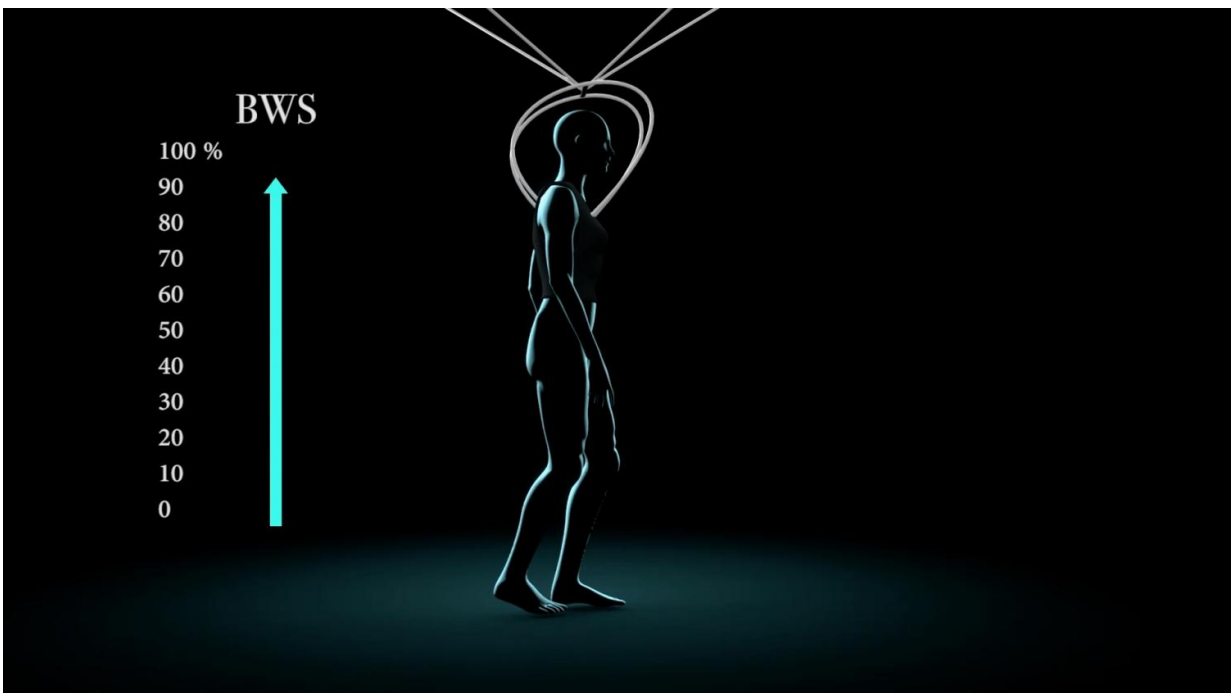


# 'Smart' robot technology could give stroke rehab a boost

July 19 2017, by Amy Norton, Healthday Reporter

---



Credit: Ecole Polytechnique Federale de Lausanne

Scientists say they have developed a "smart" robotic harness that might make it easier for people to learn to walk again after a stroke or spinal cord injury.

The harness, the researchers said, can be fine-tuned to individual patients to help them find a more natural walking pattern as they go through

rehabilitation.

In early tests with 26 patients recovering from a spinal cord injury or stroke, the technology looked promising, according to a new report.

In general, the study found, the system allowed patients to move with a more natural gait, and better balance and coordination.

The researchers also saw immediate effects among five spinal cord injury patients. Right after an hour of training with the harness, the patients were able to move more easily using their usual assist devices, such as crutches or a walker.

Right now, rehab is often done the old-fashioned way, with patients supported by a therapist—or more than one—as they slowly learn to put one foot in front of the other.

When patients have more severe injuries, that's an especially arduous process, said Dr. Preeti Raghavan, who directs motor recovery research at NYU Langone's Rusk Rehabilitation in New York City.

"If you need two or three people to hold the patient up, it becomes very laborious to even take a step forward," said Raghavan, who was not involved in the study.

So, she said, robotic harness systems have been developed to assist therapists. They essentially consist of a harness attached to the ceiling that supports the patient on a treadmill.

"The trouble is," Raghavan said, "large clinical trials have found that [the systems] don't improve patients' outcomes any more than the low-tech approach with a therapist."

What's "exciting" about the new research, Raghavan said, is that it may shed light on why the current harness systems have not improved recovery.

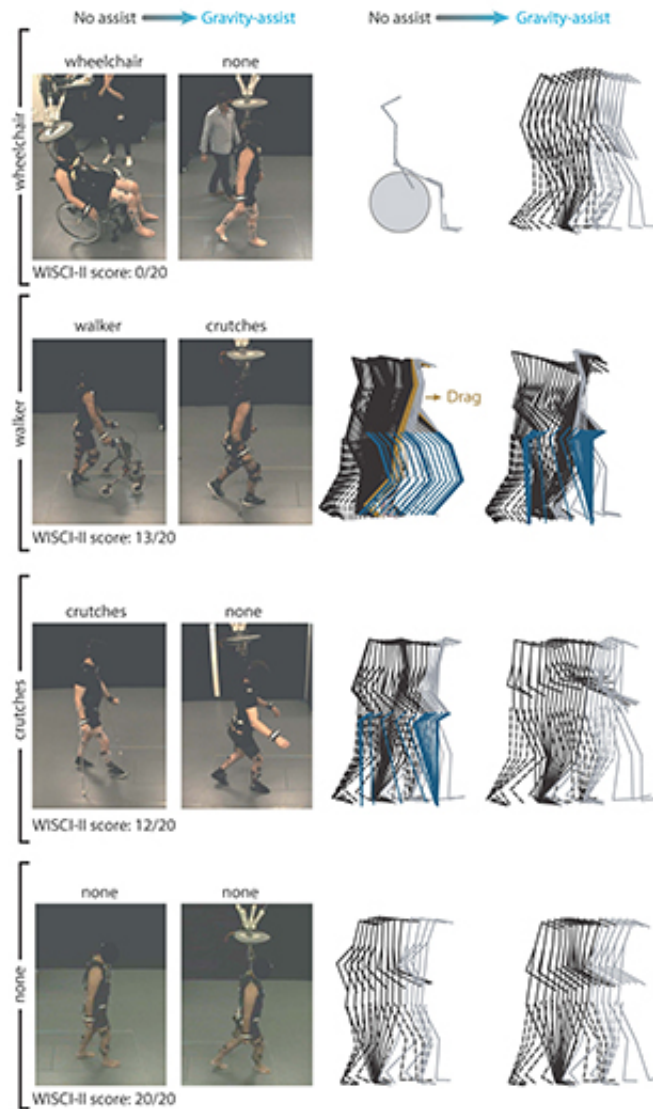
Gregoire Courtine, the senior researcher on the work, explained it this way: The current harnesses apply an upward force, working against gravity. But that also causes the patient's body to shift backwards somewhat, which is destabilizing, said Courtine, a neuroscientist at the Swiss Federal Institute of Technology in Lausanne, Switzerland.

So, the researchers said, that backward force needs to be balanced with a precisely calculated forward force. They developed an algorithm that can do that for each patient.

The result, said Courtine, is that the smart harness "re-establishes the natural interactions between the walking body and gravity."

The harness is attached to the ceiling, and allows patients to move forward, backward and side-to-side.

"We take it for granted," Raghavan said, "that in walking, there's a delicate balance between the forces we apply to the ground, and the forces it applies to us."



A robotic rehabilitation harness controlled by a custom algorithm improved walking ability in spinal cord injury patients who relied on a wide variety of assistive devices in their daily lives.

[Credit: Mignardot et al., *Science Translational Medicine* (2017)]

[Download this image in high-res JPG format](#)

A robotic rehabilitation harness controlled by a custom algorithm improved walking ability in spinal cord injury patients who relied on a wide variety of assistive devices in their daily lives. Credit: Mignardot et al., *Science Translational Medicine* (2017)

She said these early findings are an "interesting first step," but important questions remain.

Larger studies are needed to compare the smart harness with standard versions, Raghavan said. And ultimately, she added, trials need to prove that the high-tech approach improves patients' recovery.

Courtine agreed, and said such a trial is planned.

He said he and his colleagues are already working to commercialize a newer version of the robotic harness—dubbed RYSEN—along with the European company Motek Medical. Courtine and several co-researchers are inventors on patents submitted by their institution that cover the technology. RYSEN was also scheduled for presentation in London this week at the International Conference on Rehabilitation Robotics.

It's not clear when the approach might be available for widespread use. Raghavan cautioned that it can be "a long road" from the research setting to the real world.

But increasingly, researchers are looking to technology for ways to help patients recover the use of paralyzed limbs.

A recent development, Raghavan noted, is the robotic "exoskeleton," which is used in some specialized centers. The devices attach directly to the affected body part to help facilitate movement during rehab sessions.

Nearly 800,000 Americans suffer a stroke each year, according to the U.S. Centers for Disease Control and Prevention. Many survivors have lingering disabilities that require rehab.

The study findings were published July 19 in *Science Translational Medicine*.

**More information:** J.-B. Mignardot et al., "A multidirectional gravity-assist algorithm that enhances locomotor control in patients with stroke or spinal cord injury," *Science Translational Medicine* (2017).

[stm.sciencemag.org/lookup/doi/...scitranslmed.aah3621](http://stm.sciencemag.org/lookup/doi/...scitranslmed.aah3621)

Copyright © 2017 [HealthDay](#). All rights reserved.

Citation: 'Smart' robot technology could give stroke rehab a boost (2017, July 19) retrieved 13 March 2024 from [https://medicalxpress.com/news/2017-07-smart\\_1.html](https://medicalxpress.com/news/2017-07-smart_1.html)

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--