10 minutes	December 2020	March 22, 2021	March 2, 2022	Valencia, Spain
NCT04807764	City University of New York	40 daily sessions of 30 minutes of non-invasive high frequency (e.g. 30 Hz) transcutaneous transspinal stimulation during standing or lying followed by 30 minutes of assisted stepping robotic gait training. Before and after training standardized clinical and neurophysiological tests will be used to assess recovery of sensorimotor function.	• Age 18-70 years • AIS C-D • SCI level >T10 • SCI > 6 months • NO peripheral neuropathy • NO degenerative neurological disorders of the spine or spinal cord • NO cochlear implants, pacemaker, implanted infusion device, and/or implanted stimulators of any type • NO history of seizures	Recruiting	45	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Rehabilitation	Standing/ Walking/ Mobility	• Plasticity of spinal neuronal networks (soleus H-reflex following posterior tibial and common peroneal nerves stimulation) • Plasticity of corticospinal networks (recording responses to single-pulse transcranial magnetic stimulation; TMS) • Ambulatory function (2-min walk and 10-meter timed test) • Balance (BESTtest clinical assessments) • Autonomic function (bowel, bladder, and sexual function) F/U 4 years	August 2021	March 19, 2021	May 31, 2022	Staten Island, NY, USA
NCT04798378	Thomas Jefferson University	Upper extremity orthosis and functional stimulation system (Neurosleeves) for restoration of independent arm function	• Age >= 4 years • weakness in one or both arms such that wrist flexion and wrist extension are 3/5 on the Manual Muscle Testing Scale • SCI >= 6 months • fluent in English • NO visual impairment such that following visually-guided instructions would be challenging even with ordinary corrective lenses • NO untreated psychiatric or neurologic disturbances • NO implanted medical device in the body (such as cardiac pacemaker, implanted defibrillator, metallic device) • NO history of seizure or epilepsy • history of alcohol or other substance use	Recruiting	20	Phase: Not Applicable, Primary Purpose: Supportive Care, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Canadian Occupational Performance Measure (COPM) score • Action Research Arm Test (ARAT) • Motricity Index score • ABILHAND-Kids questionnaire score • Box and Blocks score F/U 8 weeks	June 2021	March 15, 2021	June 16, 2022	Philadelphia, PA, USA
NCT04777149	Shepherd Center, Atlanta GA	Transcranial Random Noise Stimulation (tRNS), transcranial Direct Current Stimulation (tDCS), vs. sham-stimulation	• SCI above C8 • AIS C, D • SCI ≥ 1 year • Active intrinsic hand muscles in at least one UE • Active extrinsic hand muscles in both UE • NO implanted metallic device in the head and/ or pacemaker • NO history of seizures • NO history of severe headaches • NO prior tendon or nerve transfer surgery	Recruiting	28	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Double	Technology	Arm/Hand Function	• Change in Cortical excitability (transcranial magnetic stimulation) • Change in Strength (key pinch and grasp strength) • Change in Sensory function (Graded Redefined Assessment of Strength Sensibility and Prehension) • Change in Unimanual function (Grasp and Release Test) • Change in Bimanual function (Chedoke Arm and Hand Activity Inventory) • Change in Sensory Function (revised Nottingham Sensory Assessment) F/U 2 weeks	March 2021	March 2, 2021	March 3, 2021	Atlanta, GA, USA

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04782947	United States Department of Defense	Compare the impact of Exoskeletal assisted walking (EAW)+Epidural stimulation (ES) following improving lower extremity muscle quality compared to those who will only undergo EAW+ ES without conducting resistance training on motor recovery, cardio-metabolic health and bladder control in persons with complete SCI.	• Age 18-60 years • SCI >= T10 • AIS A-B	Recruiting	20	Phase:Pahse 2/3, Primary Purpose: Health Services Research, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 10MWT F/U: 12 months	February 2021	March 2, 2021	February 3, 2022	Richmond, VA, USA
NCT04760470	University of Helsinki	6 weeks of technological-assisted upper extremity rehabilitation	• AIS C-D • SCI level C2-C8 • SCI since 1 - 5 years • ability to sit • motivation and ability to participate in intensive rehabilitation 3 times per week for 6 week period. • NO memory disorder	Enrolling by invitation	60	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Single	Technology	Arm/Hand Function	• Action Research Arm Test (ARAT) scores • Goal Attainment Scaling (GAS) scores • Upper Extremity Motor Scores (ASIA-UEMS) • Grip strength • Pinch strength • Upper extremity active range of motion • SCIM-SR scores F/U 6 months	April 2021	February 18, 2021	April 28, 2021	Helsinki, Finland
NCT04759976	University of Bern	Robotic motor training: performing motor tasks with upper-limb robotic devices.	• Age ≥18 years • NO serious medical or psychiatric disorder	Recruiting	250	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Change in kinematic performance assessed by the robot • Change in kinetic performance assessed by the robot • Spatial analysis of changes in evoked potentials • Change in virtual reality (VR) embodiment • Spatial analysis of changes in Task-Based Brain Connectivity • Change in Motivation as assessed by Intrinsic Motivation Inventory (IMI) • Change in Cognitive Load as assessed by National Aeronautics and Space Administration (NASA) (Raw) Task Load Index • System Usability as assessed by System Usability Scale (SUS) F/U 1-2 days after the training	January 2019	February 18, 2021	May 26, 2022	Bern, Switzerland
NCT04755699	Northwell Health	Transcutaneous Electrical Stimulation: administration of various electrical pulses being delivered to muscles and/or the spinal column with an investigational neurostimulator to evoke various limb movements in order to improve functional movement.	• Age 18 - 75 yrs • limited ability or no ability to use at least one hand • SCI > 1 year • History of epilepsy • Chronically-implanted electronic medical device (e.g. deep brain stimulator, epidural stimulator, cardiac pacemaker, vagus nerve stimulator, or other) • Abnormalities of the arms/hands, legs/feet, or spinal column that would prevent electrical stimulation • Ventilator dependence • History of serious mood or thought disorder • Pregnant women • Prisoners	Recruiting	28	Phase: Early Phase 1, Primary Purpose: Device Feasibility, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Device Feasibility • Muscle Activation of the Targeted Limbs F/U 12 months	December 2020	February 16, 2021	April 7, 2022	Manhasset, NY, USA
NCT04736849	Peter J. Grahn	Percutaneous epidural and dorsal root stimulation	• Age > 22years • SCI level C7 - T10 • AIS A-D • SCI > 1 year • NO history of frequent and/or severe autonomic dysreflexia • NO history of seizure disorder	Not yet recruiting	32	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Kinematics •Electromyography/Electroneurography • Foot pressure • Somatosensory evoked potentials • Transcranial magnetic stimulation motor evoked potentials • AIS • Neurogenic Bowel Dysfunction Score. • Neurogenic Bladder Symptom Score • Sexual Health Inventory for Men (SHIM) / International Index for • Erectile Function (IIEF) • Female Sexual Function Index (FSFI) • Spinal Cord Injury Spasticity Evaluation Tool (SCI-SET) • User Experience Questionnaire (UEQ) • WISCI II • Modified 6 Minute Walk Test • Modified Timed Up and Go test F/U 4 weeks	April 2021	February 3, 2021	February 3, 2021	No known locations
NCT04735887	University of Stellenbosch	The SADL-eM includes three elements essential to the intervention, namely: knowledge, skills, and advice. The manual includes 92 A5 pages with six detailed sections: an Introduction and five chapters: (1) Rehabilitation team, (2) Activities of Daily Living, (3) Assistive devices, (4) Home environment adaptation, and (5) Knowledge guide. The SADL-eM uses text and illustrative pictures that are carefully selected for contextual relevance. The manual is simple, easy, and suitable for people with a non-medical background.	• AIS A, B, and C • Age 18 - 65 yrs • SCI <= 6 months. • Sufficient comprehension (read/write) of the Arabic language. • communication and/or cognitive disorders such as global aphasia and memory deficit. • disturbed level of awareness such as coma or lethargy. • other cause(s) of disability in addition to SCI such as stroke or amputation. • progressive disease or a psychiatric condition that would interfere with study • mechanical ventilator dependency	Not yet recruiting	132	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	General Health	• SCIM-SR • SCIM-III F/U 6 weeks	February 2021	February 3, 2021	February 3, 2021	Gaza Strip

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04727866	Bronx VA Medical Center	Transcutaneous spinal direct current stimulation (tsDCS) - coronal, 20 minutes of tsDCS will be delivered at 66% of maximum tolerated intensity with cathode over C5-C7 transverse process on target side, anode over C5-C7 transverse process on non-target side. Also over ~T1-T4 posteriorly, anode over ~C5-T1 anteriorly, and over ~C3-C5 posteriorly, anode over ~C5-T1 anteriorly	• Age 18-75 yrs • SCI > 12 months • SCI Level C1-C8 • Score of 2, 3, or 4 (out of 5) on manual muscle testing of elbow flexion, wrist extension, wrist flexion, finger extension, finger flexion, or finger abduction in left or right hand • NO multiple spinal cord lesions • NO history of seizures; • NO ventilator dependency or patent tracheostomy site • NO History of stroke, brain tumor, or brain abscess • NO History of implanted brain/spine/nerve stimulators, aneurysm clips, ferromagnetic metallic implants, or cardiac pacemaker/defibrillator	Recruiting	20	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Motor evoked potential (MEP) amplitudes • H-reflex amplitudes • Muscle dynamometry • Intracortical inhibition and facilitation F/U immediately after procedure	January 2021	January 27, 2021	March 17, 2022	The Bronx, NY, USA
NCT04726059	University of British Columbia	Therapeutic Transcutaneous Spinal Cord Stimulation (TCSCS) during Activity-Based Therapy (ABT) using the Lokomat exoskeleton (Hocoma). All participants (both arms) will train 3 times per week for 12 weeks with a target to reach 20 minutes of balance training and 30 minutes of gait training in each session.	• Resident of British Columbia, Canada with active provincial medical services plan • Age 18-60 yrs • Chronic traumatic SCI (non-progressive, with complete motor paralysis) • SCI Level at or above T6 • SCI > 1 year • AIS A or B • NO ventilator dependency • NO intrathecal baclofen pump • NO implanted metal in skull or pacemakers, stimulators, medication in the trunk • NO fractures, metal implants, recurring headaches, pressure sores, epilepsy/seizure • NO severe anemia (Hgb<8 g/dl) or hypovolemia	Recruiting	12	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Quadruple	Technology	Standing/Walking/ Mobility	• Corticospinal excitability (motor evoked potentials) • Attempted voluntary contraction • Seated and standing balance control • Blood pressure variability • Cardiac outcomes • Dysautonomia • Autonomic dysreflexia • Bladder function based on the neurogenic bladder symptom score • Bladder function based on the incontinence - quality of life questionnaire • Bowel function based on the neurogenic bowel dysfunction score • Sexual function based on the international index of erectile function questionnaire • Sexual function based on the female sexual function index • Quality of life based on the short form (SF-36) health survey • Quality of life based on fatigue severity scale • Quality of life based on spinal cord injury: spasticity evaluation tool F/U 14 weeks	June 2021	January 27, 2021	May 31, 2022	Vanvouver, BC, Canada
NCT04726891	University of Alabama at Birmingham	Movement-2-Music + Social Networking Support: 12-week pilot study of the SMART-HEALTH intervention in 30 individuals with SCI.	• Age > 18 yrs • SCI > 1 year • Wheelchair User • Able to use arms for exercise • Sedentary (<60 minutes of exercise/week) • NO Cognitive Impairment (Folstein's Mini-Mental State Exam Score < 24) • NO Depression (Centers for Epidemiological Studies Depression Scale Score > 16) • NO poorly controlled blood pressure (SBP > 159 or DBP > 95 mmHg)	Recruiting	44	Phase: Not Applicable, Primary Purpose: Prevention, Intervention Model: Factorial Assignment, Masking: Triple	Rehabilitation	General Health	• Physical Activity (PARA-SCI) • Grip strength • Respiratory functioning (Peak Expiratory Volume) • Blood pressure • Heart rate • Physical activity self-efficacy scale • Outcomes expectations for exercise scale • Demographics • Sleep disturbance • Depression • Pain intensity • Anxiety F/U 12 weeks	June 2021	January 27, 2021	June 30, 2022	Birmingham, AL, USA
NCT04699474	Hopital du Sacre-Coeur de Montreal	Leg cycling in bed using motorized ergometer	• Blunt traumatic SCI • SCI Level C0 to L2 • AIS A-C • Spine surgery performed within 48 hours of injury • NO moderate or severe brain injury • NO pre-existing neurological disorder • NO complete spinal cord transection	Recruiting	45	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/Walking/ Mobility	• Ambulation (independent walking) • Neurological recovery • Spinal Cord Independence Measure • Spasticity Secondary • Health related quality of life (WHO-QOL-BREF) F/U 6 months	January 2021	January 7, 2021	August 25, 2021	Montréal, QC, Kanada
NCT04697472	ONWARD Medical, Inc.	The LIFT System delivers the non-invasive electrical spinal cord stimulation (ARC Therapy) to improve upper extremity function in individuals with tetraplegia.	• Age 22-75 yrs • Non-progressive SCI • SCI Level C2-C8 (inclusive) • AIS B-D • SCI >= 12 months • NO ventilator support needed • NO autoimmune etiology of spinal cord dysfunction/injury • NO active implanted medical device	Recruiting	65	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Sequential Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Incidence of serious adverse events (SAEs) • Number of participants with change in upper extremity strength and function • Superiority of combined FTP and ARC Therapy with LIFT vs. FTP alone. F/U around 16 months	January 2021	January 6, 2021	December 9, 2021	Multicenter: USA, Canada, Netherlands, UK
NCT04688229	Shirley Ryan AbilityLab	Hummingbird hand training device plus standard of care rehabilitation. The Hummingbird is a comprehensive hardware and software platform that isolates the hand, wrist, and forearm in a neutral and comfortable position. The platform also comprises therapeutic software to train exploratory, individuated, and inter-digit complex finger movements by coupling force and torque output to NeuroAnimation physics-based virtual animals in engaging therapeutic experiences.	• Age 18-75 yrs • traumatic SCI within 1-2 months • Cervical injury at C8 or above (tetraplegia) • AIS A, B, C and D • No uncontrolled medical problems including pulmonary, cardiovascular or orthopedic disease • No ongoing cord compression or a syrinx in the spinal cord or who suffer from a spinal cord disease such as spinal stenosis, spina bifida or herniated cervical disk.	Not yet recruiting	24	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Technology	Arm/Hand Function	• Graded and Redefined Assessment of Strength, Sensibility, and Prehension (GRASSP) measure • Action research arm test (ARAT) • Box and Block test • Maximum voluntary force (MVF) • Average strength index • Individuation index F/U 3 months	October 2021	December 29, 2020	September 21, 2021	Chicago, IL, USA

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04641793	Shirley Ryan AbilityLab	Motion and EMG Control. Two methods (direct and indirect) for integrating motions and EMG signals	• Age 16-65 yrs • SCI Level C3-6 • AIS A-C • NO metal in head with the exception of dental work or any ferromagnetic metal elsewhere in the body • Personal history of epilepsy (untreated with one or a few past episodes), or treated patients	Recruiting	60	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Parallel Assignment, Masking: Single	Technology	Arm/Hand Function	• Time to task completion • Muscle activity (EMG) • Cortico spinal connectivity (motor evoked potentials, MEPs) F/U: 1 week	January 2020	November 24, 2020	November 24, 2020	Chicago, IL, USA
NCT04632290	Ecole Polytechnique Fédérale de Lausanne	STIMO-BSI system. Bilateral implantation of epidural electrocorticography devices. The decoded motor intentions are driving the implanted spinal cord stimulation system. Brain-controlled spinal cord stimulation is used for training and rehabilitation to recover voluntary movements.	• Having completed the main phase of the STIMO study (NCT02936453) • AIS A-D • Level T10 and above • Focal spinal cord disorder caused by either trauma or epidural, subdural or intramedullary bleeding • SCI ≥ 12 months • NO epilepsy • NO spinal stenosis • NO use of an intrathecal Baclofen pump. • NO active implanted cardiac device such as pacemaker or defibrillator	Enrolling by invitation	3	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Safety Measure (adverse events, device deficiencies) • WISCI II score • 10mWT • Weight bearing capacity • SCIM III score • 6MWT • Time Up and Go • Maximum Voluntary Contraction • ISNCSCI score • Modified Ashworth Scale • Berg Balance Scale • Gait Analysis • WHOQOL-BREF • BCI performance measures (accuracy) • Upper Limb Neurobiomechanics • ECoG signal stability • Somatosensory-evoked potentials (SSEP) F/U: Through study completion, an average of 1 year	July 2021	November 17, 2020	November 5, 2021	Lausanne, Switzerland
NCT04627441	Kristin Zhao, PhD	Transcutaneous and epidural spinal cord stimulation	• Traumatic SCI • SCI Level C6-T9 • AIS A-B • Intact spinal reflexes below the level of SCI • SCI ≥ 1 year • Age ≥ 22 yrs	Not yet recruiting	8	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Electromyography (EMG) • Overground ambulation (6 MWT, WISCI) • Somatosensory evoked potentials (SSEP) • Motor evoked potentials • Modified functional reach test mFRT, for trunk stability) • AIS grade (injury severity) • Spasticity (SCI-SET) • Bone mineral density (DEXA) • Neurogenic Bowel Dysfunction Score, International Spinal Cord Injury Bowel Function Basic Data Set v2.0 • Neurogenic Bladder Symptom Score, International Spinal Cord Injury Urodynamic Basic Data Set v2.0) • International Spinal Cord Injury Male Sexual Function Basic Data Set v2.0, Sexual Health Inventory for Men, International Index for Erectile Function • International Spinal Cord Injury Female Sexual and Reproductive Function Basic Data Set v2.0, Female Sexual Function Index • Timed Up and Go test F/U: 6 months	December 2022	November 13, 2020	January 19, 2022	Rochester, N, USA
NCT04604951	University of British Columbia	Non-invasive transcutaneous spinal cord stimulation	• Resident of British Columbia (Canada) with active provincial medical services plan • 18-65 years of age • Chronic traumatic SCI (non-progressive, with complete motor paralysis) at or above the T6 spinal segment. vSCI ≥ 1 year, at least 6 months from any spinal surgery. • Documented presence of bladder dysfunction (NDO during UDS) • Documented presence of bowel or sexual dysfunction • AIS A-B • NOT Ventilator dependent • NO Intrathecal baclofen pump. • NO implanted metal in trunk or spinal cord under the sites of application of electrodes (between anode and cathode) for those who are allocated to receive TCSCS.	Recruiting	40	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	General Health	• Blood pressure (number of potential adverse cardiovascular events, i.e. autonomic dysreflexia) • Surface electromyography (EMG, motor threshold for skeletal muscles known to be involved in lower urinary tract and bowel control • Urodynamics parameters • Mean maximum resting anorectal pressure • Frequency of urinary incontinence • Neurogenic bladder symptoms • Frequency of fecal incontinence • Neurogenic bowel symptoms • Participant's sexual function and satisfaction with their overall sexual life (International Index of Erectile Function, Female Sexual Function Index, semi- structured qualitative interview) F/U: 25 weeks	May 2022	October 27, 2020	May 19, 2022	Vancouver, BC, Canada
NCT04577573	VA Office of Research and Development	Functional prototype of an instrumented glove (Cognition glove) to alert the user about secure grasp of objects.	• SCI > 12 months • SCI level C1-T1 • Hand weakness: score of 2-4 out of 5 on manual muscle testing of finger extension, finger flexion, or finger abduction in either hand	Recruiting	20	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Crossover Assignment, Masking: Single	Technology	Arm/Hand Function	• Time to achieve secure grasp upon initial contact • Time to complete pick-up and placement of object • Motion pathlength in moving object • Error in placing object onto target F/U immediately after the procuedure	May 2021	October 8, 2020	May 9, 2022	Bronx, NY, USA
NCT04578665	Shirley Ryan AbilityLab	Behavioral Interaction Conditions.Complete a tracking task (solo, collaboration task, competition task or cooperation task). Haptic Impedance Level (rigid, medium or soft). Skill Level of Partner (novice or expert). Participants will start experimentation paired as novice-novice, and at the end of the session may be invited to continue additional sessions to be paired as the expert in a novice-expert dyad.	• Age 18-80 yrs • AIS C-D • SCI > 6 months • Ability to walk >10 m independently (w or w/o assistive devices or bracing) • Normal hearing and vision	Recruiting	544	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• lower limb motor control • motor output from surface EMG of lower limb muscles • 6 minute walking test • 10 meter walking test • Modified Ashworth Scale (Spasticity) • BERG balance scale (BBS) • functional gait assessment (FGA) F/U 5 months (average)	July 2021	October 8, 2020	July 27, 2021	Chicago, IL, USA

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04568928	Laval University	Overground locomotor training program using a powered exoskeleton combined with functional electrical stimulation (OLTP/PE+FES), or sham stimulation (OLTP/PE+shamFES), or OLTP without FES.	• Age 18-64 yrs • AIS C or D in the sub-acute stage • Actively participating in intensive functional rehabilitation in the SCI program of the IRDPQ/CIUSSS-CN • sufficient upper extremity strength and function to use a walker with wheels • be able to stand >30 minutes • NOT have osteoporosis • NOT have epilepsy	Enrolling by invitation	20	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• Modified 6 Minute Walk Test (6MWT) • 10 Meter Walk Test (10mWT) • Modified Timed Up and Go test (TUG) • Walking Index for Spinal Cord Injury (WISCI-II) • Brief pain inventory questionnaire • Spinal Cord Injury Secondary Conditions scale (SCI-SCS) • Modified Ashworth Scale (MAS) • Electromyographic (EMG) activity of leg muscles during walking F/U 3 months	December 2020	September 29, 2020	September 29, 2020	Québec, QC, Canada
NCT04496609	Hopital Foch	Stimulation and automated rehabilitation for 40 working days, then washout during 30 days, then automated rehabilitation for 40 working days	• Age 18-65yrs • AIS B or C • SCI above T10 (sensation preserved below level of lesion) • Absence of significant motor deficit of the upper limbs or recovered motor deficit (muscular score ≥ 4/5) • SCI > 2years	Recruiting	14	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Assessment of number of patients able to move over a distance of 5 metres • Percentage of patients capable of moving at the end of treatment • Assessment of vesico-sphincter function • Assessment of the genito-sexual function • Assessment of the excitability of the spinal neuronal circuits • Assessment of the kinetics of action of the induced effects • Quality of life (EQ5D-3L) • AE/SAE related to tolerance F/U 6 months	July 2021	August 3, 2020	July 14, 2021	Garches, France Suresnes, France
NCT04440709	University Hospital Tuebingen	The brain/neural hand exoskeleton restores hand motor function by translating user's intention into grasping motions	• SCI C5-C6 • SCI > 6M • AIS B,C • no severe spasticity (Ashworth grade ≥ 4)	Recruiting	10	Phase: Not Applicable, Primary Purpose: Supportive Care, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Change in Berlin Bimanual Task Assessment (BEBITA) score F/U NA	June 2020	July 22, 2020	June 22, 2020	Tübingen, Germany Berlin, Germany
NCT04474106	AUVA Trauma Center Meidling	Extracorpeal shock wave therapy (shockwave generator orthogold 100)	• traumatic SCI • Age >= 18 yrs • SCI =< 24 hours • no serious traumatic brain injuries • no pacemakers or implantable defibrillators	Recruiting	246	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Quadruple	Technology	General Health	• Total motor scores • AIS grade • Degree of spasticity • Walking ability (WISCI II, TUG, 10MWT, 6MWT= • Urological function • Plantar reflex • SCIM II • Adverse events (AEs) • Dexterous control (Nine-Hole Peg Test, Grasp and Release Test, Pinch grip, Clenched grip, Pencil grip, Lumbrical grip) F/U 6 months	July 2020	July 16, 2020	February 24, 2022	Multicenter: Austria (Innsbruck, Bad Häring, Feldkirch, Graz, Tobelbad, Klosterneuburg, Linz, Salzburg, St. Pölten, Wien) Berlin, Germany
NCT04468919	Oregon Health and Science University	Brain-Computer Interfacte (BCI) Functional Implementation Toolkit (FIT) to customize the method for each individual end user	• Age 18/75 yrs • severe speech and physical impairment • no implanted hydrocephalus shunt, cochlear implant or deep brain stimulator	Not yet recruiting	60	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Sequential Assignment, Masking: None (Open Label)	Technology	Mental Health	• Typing Accuracy • Typing Speed • Information transfer rate • User experience F/U 12 weeks	July 2021	July 13, 2020	July 15, 2020	Portland, OR, USA
NCT04460872	North Florida Foundation for Research and Education	Intramuscular testosterone injection and locomotor training (4 sessions/week for 2-3 months)	• male • Age >18 yrs • incomplete SCI • SCI C1-T12 • SCI >= 1y • Locomotor dysfunction • Diagnosis of first time SCI including etiology from trauma, vascular, or orthopedic pathology	Recruiting	21	Phase: Phase 2, Primary Purpose: Supportive Care, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Drug	Standing/ Walking/ Mobility	• muscle cross-sectional area • 6MWT • bone mineral density • knee extensor peak torque • 10mWT • bone resorption/formation marker F/U 6 months	January 2021	July 8, 2020	September 5, 2021	Gainesville, FL, USA Jacksonville, FL, USA
NCT04458324	Spaulding Rehabilitation Hospital	Functional Electrical Stimulation Row Training (FESRT, 2-3 times/week for 6 months) combined with a medication against respiratory abnormalities (Buspirone Hydrochloride), and with non-invasive ventilation (NIV)	• SCI outpatients • SCI for 3-36 M • AIS A, B, or C • SCI C1-T3 • wheelchair users • no diabetes, cancer, epilepsy	Recruiting	70	Phase: Phase 2, Primary Purpose: Prevention, Intervention Model: Factorial Assignment, Masking: Double	Drug	General Health	• aerobic exercise capacity • ventilation during exercise • glucoregulatory status (hemoglobin) •serum lipids (cholesterol and triglycerides) • dual x-ray absorptiometry (DXA) • Change in baseline ventilatory function (spirometry) F/U 6 months	December 2020	July 7, 2020	August 5, 2021	Cambridge, MA, USA
NCT04453943	North Carolina State University	Exoskeleton Walking and Exoskeleton Sitting to Stading - with or without FES. Walking movements will be elicited by the hybrid walking platform that combines a powered exoskeleton and an FES system.	• Age 18-60 yrs • complete or incomplete SCI • SCI >= 1yrs • SCI T1-T10 • no heart conditions and pacemakers	Not yet recruiting	30	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Controls Algorithm Performance - Limb Angle Errors • Muscle fatigue Index to Measure FES-Induced Muscle Fatigue • Participant Verbal Feedback F/U through study completion, an average of 30m.	July 2020	July 1, 2020	July 1, 2020	Raleigh, NC, USA
NCT04393922	Shirley Ryan AbilityLab	Acoustic stimuli (Startle), Description: A startle stimulus (120 dB, 500 Hz, 50 ms) will be delivered through headphones.	• Age 18-75 yrs • Chronic SCI (≥1 year) • Incomplete SCI • SCI T12 or above • no pacemaker • no history of seizures	Recruiting	120	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Crossover Assignment, Masking: Single	Technology	Spasticity	• MEP recruitment curves • StartReact • Modified Ashworth Scale (MAS) • Pendulum Test • 10-meter walk test • GRASSP • Toronto Rehabilitation Institute-Hand Function Test (TRI-HFT) F/U 3-4 hours	May 2020	May 19, 2020	June 22, 2022	Chicago, IL, USA
NCT04369131	Quality Living, Inc.	Functional electrical stimulation of the calves, quads and/or abdominals	• Age 19-70 yrs • SCI C1-C5 • AIS ns	Enrolling by invitation	10	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Change in tilt table angle • Maximum tilt table angle • Blood pressure F/U 1hour tilt table session	December 2021	April 30, 2020	January 11, 2022	Omaha, NE, USA

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04367623	NHS Greater Glasgow and Clyde	Brain computer interface based therapy with Functional Electrical Stimulation	• Age 18-80 yrs • SCI C3-C8 • Sub-acute patients post spinal injury • no other neurological conditions	Not yet recruiting	26	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• SCIM • Hand function • EEG • NASA task load index • Quebec User Evaluation of Satisfaction with Assistive Technology • Patient feedback F/U 2 months	June 2020	April 29, 2020	April 29, 2020	Glasgow, UK
NCT04340063	VA Office of Research and Development	Gait training performed on a treadmill or in a Movement Amplification Environment	• SCI C1-T10 • AIS C or D • >= 6 months post spinal injury • no excessive spasticity in the lower limbs	Recruiting	36	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• Daily Stepping • LEMS • WISCI II • Functional Gait Assessment (FGA) • 10MWT • Activities Specific Balance Confidence (ABC) Scale • Balance Evaluations Systems Test (BESTest) • Berg Balance Scale (BBS) • The World Health Organization Quality of Life Scale • Urinary Incontinence Questionnaire (ICIQ-UI SF) F/U 3 months	October 2020	April 9, 2020	December 13, 2022	Hines, IL, USA
NCT04323449	VA Office of Research and Development	Control methods for a wheelchair-mounted robotic manipulator	• Age 18yrs • using a power wheelchair as primary means of mobility • no impaired vision	Recruiting	16	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Task completion time • Mode Switching Frequency • Task success rate • NASA Task Load Index (TLX) • System Usability Scale (SUS) F/U: After completing all tasks	April 2022	March 26, 2020	May 31, 2022	Pittsburgh, PA, USA
NCT04307303	Salisbury NHS Foundation Trust	functional electrical stimulation of the abdominal muscles	• Age >=18 yrs • SCI C1-T12 • AIS NS • >=1 year post spinal injury • no implanted electrical devices (cardiac pacemaker in situ or other)	Not yet recruiting	36	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Parallel Assignment Masking: Triple	Technology	Bowel Health	• Time required for defecation • Neurogenic bowel dysfunction • sexual function index F/U 8 weeks	May 2020	March 13, 2020	March 13, 2020	Salisbury, UK
NCT04302259	Rhode Island Hospital	Intelligent Spine Interface - Commercial (ISI-C) is a Epidural Electrical Stimulation (EES). The aim is to restore volitional control of the lower limb.	• Age 18-65yrs • SCI C7/T1- T10 • AIS A-B • traumatic SCI • SCI > 1 year • able to ambulate with a wheelchair or crutches • no intrathecal baclofen or morphine pump • no implanted device	Not yet recruiting	3	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Safety: adverse events • ISNCSCI • 6MWT • 10MWT • TUG • Spinal cord Injury Functional Ambulation Inventory • SCI-QOL • Berg Balance Scale F/U 8 months	September 2021	March 10, 2020	September 21, 2022	Providence, RI, USA
NCT04292717	University of Zurich	Gait training three times a week for 6 weeks (18 training sessions). Each exercise session will last for 1 hour and will be conducted and supervised by an experienced physical therapist.	• Age 18-80 yrs • SCI > T12 • SCI >6 months • AIS C-D • walk without assistance or devices on the treadmill and 10m over ground	Recruiting	56	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• 6MWT • ISNCSCI • WISCI II • 10MWT • TUG • Kinematics, EMG • SCIM III • MRI/MRS F/U 10 weeks	January 2021	March 3, 2020	July 23, 2021	Zurich, Switzerland
NCT04288245	Baylor Research Institute	Active Vagus Nerve Stimulation paired with upper extremity rehabilitation.	• Age 18-64yrs • cervical SCI • ASIA B, C, D • traumatic SCI ≥ 12 months • no SCI due to sharp objects, firearms	Enrolling by invitation	20	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Crossover Assignment, Masking: Triple	Technology	General Health	• Functional Independence Score Description • Spinal Cord Independence Measure (SCIM) III • AIS • Walking Index for Spinal Cord Injury II (WISCI II) • GRASSP F/U 1 year	February 2021	February 28, 2020	May 25, 2022	Dallas, TX, USA
NCT04286191	Medical University of South Carolina	Operant Conditioning training intervention in which the brain-spinal cord-muscle pathways are strengthened. Transcranial magnetic stimulation (TMS).	• SCI >1 year • AIS NS • SCI level NS • able to ambulate at least 10 m with or without an assistive device (except for parallel bars) • Signs of weak ankle dorsiflexion at least unilaterally	Recruiting	44	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Triple	Technology	Standing/ Walking/ Mobility	• MEP/CMEP • Short Interval Intra-cortical Inhibition (SICI) • H-reflex amplitude • F-wave amplitude and occurence • tibialis anterior EMG amplitude • Ankle function • 10-meter walk test • 6-minute walk test F/U 3 months	February 2021	February 26, 2020	October 19, 2021	Charleston, SC, USA
NCT04250688	Shirley Ryan AbilityLab	Ekso Training with FES	• Age 18-70 yrs • SCI C7-T11 • AIS A, B, C, D • SCI <6 months at completion of study • able to tolerate upright standing for a minimum of 30 minutes	Enrolling by invitation	10	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 6MWT • 10MWT F/U 6 weeks	January 2016	January 31, 2020	May 4, 2022	Chicago, IL, USA
NCT04241250	VA Office of Research and Development	EAW+SCES (exoskelton and spinal cord epidural stimulation): 3 months of EAW training followed by 6 months of SCES.	• Age 18-70 yrs • SCI C1-T10 • traumatic SCI • AIS A, B • no mplanted pacemakers and/or implanted defibrillator devices	Recruiting	10	Phase: Phase 2, Primary Purpose: Health Services Research, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 10-meter walking speed (m/sec) • Muscles electromyography (EMG) during locomotion F/U 9 months	July 2020	January 27, 2020	April 13, 2022	Richmond, VA, USA
NCT04221373	Icahn School of Medicine at Mount Sinai	Ekso™ powered exoskeleton-assisted walking (EAW) for early training compared to standard of care.	• Age >=18 yrs • SCI level NS • AIS NS • Height between 5'2" and 6'2" (1.6 meters to 1.9 meters)	Enrolling by invitation	40	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Technology	Pain	• ISNCSCI • FIM • SCIM • Pain: ISCIBPDS 2.0 and SCIPI F/U 2-3 weeks	September 2019	January 9, 2020	April 20, 2022	New York, NY, USA

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT04194099	Taipei Medical University Hospital	Paired Nerve Stimulation (PNS) with various stimulation parameters of repetitive transcranial magnetic stimulation (rTMS) combined with trans-spinal electrical stimulation (tsES) vs. Sham PNS; followed by cycling exercise.	• Age 20-65 yrs • Vertebral level above T10 • AIS B, C, D • Chronic SCI • SCI>1yr	Recruiting	12	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single (Outcomes Assessor)	Technology	Standing/ Walking/ Mobility	• MEP • Resting Motor Threshold • Modified Ashworth Scale • LEMS • fMRI • EMG F/U 1d (immediately after intervention finished)	December 2019	December 11, 2019	May 5, 2022	Taipei City, Taiwan
NCT04193709	University of Louisville	Arm 1: Cross-sectional and observational autonomic function data collection during bladder filling and bowel stimulation Arm 2: use of scES in the lab and at home configured for maintenance of normative blood pressure and heart rate during bladder filling and bowel evacuation	• Age 18-70 yrs • SCI Level NS • AIS A, B, C, D For Arm 2: • IC blaer mgmt; Prior scES implant • SCI duration NS	Recruiting	70	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Bladder Health	• 24hr Blood Pressure monitor • Bladder Function F/U 6 months	January 2021	December 10, 2019	May 9, 2022	Louisville, KY, USA
NCT04132596	The Neurokinex Charitable Trust	transcutaneous electrical spinal cord stimulation via transcutaneous hydrogel electrodes (tSCS) combined with activity- based rehabilitation	• Age ≥18 yrs • SCI C4-T12 • AIS NS • Chronic SCI≥1yr	Enrolling by invitation	12	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• ISNCSCI • SCIM • Berg Balance Score NeuroRecovery Scale • GRASSP • CUE EMG ISAFSCI F/U 1 year	November 2019	October 21, 2019	October 23, 2019	UK
NCT04105114	University of Louisville	Three arm study of different combinations of non-invasive electrical spinal cord stimulation, oral buspirone vs. placebo, BWSTT, gravity neutral device, Ekso Bionics Exoskeleton, rolling walker. Group 1 complete SCI-gravity neutral stepping; Group 2 complete SCI exoskeleton assisted stepping; Group 3 incomplete SCI overground stepping.	• Age 18-65 yrs • SCI Level T2-T7 • AIS A, B, C • Chronic SCI>1yr	Recruiting	15	Phase: Early Phase 1 Primary Purpose: Basic Science Intervention Model: Crossover Assignment Masking: Triple (Participant, Investigator, Outcomes Assessor)	Technology	General Health	• EMG • Kinematics • Blood Pressure • Heart Rate • DEXA Bone/Soft Tissue • Urodynamics F/U 5 years	September 2019	September 26, 2019	April 5, 2022	Louisville, KY, USA
NCT04101916	Helsinki University Central Hospital	Paired Associative Stimulation (PAS) using transcranial magnetic stim paired with Lower Extremity (LE) peripheral nerve electrical stimulation vs. Sham PAS. Several sessions/wk for 12 weeks.	• Age 18-75 yrs • Cervical SCI • AIS NS • Voluntary finger muscle or MEP obtained from hand muscles • Subacute SCI 1m≤SCI≤4m	Enrolling by invitation	24	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Double	Technology	Arm/Hand Function	• Muscle Strength Testing • SCIM F/U 15m (12m after final PAS session)	October 2019	September 24, 2019	March 16, 2022	Helsinki, Finland
NCT04102826	Robert Jones and Agnes Hunt Orthopaedic and District NHS Trust	Functional Electrical Stimulation (FES) to nerves supplying weakened UE muscles combined with the use of mobile arm supports to compensate for diminished strength where necessary	• Age NS • Cervical SCI • Subacute-Chronic SCI • SCI≥6wks	Recruiting	10	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Canadian Occupational Performance Measure (COPM) F/U 6 months	September 2021	September 15, 2019	Novmeber 11, 2021	Oswestry, UK
NCT04077346	University of Louisville	Biostim-5 Transcutaneous Spinal Stimulation (TcStim) alone, Activity-Based Locomotor Training (AB-LT) alone, and in combination (AB-LT+TcStim). 120 weekday sessions (5x/week within 8 months)	• Age 4-12 yrs • SCI T12 & above • Unable to stand, walk, initiate steps • Chronic SCI>1yr	Enrolling by invitation	19	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Ability to take independent step • EMG • Angular excursions of LE • Blood Pressure • Heart Rate • Compliance with Sessions F/U 8 months	April 2021	September 4, 2019	May 25, 2022	Louisville, KY, USA
NCT04052776	Centre Hospitalier Universitaire Vaudois	Orally administered buspirone and levodopa/carbidopa taken individually and in combination plus placebo, by subjects who have completed the STIMO Study NCT02936453 (see above) and are enrolled in the STIMO ESS extension study. 4 arms-all subjects will receive all 4 (crossover).	• Age 18-65 yrs • Enrolled in STIMO Ext. • Level NS • AIS A, B, C, D • Chronic SCI • Enrolled in STIMO Ext. (see above)	Not yet recruiting	8	Phase: Phase 1, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Quadruple	Technology	General Health	• Safety: AE, SAE, Side Effects • Blood Pressure • Heart Rate • Pendulum Test • ISNCSCI • Kinematics • EMG • 10MWT F/U 4hrs after last study arm completed	May 2020	August 12, 2019	May 26, 2022	Lausanne, Switzerland
NCT04050696	BrainQ Technologies Ltd.	Physical Therapy run-in/baseline with Machine Learning analysis of EEG/MEG (BCI) and EMG patterns during functional motor tasks to create low-intensity, non- invasive patterned electromagnetic field CNS stimulation.	• Age 18-75 yrs • SCI C1-C8 • AIS B, C, D • GRASSP motor 5-30/50 at least one side • Chronic SCI 12m≤SCI≤30m	Recruiting	8	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• GRASSP • CUE-T • ISNCSCI • Ashworth • SCIM III • SCI-QoL • MRI F/U 34 weeks	August 2019	August 8, 2019	September 28, 2021	Miami, FL, USA West Orange, NJ, USA Ramat Gan, Israel
NCT04043715	University of Washington	Transcutaneous Spinal Stimulation (TSS), Epidural Spinal Stimulation (ESS), Physical Therapy (PT) in Phased intervention: baseline testing→PT only→ PT+TSS →Washout→PT+ESS→follow-up testing	• Age 21-70 yrs • LE impairment • Level NS • AIS NS • Candidate for ESS implant (pain) • Chronic SCI≥1yr	Recruiting	6	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Neuromuscular Recovery Scale • ISNCSCI • WISCI • SSEP, MEP • Berg Balance • Gait Kinematics • 6MWT • 10MWT • NBSS F/U 11 months	August 2019	August 2, 2019	October 8, 2020	Seattle, WA, USA
NCT03998527	University of Louisville	6 Groups: 1) Transcutaneous electrical spinal cord stimulation (TcESCS), 2) Respiratory training (RT), 3) TcESCS+RT, 4) TsESCS+Arm training; 5) TcESCS+Trunktraining, 6) TcESCS to Non- Disabled control group	• Age 18-99 yrs • SCI T5 or above • ≥15% deficit in FVC or FEV1 • Chronic SCI≥1yrs	Enrolling by invitation	36	Phase: Early Phase 1, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single (Outcomes assessor)	Technology	General Health	• Respiratory EMG • Pulmonary Function Spirometry • Max Airway Pressure • FNPA • MMR F/U 1 year	May 2023	July 26, 2019	June 3, 2022	Louisville, KY, USA
NCT04032990	University of Louisville	Transcutaneous spinal stimulation with activity-based upper extremity training (40 sessions, 1.5 hours/day, 5 days/week); stimulation will be applied intermittently (with Biostim-5 transcutaneous spinal stimulator) for no more than 10 minutes at a time	• Age 4-18 yrs • SCI T1 or above • Moderate-severe UE deficit • Chronic SCI>1yr	Recruiting	10	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Safety/Feasibility • Skin Irritation • Pain • Blood Pressure • Arm Excursion, Grip Strength F/U 3 months	November 2019	July 25, 2019	March 28, 2022	Louisville, KY, USA

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT03975634	University of Louisville	Transcutaneous spinal stimulation applied in combination with activity-based locomotor training (40 sessions, 1.5 hours/day, 5 days/week; stimulation will be applied intermittently for no more than 10 minutes at a time during training)	• Age 2-15 yrs • Level NS • Traumatic or Non-traumatic • SATCo<15/20 • Chronic SCI • Discharged from inpatient rehab	Recruiting	10	Phase: Not Applicable Primary Purpose: Device Feasibility Intervention Model: Single Group Assignment Masking: None (Open Label)	Technology	General Health	• Safety/Feasibility • Skin Irritation • Pain • Blood Pressure Requests to stop/Compliance Trunk Kinematics F/U 9 weeks	August 2019	July 5, 2019	August 5, 2021	Louisville, KY, USA
NCT03949660	University of Louisville	Must be already be enrolled in epidural spinal stimulation and training study. Various epidural stimulation protocols will be performed with assessments of bowel function and QoL.	•Age 18-75 yrs • SCI Level NS • AIS A, B • Cardiovasc & bowel dysfunction • Chronic SCI≥2yrs	Recruiting	36	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Bowel Health	• Wireless Bowel Motility Capsule • Blood Pressure • Heart Rate • Anorectal Pressure • Bowel Diary • SCI-QoL F/U 20 months	September 2019	May 14, 2019	May 12, 2022	Louisville, KY, USA
NCT03930056	Shirley Ryan AbilityLab	C-Brace II use vs. traditional KAFO use. Following evaluation and brace fitting, participants will receive 10-20 one hour training sessions with assigned brace, then transition to home use for 3 month period.	• Age 18-80 yrs • SCI Level NS • AIS NS • Requires LE • orthotic bracing including knee for instability • Chronic SCI 3mos≥SCI≥24mos	Recruiting	30	Phase: Not Applicable, Primary Purpose: Supportive Care, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 6MWT • 10MWT • MMT • LE ROM • Ashworth • WISCI • Gaitrite Data Capture F/U 12 months	April 2019	April 29, 2019	October 4, 2021	Chicago, IL, USA
NCT03922802	Shirley Ryan AbilityLab	Acute intermittent hypoxia (AIH) + non invasive spinal cord stimulation (TSCS) + walking rehabilitation.	• Age ≥ 18yrs • SCI > 6 months • Level below C2 • AIS A, B, C, D • No epilepsy or a concussion within 6 months • No metal implants in the head or face • No implanted cardiac pacemaker or drug pump	Recruiting	36	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Single (Participant)	Technology	Standing/ Walking/ Mobility	• Gait kinematics using Gait Rite • 10 Meter Walk Test • 6 Minute Walk Test using V02 analysis • TUG F/U 1 weeks	December 2020	April 22, 2019	July 29, 2021	Chicago, IL, USA
NCT03909958	The Third Affiliated hospital of Zhejiang Chinese Medical University	Electroacupuncture: five daily 30 minute sessions per week for 12 weeks. Subjects be randomly assigned to either receive electroacupuncture + routine rehab or routine rehab alone	• Age 18-55 yrs • Cervical SCI • AIS C, D • Grade 1-3 strength in BLE • Subacute SCI 14d≥SCI≥30d	Recruiting	84	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• ISNCSCI • Ashworth • Modified Barthel Index F/U 6 months	June 2019	April 10, 2019	April 11, 2019	Zhejiang Sheng, China
NCT03892746	Cleveland Clinic US Department of Defense	Non-invasive brain stimulation tDCS (Transcranial Direct Current Stimulation) vas. sham tDCS to the area in the brain controlling the weaker muscle of the weakest upper limb while receiving task-oriented training for 15 Session (5d/wk X 3wks)	• incomplete SCI • Age 18-75yrs • SCI level C1-C8 • AIS NS Chronic SCI≥1yr • Triceps strength of weaker UE is 1 grade< stronger UE	Recruiting	49	Phase: Phase 1. Phase 2, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Quadruple (Participant, Care Provider, Investigator, Outcomes Assessor)	Technology	Arm/Hand Function	• ISNCSCI • UEMS • GRASSP • Ashworth • COPM • SCIM • TMS • H-reflex F/U 3 months	July 2019	March 27, 2019	January 14, 2022	West Orange, NJ, USA Cleveland, Ohio, USA
NCT03714997	Indiana University	Comparison of two different intensities of walking training (30 one-hour sessions on a treadmill, overground, and on stairs). High intensity training will target achievement of heart rates close to 80% of heart rate reserve; lower intensity to heart rates from 30% to 40% of heart rate reserve.	• Age 18-75 yrs • SCI C1-T10 • AIS C, D • Must tolerate 10m of standing without hypotension • Chronic SCI≥1yr	Not yet recruiting	80	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• 10MWT F/U 8 weeks	July 2019	October 22, 2018	April 22, 2019	Indianapolis, IN, USA
NCT03698149	University of California, San Francisco	Brain implantation of cortical electrodes to enable electrocorticography (ECoG) recording of brain activity. Study subjects will undergo training and assessment of their ability to control a complex robotic system and/or produce speech	• Age>21yrs • Limited UE use due to SCI or other neuro disability. Lives close to UCSF • Chronic SCI≥1yr	Recruiting	8	Phase: Early Phase 1 Primary Purpose: Device Feasibility Intervention Model: Single Group Assignment Masking: None (Open Label)	Technology	General Health	• Adverse Events associated with ECoG-based interface F/U 6 years	August 2018	October 5, 2018	May 13, 2022	San Francisco, CA, USA
NCT03690700	Spinal Cord Injury Centre of Western Denmark	Active vs. Sham low-intensity blood-flow restricted exercise (BFRE): low-intensity strength training (20-30 % of max) while using circumferential cuffs during exercise adjusted to maintain arterial inflow to the muscles while preventing venous return.	• Age >18 yrs • SCI below T7 • Elbow flex & Wrist extend strength 2-4/5 • AIS A, B, C, D • Subacute/Chronic SCI>1yrs	Recruiting	28	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Rehabilitation	Standing/ Walking/ Mobility	• SCAR • 10MWT • 6MWT • TUG • H-Reflex • Pain Level • QoLBDS • COPM F/U 12 weeks	May 2020	October 1, 2018	June 8, 2021	Viborg, Denmark
NCT03680872	Chad Bouton	Bidirectional Neural Bypass System: Implantation of microelectrode arrays into the primary motor cortex to record neural activity associated with desired movements and into the primary somatosensory cortex to deliver stimulation in order to provide sensory perception. Participation in 3 study session/wk X 12mos	• Age 22-65 yrs • Stable cervical SCI • Finger strength 0-2 • Plamar finger sensation 0-2 • Chronic SCI≥1yr	Recruiting	3	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• GRASSP-restoration of hand movement • Restoration of tactile sensation of the hand F/U 12 months	September 2019	September 21, 2018	November 23, 2021	Manhasset, NY, USA
NCT03534518	University of Zurich	Body Weight Supported (BWS) overground training v. BWS treadmill training. 4 weeks of training	• Age 18-70 yrs • SCI above T12 • AIS C, D • Can walk 10m; 6MWT≤500m • Chronic SCI>6m	Recruiting	30	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Rehabilitation	Standing/ Walking/ Mobility	• 6MWT • TUG F/U 2 months	March 2019	May 2, 2018	August 16, 2021	Zürich, Switzerland
NCT03504826	Brooks Rehabilitation	Locomotor training with Cyberdyne Hybrid Assistive Limb (HAL) and locomotor training overground with or without the HAL device. 60 sessions (5 days/week for 12 weeks).	• Age 18-80 yrs • Level NS • AIS B, C, D • Can walk 10ft • Chronic SCI>1yr	Recruiting	24	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 10MWT • 6MWT • EMG F/U 12 weeks	November 2018	April 20, 2018	December 7, 2021	Jacksonville, FL, USA

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NCT03482310	VA Office of Research and Development	Use of Neuroport array to record cortical activity to train the development of brain activity correlated with appropriate grasp patterns, utilizing virtual reality and FES controlled hand movement. Eligible subjects must have been successful participants in BrainGate2 trial.	• Age NS • SCI with UE impairment • Neuroport implant BraingGate2 participant • Chronic SCI • Time post SCI NS	Recruiting	6	Phase: Not Applicable, Primary Purpose: Device Feasibility, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Ability to form appropriate grasp patterns F/U 1 year	June 2018	March 29, 2018	April 21, 2022	Cleveland, OH, USA
NCT03447509	VA Office of Research and Development	Transcranial non-invasive Magnetic Stimulation targeting late indirect descending volleys (iTMS) (vs. sham iTMS) with acoustic startle during performance of UE movement tasks/training	• Age 18-85 yrs • SCI above C8 • AIS A, B, C, D • Visible grip/UE movement ability • Chronic SCI>1yr	Recruiting	300	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: Single	Technology	Arm/Hand Function	• Motor Evoked Potential Amplitude • Grip Strength 9-Hole Peg Test F/U 60minutes	January 2020	February 27, 2018	March 21, 2022	Miami, FL, USA Hines, IL, USA
NCT03443700	Montecatone Rehabilitation Institute S.p.A.	EKSO-GT locomotor training plus 8 weeks standard locomotor training vs. 8 weeks of standard locomotor training alone	• Age 18-65 yrs • SCI T1-L1 • AIS C, D • Functional Gait (incl with braces) • Chronic SCI 1yr<SCI<5yrs	Recruiting	40	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Technology	Standing/ Walking/ Mobility	• 10MWT • 6MWT • WISCI II • Ashworth • LEMS • EMG • SSEP • fMRI F/U 8 weeks	December 2020	February 23, 2018	December 16, 2021	Imola BO, Italy
NCT03364660	University of Louisville	Spinal Cord Epidural Stimulation utilizing stim parameters for voluntary movement, standing, or cardiovascular responses combined with leg movement training or stand training while sitting or supine.	• Age≥18 yrs • SCI level NS • Unable to move legs/stand • Chronic SCI≥2yrs	Recruiting	36	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: None (Open Label)	Technology	General Health	• Cardiovascular Assessments • Functional Movement Assessments • Standing Assessments F/U 20 months	November 2017	December 6, 2017	April 5, 2022	Louisville, KY, USA
NCT03161067	Johns Hopkins University	Investigation on the Bidirectional Cortical Neuroprosthetic System	Age 22-65 years AIS A-C SCI level C4-C6 >1 year after SCI >5 years life expectancy NO memory impairement F/U: 52 weeks	Recruiting	5	Phase: Not Applicable Primary Purpose: Device Feasability Intervention Model: Single Group Assignment Masking: None (oOpen Label)	Technology	Sensory function	ARAT (Successful control of an assistive device)	August 2017	May 19, 2017	May 19, 2022	Baltimore, MA, USA
NCT03057652	The University of Texas Health Science Center, Houston	algorithmic-based evaluation and treatment approach for wearable robotic exoskeleton (WRE) gait training using ReWalk, Ekso, and REX systems; randomly assigned order of device use. Up to 15 training sessions per device.	• Age≥18 yrs • SCI level NS • AIS NS • Ashworth <3 • Chronic SCI>6m	Recruiting	75	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 10 Meter Walk • 6 Minute Walk • Surface EMG • Oxygen Consumption • Gait Kinematics • Bone Mineral Density F/U 14-20 weeks	March 2016	February 20, 2017	May 23, 2022	Houston, TX, USA
NCT03053791	University of Zurich	Unilateral implantation of a Medtronic Activa SC deep brain stimulation system in the mesencephalic locomotor region	• Age 18-75 yrs • SCI T10 & above • AIS C, D • walk 10 meters • Chronic SCI≥6m • no implanted devices (e.g., pacemaker)	Recruiting	5	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• 6 Minute Walk • 10 Meter Walk Test • TUG • Ashworth • AIS • GRASSP • SF-36 • Lower urinary tract function • Activity monitoring F/U 6 months	February 2017	February 17, 2017	May 20, 2022	Zürich, Switzerland
NCT03026816	University of Minnesota	Implanted epidural spinal cord stimulator for improving volitional motor activity autonomic function in persons with chronic motor complete SCI; comparing outcomes with stimulator on vs. off (sham stimulation).	• Age≥22 yrs • SCI C6-T10 • AIS A, B • Chronic SCI>1yr	Recruiting	100	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Brain Motor Control Assessment Volitional Movement • Systolic blood pressure during epidural stimulation • Cerebral Blood Flow (tilt table) • Stroop test F/U 15 months	August 2017	January 20, 2017	May 2, 2022	Minneapolis, MN, USA
NCT02991248	Shirley Ryan AbilityLab	Three arm study comparing robotic/pelvic force-perturbation treadmill training with 1) active vs. 2) sham transcutaneous spinal direct current stimulation (tsDCS), and 3) standard treadmill training only. Three treatment sessions per week for 6 weeks.	• Age 18-65 yrs • SCI C4-T10 • AIS C, D • Able to walk 10 meter with no more than AFO • Time after SCI NS	Recruiting	54	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Parallel Assignment, Masking: Single	Technology	Standing/ Walking/ Mobility	• Gait Speed (overground) • 6MWT • Dynamic Gait Index • Berg Balance Scale F/U 14 weeks	November 2018	December 13, 2016	May 4, 2022	Chicago, IL, USA
NCT02978638	Palo Alto Veterans Institute for Research	Implantation of Finetech Vocare Bladder System—a sacral nerve root stimulator. The study tests the use of the system to inhibit bladder contractions by electrically stimulating sensory nerves (as an alternative to cutting sensory nerves).	• Age≥22 yrs • SCI below C4 • AIS A • Dyssynergia/Detrussor Hyper-reflexia • Chronic SCI≥2yr	Recruiting	10	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Bladder Health	• Bladder Capacity (Cystometry) Frequency of Incontinence F/U 12 months	September 2014	December 1, 2016	April 25, 2022	Palo Alto, San Jose, CA, Albuquerque, NM, USA
NCT02451683	Shirley Ryan AbilityLab	Study of motor task training with real or sham stimulation assessing electrophysiological parameters of time domain and location	• Age 18-85 yrs • SCI C8 & above • Some grasp and reach ability • Chronic SCI≥6months	Recruiting	300	Phase: Not Applicable, Primary Purpose: Diagnostic, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Functional tests of arm/hand function • Cortical Neurophysiology • Upper limb movements scale F/U 5 months	May 2020	May 22, 2015	May 25, 2021	Chicago, IL, USA
NCT02446210	Shirley Ryan AbilityLab	Magstim 200 stimulator for Transcranial Magnetic Stimulation and electrical Peripheral Nerve Stimulation	• Age 18-85 yrs • Injury above L2 • Can grip bilat • Can ambulate a few steps • Sub acute/Chronic SCI≥1 month	Recruiting	514	Phase: Not Applicable, Primary Purpose: Diagnostic, Intervention Model: Crossover Assignment, Masking: None (Open Label)	Technology	General Health	• Motor Cortical Excitability • EEG/EMG • Enhanced motor UE • Enhanced motor LE F/U 5 months	January 2021	May 18, 2015	May 25, 2021	Chicago, IL, USA
NCT02329652	Kevin Kilgore	Implantation and use of networked neuroprosthesis system (NNS) for arm, hand and trunk function.	• Age≥17 yrs • SCI C5-C7 • AIS A, B, C, D • Elbow flex≥2/5 • Chronic SCI≥6m	Recruiting	10	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• ADL Abilities Test • Grasp-Release Test F/U 3 months	December 2014	December 31, 2014	July 28, 2021	Cleveland, OH, USA

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)
NCT01964261	University of Southern California Rancho Los Amigos	Implantation of 3 Neuroport electrode arrays to enable learned control of an end effector (for reach and grasp tasks) by thought augmented with sensory feedback via intracortical brain stimulation	• Age 22-65 yrs • High cervical SCI • AIS NS • Time after SCI NS	Recruiting	2	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Patient control of end effector (virtual or physical) • Infection or Irritation F/U 1 year	November 2013	October 17, 2013	June 1, 2022	Downey, CA, USA Los Angeles, CA, USA Pasadena, CA, USA
NCT01958086	Richard A. Andersen, PhD	Implantation of two Neuroport electrode arrays in posterior parietal cortex allowing direct brain-control of a computer interface. Ultimate objective is to allow the patient autonomous control over the Google Android tablet operating system.	• Age 22-65 yrs • high cervical SCI • Lives<60 miles from study center; not on ventilator • Time post SCI NS	Recruiting	2	Phase: Not Applicable, Primary Purpose: Basic Science, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Subject control of tablet computer • Absence of infection or irritation • Adverse Events F/U 6 years	October 2013	October 8, 2013	April 13, 2022	Los Angeles, CA, USA Pomona, CA, USA
NCT01923662	VA Office of Research and Development	Device: IST-16 (16-Channel implanted stimulator-telemeter) for standing in persons with paralysis resulting from neurological disorder such as low cervical/thoracic spinal cord injuries (C6-T12)	• Age≥21 yrs • C6-T12 • AIS NS • Chronic SCI≥6m	Recruiting	10	Phase: Not Applicable, Primary Purpose: Device easibility, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Elapsed Standing Time • Subject Impression of Stability • Body Weight Distribution • Standing Stability Measures F/U 12 months	April 2013	August 15, 2013	January 20, 2022	Cleveland, OH, USA
NCT01894802	Michael Boninger	Implantation of microelectrode Cortical Recording and Stimulating (CRS) arrays in the motor cortex and sensory cortex of the brain for neural activity recording and use in control of external devices	• Age 22-70 yrs • Limited or no ability to use hands due to cervical SCI or other condition • Chronic SCI≥1yr	Recruiting	5	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	Arm/Hand Function	• Safety • Efficacy: long-term recording of neural activity and successful control of external devices F/U 12 months	December 2013	July 10, 2013	June 30, 2022	Pittsburgh, PA, USA
NCT01659541	MetroHealth Medical Center	Implantation of spinal cord expiratory muscle stimulator wire leads to restore cough	• Age 18-75 yrs • SCI C8 or above • AIS NS • Expiratory muscles weak • Chronic SCI • if AIS A: SCI≥6m; if AIS B, C, D SCI≥12m	Recruiting	25	Phase: Not Applicable, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Peak Expiratory Flow • Maximum Airway Pressure • Caregiver Burden Inventory • Secretion Management Index • Incidence of Resp. Infections • SCI related Quality of Life F/U 2 years	April 2015	August 8, 2012	February 21, 2021	Cleveland, OH, USA
NCT01491789	Hugo W. Moser Research Institute at Kennedy Krieger, Inc.	Single group study of the benefits of the VSail-Access simulator (virtual sailing simulator)	• Age 18-55 yrs • SCI C1-S1 • AIS A, B, C, D • Chronic SCI>6m	Recruiting	20	Phase: Phase 1. Phase 2, Primary Purpose: Treatment, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Rehabilitation	Arm/Hand Function	• ISNCSCI • SCI-QL-23 • Functional Reach Grasp/Pinch • Sailing Ability Questionnaire F/U 12 weeks	May 2011	December 14, 2011	January 10, 2022	Baltimore, MD, USA
NCT01474148	VA Office of R&D	Device: IRS-8 (8-Channel implanted stimulator-telemeter) to facilitate stability of the trunk and hips; Study the effect of stabilizing and stiffening the trunk with FES to change the way persons with SCI sit, breathe, reach, push a wheelchair, roll in bed	• Age≥21 yrs • SCI C4-T12 • AIS A, B, C • Chronic SCI≥6m	Recruiting	10	Phase: Not Applicable Primary Purpose: Treatment Intervention Model: Single Group Assignment Masking: None (Open Label)	Technology	General Health	• seated posture • respiration • reach ability • seated stability • personal mobility F/U up to 36 months	July 2011	November 18, 2011	February 18, 2022	Cleveland, OH, USA
NCT00912041	NIDCD US Dept of Veterans Affairs NINDS	Implantation of the one or two BrainGate2 sensor electrode arrays into the motor cortex; training implanted subjects to control a computer cursor and other assistive devices with their thoughts	• Age 18-75 yrs • Cervical SCI • AIS A, B, C, D • Lives≤3hr drive • Time post SCI NS	Recruiting	15	Phase: Not Applicable, Primary Purpose: Other, Intervention Model: Single Group Assignment, Masking: None (Open Label)	Technology	General Health	• Safety • Feasibility of BrainGate2 F/U 1 year	March 2009	July 3, 2009	June 24, 2022	Stanford, CA, USA Sacramento, CA, USA Boston, MA, USA Cleveland, OH, USA Providence, RI, USA Atlanta, GE, USA
NCT00623389	Case Western Reserve University NIH	Device: IST-16 (16-channel implanted stimulator-telemeter) with pre- and post- surgical training to facilitate exercise, standing, stepping and/or balance in people with various degrees of paralysis	• Age 21-75 yrs • C6-T12 or other paralysis • AIS A, B, C • Normal ROM • Chronic SCI≥6m	Recruiting	10	Phase: Not Applicable Primary Purpose: Device Feasibility Intervention Model: Single Group Assugnment Masking: None (Open Label)	Technology	Standing/ Walking/ Mobility	• Device reliability and technical performance • Device operability F/U 12 months	June 2018	February 26, 2008	August 18, 2021	Cleveland, OH, USA

This table is abstracted from the clinical trial registration website www.clinicaltrials.gov using the search term "Spinal Cord Injuries" and is updated periodically. The most recent update occurred June 1, 2022 at which time the www.clinicaltrials.gov search found a total of 1,497 SCI trials.
Of these, there were 410 interventional trials that are enrolling or not-yet-enrolling. Review of these 410 studies for those that are targeting improvement in neurological or related functional outcomes yielded the current list. The table includes 151 SCI trials from the search that:
1) are currently actively recruiting or soon-to-be recruiting subjects; 2) are interventional (testing an intervention/treatment) using rehabilitation, neural stimulation and/or assistive technology strategis ; and 3) targeted sensorimotor neurological or related functional improvement of the spinal cord as outcome measures.
Trials meeting these criteria are included if sufficient information is available on the clinicaltrials.gov webpages to adequately determine basic protocol design, the nature of the intervention, its delivery method, and relevant outcome measures.
Interventional clinical trials are routinely registered on www.clinicaltrials.gov based on legal requirements* and because scientific journals may require registration for publication of the trial results.
The clinicaltrials.gov website is the largest repository of current and past clinical trials for all diseases and disorders-as of July 1, 2022 the registry contained information on 421,079 trials including research conducted in all 50 states in the USA and 221 countries.
Investigators may choose not to register some early phase trials and those testing behavioral interventions, even though they may be important and scientifically rigorous studies.
*U.S. Public Law 110-85 requires the registration and reporting of results of "certain applicable clinical trials," i.e., controlled interventional clinical trials that are subject to FDA regulation and that involve a Drug or Biologic (other than Phase I investigations), or Device (other than small feasibility studies); http://prsinfo.clinicaltrials.gov/fdaaa.html.
More detailed information on individual trials may be accessed by using the NCT number found in the first column of the table. All trials registered with www.clinicaltrials.gov are assigned a registration number that begins with NCT (e.g. NCT01321333).

When an electronic version of the tables is used (e.g. when downloaded as a pdf file from www.scope-sci.org), the webpages describing a specific trial can be directly accessed by using the hyperlink (left Click to follow the link) of the NCT number in the table.
Listing of a clinical trial on the clinicaltrials.gov website does not reflect an endorsement by SCOPE or the National Institutes of Health. Information appearing on clinicaltrials.gov is provided by study sponsors/investigators and is not verified by SCOPE or clinicaltrials.gov for scientific validity or relevance.
Before volunteering to participate in a clinical trial, patients are urged to discuss all options with their healthcare provider and other trusted advisors.

NCT ID	Sponsor	Intervention	Criteria	Status	Target Enrollment	Study Phase & Design	Primary Intervention Type	Primary Potential Benefit	Outcome Measures and Follow Up	Study Start Date	First Posted	Last Updated	Location(s)

Terms/Abbreviations

• AIH: Acute Intermittent Hypoxia. Short duration (<2 min) exposure to breathing reduced oxygen concentration levels (~10% inspired oxygen), with alternating exposures to breathing air with normal oxygen concentration (~21% inspired oxygen).
This intervention is commonly delivered with a breathing mask device as a series of multiple brief hypoxic exposures alternating longer breathing exposure to "room air" with normal oxygen content.
• AIS: the ASIA (American Spinal Injury Association) Impairment Scale is a component of the ISNCSCI that classifies the degree of motor/sensory sparing below the level of injury. The AIS scale ranges from A (most severe, complete injury without sensory function in the lowest sacral segments) to E (normal). AIS B describes sensory only sparing; AIS C describes sensory and very weak motor sparing; AIS D describes sensory and stronger but not normal motor sparing.
• Ashworth/Modified Ashworth: a scale used to measure spasticity severity
• Barthel Index: a measure of performance in Activities of Daily Living (ADL) and Mobility
• Box and Block Test: a test of manual dexterity-how many blocks a person can grasp and transfer in one minute.
• Central Cord Syndrome/Cervical Central Cord Syndrome: motor incomplete cervical SCI in which the upper extremities are significantly more impaired than the lower extremities
• COPM: Canadian Occupational Performance Measure
• DASH: Disability of Arm, Shoulder, Hand scale is a measure of the upper extremity function
• EMG: the electromyogram refers to a physiological test of muscle and nerve function.
• ESWT: extracorporeal shock wave therapy. Delivery of sound wave energy to the spinal cord using a transducer applied to the skin (extracorporeal i.e. outside of the body).
• FIM: Functional Independence Measure was developed to measure the burden of care in persons who were not independent in ADL, hygiene/self-care, and mobility. The FIM and its subscales have been used as an outcome measure of a subject's independence.
• Frankel Scale: an older scale for classifying severity of injury that was modified in 1992 to create the AIS.
• F/U: follow-up
• GRASSP: Graded Redefined Assessment of Strength, Sensibility, and Prehension is a clinical measurement of upper limb function for use in person with tetraplegia (quadriplegia).
• HDE: Humanitarian Device Exemption is a U.S. Food & Drug Administration (FDA) application that, if successful, authorizes the applicant to market a Humanitarian Use Device (HUD) subject to certain profit and use restrictions.
• HUD: Humanitarian Use Device is a designation of the U.S. FDA for medical devices intended to benefit patients in the treatment or diagnosis of a disease or condition that affects or is manifested in fewer than 4,000 persons in the United States per year.
HUDs cannot be sold for profit, except in narrow circumstances, and they can only be used in a facility after an Institutional Review Board has approved their use in that facility except in certain emergencies.
• IANR-SCIFRS: the International Association of Neurorestoratology-Spinal Cord Injury Functional Rating Scale. Changes in motor and sensory scores assessed by IANR-SCIRFS scale (total score range from 0 to 51, higher values represent a better outcome)
• ICSH: International Classification for Surgery of the Hand in Tetraplegia is a clinical measure of hand function used by surgeons performing reconstructive surgery to improve function in persons with tetraplegia.
• IRB: Institutional Review Board is a multidisciplinary group that has been formally designated by an institution such as a hospital to review, approve and monitor biomedical research involving human subjects.
• ISAFSCI: International Standards to document remaining Autonomic Function after Spinal Cord Injury.
• ISNCSCI: International Standards for Neurological Classification of Spinal Cord Injury-sometimes referred to as the ASIA (American Spinal Injury Association) standards. This refers to the accepted international standards for performing motor/sensory physical examination of persons with SCI and the classification scheme for documenting the neurological level and the severity (completeness) of injury.
• IT: intrathecal, within the subarachnoid space surrounding the spinal cord-e.g. administration of a drug into the subarachnoid space which contains the cerebrospinal fluid (CSF)
• IV: intravenous-administration of a drug by vein
• Kinematics: analysis of movement
• Kunming Locomotor Scale: a 10-grade Roman numeral locomotion scoring system describing ability to stand, ability to walk, and required support/devices.
• N/A: not applicable
• NS: not specified
• Penn Spasm Frequency Scale: a measure of spasticity based on frequency of spasm occurrence
• Phase of Study: Clinical trials usually progress in phases from 1 to 4. (Note: trials that are not on the path to FDA/regulatory approval (e.g. trials of surgical techniques or rehabilitation therapies) may not have a phase designation.)

1	Phase 1 trials are usually first-in-human or first-in-disease/condition experiments that are intended to demonstrate feasibility (can it be done), safety (is it reasonably safe), and tolerability (are the side effects tolerable). These trials usually do not include a comparison control group, and do not provide direct evidence of the interventions efficacy. Phase 1 trials usually enroll a small number of subjects and are commonly done at a single study center but may use a small number of collaborating cent
2	Phase 2 trials follow successful completion of Phase 1. Phase 2 trials are used to develop information on intervention administration (how to give), dose (how much to give), timing (when and how long to give), effect of the intervention on the body (what does it do, beneficial or harmfu These trials commonly utilize multiple study centers, many subjects, and a randomized control group to provide direct information about efficacy and safety of the intervention. Phase 2 trials enable refinement of how to administer the intervention and how to measure its beneficial effe
3	Phase 3 trials are conducted using the refined protocols developed from Phase 2 trials. They are often termed "pivotal" studies because they are sufficiently well-designed and rigorously conducted that their results, if positive, can be used for regulatory approval (e.g. FDA approval). These trials almost always enroll large numbers of subjects (hundreds or more), use multiple study centers, and a randomized control group design (placebo control and double blinding). The FDA generally requires two successful confirmatory Phase 3 trials of an intervention for ap
4	Phase 4 trials are conducted after regulatory (e.g. FDA) approval to gather additional safety and efficacy data.

• Pharmacokinetics: study of the absorption, distribution, metabolism, and excretion of drugs; commonly involving periodic sampling of bodily fluids (e.g. blood, serum, CSF, urine) to determine drug concentration changes over time.
• Open Label: a trial in which there is no attempt to conceal the identity of the intervention from the subjects; i.e. there is no "blinding" or "masking" of the intervention-the subjects know that they are receiving either an "active ingredient" or a placebo.
• RCT: Randomized Controlled Trial. A clinical trial in which subjects are randomly assigned to either receive the active treatment or an alternative (control). Well-designed RCT's minimize the influence of variables other than the intervention that might have an effect on the desired outcome.
For this reason, they provide the best evidence of efficacy and safety. The most rigorous RCT's utilize a placebo (inactive) control group and blinding (concealing active vs. control assignment) to minimize bias in the interpretation of study results.
• Residual Urine: Changes in residual urine measured after voiding by ultrasound test (volume of urine in mL, lower values represent a better outcome)
• ROM: Range of Motion
• SCIM/SCIM II/SCIM III: the Spinal Cord Independence Measure is a measure of a person's ability to perform certain activities independently
• SQ: subcutaneous-administration of a drug by injection beneath the skin
• SF-36: the Short Form-36 is a patient-reported survey of health status. The SF-36 is commonly used as a measure of Health-Related Quality of Life
• TMS/UEMS/LEMS: Total Motor Score/Upper Extremity Motor Score/Lower Extremity Motor Score are components of the ISNCSCI that include the ASIA Motor Index Score (the TMS) and the sub-components of the UEMS and the LEMS which are commonly analyzed and reported separately.
• Tardieu Scale: test of spasticity by assessing muscle resistance to passive movement at both slow and fast speed.
• VAS: Visual Analogue Scale-a scale commonly used to assess the severity of pain
• 9 Hole Peg Test: a test of manual dexterity
• 6MWT: 6 minute walk test. An assessment of the distance that the subject can walk in 6 minutes.
• 10MWT: 10 meter walk test. An assessment of the time required to walk 10 meters.