Gait rehabilitation using mechanical perturbations on the unimpaired leg to provide therapy to the impaired

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Technology description

In the United States alone there are over 795,000 new strokes each year. 90% of stroke survivors require therapy, but a vast majority of these patients are only able to achieve minimal functional recovery five years after their stroke. Robot-assisted therapy is a cutting-edge technique which is expected to improve patient outcome because robots can easily facilitate key behavioral signals that drive neural plasticity. Neural plasticity is the ability of the brain to create and change neural pathways and is the mechanism underlying improvement in functional outcome after a stroke. In the past several years, a variety of robotic rehabilitation devices have been developed for gait therapy. These therapies manipulate the impaired leg. Unfortunately, studies have been unable to confirm the superiority of these robotic techniques over conventional physiotherapy approaches.
Researchers at Arizona State University have developed a new gait rehabilitation technique which takes advantages of inter-limb coordination. A modified variable-stiffness treadmill is combined with application of perturbation signals. When the neural circuitry of the unaffected limb is stimulated, the body responds by applying some sort of correction to both legs. Thus, the functionality of the unimpaired leg is used to help heal neural pathways to the impaired leg. Unlike typical therapies, this invention differentiates between force and kinematic feedback. The separate physiological mechanisms for balance and body weight support are also taken into account. Patient safety is greatly improved by not directly manipulating the impaired limb. Stimulation of the fully-functional leg elicits greater functional outcome than stimulation of the impaired leg.

Application area

Stroke Rehabilitation
Gait therapy
Physical training
Professional athletes
Personal use
Rehabilitation for patients with neurological disorders

Institution

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