Steps Toward Healing: Breakthroughs in Brain Injury and Multiple Sclerosis Rehabilitation Research

Spring 2025 Your Impact Audio Newsletter Transcript

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ANNOUNCER: 00:00

[Music] Join us on a journey where innovative technology meets storytelling, as various AI voices narrate compelling articles in our podcast newsletter.

Steps Toward Healing: Breakthroughs in Brain Injury and MS Rehabilitation

In this newsletter, we explore how two powerful therapies - spinal cord stimulation and gait training - are being combined to help people with traumatic brain injury (TBI) walk again. Dr. Karen Nolan and her team at Kessler Foundation are leading a groundbreaking study that could reshape neurorehabilitation by enhancing brain plasticity and restoring mobility.

We'll also hear from Christina Dandola, a physical therapist turned researcher, who shares how this innovative approach is changing lives.

Later in the episode, we'll shift focus to another critical area of research: healthcare disparities in Hispanic individuals with multiple sclerosis. Dr. Cristina Román is investigating how barriers to care and cardiovascular risks may accelerate brain aging in this underserved population. Stay tuned as we dive into the science, the stories, and the people driving change in rehabilitation and health equity.

Jerry: 01:20

When two is more powerful than one

A new study combines spinal stimulation and gait training to improve outcomes for people with traumatic brain injury

"What if...?" It's a question that researchers always ponder - and your support helps to answer.

Karen Nolan, PhD, associate director of the Center for Mobility and Rehabilitation Engineering Research at Kessler Foundation, recently wondered, "What if spinal stimulation were combined with gait training to help people walk again after traumatic brain injury?"

In a new study, Dr. Nolan aims to find out - and it could be a game-changer. "Spinal stimulation has been successful in improving motor function in individuals with spinal cord injury and stroke. We now have the opportunity to understand if and how combining this technology with gait training - physical therapy designed to improve the ability to stand and walk - can help restore neural pathways, mobility, and independence for people with TBI," Dr. Nolan explains.

Did you know?

Traumatic brain injury is a significant cause of disability. Despite the many advances in TBI gait research in the last decade, over two-thirds of the 2.8 million individuals diagnosed with TBI each year struggle with community walking - the ability to navigate safely when away from home, such as at work, school, restaurants, or stores. "Kessler Foundation seeks to change that," says Dr. Nolan.

"We expect that the combination of spinal cord stimulation and gait training will facilitate adaptive brain plasticity - the brain's ability to rewire itself - more than gait training alone, making it a powerful intervention for people with TBI."

Breaking down the science

During each session, researchers will place electrodes on the participant that will deliver electrical impulses along the spinal cord - transcutaneous spinal cord stimulation - and spark neural activity in the brain. Participants will then engage in a series of gait and walking exercises - three sessions per week for six weeks. Several standard metrics will measure motor and neural function and efficiency.

Dr. Nolan anticipates that this two-prong approach will strengthen neural pathways, enhance communication from the brain to the muscles, nerves, and bones that control movement, and support motor recovery.

"Our goal is to learn what works. We want to understand which interventions, individually or in combination, drive the best recovery and quality of life for people with TBI," says Dr. Nolan. "We can then leverage this knowledge and determine how to apply it to other populations. I'm already thinking about the next 'What if...' and how we might build on this trial and amplify outcomes."

Dr. Nolan credits your generosity for providing the platform upon which research is built. "Our donors are catalysts for change, allowing Kessler Foundation scientists to conduct pilot studies and pursue pioneering clinical trials that have the potential to transform medical rehabilitation."

Jenny: 04:18

Stepping into research

The move from clinical care to clinical research was a logical progression for Christina Dandola, a physical therapist in the Center for Mobility and Rehabilitation Engineering Research at Kessler Foundation. Even so, she admits, "During my academic training, research was my least favorite part of the curriculum. I was and still am passionate about hands-on patient care.

Yet the more patients I treated during my decade-long tenure at Kessler Institute for Rehabilitation, the more I wanted to uncover new and effective ways to optimize their recovery."

That led Dandola to work part-time with Kessler Foundation's research teams before permanently joining the staff in 2023. She says she now enjoys the best of both worlds: "a perfect balance between care delivery and discovery."

Dandola, who holds advanced certification as a neurologic clinical specialist, is excited to be involved in the new study that will examine the use of spinal cord stimulation and gait training in people with TBI. "This population presents with a broad spectrum of challenges, not the least of which is regaining the strengths and skills to reintegrate safely into the community. This novel combination of treatments may help jumpstart that recovery," she explains.

By engaging directly with study participants, Dandola hopes to be a source of motivation and support. She will work closely with them, measuring their steps, distance, and cadence, as well as their heart rate, muscle activation, and other functions, during each session. She will also monitor their progress to determine if neuromodulation - the altering of neural activity in the brain - is taking place.

"I am so very grateful to be part of the groundbreaking work being done at Kessler Foundation and for the generosity of donors who make so many of these studies possible," says Dandola. "It's truly life-changing."

Andrew: 06:17

Under the looking glass

How healthcare barriers and medical risks impact Hispanic people with multiple sclerosis

In one of the first national studies of its kind, Cristina A. F. Román, PhD, adjunct research scientist in the Rocco Ortenzio Neuroimaging Center at Kessler Foundation, will examine the impact of barriers to healthcare, cardiovascular risk factors on accelerated brain aging in Hispanic people with multiple sclerosis.

Dr. Román recently received the prestigious Mentored Patient-Oriented Research Career Development Award from the National Institute on Minority Health and Health Disparities, part of the National Institutes of Health. The award will fund an investigation into healthcare disparities that lead to poorer outcomes.

In securing this award, Dr. Román leveraged findings from her 2022 pilot study made possible by support from Wakefern Food Corporation and you. "I'm so very

grateful for our donors' generosity, which fuels new discoveries and leads to further research," she acknowledges.

Understanding care inequities

Healthcare disparities are believed to be strongly influenced by social determinants of health, especially related to healthcare access. Dr. Román adds that, despite limited research on Hispanic people with MS, there is evidence this population encounters greater Under the looking glass obstacles in accessing equitable care, which increases their risk of significant additional health conditions, particularly cardiovascular disease.

This, in turn, is shown to contribute to premature declines in brain function.

"This accelerated brain aging - when the brain is 'older' than an individual's chronological age - is emerging as a potential biomarker of disease progression in MS," notes Dr. Román.

Targeting lived experiences

Dr. Román will recruit 80 participants from across the country in virtual or in-person sessions, who will complete a detailed questionnaire and share their personal experiences accessing healthcare for MS. A portion of participants will also undergo magnetic resonance imaging to identify MS disease progression.

"Using both qualitative and quantitative data will give us a more complete picture," explains Dr. Román. "This study will have important implications for the treatment of debilitating neurological diseases like MS."

Dr. Román anticipates this study will fill substantial gaps in understanding how societal factors impact the trajectory of MS progression in Hispanic people and potentially other populations. "What we know is that timely intervention and consistent, ongoing medical care are crucial for improving MS prognosis. Our goal is that this and future studies will result in equitable care and improved health for all."

ALLOY: 09:15

Thank you for joining us today and for being part of our mission to create lasting change!

All of us at Kessler Foundation are grateful to you for championing rehabilitation research and employment for people with disabilities. Your continued generosity will inspire discovery and innovation for so many others striving to recover. Your

support is essential to understanding recovery and bringing life-changing treatments to people who need them - every gift matters.

If you're inspired by the work we do and want to make a difference, there are many ways to give. Whether it's through a credit card, digital wallet, check, donor-advised fund, bank or stock transfer, IRA contribution, cryptocurrency, or even a bequest - every gift helps fuel innovation and hope.

To learn more or to make your contribution today, contact us at (973) 324-8430 or Development@KesslerFoundation.org. Together, we can transform lives and build a brighter future.

Until next time, take care - and thank you for your support.

ALLOY: 10:17

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