

The Kids STEP Study at UF and Brooks Rehabilitation Healthcare Provider Information

The ‘Kids STEP Study at UF and Brooks Rehabilitation’ is investigating recovery of walking in children with chronic, severe, incomplete spinal cord injury. The study is funded for two years by the Craig H. Nielsen Foundation, an organization dedicated to spinal cord injury research and recovery. The official title of the project is *Restoring walking in non-ambulatory children with severe chronic SCI*. This project is a collaborative effort among researchers at the University of Florida and physicians at Brooks Rehabilitation Hospital.

The Kids STEP Study is lead by Dr. Andrea Behrman, PhD, PT, a physical therapist and researcher at UF, and Dr. Dena Howland, PhD, OT, an occupational therapist and neuroscientist. Together, they are working with researchers across multiple departments at the University of Florida. Dr. Jeffery Johns, MD, Associate Medical Director for Brooks Rehabilitation Hospital and Spinal Cord Injury Program Medical Director, along with Dr. Louise Spierre, MD, Director of Pediatric Rehabilitation at Brooks Rehabilitation Hospital will provide the medical management for the study.

The Kids STEP Study at UF and Brooks Rehabilitation aims to investigate:

- 1) The use of locomotor training for restoring ambulation in children with chronic, severe SCI
- 2) The neural substrates underlying walking function, specifically the descending systems from supraspinal motor areas below the cortex (midbrain and/ or medulla)

Locomotor training (LT) is an activity-based therapy to promote plasticity and recovery of walking. It is based on animal studies investigating walking recovery after spinal cord injury and the nervous system’s control of walking. Normal walking is achieved through the interaction of multiple levels of the neural axis (cortex, brain stem, spinal cord). However, a basic rhythmic walking pattern is generated by central pattern generators (CPGs) located within the spinal cord. Investigations of central pattern generators indicate that sensory input specific to the task of walking can enhance the firing of these spinal neuronal centers. Thus, LT is an intensive walking program designed to provide sensory input to the spinal cord so that the neural output from the spinal CPGs can be maximized. In addition, LT uses a treadmill and a harness to provide partial body weight support enabling persons with injury to repetitively practice walking in a safe, enabling environment. The sensory-specific training principals used during LT include: stepping speeds near normal, maximal leg loading while still retaining an optimal walking pattern, emphasis on an upright and extended trunk, facilitation of normal lower limb joint kinematics, and reciprocal interlimb joint coordination such as appropriately timed arm swing. Therapists and trainers individualize the training program based on each person’s ability and unique needs.

The Kids STEP Study at UF and Brooks Rehabilitation will work with pre-adolescent children (Tanner Stages of Puberty 1 or 2), ages 3-13 years with incomplete SCI

Kids STEP Study information

(Cervical or thoracic injury classified as ASIA B or C) who are now are non-ambulatory or have limited ambulation for >1 yr. (Refer to the attached list of specific inclusion and exclusion criteria.) Children enrolled in the study (after medical clearance and consent to participate) will undergo extensive testing and complete 12 weeks of locomotor training. Testing will examine the child's neurologic and functional status. Tests to examine functional status include: ASIA evaluation of sensory and motor function, gait analysis, comprehensive strength tests, and assessment of skills such as cycling, stepping, and kicking; Tests to examine the child's neurologic injury include: MRI, Transcranial Magnetic Stimulation (TMS), and reflex testing. Locomotor training will be conducted daily (5 days/ week) for a total of 60 sessions over 12 weeks. During training children will work closely with therapists, researcher, and trainers to practice walking skills on the treadmill and over-ground.

Please contact Emily Fox, Project Coordinator with any questions pertaining to the Kids STEP Study at UF and Brooks Rehabilitation.

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Kids STEP Study web site:
<http://locomotor.p.php.ufl.edu/KidsStepStudy>

Restoring walking in non-ambulatory children with severe chronic SCI (Kids STEP Study)

Participant Inclusion / Exclusion Criteria

Ten spinal cord injured children matching the inclusion and exclusion criteria described below will participate in this study.

Prerequisites of spinal cord injured children participating in this study:

Inclusion criteria for post-SCI children:

For the proposed experiments, inclusion criteria for individuals with SCI will include:

- 1) Pre-adolescent children, age 3 to 13 years old and within Tanner's Stages of Puberty 1 or 2
- 2) a diagnosis of first time, non-progressive SCI, upper motor neuron lesion, including, but not limited to, etiology from trauma, inflammation, vascular, surgical re-section due to localized tumor removal or orthopedic pathology resulting in clinical signs of lower cervical or thoracic spinal cord injury
- 3) non-ambulatory or impaired ambulation for greater than 1 yr, such that physical assistance and the use of assistive devices (i.e. walker) and/ or leg braces (i.e. knee- ankle- foot orthoses (KAFOs)) are required to ambulate
- 4) a SCI as defined by the American Spinal Injury Association (ASIA) Impairment Scale category B or C
- 5) a medically stable condition that is asymptomatic for bladder infection, decubiti, osteoporosis, cardiopulmonary disease, pain, or other significant medical complications that would prohibit or interfere with testing of walking function and training or alter compliance with a training protocol
- 6) documented medical approval from the participant's personal physician verifying the participant's medical status
- 7) parent's informed consent for children

Exclusion criteria for post-SCI children:

For the proposed experiments, exclusion criteria for individuals with SCI will be:

- 1) is currently participating in a rehabilitation program or another research protocol that could interfere or influence the outcome measures of the current study
- 2) has a history of congenital SCI (e.g. Chiari malformation, myelomeningocele, intraspinal neoplasm, Frederich's ataxia) or other degenerative spinal disorders (e.g. spinocerebellar degeneration or syringomyelia) that may complicate the treatment and/or evaluation procedures
- 3) children who are diabetic or have implants, pacemakers, or devices which are not NMR/MRI compatible and are not suitable for the study