Breakthrough Technologies Transform Lives: From VR Games to Robotic Rehab

2024 Impact Report Transcript

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ANNOUNCER: 00:00

[music] You Make It Possible: 2024 Impact Report - A Podcast from Kessler Foundation

Join us on a journey where innovative technology meets powerful storytelling. In this special podcast edition of our Impact Report, a chorus of AI voices brings to life the compelling stories behind our research and impact.

In a world that often celebrates instant results, we shine a light on the quiet strength of patience - the kind that turns ideas into breakthroughs and hope into healing. At Kessler Foundation, we understand that meaningful change takes time. It grows through persistence, guided by science, compassion, and the unwavering support of people like you.

Thanks to your generosity, we're advancing research in traumatic brain injury, spinal cord injury, stroke, multiple sclerosis, autism, and other neurological and developmental disabilities. Your support is transforming lives - improving care, expanding opportunities, and redefining what's possible for people with disabilities.

This is more than a report. It's a celebration of progress, resilience, and the human spirit. Tune in as we explore the stories, science, and heart behind the breakthroughs.

From all of us at Kessler Foundation - thank you. You make this journey possible.

MATILDA: 01:28

Your impact: accelerating breakthroughs

Stimulus Plan

Thanks to your support, research at the Tim and Caroline Reynolds Center for Spinal Stimulation is transforming the potential for recovery after spinal cord injury.

To date, more than 70 individuals with paralysis have contributed to the steady progress at Kessler Foundation's Reynolds Center. Alexa Alvarez, is one of them.

Diagnosed at age 21 with acute transverse myelitis, a rare, nontraumatic cause of spinal cord injury, Alexa was able to regain some upper body function through extensive rehabilitation. In 2022, she had an epidural stimulator—a device that sends electrical impulses to the spine—surgically implanted at the University of Louisville, a close collaborator of Kessler Foundation.

Now living in New York, Alexa travels to the Reynolds Center several days a week to participate in epidural stimulation research. She and others use a specialized software technology that expands the capabilities of the implanted stimulator.

Over the last several years, Kessler Foundation, the University of Louisville, Johns Hopkins Applied Physics Laboratory, and Medtronic have joined together to develop and update this technology—STIM 1.0 followed by STIM 2.0—both FDA-approved and specifically designed for people with spinal cord injury.

"STIM 1.0 improves function by reawakening the spinal cord's ability to send impulses to paralyzed muscles. STIM 2.0 added voice control, the ability to improve several physiological systems simultaneously, and a remote monitoring feature that allows researchers to follow people at home and in the community," explains Gail Forrest, PhD, director of the Reynolds Center and associate director of the Center for Mobility and Rehabilitation Engineering Research at Kessler Foundation.

Gaining recognition

The collaborative team made national news in March 2024, winning a major award for breakthrough neuromodulation research from the National Institutes of Health.

Building on their earlier work, they proposed the development of a sophisticated tablet-type controller called STIMXS. Through targeted stimulation, STIMXS will enable a person with an implanted stimulator to regain control over their bladder, blood pressure, breathing, and limbs.

The team is one of only four semi- finalists chosen to compete for the final grand prize, which will be announced later this year. "We would not have achieved this milestone without the ongoing support of Tim and Caroline Reynolds and other generous donors," remarks Dr. Forrest.

Added expertise

Internationally recognized research scientists Claudia Angeli, PhD, and Enrico Rejc, PhD, joined the Reynolds Center's staff in 2023.

"Their knowledge and experience in spinal stimulation broadens the Center's neuro-modulation research, helping advance the capacity to restore motor and autonomic function and improve outcomes for individuals with spinal cord injury," notes Doctor

Steven Kirshblum, co-director of the Reynolds Center and chief medical officer at Kessler Foundation and Kessler Institute for Rehabilitation.

XIAOXIAO: 05:03

Your impact: Moving the Goalposts

Game On

Virtual reality plays a role in stroke recovery at home, even years later, thanks to donors like you.

Therapy that is fun and engaging motivates patients to actively participate in rehabilitation and speeds their recovery. Using virtual reality and game-based activities - and with the generosity of many donors including Terri and Michael Goldberg and the Wallerstein Foundation for Geriatric Life Improvement - scientists in the Center for Stroke Rehabilitation Research are expanding treatment options and developing ways to make them available beyond the rehabilitation clinic.

Peii Chen, PhD, senior research scientist, leads studies aimed at developing effective home-based treatment for the disabling symptoms of spatial neglect, a common, but under-recognized complication of stroke and brain injury. Often unaware of this condition, individuals with spatial neglect experience a range of difficulties that hinder recovery, limit independence, and jeopardize safety.

"Immersive virtual reality provides the intensive therapy needed to restore function," explains Dr. Chen.

Wearing a virtual reality headset, participants perform game-like activities under the direction of a therapist. The activities are designed to improve performance over a 15-session, five-week course. The therapist travels to participants' homes for each session, bringing a laptop computer, virtual reality headset, and a Wi-Fi hotspot.

"The equipment is portable," Dr. Chen notes, "because the common goal of all our studies is to transition therapy to home."

Thanks to support from the Sea Grape Foundation, the development of a tele-rehab system is underway. The system will eliminate the need to travel to patients' homes and allow access from any location.

"Tele-rehab has the potential to transform the delivery of rehabilitative care," Dr Chen predicts.

A Team Effort

The success of home-based therapy for spatial neglect depends on the support of family caregivers. To actively engage them, the Center's stroke team has developed a manual that provides step-by-step guidance for working with their family members on tasks to improve symptoms of spatial neglect. Research shows that caring for family members with spatial neglect is especially stressful.

"Engaging caregivers in rehabilitation may not only improve patient outcomes but the quality of life for caregivers as well," says Dr. Chen.

Virtual game, real gains

Seven years ago, teacher Maria Martin had a devastating stroke. With the support of her husband Peter, she's come a long way, working hard to overcome challenges and volunteering to participate in research.

Maria admits she is hooked on virtual reality. Wearing a headset, she completes tasks much like a gamer competing for points in a video game.

"The games are challenging but fun. I can see how people like me could benefit from this therapy."

Peter adds,"Everyone in our life is raving about how well Maria is doing. They almost take for granted what she can do now. I can't thank Dr. Chen enough for helping us incorporate practices from the games into our routine. We're combating the neglect. It's incredible."

Dr. Chen notes, "Although it has been years since her stroke, gains are still possible. That's why we are working toward more home-based therapy programs that are both effective and accessible. This is how we can change the outlook for stroke survivors."

MACERIO

ALLOY voice for Denise Fyfee, PhD

AVA voice for Jeanne Zanca, MPT, PhD: 08:40

Your impact: Easing the Journey

Course Correction

Your support launches a transformative program for those living with spinal cord injury.

Navigating life after a spinal cord injury (SCI) can be daunting. Individuals and their families are overwhelmed with information, difficult decisions, and an uncertain

future - all while dealing with the physical and emotional impact of a life-altering injury.

Two complementary, multi-faceted new programs from the Center for Spinal Cord Injury Research at Kessler Foundation offer a comprehensive roadmap to overcome these challenges and empower individuals with SCI to rebuild their lives.

From hospital to home

Through an integrated program of outreach and education, individuals with SCI receive support and guidance to successfully navigate from hospital to home and optimize their outcomes.

"Providing educational and supportive resources at the onset of injury is key to our SCI Rehabilitation Transition Program," says Denise Fyffe, PhD, senior research scientist at the Centers for Spinal Cord Injury Research and Outcomes and Assessment Research at Kessler Foundation.

"A team of SCI Navigators will work closely with clinicians at University Hospital to help patients and their families transition to a rehabilitation facility."

This unique model also allows the SCI Navigators to follow people with SCI and their families as they adjust to living at home. They will provide resources to facilitate home modifications, access transportation, schedule outpatient rehabilitation, and address health insurance and financial challenges.

Elevating caregiver training

Individuals with SCI rely on others for care and assistance; however, most caregivers are ill-prepared for this role.

"Our new Caregiving Skills and Support Program will provide family members and/or hired caregivers with hands-on skills training, video resources, and peer support to enhance their well-being and help them meet the needs of those they assist, especially as circumstances change over time," explains Jeanne Zanca, MPT, PhD, assistant director, Center for Spinal Cord Injury Research."

The program provides support where it is critically needed, in the 'real world' of life at home and in the community.

Thanks to your generosity, these programs are helping newly injured individuals and their families move from catastrophic injury to thriving at home and in the community, transforming what it means to be an SCI survivor.

NANCY

CHRISTOPHER

voice for John McAleavey: 11:07

Experience guides the way

John McAleavey has lived with a spinal cord injury for 32 years. While thriving today, he vividly remembers his early struggles.

"The worst day of my life was the day I was injured. But returning home after my hospital and rehabilitation stays was another day I will never forget. It simply opened up a range of issues my family and I were not prepared for."

These days, in addition to being a podcaster and an SCI peer counselor, John is helping to guide the new SCI Rehabilitation Transition and Caregiving Skills and Support Programs. As a member of the steering committee, he shares his insights on navigating the myriad complex challenges that come with SCI.

"Because of donors like you, these programs increase understanding, ease fears, and provide much-needed resources,"

"Your support is appreciated more than you know."

Listen to John's podcasts at QuadCast.com

ANDREW

CORA voice for Helen Genova, PhD: 12:09

A Your impact: Targeting Strengths

Proof Positive

With your support, a novel approach to neurodiversity aims to leverage strengths.

Programs to address the learning, communication, and behavioral differences of people on the autism spectrum traditionally have focused on their deficits - the skills they lack. Thanks to your generosity, researchers at the Center for Autism Research at Kessler Foundation have developed a groundbreaking intervention that instead targets the strengths and abilities of neurodiverse adolescents and young adults.

This is particularly significant for those seeking employment. Studies have shown that neurodiverse individuals have greater difficulty finding and maintaining jobs, which leads to frustration, less motivation, and a sense of failure.

Going to the plus side

To combat this negative cycle, Helen M. Genova, PhD, associate director, Center for Autism Research, developed Kessler Foundation STRength IDentification and Expression - KF-STRIDE - an innovative, positive-psychology approach that helps

identify and build on individuals' unique skills and talents and provides training to perform well in job interviews and the workplace.

"Preliminary findings have shown KF-STRIDE effective in preparing transition-age autistic youth for work opportunities. Study participants learned to recognize their strengths and convey them appropriately in an interview setting. They also demonstrated greater confidence and self-awareness," explains Dr. Genova.

Expanding access

The next step is to make this tool available to the autism community through a partnership with SpectrumWorks, a New Jersey-based organization committed to building a more neurodiverse workforce.

Equally important is Kessler Foundation's partnership with Understood.org's NeuroEquity Research Collaborative, a consortium of thought leaders and experts in neurodivergence. The group is working to advance understanding of neurodiversity and create a research base for a social and structural shift toward equity and inclusion. This partnership is funding the expansion of Dr. Genova's research to youths with learning and thinking differences such as ADHD and dyslexia.

"None of this would be possible without the generous support of our donors. Together, we're making great strides in helping neurodiverse individuals achieve independence."

NANCY

SARA voice for Melissa: 15:09

Bridging Perspectives

Inspired by their daughter Kira and her journey on the autism spectrum, Melissa and Tony Bianchino are dedicated members of the Center for Autism Research's Community Advisory Board. They see it as a vital bridge between the research community and families, driving impactful change.

"The collaboration between Dr. Genova and her team is invaluable, ensuring that research is informed by lived experiences and diverse perspectives," Melissa shares.

Melissa and Tony are tireless advocates not only for their daughter but the entire community.

"So many have immense talent and a strong desire to do more, yet haven't been given the opportunity. This line of research makes that possible, and we are so proud to be a part of it."

DAVIS

EMMA voice for Karen Nolan, PhD: 15:57

Your impact: Advancing Mobility

Power Walk - Thanks to you, robotic exoskeletons are getting people with brain injuries back on their feet.

the past decade, thanks to the support of many donors, Kessler Foundation has emerged as a leader in robotics research, achieving advances that have established new ways to restore mobility and independence after stroke and brain injury.

Karen J. Nolan, PhD, associate director of the Center for Mobility and Rehabilitation Engineering Research, credits this trailblazing reputation to the vision of Liz Lowenstein, chair of the Kessler Foundation Board of Trustees from 2013 to 2016.

"It all started with a gift in 2014 to purchase a second robotic exoskeleton,"

Dr. Nolan recalls.

"Over the years, Liz, her husband David, and her family's Reitman Foundation have supported the expansion of our robotic exoskeleton research, and many other donors have followed suit."

This has enhanced opportunities to collaborate with industry leaders and device manufacturers to investigate new exoskeleton technology. Using Kessler Foundation's research data, several devices gained FDA clearance.

"It is rewarding to work in a place that not only conducts life-changing research for patients but also provides feedback to the industry to improve technology for better outcomes,"

remarks Dr. Nolan.

Early successes paved the way for additional funding and greater progress, culminating in a large federal grant for the first clinical trial of exoskeletons in adults with acute stroke, a large and growing population in need of new avenues for rehabilitation. Inpatients at Kessler Institute for Rehabilitation are eligible for the study, which entails intensive, repetitive training in the exoskeleton.

"We believe that intervening soon after stroke using the exoskeleton to retrain the individual's gait will contribute to faster and more complete recovery,"

says Dr. Nolan.

More than just another clinical trial, the study marks a fundamental shift in treatment protocols. Because of your generosity, robotic exoskeletons are on the way to becoming a standard of care for the rehabilitation of mobility deficits after stroke and brain injury.

Reflecting on this journey, Dr. Nolan says,

"We started with the question, 'How do wearable robots help walking?' Then, 'How do we maximize recovery?' Now, we are asking, 'How does intensive robotic therapy cause lasting changes in the brain?' These questions will continue to evolve until we achieve the best possible outcomes for people affected by brain injury and stroke."

BRANDON

A major step forward

THALITA voice for Raquel: 18:35

Racquel Porter, a charter school paraprofessional, survived a stroke last year.

"It was life-changing,"

Racquel says,

"but it's my nature to stay positive."

During her inpatient rehabilitation stay at Kessler Institute for Rehabilitation, she volunteered for Dr. Nolan's robotics study.

Paralyzed on one side, Racquel had to relearn to walk.

"The exoskeleton was exciting. Every day, I accomplished something different. I could see improvement."

At discharge, Racquel walked to her van for the ride home.

"My children encouraged me to come to Kessler and I'm grateful I did. The research at Kessler Foundation helped me start over."

LUCIEN

CORA

voice for Nancy Chiaravalloti, PhD: 19:24

Aging Well

Brain Training - How can cognitive function be preserved as we get older? Your generosity extends a pioneering memory protocol to a new community.

Aging is inevitable. But how we age is far less predictable. Certainly, having "good" genes helps. Apart from that, the medical community suggests a healthy lifestyle may be beneficial. This includes a well-balanced diet, exercise, social activity, and minimizing stress, smoking, and alcohol use - all of which can be controlled. Less so are injuries and illnesses that may adversely impact physical and cognitive functioning over time.

"As difficult as it may be for aging adults to stay physically strong, their greatest fear is declining mental acuity. Memory loss and dementia are frightening and often lead to a range of other challenges for the individual and their family or caregivers,"

notes Nancy Chiaravalloti, PhD, director of the Centers for Neuropsychology and Neuroscience Research and Traumatic Brain Injury Research at Kessler Foundation.

"Thanks to the generosity of our donors, we are investigating a pioneering protocol to help otherwise healthy adults stay cognitively intact for as long as possible."

The Kessler Foundation modified Story Memory Technique (KF-mSMT) is based on the use of context and imagery to reinforce learning and recall.

During ten bi-weekly sessions, study participants, age 60 years and older, are taught to visualize verbal information, incorporate unrelated material into a meaningful context, and then apply these strategies to the memory demands in everyday life.

This protocol was previously shown to improve cognitive performance in individuals with multiple sclerosis and traumatic brain injury. Dr. Chiaravalloti explains,

"In this new five-year study, we are building on the science of cognitive training. Our objective is to examine the short- and long-term impact of KF-mSMT on learning and memory abilities, daily function, and overall quality of life in older adults. Early findings are encouraging and with further research, we may be able to learn how we can change the dynamics of aging."

ASHLEY

MASARU voice for Mark Jay: 21:35

Picture this

Participating in Kessler Foundation's modified Story Memory Technique study was a meaningful experience for attorney and world traveler Mark Jay.

"As I get older, I know my physical and cognitive strengths will decline. But I was curious to learn how the aging brain functions - and what it means for me going forward."

Mark was gratified, although admittedly a bit frustrated, by his personal performance on certain aspects of this memory protocol. Yet he readily acknowledges what a unique opportunity this was.

"By using these visualization techniques during trips where I was well outside my comfort zone, I retained more from each experience and came home bigger than when I left,"

"Thanks to donors like you, people like me can contribute to a growing body of knowledge - collective knowledge - that will surely impact the science and understanding of healthy aging."

MARCELLO

ISIDORA voice for Betsy Choquette: 22:30

Hire Potential - Outside-the-box thinking in vocational counseling fosters financial independence, thanks to your support.

Over 14 million Americans with disabilities rely on either Social Security Disability Income (SSDI) or Supplemental Security Income (SSI) to survive. But the system meant to help them can sometimes trap them in poverty. Qualifying for SSDI and SSI is often a long and arduous process, and both have complex rules around employment that limit earnings and impact benefit payments.

Faced with these challenges and the uncertainties of the job market, many individuals opt out of the workforce.

HireAbility Vermont, part of the state's Division of Vocational Rehabilitation, is seeking to change that mindset by demonstrating a new way to help people with disabilities achieve financial independence. The program was funded by a grant from Kessler Foundation, which was made possible by your support.

"This two-year grant has been life-changing for several of our participants. The program combines work incentive counseling with career planning to effectively educate clients about the system, explore their skills and work potential, and enable them to make informed decisions. Our goal is to help those who can work become economically self-sufficient,"

says Betsy Choquette, program manager at HireAbility Vermont.

Dollars and sense

Helping clients understand their earning potential and the rules around their benefits is the first step.

"While it's true that working full time at a low wage may put individuals in a worse financial position than keeping their benefits, we help our clients understand that there are career pathways through credentialing and education that allow them to earn more money and be significantly better off without benefits,".

"When people have information about possibilities, they can make better decisions on how to move forward with employment."

REMY: 24:23

How Would You Make A Living

Let's say you were eligible to receive $1,655 in monthly Social Security Disability Income (SSDI) benefits.

If you had a part-time job for 18 hours a week at $18.25 an hour, your wages would reduce your SSDI to $1,490, but your total monthly income would be $2,903.

If you increased your hours to 30 per week at the same pay rate, you would lose your SSDI benefits, and your total income would decrease to $2,354.

BUT if you explored your skills and potential and landed a full-time job at $20 per hour, your income would be $3,440 - an 18 percent increase from working 18 hours a week and more than double your income compared to benefits alone.

ANDREW: 25:11

[music] 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.

With listeners spanning across 90 countries, our podcasts on SoundCloud offers a fascinating insight into the impactful work of Kessler Foundation.

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