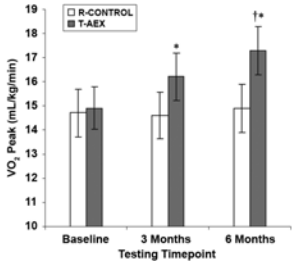
JRRD at a Glance

Exercise-mediated locomotor recovery and lower-limb neuroplasticity after stroke

Larry W. Forrester, PhD, et al.



Many individuals with a stroke have weakness in one leg that causes them difficulties with walking. In this article, we review evidence that treadmill exercise training can improve walking in people with stroke. We suggest that discoveries being made about how the brain and nervous system change with arm therapies may also apply to recovery of leg function after stroke. We present examples of how the brain plays an important part in the control of leg muscles and walking and how this control may be changed by therapies, such as treadmill training to improve walking ability.

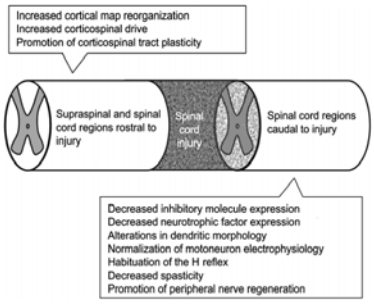
Effect of treadmill exercise training on spatial and temporal gait parameters in subjects with chronic stroke: A preliminary report

Shawnna L. Patterson, MD, PhD, et al.

People with stroke walk slowly and irregularly. We studied the walking patterns of subjects with stroke who exercised on a treadmill. After 6 months, these subjects increased their cardiovascular fitness, changed their walking patterns, and walked faster on and off the treadmill whether using their assistive device or not. Both feet took longer steps and spent less time on the ground at the same time. Treadmill training helped the subjects with stroke improve their fitness and walk faster, although they still walked with an irregular gait pattern. A different strategy may be necessary to further improve their walking patterns.

Activity-dependent plasticity in spinal cord injury

James V. Lynskey, PhD, PT



Spinal cord injuries (SCIs) can severely disrupt motor, sensory, and autonomic functions. In the first year after an incomplete injury, significant recovery often occurs. The recovery depends on multiple factors, including the level and extent of injury, postinjury medical and surgical care, and rehabilitative interventions. This article will help patients, their families, and care givers to understand the spontaneous changes that occur after SCI and how rehabilitation therapies using exercise and/or electrical stimulation could promote changes in the nervous system to improve recovery of function.

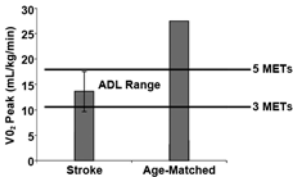
Treadmill training after spinal cord injury: It's not just about the walking

Audrey L. Hicks, PhD; Kathleen A. Martin Ginis, PhD

Body weight-supported treadmill training (BWSTT) is being used throughout the world as a method to improve functional ambulation after spinal cord injury. This therapy allows individuals with varying degrees of paralysis to participate in whole-body, weight-bearing exercise. We contend that this therapy should not be evaluated only for its potential to improve ambulation since it can also improve a variety of health-related outcomes. People with either acute or chronic injuries show benefits related to cardiovascular function, muscle morphology, glucose metabolism, and psychological well-being after participation in BWSTT, regardless of whether ambulatory ability is improved.

Task-oriented treadmill exercise training in chronic hemiparetic stroke

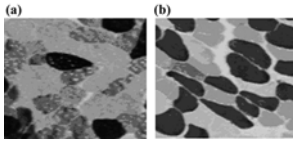
Frederick M. Ivey, PhD, et al.



Because stroke patients are extremely physically inactive, they become "out of shape" to the point that it affects their ability to care for themselves and increases their risk for future heart attack and stroke. Recently, treadmill exercise training has been studied as a means to combat the physical decline that otherwise occurs in the average stroke survivor. Encouragingly, this form of therapy seems to result in many measurable health benefits after stroke, including improved function and reduced cardiovascular disease risk. Future research studies will be required to determine the ideal dose of treadmill exercise therapy for a person who has had a stroke.

Skeletal muscle changes after hemiparetic stroke and potential beneficial effects of exercise intervention strategies

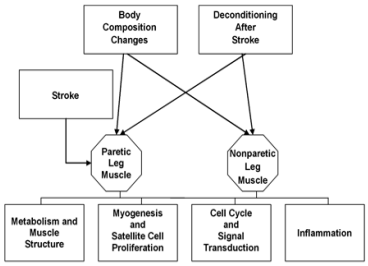
Charlene E. Hafer-Macko, MD, et al.



Stroke is one of the most debilitating conditions known. It is thought to cause several different events in the body, including muscle alterations. By examining differences in gene levels between muscles on the stroke and nonstroke side, we can help determine the likely causes of some of the loss of function seen in individuals with stroke. These gene differences include those that may contribute to muscle weakness, inflammation, and diabetes. This study is the first step in identifying how these genes may contribute to these differences.

Human genome comparison of paretic and nonparetic vastus lateralis muscle in patients with hemiparetic stroke

Michael J. McKenzie, PhD, CSCS, et al.



Stroke is quite debilitating. In addition to the brain, it can have consequences for other organs, such as muscle, which may contribute to further disability. We determined whether gene levels differed between the paretic and nonparetic stroke leg muscles in stroke survivors. These skeletal-muscle gene differences may contribute to weakness, inflammation, and diabetes. This study is the first step toward identification of how these genes are altered after a stroke.

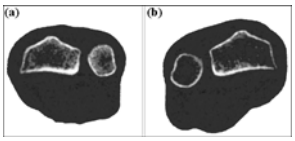
Muscle and bone plasticity after spinal cord injury: Review of adaptations to disuse and to electrical muscle stimulation

Shauna Dudley-Javoroski, PT; Richard K. Shields, PhD, PT

After spinal cord injury (SCI), muscles become smaller and more fatigable. Muscle contractions usually help bones maintain appropriate density. Without routine muscle contractions, bones develop severe osteoporosis, making fractures a serious problem for people with SCI. Rehabilitation researchers are exploring the use of electrical muscle stimulation to prevent muscle and bone deterioration after SCI. After electrical stimulation training, muscles generate higher forces and become less fatigable. Research is ongoing to discover the extent to which electrically elicited muscle contractions preserve bone density after SCI. The dose of musculoskeletal stress and the feasibility of delivering that dose should be carefully considered when designing new rehabilitative therapies in the future.

Balance, falls, and bone health: Role of exercise in reducing fracture risk after stroke

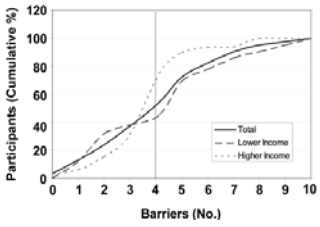
Janice J. Eng, PhD, PT/OT, et al.



People who have had a stroke have an increased risk of falls and resulting fracture, especially at the hip or wrist. Exercise is a promising treatment for preventing these fractures because it has the potential to improve balance, reduce falls, and maintain or possibly improve the strength of bones. We provide an overview of the evidence underlying exercise interventions targeted at reducing falls and improving bone health in people with stroke. Given the multiple benefits of exercise on fracture risk factors, exercise should be considered for the management of falls and bone health following a stroke.

Barriers associated with exercise and community access for individuals with stroke

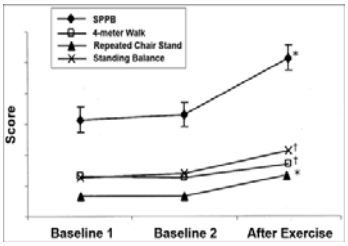
James H. Rimmer, PhD, et al.



Barriers to participation in physical activity are an enormous problem for many individuals with stroke. These barriers, which include cost of an exercise program, transportation to and from an exercise facility, and no knowledge of where or how to exercise, are often insurmountable and make maintaining health and function after rehabilitation difficult for people with stroke. The complex barriers that the participants with stroke reported in our study provide a strong incentive for Federal and public agencies to address growing concern about this patient population's lack of access to fitness and recreation venues.

Adaptive physical activity improves mobility function and quality of life in chronic hemiparesis

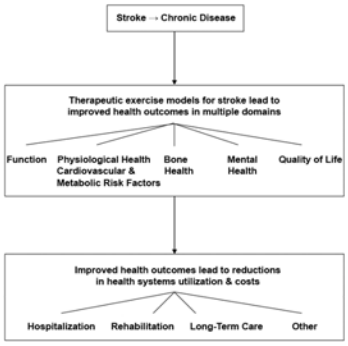
Richard F. Macko, MD, et al.



Access to exercise programs after stroke rehabilitation has ended is a problem. In Italy, we tested a group exercise program that can be done in community centers. Twenty older people who had had a stroke 5 years earlier entered a 2-month exercise class and did exercise homework to improve their mobility. Participants improved all mobility skills, including walking speed (by 25%), balance, and rising from a chair. These improvements increased scores on basic activities of living and stroke-specific quality of life scales. These results give promise that exercise programs can be set up in the community to help chronic stroke survivors.

Exercise for chronic stroke survivors: A policy perspective

Mary Stuart, ScD, et al.



Stroke is one of the leading causes of death and disability in the United States. Usually, prevention or acute treatment for stroke is emphasized. However, few services currently target stroke survivors. The development of a partnership led by the Veterans Health Administration (VHA) to develop community exercise programs throughout the VHA and the greater community can lead to improved physical benefits for stroke survivors and their families. The VHA is currently looking at duplicating an Italian model for community exercise and rehabilitation through partnerships between community-based outpatient clinics and community Offices on Aging.

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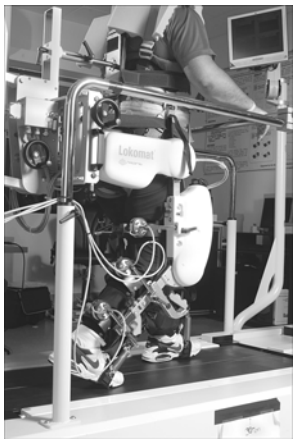
Automating activity-based interventions: The role of robotics

Joseph Hidler, PhD, et al.



We have seen a continued growth of robotic devices being tested in neurorehabilitation settings over the last decade. The main goal of this testing has been to improve upper- and lower-motor function in individuals with stroke, spinal cord injury, and other neurological conditions. Interestingly, few studies have investigated the use of these devices to improve the overall health and wellbeing of these individuals, despite their capability to deliver intensive time-unlimited therapy. In this article, we discuss using robotic devices to deliver intense, activitybased therapies that may significantly benefit exercise. We also present preliminary studies that investigate the metabolic and cardiac responses both during and 6 months after robotic training. Finally, we speculate on the future of robotics and how these devices will affect rehabilitation interventions.