

Galvez, J., Reinkensmeyer, D. (2005) **Robotics for gait training after spinal cord injury.** *Topics in Spinal Cord Injury Rehabilitation*, 11(2), 18-33. [NARIC Accession Number: J49699](#). Project Number: H133E020732.

Abstract: Article reviews research on ways to automate locomotor training through the use of robotics. Robotic devices that have been developed to automate partial body weight support treadmill training include the Mechanized Gait Trainer, the Lokomat, and the AutoAmbulator. Clinical studies involving these systems, the benefits of robotic devices that assist only as needed during motor training, and directions for future research are discussed.

McMahon, B., Shaw, L. (2005) **Workplace discrimination and spinal cord injury: The national EEOC ADA research project.** *Journal of Vocational Rehabilitation*, 23(3), 155-162. [NARIC Accession Number: J49829](#). Project Number: H133B040011.

Abstract: Study documents the employment discrimination experiences of Americans with SCI using data from the Equal Employment Opportunity Commission (EEOC). It presents an analysis of the allegations of employment discrimination brought under Title I of the Americans with Disabilities Act (ADA) filed by people with SCI compared to allegations filed by individuals with other physical, neurological, or sensory disabilities. Researchers examined demographic characteristics of the charging parties, characteristics of respondents, the nature of the allegations, and the outcomes of the allegations. Analyses revealed that people with SCI were more likely to experience discrimination involving hiring, promotion, and reinstatement and were less likely to encounter discrimination related to discharge, reasonable accommodation, harassment, discipline, and intimidation. Allegations of discrimination against people with SCI occurred more often in the services and public administration industries, more often among small employers, and more often among employers located in the South. EEOC findings of "no cause", in which full investigation fails to support the alleged violation, are significantly less common among people with SCI, compared to charging parties with general disabilities.

Kogos Jr., S., Richards, S. (2005) **Visceral pain and life quality in persons with spinal cord injury: A brief report.** *Journal of Spinal Cord Medicine*, 28(4), 333-337. [NARIC Accession Number: J50071](#). Project Number: H133A011108.

Abstract: The prevalence of visceral pain and quality of life (QOL) were compared in people with SCI at 5, 10, and 15 years after injury. The rates of visceral pain increased at each measurement: 10 percent at year 5, 22 percent at year 10, and 32 percent at year 15. There was no significant relationship between visceral pain and QOL at any of the time measurements. However, at 10 years after injury, people who had reported visceral pain at any time reported a significantly lower QOL than those without visceral pain.

Rimmer, J., Schiller, W. (2006) **Future directions in exercise and recreation technology for people with spinal cord injury and other disabilities: Perspectives from the rehabilitation engineering research center on recreational technologies and exercise physiology for people with disabilities.** *Topics in Spinal Cord Injury Rehabilitation*, 11(4), 82-93. [NARIC Accession Number: J50441](#). Project Number: H133E020715.

Abstract: Article focuses on a conceptual framework for addressing barriers that people with spinal cord injuries and other disabilities face when attempting to participate in community living. The framework identifies four key areas necessary that are pivotal in facilitating participation in exercise and recreation: (1) access, (2) participation, (3) adherence, and (4) health and function. The significance of each of these elements is discussed in terms how it guides the research and development practices of the Rehabilitation Engineering Research Center on Recreational Technologies and Exercise Physiology for People with Disabilities.

Klebaine, P., Lindsey, L. (2005) **Weight management following spinal cord injury.** *Spinal Cord Injury InfoSheet*. [NARIC Accession Number: O16021](#). Project Number: H133B980016.

Abstract: Consumer-oriented fact sheet provides consumer information on weight management after SCI. Offers advice on proper nutrition; behavior and lifestyle changes related to planning meals, shopping for food, cooking, eating out, self-improvement, stress reduction, and goal setting; participation in physical activities; and maintaining long-term success.

(2005) **Spinal cord injury peer mentoring.** [NARIC Accession Number: O16294](#). Project Number: H133B031114.

Abstract: Fact sheet provides general information on SCI peer mentors. Peer mentors share thoughts and experiences about SCI, help people with SCI cope with their injury, help prevent medical complications, and help find ways to live a healthy, active lifestyle. Tips are presented for ways to develop or maintain a positive, beneficial peer mentoring relationship.

## NIDRR Grantees on the Cutting Edge

**Collaboration of Upper Limb Pain in Spinal Cord Injury** *University of Pittsburgh* (H133A011107) led by Michael L. Boninger, MD. Theresa San Agustin, MD, Project Officer.

Abstract: This collaborative studies project provides an opportunity to gain further insight into the cause and prevention of upper limb repetitive strain injuries in SCI. For the approximately 200,000 individuals with SCI, upper limb pain and injury is very common; some studies find prevalence rates above 70 percent. Prolonged wheelchair use and transfers have long been thought to cause these repetitive strain injuries. The consequences of upper limb pain are so significant that some researchers have suggested that damage to the upper arm may be functionally and economically equivalent to a spinal cord injury of higher neurological level.

Find out more at: [www.herpitt.org](http://www.herpitt.org)

**Lifetime Outcomes and Needs: Refining the Understanding of Aging with Spinal Cord Injury** *Craig Hospital* (H133A011108) led by Daniel P. Lammertse, MD; Susan B. Charlifue, PhD. Phillip Beatty, Project Officer.

Abstract: This project explores the incidence and prevalence of several health and psychosocial conditions that accompany living many years with SCI. Also studied in this comprehensive, longitudinal, multicenter effort are the services available to individuals with SCI as they attempt to address these conditions throughout their lives. The study expands the longitudinal database, addressing emerging issues of aging with SCI in greater detail, and expands efforts to share findings with a variety of constituents. The eight areas of focus include: (1) secondary conditions from 5 to 25 years post-injury, (2) new analytic techniques with longitudinal datasets, (3) chronic pain, (4) access to and satisfaction with health services, (5) personal assistance services, (6) spirituality and its effects on health outcomes and quality of life, (7) the role of perceived stress and self-reported problems on the presence or absence of secondary conditions and in relation to one's overall well-being, and (8) trends in quality of life and health.

Find out more at: [www.craighospital.org](http://www.craighospital.org)

**Rehabilitation Research and Training Center on Spinal Cord Injury: Promoting Health and Preventing Complications through Exercise** *National Rehabilitation Hospital/MedStar Research Institute* (H133B031114) led by Suzanne L. Groah, MD. Thomas Corfman, Project Officer.

Abstract: This project systematically and comprehensively addresses the role and impact of physical activity in the prevention of secondary conditions in people with SCI. Initially, the project establishes critical, yet-undefined physiological responses to exercise in SCI and comprehensively examines cardiovascular disease risk in individuals with SCI

The 2006 Model Spinal Cord Injury Systems will be announced by NIDRR shortly. This issue focuses on Field Initiated Projects, RRTCs and RERCs, and Disability and Rehabilitation Research Projects and their research efforts in SCI.

*Please note: These abstracts have been modified. Full, unedited abstracts, as well as any available REHABDATA citations, are available at [naric.com](http://naric.com).*

**Thousands of additional resources on these topics are available from NARIC's resource pages at [www.naric.com/public](http://www.naric.com/public)**

**For August, RehabWire looks at current research in spinal cord injury (SCI) outside of the Model Systems.**

applying accepted guidelines used in the able-bodied population. The project develops exercise formats specifically designed according to severity of SCI and chronicity of SCI to address the prevention of and knowledge regarding osteoporosis and other secondary conditions. In addition, the project determines whether regular exercise is related to fewer secondary conditions. These research findings feed into four training activities that include a peer mentoring program for newly injured people with SCI, a consumer-driven education curriculum for physical therapy and medical students, a state-of-science and training conference, and the development of a virtual resource network on exercise and prevention. Find out more at: [www.sci-health.org](http://www.sci-health.org)

**RERC on Spinal Cord Injury: Keep Moving: Technologies to Enhance Mobility and Function for Individuals with Spinal Cord Injury** *Los Amigos Research and Education Institute, Inc. (LAREI)* (H133E020732) led by Philip Requejo, PhD; Robert Waters, MD. Theresa San Agustin, MD, Project Officer.

Abstract: This RERC improves the lives of individuals with SCI by promoting their health, safety, independence, and active engagement in daily activities. Activities include: (1) monitoring trends and evolving product concepts that represent future directions for technologies in SCI, (2) conducting research to advance the state of knowledge, (3) disseminating the information to the population, (4) developing and testing prototype devices that are useful and effective and transferring them to the marketplace, (5) advancing employment opportunities for individuals with SCI, and (6) developing ways to expand research capacity in the field of SCI. The R&D program is focused on the need to maintain mobility for as long as possible in order to enhance independent function. An active Mobile Arm Support for adults allows those with limited arm function greater independence. The shoulder-preserving wheelchair, gait training robotic assist device, and adaptive exercise equipment are all specifically geared to preserve or enhance mobility in individuals with SCI. A project on optimized wheelchair suspension keeps people mobile by increasing comfort and reducing tissue loading. Find out more at: [www.larei.org](http://www.larei.org)

**A Study of Biophysical and Microvascular Function of Individuals with SCI: Implications for Alternating Pressure Support Surfaces** *University of Pittsburgh* (H133G040222) led by David M. Brienza, PhD. Theresa San Agustin, MD, Project Officer.

Abstract: The specific aims of this research study are to: (1) characterize blood flow control mechanisms (e.g. metabolic, neurogenic, and myogenic controls) via laser Doppler blood flow using Wavelet analysis in individuals with SCI; (2) investigate the use of alternating pressure for enhancing skin blood flow in SCI; (3) compare the effect of neurogenic control of cutaneous microcirculation on the strength of blood flow responses to alternating pressure in SCI with T-6 above and below; and (4) compare the effect of soft tissue properties on the strength of blood flow responses to alternating pressure in SCI with T-6 below and unimpaired subjects. These studies provide insight into mechanisms important to the configurations of optimal parameters for enhancing blood flow in SCI population, and provide a valid method for the evaluation of alternating pressure devices.

**Psychological and Physiological Aspects of Menopause in Women with Spinal Cord Injury** *University of Michigan* (H133G040274) led by Claire Kalpakjian, PhD. Theresa San Agustin, MD, Project Officer.

Abstract: The overall goal of this project is to test the general hypothesis that SCI will moderate the relationship of menopause and health-related outcomes. This research involves two interrelated studies of women with SCI: Study 1 is aimed at examining physical (e.g., secondary conditions), and psychological outcomes (e.g., depression, perceived stress), while Study 2 is aimed at examining physiological outcomes (e.g., body composition, fitness levels). These studies involve a total of 227 women with SCI, men with SCI, and women without disabilities. Study 1 involves three collaborating centers in the collection of longitudinal survey data from 207 participants to assess the ability to reliably distinguish secondary conditions of SCI from menopause symptomatology and experience of menopause symptomatology in women with SCI (women without disabilities serve as controls). Men with SCI serve as controls in the first part of this study. Study 2 collects longitudinal data to investigate physiological outcomes menopause in a total of 20 women.

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## The Cochrane Library

A quick search for "spinal cord injury" at The Cochrane Library found 13 Cochrane Reviews, 9 Other Reviews, 583 Clinical Trials, 6 Methods Studies, 8 Technology Assessments, and 38 Economic Evaluations. These include reviews by NIDRR projects. Visit [thecochranelibrary.org](http://thecochranelibrary.org) for more information

### Where Can I Find More?

A quick keyword search is all you need to connect to a wealth of disability and rehabilitation research. NARIC's databases hold more than 75,000 resources. Visit [www.naric.com/research](http://www.naric.com/research) to search for literature, current and past research projects, and organizations and agencies in the US and abroad.



Photo Credit: Nick Traboulay, Riverside, CA

**A Longitudinal Study of Risk for Hospitalization, Pressure Ulcers, and Subsequent Injuries After Spinal Cord Injury** *Medical University of South Carolina* (H133G050165) led by James S. Krause, PhD Joyce Y. Caldwell, Project Officer.

Abstract: The onset of SCI increases the risk for the development of a number of secondary conditions that may adversely impact an individual's life and even result in early mortality. The purpose of this project is to perform a longitudinal study to identify protective and risk factors associated with the onset of multiple types of adverse health events among a large sample of individuals with SCI. In 1997-8, prospective data was collected on 1,391 participants who included a substantial number of women and racial/ethnic minorities. Risk and protective predictors were selected based on a general empirical risk model. Predictor variables were first measured over a 10-month period in 1997-1998, including: (a) biographical status, (b) injury status, (c) psychological status, (d) environmental factors, and (e) health behaviors. Several health outcomes measures were also used. During this follow-up study, the project administers several new predictor measures along with multiple outcome measures, several of which were also administered during the previous study. These measures focus on adverse health events including hospitalizations, onset of pressure ulcers, subsequent injuries, and the onset of probable major depression. The project includes structural equation modeling to develop risk models for each outcome.

### Current Literature - Selections from REHABDATA

Chen, Y., DeVivo, M. (2005) **Pressure ulcer prevalence in people with spinal cord injury: Age-period-duration effects.** *Archives of Physical Medicine and Rehabilitation*, 86(6), 1208-1213. NARIC Accession Number: J49028. Project Number: H133A011201.

Abstract: Longitudinal study examined the effects of age, time period, and duration of injury on the prevalence of pressure ulcers in people with SCI. Participants were injured between 1986 and 1995 and followed up thereafter on a yearly basis through 2002. The prevalence rate of pressure ulcers was calculated for each annual visit, stratified by calendar year of examination and age at examination. Analysis showed a significant trend toward increasing pressure ulcer prevalence in the more recent years, which were not explained by aging, years since injury, or demographic and clinical factors. The risk of pressure ulcers appeared to be steady for the first 10 years and increased 15 years after injury. Pressure ulcers were more common among subjects who were elderly, African American, single, less educated, unemployed, with complete injuries, and a history of pressure ulcers, rehospitalization, nursing home stay, and other medical conditions. Injury cause and level had no significant effect.

Krause, J., Broderick, L. (2005) **A 25-year longitudinal study of the natural course of aging after spinal cord injury.** *Spinal Cord*, 43(6), 349-356. NARIC Accession Number: J49177. Project Number: H133G010009; H133G70111.

Abstract: Study examined the natural course of aging over a 25-year period among people with SCI. The Life Satisfaction Questionnaire was used to identify changes in education, employment, activities, medical treatments, adjustment, and life satisfaction. Analyses revealed that adjustment scores, satisfaction with employment, satisfaction with finances, years of education, and employment indicators significantly improved over time. However, satisfaction with sex life, satisfaction with health, and the number of weekly visitors significantly decreased. The number of non-routine medical visits and days hospitalized within two years prior to the study significantly increased.