THE INSTITUTE FOR REHABILITATION AND RESEARCH

TIRR JOURNAL

SPRING 2023

LIMB REPLACEMENT THROUGH OSSEOINTEGRATION GIVES PERSONS WITH AN AMPUTATION CONTROL OF THEIR LIVES

TIRR MEMORIAL HERMANN DESIGNATED A NATIONAL REHABILITATION INNOVATION CENTER BY PRESIDENT BIDEN AND THE U.S. CONGRESS

TIRR MEMORIAL HERMANN
Rehabilitation & Research

TIRR JOURNAL
WINTER/SPRING 2023

COVER STORY/FEATURES

3 Limb Replacement Through Osseointegration Gives Persons with an Amputation Control of Their Lives

7 Message from the CMO

CLINICAL CARE

8 Profile in Caring: Mark Sherer, PhD, APPP, FACRM

12 TIRR Memorial Hermann to Pair Vagus Nerve Stimulation with Rehabilitation at New Clinic

14 TIRR Memorial Hermann Designated a National Rehabilitation Innovation Center by the U.S. Congress and President Biden

RESEARCH

15 TIRR Memorial Hermann / Baylor College of Medicine / UTHealth Houston Collaborative Traumatic Brain Injury and Spinal Cord Injury Model Systems Funded

17 Think and Make It Happen: Investing in Brain Research and Neurotechnology

19 Dr. Korupolu Receives NIH Grant for Mindfulness Study

ADVOCACY

20 Advancing Care for Spinal Cord Injury Patients in Latin America

21 Peggy Turner Invited to Title IX 50th Anniversary Luncheon

EDUCATION

22 TIRR Memorial Hermann and UTHealth Houston Collaborate on International Stroke Rehabilitation and Recovery Conference

NEWS AND ACCOLADES

23 Heather Taylor, MS, MEd, PhD, Receives ACRM Margaret Nosek Award

24 Angelle Sander, PhD, Named Chair of ACRM's Brain Injury Interdisciplinary Special Interest Group

25 American Association of Critical-Care Nurses Recognizes Patient Care Unit at TIRR Memorial Hermann with Beacon Award for Excellence

26 TIRR Memorial Hermann Provides Support for Two Inclusive Houston Area Parks

27 Nielsen Grant Funds TIRR Memorial Hermann's Empowered Advocates Mentoring Project

28 Sandra Breitengross Bitter Joins TIRR Memorial Hermann's Independent Living Research Utilization Program

TIRR Memorial Hermann Recognized as #2 in Nation by *U.S. News & World Report*

29 TIRR Memorial Hermann Welcomes Two Physiatrists

30 Message from the CEO

Six Pilot Health Organizations Selected for Schwartz Center's Inaugural Healing Healthcare Initiative

SELECTED PUBLICATIONS PRESENTATIONS

Limb Replacement Through Osseointegration Gives Persons with an Amputation Control of Their Lives

For patients who face amputations, the road to recovery is a long one, filled with physical, emotional and social challenges. For those who undergo bilateral transfemoral amputations, the impact of limb loss is amplified.

In 2014, real-estate attorney Alex Weatherford was in his early 30s and enjoying time with his wife and 18-month-old twin daughters. He remembers regaining consciousness at Memorial Hermann-Texas Medical Center two weeks after surviving the crash of a two-seater plane in Shepherd, Texas, an hour north of Houston.

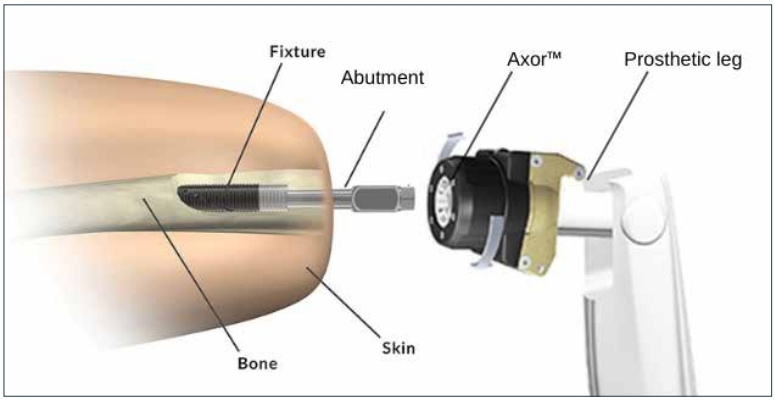
The pilot, a friend of a friend, was flying him to look at a property in the area. He buzzed a private landing strip to announce that they planned to land; however, the plane malfunctioned and went down in the surrounding trees. The entire front of Weatherford's body absorbed the impact, and his legs were crushed.

"I had lost a lot of blood, and I remember the trauma and orthopedic teams discussing how to move forward with my care," Weatherford says. "My wife, Nicola Dundas, a pathologist, was there. I was in bad shape but had no internal bleeding. I was losing all the blood through my legs. They told us they'd like to remove my legs above the knee, and with the support of my wife, I decided to move forward with amputation."

Weatherford was discharged one month after the accident, and he began a home rehabilitation program with physical and occupational therapy. "I've always been athletic, so I didn't really require home therapy and started outpatient therapy instead at TIRR Memorial Hermann Outpatient Rehabilitation – Kirby Glen Center three times a week. My therapists' ultimate goal was to have me fitted with prosthetic legs and teach me to start using them. You go through a lot before you get the prosthetics. During this time, I was building strength, learning to sit up properly in a wheelchair and seeing prosthetists.

"First, I was fitted with short prosthetics a few inches off the ground and worked on increasing my ability to bear weight," Weatherford says. "The carbon fiber shells that fit over your legs are big and bulky. They're hot on the skin and when you sweat, they lose suction and come off. I tried for a year and a half with the pros-

continues on page 4



The OPRA™ Implant System

continued from page 3

theses, but they weren't for me, so I decided to use a wheelchair."

At the time, his rehabilitation plan was overseen by Danielle Melton, MD, former director of the Amputee and Limb Loss Rehabilitation Program at TIRR Memorial Hermann. "Early in January 2021, Dr. Melton told me Osseointegration (OI) had been approved by the FDA in the United States," Weatherford says.

Coping with Limb Loss

Physiatrist Vinay Vanodia, MD, assistant professor of physical medicine and rehabilitation at McGovern Medical School at UTHealth Houston and the new director of the Amputee and Limb Loss Rehabilitation Program at TIRR Memorial Hermann, trained under Dr. Melton as a fellow in orthopedic trauma and amputee rehabilitation at UTHealth Houston in 2020 through 2021. When he took over as director, he had the advantage of familiarity with the patients and the OI procedure, as well as extensive experience with the specialized rehabilitation protocol. Prior to medical school, Dr. Vanodia worked as a board-certified prosthetist, making prosthetic legs for the amputee population.

"Limb-loss patients have to deal with the physical, functional and cosmetic components of losing a limb, and at the same time they're learning how to cope psychologically with the limb loss," says Dr. Vanodia. "Many do well in the hospital, where they receive assistance with the activities of daily living, but for some, returning home, where they previously were independent, can be difficult. That's where support from family, friends, the health care team and support groups comes into play."

The power to move from sitting to standing comes from muscles that pass over the knee joint. Persons with unilateral transfemoral amputations have to be able to power themselves

from a sitting position to standing with their sound leg to be candidates for a prosthesis. Those who can accomplish this begin therapy with the goal of developing the strength they need to use a traditional prosthesis which has a socket to hold the limb.

"In the first few months after amputation, patients tend to lose a lot of volume in the leg, causing the leg to drop too far into the socket," Dr. Vanodia says. "This creates pressure and discomfort and can lead to skin breakdown. People want to be able to walk, but many discover they can't. With bilateral transfemoral amputations like Alex's, you have to push yourself up into a standing position, and then you have two sockets pushing on your groin. People tend to walk a bit and then take them off. With bilateral limb loss, wheelchair use increases significantly."

OI emerged as an attempt to overcome the issues associated with traditional socket-mounted prosthetics. It eliminates the need for a socket, which is the most challenging part of fitting a prosthesis. "The prosthesis for limb-loss patients who undergo OI has a knee, shin and foot and is connected directly to the femur," he says. "It offers much more range of motion and allows people to be more mobile because they're more comfortable. There's another advantage called osseoperception. We've found that people who have an osseointegrated prosthesis have more perception of the ground. If they walk on grass or uneven surfaces, they can feel the difference because the vibrations travel up to the femur bone. There's quite a bit of literature about this, and we're continuing to do research."

The Osseointegration Surgery

David Doherty Jr., MD, assistant professor of orthopedic surgery at UTHealth Houston and adult reconstruction specialist, performs the surgery at the Memorial Hermann | Rockets Orthopedic Hospital. In the operating room, a specialized implant that permanently bonds to the bone is inserted into the femur, which will eventually attach to the prosthesis; the device is a micro-porous, titanium implant that biologically bonds with the residual limb.

"We use the term osseointegration, but the more appropriate medical term is direct percutaneous skeletal attachment," Dr. Doherty says. "The surgery quite literally directly attaches a robotic prosthetic leg into the patient's skeleton. The benefits are numerous."

Alex Weatherford was an early OI patient and the first bilateral amputee for the team. "Alex's experience with traditional prostheses is typical," he says. "Persons with bilateral amputations are prescribed and given very advanced prosthetic limbs with microprocessors and technology found in computers and airplanes, and we attach these prosthetic legs with what is basically a plastic bucket. The materials have gotten better and we've made technological advances, but the concept is the same one the ancient Greeks used. All of the muscle and skin of the leg is pushed into the prosthesis socket. If you gain or lose weight, your thigh might not fit into the socket. Skin breakdown, pain, falls or lack of confidence are frequent features of above-knee socket users. This leads to noncompliance and lowered quality of life. It's very common for these extremely expensive prosthetic legs to end up in the closet. The

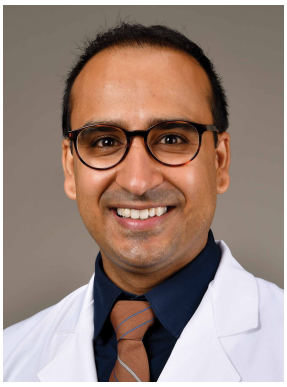
continues on page 6

"Our patients who have had OI feel that they have better stability because the prosthesis attaches directly to the skeleton, which allows for increased hip range of motion and increased sitting comfort."

- Kristin Reeves, PT, MS

continued from page 5

David Doherty Jr., MD



Vinay Vanodia, MD

Kristin Reeves, PT, MS

percentage of persons with bilateral amputations in wheelchairs is high, especially patients with bilateral above-the-knee amputations."

Weatherford recalls meeting Dr. Doherty to discuss the procedure. "He and my wife went to medical school together," he says. "I liked him and his attitude immediately. He explained everything in terms I could understand. When I was doing research on OI earlier, I talked with a military surgeon on the East Coast, who had performed many OI procedures. He suggested that I ask my surgeon a few specific questions. I did, and Dr. Doherty had the answers."

In April 2021, Weatherford underwent his initial procedures. He joined a growing number of patients around the world who have had titanium rods inserted into their femurs that will later be used to walk. Shortly after, the stage 2 procedures followed and, ultimately, he progressed through his rehab protocol.

"Alex never complained during the entire process," Dr. Doherty says. "Instead, he said, 'I know you're going to make it work.' He was a calming force for me, his therapy team and his wife."

The Rehabilitation Protocol

In the United States, OI was initially performed at the Walter Reed National Military Medical Center in Bethesda, Md., through the U.S. Department of Defense. As it became available at other sites, there was a need to adjust the rehabilitation protocol to accommodate the demands of civilian life.

"In the military model of OI therapy, patients see their therapist every day or even twice a day," says Kristin Reeves, PT, MS, program manager of the amputee and limb loss program, who also is a key member of TIRR Memorial Hermann's OI team. Reeves modified the Walter Reed protocol to meet the time constraints and insurance requirements of nonmilitary therapy.

After Dr. Doherty clears the patient for therapy, Reeves starts the rehabilitation protocol at TIRR Memorial Hermann Outpatient Rehabilitation – West University. "For the first month, Alex used short training prostheses that lower the center of gravity to load the bone and muscles in a static position," she says. "We start very slowly because persons with double amputations need time to regain balance. He stood for 30 minutes on the short prostheses, beginning with 40 pounds of weight and moving up from there. We do this gradual weight-bearing program for the first month, and after that we move to the regular prosthesis, but we keep the knee locked and start training on some functional activities. The program includes minimal gait at this stage, with only a small amount of distraction on the bone. Assuming everything goes well, we start traditional gait training on level surfaces, and then as time progresses, we add stairs, ramps and more higher-level activities."

To speed his progress, Weatherford practiced weight bearing at home. "Then I would go once a week to therapy, just standing for 30 to 45 minutes for the weight bearing. By the time we got to full weight bearing, my long-legs prostheses with the knees had arrived. I switched from the little version to the big-legs prosthesis and practiced balancing."

"Our patients who have had OI feel that they have better stability because

the prosthesis attaches directly to the skeleton, which allows for increased hip range of motion and increased sitting comfort," Reeves says. "They don't have the problem of sweating that they have with the traditional socket and liner. They use less energy when using the prosthesis, so they tend to use it more often. Some of our patients have had minor setbacks, but they say they would do it again because of the benefits."

Moving Forward on Two Legs

Weatherford is past the weight-bearing portion of the protocol, but because he lost both legs above the knee, his continued training is helping him to gain confidence and reach his ultimate goal of unassisted walking.

"I use two forearm crutches and walk as much as I want and wherever I want, and in therapy I'm working on walking without them," he says. "I'm also working with a trainer at a gym to increase my hip and core strength."

Weatherford is known for his sense of humor at the Osseointegration Clinic at the Rockets Orthopedic Hospital and the therapy clinic at TIRR Memorial Hermann Outpatient Rehabilitation – West University. "He's always in the best mood of everyone in the room," Dr. Doherty says. "He has great family support–his wife is amazing. He's very positive and very devoted to his family. We are so reliant on therapy at TIRR Memorial Hermann for a good outcome. We couldn't do it without the entire team, and we're all really in tune with each patient's individual needs and goals."

Dr. Vanodia and Reeves plan to make TIRR Memorial Hermann's OI rehabilitation protocol available for the benefit of other facilities. "There's no official protocol for osseointegration rehabilitation available for civilians," he says. "We've had successful outcomes with our protocol, and our patients have said that this has been a life-changing experience for them."

After seven years in a wheelchair, Weatherford, now 43, goes where he wants to go. "Now I have four kids," he says. "Our twins were too young to remember me with legs, and the new kids didn't know I'd ever had legs. It's an incredible surgery and has been an amazing experience, but I also had a really good life without it. When anyone asks me if I'd do it again, the answer is always yes." ■

The multidisciplinary OI Clinic meets once a month at the Memorial Hermann | Rockets Orthopedic Hospital. Potential patients meet with Dr. Vanodia, Dr. Doherty, Kristin Reeves and a prosthetist. Reeves also shares her knowledge of OI rehabilitation and provides support for therapists and patients located in other parts of the country. For more information, email her at tirrlimbloss@memorialhermann.org.

MESSAGE FROM THE CHIEF MEDICAL OFFICER

Over 45 years, the research conducted and published by Mark Sherer, PhD, ABPP, FACRM and his many collaborators has changed the way we treat patients with brain injury. He has made major contributions to the development of clinical services for people with brain injury and to research that informs the clinical care we deliver.

When Mark first came to TIRR Memorial Hermann in 1991 as the director of neuropsychology and the Challenge Program, he brought with him a history of success in the creation of a community re-entry program in Mobile, Ala., the first program of its kind in the Southeast. During the six years he directed our Challenge Program, he put it on the map as one of the most successful programs in the country to help brain injury survivors maximize their potential. He left TIRR Memorial Hermann in 1997 and built another successful community re-entry program in Jackson, Miss., returning to us in 2007 as director of research and senior scientist.

In a landmark series of studies, Mark and his colleagues found that the agitation many traumatic brain injury patients suffered in the early stages of recovery was due to disorientation and cognitive impairment, now known as the post-traumatic confusional state. This had an immediate and significant effect on our clinical practice. We began treating patients who became agitated with other, more effective medications, which had an immediate positive impact on their outcomes.

One research project led to the next for Mark, with more outside funding, and even more discoveries built on the insights that came before. His accomplishments go far beyond what I've written here. His service to TIRR Memorial Hermann and our specialty is immeasurable.

Congratulations on your upcoming retirement Mark, we will miss you.

Gerard E. Francisco, MD

Professor and Wulfe Family Chair in Physical Medicine and Rehabilitation
Department of Physical Medicine and Rehabilitation
McGovern Medical School at UTHealth Houston
Chief Medical Officer, TIRR Memorial Hermann

Profile in Caring: Mark Sherer, PhD, ABPP, FACRM

Dr. Mark Sherer has spent his career expanding compassionate, state-of-the-science clinical services for people affected by brain injury, through high-impact contributions to clinical research, program development, education and dissemination.

Mark Sherer grew up in Tuscumbia, Ala., a few blocks from the home of Helen Keller, which today is a museum. He began his academic career as a math major at a small college that later became the University of North Alabama. Toward the end of his undergraduate years, he developed an interest in sociology and then psychology, graduating with a bachelor's degree in psychology in 1976. He earned a master's degree in clinical psychology in 1978 and a doctorate in the same specialty in 1981.

Over the last 40 years, Dr. Sherer has made major contributions to the development of clinical services for people with brain injury and to research applied rapidly to clinical care. Early in his career, after three years in the Department of Psychology at Mississippi State University in Starkville, he and his wife, Connie, moved to Mobile, Ala., where he developed and directed the first community reintegration program for people with brain injury in the Southeast, and one of the first in the United States.

"It was a very early program at a time when there were few interdisciplinary post-acute rehabilitation programs in the U.S., and we had a lot of success returning people with brain injury to work and the community," he says. "Many of these people did not have a lot of activity outside the home, placing a huge burden on the family. We saw that when we could help them return to work, the quality of their lives improved. They could develop other relationships, which lightened the family burden of support. They also developed a satisfying sense of self by providing value to the people around them. The return to work was important for them in practical terms, but it was also important symbolically, because it represented a return to normalcy."

In developing his program in Alabama, Dr. Sherer joined Yehuda Ben-Yishay, PhD, a psychologist whose experience working with wounded Israeli soldiers led to pioneering advances in treating traumatic brain injury, and George Prigatano, PhD, emeritus chair of the Department of Neuropsychology at Barrow Neurological Institute, known for his study of impaired awareness as reflected in anosognosia, in leading the field in the development of post-acute rehabilitation services for individuals with brain injury. Although considerable progress had been made in developing methods of physical rehabilitation by the 1980s, methods to address cognitive and behavioral disabilities after brain injury were largely undeveloped. A handful of programs like Dr. Sherer's became the living laboratories for developing more specific methods for addressing these issues.

After five years of accomplishment in Mobile, Dr. Sherer recognized

that his lack of specialized training in neuropsychology was preventing him from doing research that would have a more far-reaching impact. "I had been out of school for eight years. Connie and I took a big chance and a big cut in pay and moved from Mobile to Oklahoma City so I could complete a postdoctoral fellowship in clinical neuropsychology at the University of Oklahoma Health Sciences Center," he says. "There, I worked with Oscar Parsons, one of the most prominent neuropsychologists in the world at the time, and learned about neuroanatomy, neuropathology, clinical neurology and the signs and symptoms of various neurological disorders."

During his two years in fellowship, he authored 12 scientific papers, one of many accomplishments of which he is proud. His academic success increased his motivation to go further in the field of brain injury and led to his recruitment in 1991 to TIRR Memorial Hermann (formerly TIRR, The Institute for Rehabilitation and Research) as director of neuropsychology and the Challenge Program. The move also gave him the opportunity to begin working with the Traumatic Brain Injury Model Systems of Care, founded by the National Institute of Disability, Independent Living and Rehabilitation Research in 1987, with TIRR Memorial Hermann as one of the original sites.

During his first decade at TIRR Memorial Hermann, Dr. Sherer continued as a leader in the field of post-acute brain injury rehabilitation in his clinical work with the Challenge Program. Under his direction, the Challenge Program overtook a similar program in Houston to become

Challenge Program Group

one of the largest such programs in the country, treating more than 200 patients a year.

"We had a really strong staff and a strong assistant director, and I had a real passion for the work that came from the time I had spent in Mobile watching lives transform when we could return them to work," he says.

His work with the Challenge Program and with TIRR Memorial Hermann's TBI Model System led him to begin research in impaired self-awareness after brain injury, resulting in the Awareness Questionnaire[1] used around the world to measure the degree of impairment in accurate self-awareness in brain injury patients. It also led to a peer-reviewed article on return to employment,[2] one of his most frequently cited. His work on impaired awareness after brain injury helped build his reputation and increased knowledge of his contributions to rehabilitation nationally and internationally.

"The brain monitors our abilities, behaviors and capabilities," Dr. Sherer says. "People struggle with their sense of self after brain injury. You may think of yourself as a person full of energy with a good memory but then suddenly you're not that person, so who are you? Our ability to interact effectively with others, remember and keep track of things can all be affected by brain injury. If you can't remember those things, you can't accurately measure what you're capable of. You will keep trying to do something that's impossible for you to do."

At TIRR Memorial Hermann, he also started one of the first post-doctoral training programs based in neurorehabilitation, in collaboration with Corwin Boake, PhD, an adjunct associate professor of physical medicine and rehabilitation at Baylor College of Medicine.

In 1997, Dr. Sherer accepted the position of director of neuropsychology and chair of the research council at Methodist Rehabilitation Center in Jackson, Mississippi, and developed the first community reintegration program in Mississippi. At the University of Mississippi, he

continues on page 10

continued from page 9

started a postdoctoral fellowship and helped train numerous people who have gone on to become accomplished professionals in the specialty. He also served as director of the TBI Model System center in Jackson.

While in Mississippi, Dr. Sherer published what he and others consider his second most important contribution to brain injury rehabilitation: the Confusion Assessment Protocol.[3] "We noticed that in early recovery after brain injury, patients had a whole constellation of symptoms: memory loss; disturbance in level of arousal, either hypo- or hyper-arousal; restlessness or agitation; cognitive impairment; and psychotic-type symptoms without a true psychotic disorder," he says. "We focused on this overall syndrome and called it the post-traumatic confusional state. , we showed that each one of the symptoms had its own impact on the patient's eventual outcome." [4]

The year before that article was published in 2008, Dr. Sherer returned to TIRR Memorial Hermann as the director of research and senior scientist and worked with Gerard Francisco, MD, professor and Wulfe Family Chair in Physical Medicine and Rehabilitation at McGovern Medical School at UTHealth Houston and chief medical officer at TIRR Memorial Hermann. Dr. Francisco cites Dr. Sherer's work on the post-traumatic confusional state as "a landmark study that had an immediate and significant effect on my clinical practice. Once we recognized that the agitated state was caused by confusion, we began treating patients with other, more effective medications, which had an immediate positive impact on their outcomes. Personally, I thank Mark for his research and insights."

In 2020, after years of study, Dr. Sherer and his collaborators published the seminal work on the post-traumatic confusional state and its diagnostic criteria,[5] which was endorsed by the American Congress of Rehabilitation Medicine as the official case definition. "This was one of the biggest projects of my career and an important contribution to our field. It involved a large number of authors and took us a number of years. We had started publishing papers on the topic in 2005," he says.

Rhonda Abbott, PT, FTPTA, MBA, FACHE. has worked closely with Dr. Sherer since she assumed the role of senior vice president and chief executive officer of TIRR Memorial Hermann. "Mark has provided much-needed infrastructure support for our diverse research programs, allowing our teams to accomplish many firsts," she says. "He is a pioneer for our rehabilitation research programs as the only person ever at TIRR Memorial Hermann to serve as associate vice president for research, and his senior scientist background allowed him to create functional foundational policies and procedures that were vital. His desire to advance the work of our research teams has led to alignment around key strategic initiatives. In doing so, he transformed us into a more unified research organization. He truly has left TIRR Memorial Hermann in a better place, and his legacy will carry us forward."

Among the physician researchers Dr. Sherer has worked with as part of the TBI Model Systems program is Flora Hammond, MD, professor and chair of the Department of Physical Medicine and Rehabilitation at Indiana University School of Medicine. "I did my residency at Baylor College of Medicine and remember meeting Mark during the six months I spent at TIRR Memorial Hermann. Seven or eight years later, we both were funded for TBI Model Systems and started working together," says Dr. Hammond, who now considers him a dear friend. "In 2008, I was leading a multisite study on the efficacy of amantadine to treat irritability, with Mark as co-investigator. He was the person I would talk through things with. He was always available, calm and supportive, offering advice in a collegial way. He also was always spot on with his expertise and recommendations. He helped make the project fun, productive and successful.

"Part of moving science forward is not just what the study results showed but how you accomplished it," she adds. "Mark has been a steady contributor to research, with studies that span a range of topics that are important for the care of individuals with brain injury. He's very collaborative and comes alongside you to work with you. You don't see that with everyone."

In the past 40 years, the field of brain injury rehabilitation has gone from little knowledge about how to provide rehabilitation services to people recovering from brain injury to solid evidence-based practices. "My interest was never in identifying the deficits but in how we can return

people with brain injury to normal life. Over time, the profession of neuropsychology became more about treatment rather than just assessment," says Dr. Sherer, who will retire from TIRR Memorial Hermann in 2023. His research in impaired awareness and the post-traumatic confusional state have resulted in assessment protocols used around the world.

Joseph T. Giacino, PhD, is the director of rehabilitation neuropsychology at Spaulding Rehabilitation Hospital, consulting neuropsychologist in the Department of Psychiatry at Massachusetts General Hospital and professor of physical medicine and rehabilitation at Harvard Medical School. He and Dr. Sherer have worked together for more than two decades, first publishing together in 2008 through a Traumatic Brain Injury Model System collaboration.

"I'm built the same way as Mark. I spent years as a clinician and made a slow transition to research," Dr. Giacino says. "We bonded at our twice annual visits to Washington for the TBI Model Systems project directors meetings, and over the years, we became close friends. Mark has a distinctive conversational style. He's deliberate and articulate, and he holds your attention. He also has a very dry, saber-sharp wit and can take an idea and spin it very quickly and fluently. He and I very quickly got into a jab fest, which we continue to this day, and he's always better at it than I am.

"His work on post-traumatic confusional state, built on the work of many people, advanced our field in terms of understanding a really enigmatic clinical syndrome," Dr. Giacino adds. "At Spaulding, we're now finishing up our protocol for management of patients in post-traumatic confusional state and much of what we're doing draws on his work."

What will Dr. Sherer miss most in retirement? "The people," he says without pause. "I've worked with a lot of patients who have changed my life. I've had the opportunity to know them and see the incredible resilience they have in the face of brain injury. All the good research we've done has come from these patients and what they've taught me.
"I'll also really miss TIRR Memorial Hermann," he says. "Most of my career has been at TIRR Memorial Hermann–21 years in two posts and about 22 years by the time I retire.
I can see myself extending a little, probably on a part-time basis. I feel enormous gratitude and commitment to TIRR Memorial Hermann and want to leave it in the best shape I can." ■

[1] *Sherer M, Bergloff P, Boake C, High W, Levin E. The Awareness Questionnaire: Factor structure and internal consistency. Brain Injury. 1998;12:63-68.*

[2] *Sherer M, Bergloff P, Levin E, High Jr WM, Oden KE, Nick TG. Impaired awareness and employment outcome after traumatic brain injury. Journal of Head Trauma Rehabilitation. 1998;13(5):52-61.*

[3] *Sherer M, Nakase-Thompson R, Yablon SA, Gontkovsky ST. Multidimensional assessment of acute confusion after TBI. Archives of Physical Medicine and Rehabilitation. 2005;86:896-904.*

[4] *Sherer M, Yablon SA, Nakase-Richardson R, Nick T. Effect of Severity of Posttraumatic Confusion and its Constituent Symptoms on Outcome after Traumatic Brain Injury. Archives of Physical Medicine and Rehabilitation. 2008;89:42-47.*

[5] *Sherer M, Katz DI, Bodien YG, Arciniegas DB, Block C, Blum S, Doiron M, Frey K, Giacino JT, Graf MJP, Greenwald B, Hammond FM, Kalmar K, Kean J, Kraus MF, Nakase-Richardson R, Pavawalla S, Rosenbaum A, Stuss DT, Yablon SA. The Post-traumatic Confusional State: A Case Definition and Diagnostic Criteria. Archives of Physical Medicine and Rehabilitation. 2020;101:2041-2450.*

TIRR Memorial Hermann to Pair Vagus Nerve Stimulation with Rehabilitation

"Patients will be seen and evaluated by a physical medicine and rehabilitation physician, referred to a Houston neurosurgeon for VNS implantation and return to TIRR Memorial Hermann for task-specific physical and occupational therapy,"

- Dr. Gerard Francisco

A peer-reviewed article published in *The Lancet* in April 2021 [1], and co-authored by **Gerard E. Francisco, MD**, described the highly promising results of an international, multi-center study investigation of the effect that combined vagus nerve stimulation (VNS) and intensive upper limb therapy has on the recovery of arm mobility after ischemic stroke. Based on the study results, TIRR Memorial Hermann has announced plans to open a Vagus Nerve Stimulation Clinic.

"Patients will be seen and evaluated by a physical medicine and rehabilitation physician, referred to a Houston neurosurgeon for VNS implantation and return to TIRR Memorial Hermann for task-specific physical and occupational therapy," says Dr. Francisco, professor and Wulfe Family Chair in Physical Medicine and Rehabilitation at McGovern Medical School at UTHealth Houston and chief medical officer at TIRR Memorial Hermann.

The pivotal VNS study was conducted following two earlier pilot studies that demonstrated the safety and potential efficacy of VNS. In the more recent study, about half of the patients treated with combined VNS and therapy showed significant improvement in arm movement, when

compared to only about a quarter of those who received no stimulation with intensive therapy.

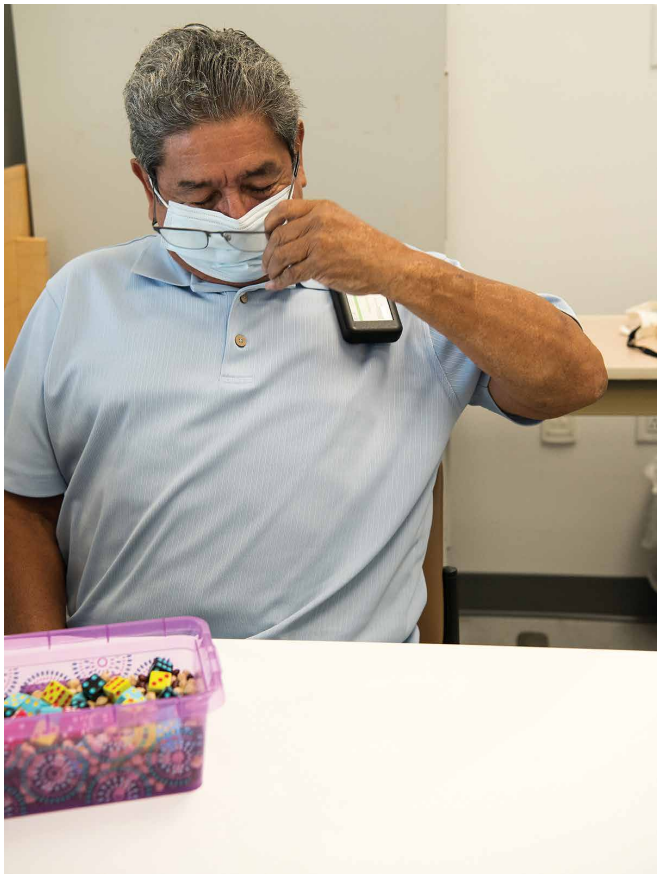
All 108 study participants had an ischemic stroke between nine months and 10 years prior to beginning the study protocol and were implanted with a vagus nerve stimulator. They were randomized to one of two groups: Half of the participants received VNS during intensive upper limb therapy under the supervision of a therapist, and the other half of participants had the implanted device deactivated, so they did not receive actual stimulation during the same therapy program.

The supervising therapist activated the device, and the delivery of the electrical pulse was timed to coincide with the upper limb exercises. Stimulation of the vagus nerve was delivered through a minimal electrical current from a cuff wrapped around the nerve. Participants were not informed of the group to which they were assigned. In-clinic therapy, under therapist supervision, was provided three times a week for six weeks, after which the participants performed a prescribed, daily home exercise program for three months. While performing the home exercises, the participants activated the VNS themselves.

At the end of the first day, after completing the six-week in-clinic therapy, and again 90 days afterward, the participants were re-evaluated using the Fugl-Meyer Assessment-Upper Limb (FMA-UL), a tool widely used for research and clinical assessment. At the beginning of the study, participants' FMA-UL scores ranged from 20 to 50 out of 66 (the higher the score, the less impairment exists). Following in-clinic therapy, those who received combined VNS and intensive upper limb therapy improved their FMA-UL scores by about five points, while those who performed the intensive upper limb therapy without concomitant, VNS improved only by 2.4 points. Ninety days later, the VNS plus therapy group's mean FMA-UL scores improved by 5.8 points, while the therapy-only group improved by an average of 2.8 points. Quality of life also improved more for those who received both VNS and therapy. The study also did not result in any unexpected or serious adverse events associated with VNS. "Maximizing recovery and optimizing functional use of the weak limb after a stroke has been a holy grail in rehabilitation," says Dr. Francisco, who directs the NeuroRecovery Research Center at TIRR Memorial Hermann. "We are fortunate to have participated in this landmark trial that investigated the potential of VNS to increase the ability of some people with post-stroke weakness to use the affected arm and hand once again. VNS may be helping the brain 'rewire' as it recovers from a stroke."

To refer a patient, contact 800.44.REHAB (73422). ■

[1] *Dawson J, Liu CY, Francisco GE, Cramer SC, Wolf SL, Dixit A, Alexander J, Ali R, Brown BL, Feng W, DeMark L, Hochberg LR, Kautz SA, Majid A, O'Dell MW, Pierce D, Prudente CN, Redgrave J, Turner DL, Engineer ND, Kimberley TJ. Vagus nerve stimulation paired with rehabilitation for upper limb motor function after ischaemic stroke (VNS-REHAB): a randomized, blinded, pivotal device trial.* The Lancet. *2021 Apr. 24;397(10284):1545-1553.*



TIRR Memorial Hermann Designated a National Rehabilitation Innovation Center by President Biden and the U.S Congress

Legislation passed by the United States Congress and signed into law by President Joe Biden on Jan. 5, 2023, designates TIRR Memorial Hermann a National Rehabilitation Innovation Center. The Dr. Joanne Smith Memorial Rehabilitation Innovation Centers Act of 2022 recognizes a leading class of pioneering rehabilitation research facilities across the United States that set the standard for ongoing study and clinical care. The act helps ensure that best practices and cutting-edge research are disseminated widely to maximize patient outcomes.

"From our earliest days of providing rehabilitation to people affected by polio, TIRR Memorial Hermann has been known for embracing innovation in its clinical, education, research and advocacy efforts," says **Rhonda Abbott, PT, FTPTA, MBA,** senior vice president and chief executive officer of TIRR Memorial Hermann and system executive for rehabilitation services at the Memorial Hermann Health System. "We join our colleague institutions in gratitude to all in Congress for this national designation and with reflection on the responsibility it brings. We will continue creating hope for patients with complex health conditions, teaching future clinicians, redefining medical rehabilitation science, translating the implementation of best practices into standard-of-care interventions and disseminating proven clinical pathways across the country and globally."

The law, which was more than a decade in the making, legally defines institutions that conduct specified federal research and training programs for traumatic brain injury and spinal cord injury, and which serve a certain number of Medicare patients. It also directs the U.S. Department of Health and Human Services to disseminate best practices and lessons from these facilities through the completion of studies designed to shape the future of post-acute care.

"This is exciting news for many patients who need tailored, state-of-the-art rehabilitation to resume a fulfilling life. The bipartisan legislative achievement is driven in large part by the ongoing distinction of TIRR Memorial Hermann, recognized worldwide as a leader in research and treatment for patients with the most challenging, complex conditions," says former Rep. Kevin Brady of The Woodlands, Texas, who played a significant role in ushering the bill toward passage. "I have seen their work up close, and it is beyond amazing. Now, with the designation as a National Rehabilitation Innovation Center, TIRR Memorial Hermann can propel rehabilitation medicine far into the future, providing hope for generations to come."

The act is named after the late Dr. Joanne Smith, who was president and chief executive officer of the Shirley Ryan AbilityLab in Chicago. The legislation was authored by Sen. Richard Durbin (D-Ill.) and Sen. Bill Cassidy, MD (R-La.). Co-sponsors include Sen. Mitch McConnell (R-Ky.) and Sen. Mark Kelly (D-Ariz.). Rep. Lizzie Fletcher (D-Texas) and Rep. Dan Crenshaw (R-Texas) were also instrumental in advancing this legislation. ■

Traumatic Brain Injury and Spinal Cord Injury Model Systems Funded

The National Institute on Disability, Independent Living and Rehabilitation Research (NIDILRR) has announced funding awards to TIRR Memorial Hermann as a Traumatic Brain Injury Model System (TBIMS) and Spinal Cord Injury Model System (SCIMS). NIDILRR awards grants to institutions that are national leaders in medical research and patient care. As part of the institute's Model Systems of Care, participating organizations contribute to the Traumatic Brain Injury (TBI) and Spinal Cord Injury (SCI) National Data and Statistical Center and conduct independent and collaborative research studies. TIRR Memorial Hermann is the only site in Texas and one of only six sites nationwide to have both TBI and SCI Model Systems programs.

The Traumatic Brain Injury Model System

The NIDILRR TBI Model Systems program began in 1987 and is one of the largest research programs on recovery from TBI in the world, with the largest longitudinal database on traumatic brain injury. The Brain Injury Research Center (BIRC) at TIRR Memorial Hermann, led by director **Angelle Sander, PhD**, professor in the Baylor College of Medicine's H. Ben Taub Department of Physical Medicine and Rehabilitation, was one of the original TBI Model Systems sites. The TBI Model System program now consists of 16 centers around the United States.

TIRR Memorial Hermann has been funded as a TBI Model System center for six five-year cycles, with the most recent cycle beginning in September 2022 and running through August 2027. The new TIRR Memorial Hermann / Baylor College of Medicine / UTHealth Houston Collaborative TBI Model System will enroll individuals with TBI in a national database, for a multicenter, longitudinal study that examines the course of recovery and outcomes following the delivery of a coordinated system of acute neurotrauma care and inpatient rehabilitation. The database collects information on the course of TBI through the continuum of care, including acute trauma care, comprehensive inpatient rehabilitation, post-acute rehabilitation and long-term outcomes.

Dr. Sander is TBIMS project director, and **Shannon Juengst, PhD, CRC**, who joined the Brain Injury Research Center in September 2021 as senior scientist at TIRR Memorial Hermann and clinical investigator for BIRC, is co-director of the TBIMS. **Monique Pappadis, PhD**, is director of dissemination and cultural humility, and **Cindy Ivanhoe, MD**, professor of physical medicine and rehabilitation at McGovern Medical School at UTHealth Houston, is medical director.

In addition to the overall TBIMS project, TIRR Memorial Hermann is conducting a local research project led by Dr. Juengst, called "Symptom Trajectories and Evolution of Mental Health Conditions Over the First Year Post-Injury: A Mobile Health Application." The study will track temporal patterns of everyday neurobehavioral symptoms–emotions, fatigue, cognitive challenges and substance use–that often develop into mental health conditions in the first year after TBI, and determine patterns in these symptoms that predict a diagnosis of depression or anxiety at one year post-injury. Tracking is conducted via a mobile health platform developed specifically with and for persons with TBI, allowing for the collection of data on emotional and behavioral symptoms in daily life.

The TBIMS's collaborative module project, "Multidimensional Health Perceptions Profiles for Personalizing Patient-Provider Communication," also will be led by Dr. Juengst and will validate a measure of health perceptions for persons with TBI: the Multidimensional Health Perceptions Questionnaire. Developed and validated in a general population, with both English and Spanish speakers, using patient-centered outcomes techniques, it captures several areas considered to be important social determinants of health, including anticipated discrimination, spiritual health beliefs, beliefs about social and emotional well-being, trust in healthcare providers, health self-efficacy and perceived health literacy.

The Texas Model Spinal Cord Injury System

The NIDILRR SCI Model Systems (SCIMS) Program began in 1970 to support research and the provision of comprehensive medical rehabilitation services for individuals with spinal cord injury. In 2022, TIRR Memorial Hermann's center for Spinal Cord Injury and Disability Research (SCIDR) was awarded the Texas Model Spinal Cord Injury System

continues on page 16

continued from page 15

(TMSCIS) and rejoined 18 SCIMS centers across the United States as they mark the milestone of 50 years of working to improve the lives of individuals with SCI. The TMSCIS is a collaboration among TIRR Memorial Hermann, Baylor College of Medicine, UTHealth Houston and the University of Montana. The TMSCIS will enroll individuals with SCI in a national database, conducting a longitudinal study that follows individuals with SCI through their acute care trauma, rehabilitation and long-term outcomes over their life span; conduct a site-specific project; and collaborate in module projects with other Model Systems centers.

TMSCIS project director is **Heather Taylor, MS, MEd, PhD,**, associate professor of physical medicine and rehabilitation at UTHealth Houston, senior scientist and director of SCIDR at TIRR Memorial Hermann and an adjunct associate professor in Baylor College of Medicine's H. Ben Taub Department of Physical Medicine and Rehabilitation. Co-investigators include **Susan Robinson-Whelen, PhD**, scientist at TIRR Memorial Hermann, clinical investigator at SCIDR, assistant professor of physical medicine and rehabilitation at Baylor College of Medicine and assistant professor at UTHealth Houston; **Argyrios Stampas, MD**, director of spinal cord injury medicine research at TIRR Memorial Hermann and associate professor at UTHealth Houston; and Rosemary Hughes, PhD, senior research scientist at the University of Montana's Rural Institute for Inclusive Communities and a research professor in the university's Department of Psychology.

The TMSCIS includes a strong team of collaborators who will guide and advise national database recruitment and follow-up as well as the local research project. Members of the TMSCIS Medical and Scientific Advisory Board include **Matthew Davis, MD; Joel Frontera, MD; Radha Korupolu, MD; Isaac Hernandez Jimenez, MD**; and **Shuo-Hsiu James Chang, PT, PhD**, all associate professors of physical medicine and rehabilitation at UTHealth Houston; **Lisa Wenzel, MD**, assistant professor of physical medicine and rehabilitation at Baylor College of Medicine; Richard Petty, MBA, co-director of TIRR Memorial Hermann's Independent Living Research Utilization and director of the Center for Aging and People with Disabilities; **Julie Laymon, PT, MS**, director of clinical programs at TIRR Memorial Hermann; and **Becky Thayer RN, MSN, CRRN** Admin Nursing Project Lead and Evidence Based Practice at TIRR Memorial Hermann.

The TMSCIS also includes two senior community advisors and a six-member Community Advisory Board consisting of individuals with lived experience with SCI. The senior advisors and the Community Advisory Board partner with the investigators on the local, site-specific research project and provide input and guidance on other research activities throughout the full duration of the funding cycle. The senior advisors are Linda Norah-Davis and Travis Hoffman. Norah-Davis, a former TIRR Memorial Hermann patient from the Houston area, has served as a peer-group facilitator on two previous intervention studies. Hoffmann, a program coordinator at Summit Independent Living serving rural residents in Montana, brings important perspectives to the site-specific project, which will include individuals with SCI from across the U.S., among them people living in rural areas. The Community Advisory Board is comprised of a diverse group of individuals from across the country

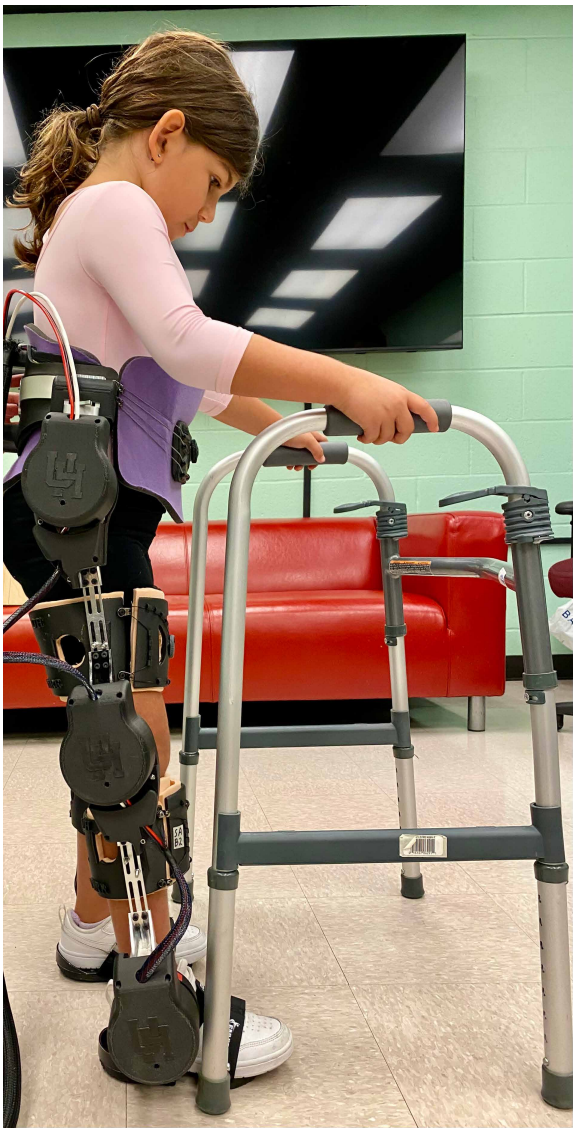
who are dedicated to contributing to research that can benefit others with SCI. Members include Myford Collins, David Davidson, Susan Hagel, Dr. Rex Marco, Angel Ponce and Pam Williams.

In the new cycle, TMSCIS' site-specific study is called "Living Longer and Stronger with SCI: An Online Program for Promoting Healthy Aging," directed by Dr. Robinson-Whelen. According to the National Spinal Cord Injury Statistical Center's Spinal Cord Injury Facts and Figures database, the past 40 years have brought a significant change in patterns of injury. The average age of injury has increased from 29 years in the 1970s to approximately 42 years at present. Aging individuals with SCI may have a higher risk of developing other medical complications. The TMSCIS site-specific study aims to develop and test the efficacy of an eight-week online group health promotion program for men and women aging with SCI.

In addition, the TMSCIS is leading a collaborative module research project called "Acute Spinal Cord Injury Outcomes Associated with Early Opioid Administration." The study, led by Dr. Stampas, will examine the effects of opioid administration in people with acute SCI and examine the association between opioid dose and changes in motor/functional scores and in pain, depression and quality of life scores post-injury. ■

Think and Make It Happen: Investing in Brain Research and Neurotechnology

On any given day inside the BRAIN Center at the University of Houston (UH), which is sponsored by the National Science Foundation (NSF) Industry-University Cooperative Research Center (IUCRC), you might find visual artists and dancers amid adults and children with paralysis, all wearing caps that chart the electrical signals emitted by their brains. Researchers are mapping the signals to learn which areas of the brain are activated when the study participants express their feelings during creative movement, daily movements or as they attempt to regain the ability to move. Those with paralysis who are relearning essential movement skills are wearing powered exoskeletons augmented with brain-machine interfaces designed to interpret their thoughts and help them move when the thought of moving enters their minds.



Directing the activity as fellow researchers put his discoveries into practice is **José Luis "Pepe" Contreras-Vidal, PhD**, the neural engineer behind the IUCRC for Building Reliable Advancements and Innovations in Neurotechnology (BRAIN). The partnership between UH, Arizona State University (ASU), TIRR Memorial Hermann and UTHealth Houston now includes world-class industry and academic teams from around the world.

"Disability has become a leading health care concern because our population is aging, and while advances in trauma care are saving more lives, they're leaving many people with long recovery times," says Dr. Contreras-Vidal, professor of electrical and computer engineering at UH. "About 5.4 million people in the United States are living with paralysis, creating a critical need for accessible and ethical technologies that address their needs effectively. We're making substantial strides with the neurotechnology solutions we're developing at the BRAIN Center in collaboration with our industry and academic partners."

When Dr. Contreras-Vidal moved to Houston 10 years ago, one of his first National Institutes of Health (NIH) grants for a brain-machine interface for rehabilitation of upper-limb movement after stroke was a cross-disciplinary collaboration with **Gerard Francisco, MD**, professor and Wulfe Family Chair in Physical Medicine and Rehabilitation at McGovern Medical School at UTHealth Houston and chief medical officer at TIRR Memorial Hermann. The collaboration led to other grants, including one awarded by the NSF that funded Phase 1 of the BRAIN Center.

"All these grants have been focused on developing ways to connect the brain with machines and particularly machines that can be used for rehabilitation, such as exoskeletons patients can wear to retrain an arm or their legs after a stroke, for example," Dr. Contreras-Vidal says.

Initially funded by NSF in 2017, the BRAIN Center has become an international hub for emerging technologies, with international affiliate partners that include the Tecnológico de Monterrey in Mexico and Universidad Miguel Hernández de Elche in Spain. The U.S. Food and Drug Administration has joined as an affiliate member, along with three new academic sites scheduled to join in 2023: the Georgia Institute

continues on page 18

continued from page 17

of Technology, West Virginia University and the University of Maryland, Baltimore County.

Phase 2 of the BRAIN Center, from 2022 to 2027, is funded by NSF grants and industry membership fees that support the design, validation and transfer of novel neurotechnologies to end users. The BRAIN Center also has continued to develop a strong and unique workforce development program from high school to post-doctoral levels. Last year, the NSF renewed the BRAIN Center's Research Experiences for Undergraduates (REU) site grant to offer research experience for undergraduates in "Neurotechnologies to Help the Body Move, Heal and Feel Again." In addition, the National Institutes of Health awarded a five-year R25 Research Education Grant of $768,000 to Dr. Contreras-Vidal and Pranav J. Parikh, PhD, associate professor of health and human performance at UH. The R25 grant will help fund didactic and hands-on activities to enhance the training of therapists, clinical and research fellows, and orthotists and prosthetists for neurorehabilitation and neuroengineering research, with the goals of using these emerging technologies to meet the nation's biomedical, behavioral and clinical research needs.

"Workforce development is another challenge the NIH grant will help us meet," Dr. Contreras-Vidal says. "We want to train scientists, engineers and physicians in this new technology, and this is why TIRR Memorial Hermann is an important member of our team. Some of the students and study participants we're working with will spend time in labs at TIRR working with our technology. TIRR Memorial Hermann also is helping us by training new generations of physical medicine and rehabilitation specialists, as well as neuroengineers."

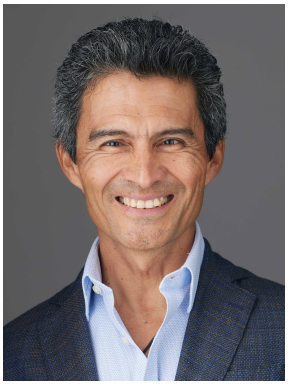
In their research, he and Dr. Francisco found that neurotechnology is lagging in its application to the pediatric population. "Children's needs change rapidly as they develop, so creating neurotechnology they can use is a moving target," says Dr. Francisco, who directs the TIRR Memorial Hermann NeuroRecovery Research Center." In Phase 1 of the BRAIN Center, we saw an opportunity to develop the first over-ground exoskeleton for children and have completed the project. We expect to start clinical trials of the exoskeleton with children with cerebral palsy this spring."

"All data produced by the exoskeleton can be collected by physicians to evaluate progress and determine if modifications are needed in therapy," Dr. Contreras-Vidal says. "This is a challenging project that requires close work with physicians, children, parents, our industry partners and regulatory agencies. We're very fortunate to have the full support of TIRR Memorial Hermann and its researchers. As medical devices, our exoskeletons will have to be approved by the FDA. We're working very closely with all stakeholders to develop the science in ways that maximize safety and benefits for end users.

"As part of our roadmap for the future, we're creating the next generation of soft exoskeletons that can be personalized to each child's needs," he says. "These exoskeletons will be made of special technical fabrics with very small sensors and actuators built in. It's an entirely new concept that will increase our ability to collect data we can use to improve function and conduct future research."

The BRAIN Center also is actively engaged in the development of standards and best practices for brain-machine interface systems, artificial intelligence, or AI, applications, use-inspired roadmaps for emerging technologies and convergent research at the nexus of the arts, science and medicine.

"Through our nationally funded BRAIN Center and our close collaboration with TIRR Memorial Hermann and other partners, including those from industry, we are putting Houston on the map as a leader in the application of these new technologies," Dr. Contreras-Vidal says. "We're asking ourselves which challenges may not be attainable today but could be attainable tomorrow. As part of the roadmap, we'll add other technologies to exoskeletons, prosthetics and other wearable devices and virtual machines so they can be controlled directly by body movement or brain activity. For example, just by thinking about it, the brain-controlled devices will engage, assist and rehabilitate movement in people with disabilities. We're developing innovative, safe, effective, inclusive and accessible technologies, which is very exciting for us, and critical to improving the quality of life of millions of people with cognitive and motor disabilities." ■



"Pepe" Contreras-Vidal, PhD

Dr. Korupolu Receives NIH Grant for Mindfulness Study

Radha Korupolu, MD, MS, associate professor in the Department of Physical Medicine and Rehabilitation at McGovern Medical School at UTHealth Houston and an attending physician in the Spinal Cord Program at TIRR Memorial Hermann, has been awarded a National Institutes of Health R34 planning grant to examine mindfulness meditation training in patients with spinal cord injury who are also experiencing chronic pain. The three-year, $714,096 grant from the National Center for Complementary and Integrative Health will fund a pilot study.

Dr. Korupolu and her team report that chronic pain after spinal cord injury can be debilitating and lead to multiple other complications, such as depression, anxiety and poor health-related quality of life. Current therapeutic options include pain medications such opioids, which can have significant side effects in this population.

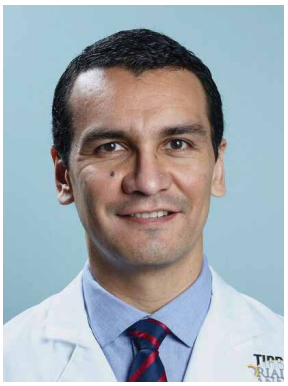
"The literature suggests that mindfulness-based interventions can improve pain and mood," Dr. Korupolu says. "However, given significant barriers related to travel to attend in-person sessions, there is a need to test the feasibility and acceptability of remote delivery of these interventions."

The study will use a mobile application known as "Mindfulness Coach," which was created by the United States Department of Veterans Affairs National Center for PTSD, and a TED Talks application to deliver control intervention for six weeks. Participants can complete all aspects of this intervention from home without the need to travel. Both applications used in the study are publicly available and free.

The study began in November 2022 in collaboration with Chelsea Ratcliff, PhD, from Sam Houston State University, as a multiple principal investigator. Co-investigators are **Susan Robinson-Whelen, PhD**, assistant professor of physical medicine and rehabilitation at Baylor College of Medicine and an investigator at the TIRR Memorial Hermann Spinal Cord Injury and Disability Research Center (SCIDR) and **Heather Taylor, MS, MEd, PhD**, associate professor of physical medicine and rehabilitation at UTHealth Houston and director of the Texas Model
Spinal Cord Injury System and SCIDR at TIRR Memorial Hermann. ■

Radha Korupolu, MD, MS

Advancing Care for Spinal Cord Injury Patients in Latin America



Isaac Hernandez Jimenez, MD

According to the World Health Organization, every year, between 250,000 and 500,000 people around the world suffer a spinal cord injury (SCI) resulting in disability. Most cases have preventable causes–automobile accidents, falls or violence. Despite advances in rehabilitation medicine's understanding of the pathophysiology of SCI and the management of its acute and chronic complications, functional outcomes in Latin America are disproportionately variable between countries, with worse outcomes in the countries with fewer resources. As chair of the American Spinal Cord Injury Association's (ASIA) 20-member Americas Committee, **Isaac Hernandez Jimenez, MD**, associate professor in the Department of Physical Medicine and Rehabilitation with McGovern Medical School at UTHealth Houston and an affiliated physician in the Spinal Cord Program at TIRR Memorial Hermann, is helping to shape the committee's strategic focus on improving care in Latin America.

"Spinal cord injury is a very challenging condition that requires extensive education of physicians and patients, financial support and resources for long-term medical care," Dr. Hernandez Jimenez says. "ASIA defines itself as the premier association for SCI in the Americas, but in the past we've focused for the most part on the United States and Canada. Recently, we began focusing more attention on Mexico, Central America and South America."

When the Americas Committee first started looking farther south, they were told that there was little interest in SCI rehabilitation education in Latin America. "We refused to believe that," he says. "Because a spinal cord injury subspecialty doesn't exist in Latin America, people with SCI are served by general rehabilitation physicians, physical therapists, occupational therapists, nurses and primary care physicians. Our goal is to offer educational opportunities for these Latin American rehabilitation providers who care for patients with acute and chronic SCI. We're also working to enhance cooperation between the various disability organizations to share knowledge and training in ways that will improve the care of these patients."

Last September, the Americas Committee created an online research methodology course in Spanish, to which 300 people applied to attend. "We selected the top 13 who had ongoing research projects and committed to helping them carry them out," Dr. Hernandez Jimenez says. "Being able to connect with people in Latin America virtually has been a godsend because of the sheer size of our two continents. Today, we have an Americas subcommittee located across Latin America, with two liaisons in Argentina who connect the groups. At any given time, we're communicating directly

with 200 to 400 physicians, therapists, nurses and residents in various working groups."

Americas Committee members also presented on various topics at the 2022 meeting of the Asociación Médica Latinoamerica de Rehabilitación (AMLAR) held Oct. 28 through Nov. 1 in Cochabamba, Bolivia. Dr. Hernandez Jimenez was among eight presenters from the committee.

"We're working with our counterparts in Latin America to structure the educational process in ways that will best benefit them," he says. "All talks are available on the ASIA YouTube channel, either in Spanish or with Spanish subtitles. Some are available with Portuguese subtitles. We're working toward high-yield education and interaction. We want clinicians to be able to talk with us today and put the knowledge they gain to work to fine-tune care for their patients tomorrow. We have an active core of members, but we can always use more help. We're looking for people from across the clinical rehabilitation spectrum–physicians, therapists and nurses–especially those who can speak Spanish or Portuguese."

Clinicians who are interested in joining the committee, or who have a special interest in helping SCI patients in Latin America, may email americas@asia-spinalinjury.org for more information. ■

"Spinal cord injury is a very challenging condition that requires extensive education of physicians and patients, financial support and resources for long-term medical care."

- Issac Hernandez Jimenez, MD

Peggy Turner Invited to Title IX 50th Anniversary Luncheon

Peggy Turner, CTRS

Peggy Turner, CTRS, attended a VIP luncheon held in Washington, D.C., to celebrate the 50th anniversary of the Title IX clause of the Federal Education Amendments, signed into law in 1972. The event, held in June 2022, also recognized the 10th anniversary of the U.S. Department of State Global Sports Mentoring Program, in which Turner, through TIRR Memorial Hermann, participates. She is the athletics community liaison and the adapted sports and recreation coordinator at TIRR Memorial Hermann.

In 37 words, Title IX changed the life course of hundreds of thousands of American women. The amendment states, "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of or be subjected to discrimination under any education program or activity receiving Federal financial assistance." Turner was among them.

"Title IX applies to a variety of programs and opportunities for women, but it has received the most attention for its impact on athletics," Turner says. "The trajectory of my life changed during my sophomore year in high school, when the law required my school to have a girls' basketball team. That led me to college sports and, ultimately, to my job at TIRR Memorial Hermann."

Headline speakers at the luncheon were the First Lady of the United States, Jill Biden, Ed. D., and sports icon and equality champion, Billie Jean King. The celebration was held at Capital One Arena in concert with the Department of State's implementing partner, the University of Tennessee Center for Sport, Peace & Society. Luncheon attendees were also invited to a private preview of "37 Words," a four-part ESPN docuseries that premiered last June, which examines how Title IX shaped American culture. ■

TIRR Memorial Hermann and UTHealth Houston Collaborate on International Stroke Rehabilitation and Recovery Conference

TIRR Memorial Hermann, the Department of Physical Medicine and Rehabilitation at McGovern Medical School at UTHealth Houston and the UTHealth Houston Institute for Stroke and Cerebrovascular Diseases will host colleagues from around the world to present and discuss the latest science, clinical applications and device development with the goal of improving the lives of people recovering from stroke. The conference will be held Nov. 30 through Dec. 2, 2023, in the Texas Medical Center.

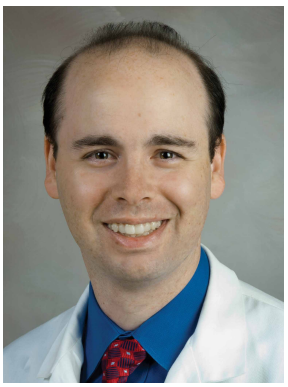
The inaugural 2.5-day conference will host keynote speakers and leaders in stroke recovery, research and rehabilitation, with the goal of translating knowledge into clinical practice that improves outcomes. Co-chairs of the conference are **Gerard E. Francisco, MD**, professor, chair and Wulfe Family Chair in the Department of Physical Medicine and Rehabilitation at McGovern Medical School, chief medical officer at TIRR Memorial Hermann, and director of the UTHealth Houston NeuroRecovery Research Center at TIRR Memorial Hermann; **Sean I. Savitz, MD, FAHA, FANA**, professor of neurology, Frank M. Yatsu Chair in Neurology, director of the UTHealth Houston Institute for Stroke and Cerebrovascular Diseases at McGovern Medical School, and adjunct professor of physical medicine and rehabilitation at the medical school; and **Sheng Li, MD, PhD**, professor and director of the NeuroRehabilitation Research Lab, director of stroke rehabilitation and recovery research in the Department of Physical Medicine and Rehabilitation at McGovern Medical School.

Attendance is open to physicians, nurses, occupational therapists, physical therapists, speech language pathologists, psychologists, social workers, case managers, pharmacists, respiratory therapists, music therapists, recreation therapists, other health care professionals and trainees, and community members who work with the growing population of individuals recovering from stroke.

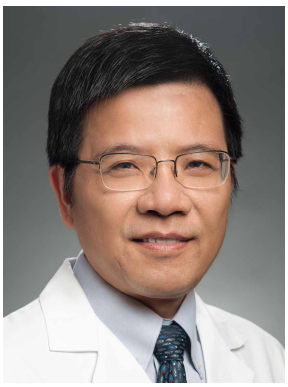
Post-stroke rehabilitation topics will include robotics, innovative technology, spasticity management, knowledge translation, neurologic music therapy, current research, pharmaceutical considerations, disparities and outcomes, nutritional management, pediatric stroke treatment paradigms, recreation for living, complex rehabilitation technology (CRT), and return to home and community.

For more information and to register, visit https://education.memorialhermann.org/profile/web/11040 ■

Gerard E. Francisco, MD



Sean I. Savitz, MD, FAHA, FANA



Sheng Li, MD, PhD

Heather Taylor Receives ACRM Margaret Nosek Award

Heather Taylor, MS, MEd, PhD, associate professor of physical medicine and rehabilitation with McGovern Medical School at UTHealth Houston and director of the Texas Model Spinal Cord Injury System and the Spinal Cord Injury and Disability Research (SCIDR) program at TIRR Memorial Hermann, is the recipient of the American Congress of Rehabilitation Medicine's (ACRM) SCI-ISIG Margaret Nosek Award. Given annually as part of the Margaret ("Peg") Nosek Lecture Series presented by the SCI Interdisciplinary Special Interest Group, the award recognizes an individual who demonstrates drive and commitment to advancing scientific knowledge, developing standards of clinical practice, raising awareness and advocating for appropriate health care and community support for women with disabilities.

"I am so honored to receive this award. I first worked with Peg Nosek when I joined the faculty of Baylor College of Medicine just after graduate school in 2001," said Dr. Taylor. who also holds an adjunct faculty appointment at Baylor. "Over the years, she mentored me as a colleague and as a woman with my own disability of multiple sclerosis. When I joined TIRR Memorial Hermann in 2012, she worked with me again on the Texas Spinal Cord Injury Model System. Despite her own disabling health condition, she was full of a contagious energy that lit a fire under all those who worked with her. She was among the first to encourage clinicians and researchers to understand how the needs of women with disabilities differ from those of men. Men comprise 80% of the spinal cord injury population and, therefore, have received the most attention. Thanks to Peg's inspiration and work on the inclusion of women, more and more clinical trials are required to include women in order to identify their unique needs."

Dr. Taylor is the former chair of both the Spinal Cord Injury Model Systems and the American Congress for Rehabilitation Medicine Interdisciplinary Special Interest Group Women's Health Task Force, both of which are focused on the unique concerns of women's health after spinal cord injury. Dr. Taylor has focused her research on health, motor recovery and learning, and psychosocial functioning, with a strong emphasis on women and children with spinal cord injury. She has a long history of research with a mission to improve the lives of people with disabilities and has been principal investigator, or co-investigator, of more than 35 funded projects.

The late, Dr. Nosek was a disability rights advocate and internationally recognized authority on the health of women with disabilities. She was a professor of physical medicine and rehabilitation at Baylor College of Medicine, director of Baylor's Independent Living Research Use Program and director of Baylor's Center for Research on Women with Disabilities, which she founded in 1993. In 2014, she also joined the staff at TIRR Memorial Hermann to advocate for women's programs and participated in research activities. She was president of Health Care for All Texas, and in her later years she became interested in the possibilities of outreach to people with physical disabilities through Second Life, an online multimedia platform that allows people to interact with other users. ■

Angelle Sander Named Chair of ACRM's Brain Injury Interdisciplinary Special Interest Group

Angelle Sander, PhD

Angelle Sander, PhD, professor and director of the Division of Clinical Neuropsychology and Rehabilitation Psychology in the Baylor College of Medicine's H. Ben Taub Department of Physical Medicine and Rehabilitation, assumed the position of chair of the American Congress of Rehabilitation Medicine's (ACRM) Brain Injury Interdisciplinary Special Interest Group (BI-ISIG) in November 2022. She has served as director of the Brain Injury Research Center at TIRR Memorial Hermann since 2007.

Dr. Sander has been active in ACRM and the BI-ISIG since 1999. She was a member of the Cognitive Rehabilitation Task Force from 2004 through 2015 and participated in translating Cicerone and colleagues' systematic reviews on cognitive rehabilitation for consumers. She is a past member of the ACRM Clinical Practice Committee, Communications Committee and Consumer Relations Committee, where she served as chair from 2010 through 2012.

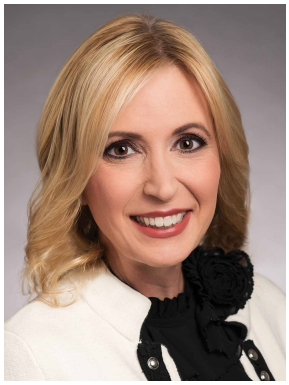
"Many of the most successful and rewarding collaborations I have had during my career began informally in small BI-ISIG groups of clinicians who were passionate about doing research that would improve clinical care and make a difference in the lives of persons with traumatic brain injury and their caregivers," says Dr. Sander, who will serve as chair through November 2024. ■

American Association of Critical-Care Nurses Recognizes Patient Care Unit at TIRR Memorial Hermann with Beacon Award for Excellence

The American Association of Critical-Care Nurses (AACN) has awarded TIRR Memorial Hermann its silver-level Beacon Award for clinical excellence among its nursing staff. The award specifically honors the team in Patient Care Unit 2C at TIRR Memorial Hermann, where staff members care for patients from around the world with brain, spinal cord and other severe injuries.

The Beacon Award for Excellence recognizes caregivers in units whose consistent, systematic approach to evidence-based care optimizes patient outcomes. Units that receive this national recognition serve as role models to others working toward excellence in patient and family care, according to the AACN. The Beacon Award also highlights positive, supportive work environments in which there is greater collaboration between colleagues and leaders, higher morale and lower turnover.

"Patient Care Unit 2C is the first unit at TIRR Memorial Hermann ever to achieve this award," says **Nicole Harrison, MBA, BSN, RN, NEA-BC**, vice president and chief nursing officer at TIRR Memorial Hermann, Memorial Hermann Rehabilitation Hospital-Katy and the Memorial Hermann Rehabilitation Network. "This is a significant acknowledgment from the Association of Critical-Care Nurses of our team and underscores their ongoing commitment to provide safe, patient-centered and evidence-based care to help ensure that patients and families meet their rehabilitation goals." ■



Nicole Harrison, MBA, BSN, RN, NEA-BC

TIRR Memorial Hermann Provides Support for Two Inclusive Houston Area Parks

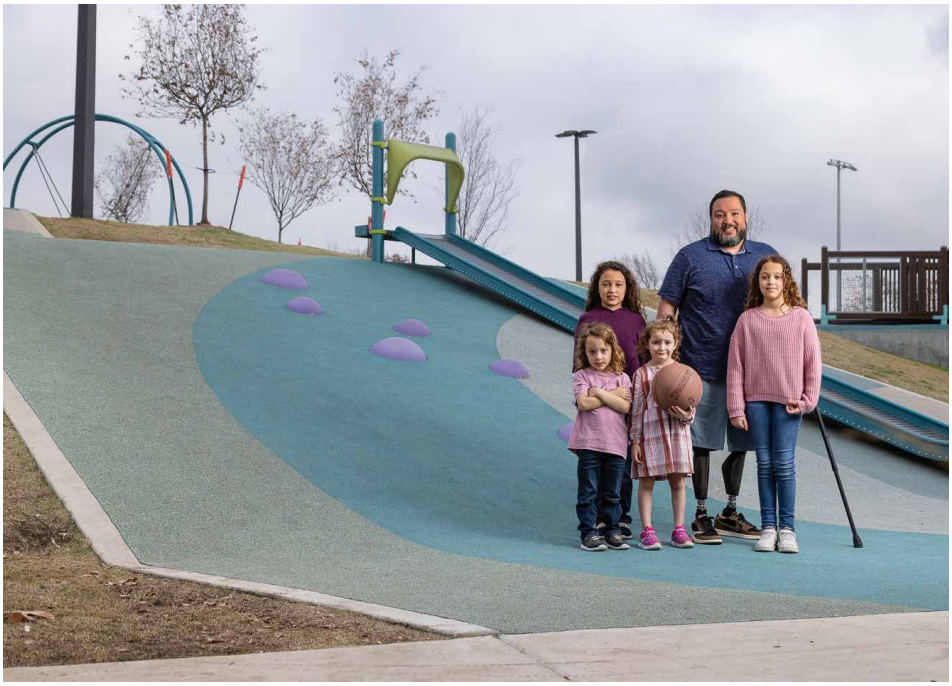
The revitalized 29-acre James Driver Inclusive Park, initiated by Harris County Precinct 2 Commissioner Adrian Garcia and located in an underserved area in northeast Houston, provides a space for people of all ages and abilities to exercise, socialize and play. The expansion is the first of its kind in the area serving the East Aldine community and was made possible, in part, through the support of TIRR Memorial Hermann.

"Part of our advocacy mission at TIRR Memorial Hermann is to ensure that people with disabilities are included in everyday activities in our community," says **Peggy Turner, CTRS**, athletics community liaison and adapted sports and recreation coordinator at TIRR Memorial Hermann. "Our goal is to encourage and help people with disabilities take advantage of the benefits of the same health promotion and prevention activities as people who do not have a disability."

Turner represented TIRR Memorial Hermann at planning meetings for the park revitalization and provided advice from a community perspective, beginning in 2018 and ending with the park's ribbon-cutting ceremony in December 2021.

TIRR Memorial Hermann is also a sponsor of the Ed Thompson Inclusive Park playground in Brazoria County, which is currently under construction and expected to open by summer 2023. ■

TIRR Memorial Hermann team members join the Forever Park Foundation, State Representative Ed Thompson, Pearland Mayor, Kevin Cole at the Ed Thompson Inclusive Park Groundbreaking Ceremony



Alex Weatherford and family at the James Driver All Inclusive Park

Daquan Minor, TEAM Mentor

Nielsen Grant Funds TIRR Empowered Advocates Mentoring Project

The Craig Nielsen Foundation has funded a new program at TIRR Memorial Hermann's Independent Living Research Utilization (ILRU) called TIRR Empowered Advocates Mentoring (TEAM). The foundation awarded the initiative a $55,000 grant in September 2022 for a program that began the following February. TEAM is designed to encourage young people with disabilities to become tomorrow's leaders, especially those with spinal cord injuries. Mentees will develop self-advocacy skills on their legal rights as a person with a disability, through education, group reflective dialogues, community engagement activities and forming relationships with other young people with disabilities.

"Our goal is to educate young people on their employment and health care access legal rights as a person with a disability," says **Alexia Smalling**, who wrote the grant proposal with **Megan Gillespie**, both of whom are TIRR Memorial Hermann ILRU research assistants. "Living with a disability can lead to isolation. Many people with disabilities lack a support system, knowledge of the law and their rights, and a sense of community with other people with disabilities. This program will provide the tools for people to make informed decisions as advocates for themselves in all aspects of their lives."

Smalling and Gillespie hope the two-year pilot initiative will develop into a long-term, far-reaching program. "We acknowledge that building an effective mentorship program is a continuous process, and we hope to continually improve the program and help it grow," Gillespie says. "The program will be informed by existing mentorship programs aimed at a diversity of disabilities. One of our goals is to develop a handbook on creating a self-advocacy mentorship program for young people with disabilities. We're hoping that our mentorship program manual will be a helpful blueprint for disability rights organizations across the United States to hold their own mentorship programs."

TEAM began as an idea suggested by Lex Frieden, professor with UTHealth Houston School of Biomedical Informatics and co-director of TIRR Memorial Hermann's Independent Living Research Utilization (ILRU), which provides research, education and consultation in the areas of independent living, home and community-based services and the Americans with Disabilities Act.

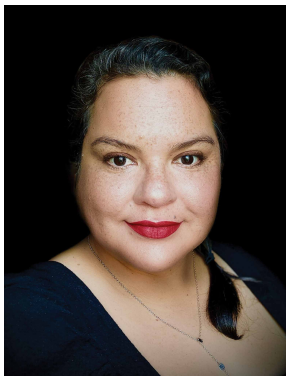
The Craig Nielsen Foundation awards funding that provides opportunities and independence for individuals with spinal cord injuries (SCI). ■

Sandra Breitengross Bitter Joins TIRR Memorial Hermann's Independent Living Research Utilization Program

Sandra Breitengross Bitter has been named director of training for the Independent Living Research Utilization (ILRU) IL-NET National Training and Technical Assistance Center for Independent Living. She joins TIRR Memorial Hermann from the Texas Statewide Independent Living Council, where she was executive director. In that role, she worked closely with centers for independent living across the state and with members of the governor-appointed state council. She also brings experience from her public policy work for the United States House of Representatives.

Bitter, who is based in Austin, leads all training activities, supervises ILRU's training and team dissemination and manages the work of key IL-NET partners, as well as consultant trainers and authors. She ensures that all principles of the independent living philosophy are present in training conducted through the IL-NET, as well as promoting an organizational culture of diversity, equity and inclusion.

In addition to Bitter, the IL-NET management team includes Richard Petty, director of the IL-NET National Training and Technical Assistance Center; Paula McElwee, director of technical assistance; and Lex Frieden, ILRU director and IL-NET national policy consultant. ■



Sandra Breitengross Bitter

TIRR Memorial Hermann Earns High Recognition by *U.S. News & World Report*

TIRR Memorial Hermann Hospital ranked No. 2 among the country's top rehabilitation hospitals in the *U.S. News & World Report*'s Best Hospital rankings for 2022-2023. TIRR Memorial Hermann was previously ranked No. 2 in the 2021-2022 rankings and has been included in the prestigious rankings since the report's inception in 1989.

"Last year we saw some changes to the ranking process to include more aspects of quality measures in addition to reputation, so TIRR Memorial Hermann's consistency in this current year supports that our staff and affiliated physicians have been able to continue giving the high-quality care that TIRR Memorial Hermann is known for," said Rhonda Abbott, PT, FTPTA, MBA, FACHE senior vice president and CEO of TIRR Memorial Hermann. "We plan to carry on with our focus on patient outcomes and the quality of care that we strive for with all of our patients in their rehabilitation journey."

The annual *U.S. News* Best Hospitals rankings and ratings, now in their 33rd year, are designed to assist patients and their doctors in making informed decisions about where to receive care for challenging health conditions or for common elective procedures. The U.S. News Best Hospitals methodologies in most areas of care are based largely on objective measures such as risk-adjusted survival and discharge-to-home rates, volume and quality of nursing, among other care-related indicators. ■

TIRR Memorial Hermann Welcomes Two Physiatrists

Michael V. Nguyen, MD, MPH, and **Vinay P. Vanodia, MD**, faculty members of McGovern Medical School at UTHealth Houston, have joined the medical staff at TIRR Memorial Hermann.

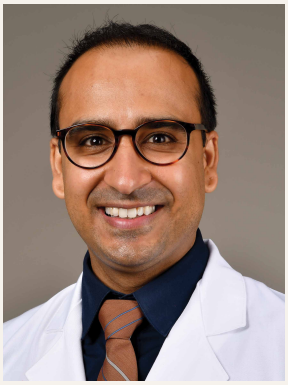
Dr. Nguyen is an assistant professor of physical medicine and rehabilitation at McGovern Medical School and joined TIRR Memorial Hermann as an attending physician in the Brain Injury Program in September 2022. He received his medical degree from the University of Washington in Seattle and his Master of Public Health from the University of California, Los Angeles. He completed residency training in the Department of Rehabilitation Medicine at the University of Minnesota, Twin Cities. He joins TIRR Memorial Hermann from the Northwest University Department of Physical Medicine and Rehabilitation and Shirley Ryan AbilityLab in Chicago, where he completed fellowship training in brain injury medicine. He is a member of the American Congress of Rehabilitation Medicine, Association of Academic Physiatrists and American Academy of Physical Medicine and Rehabilitation.

Dr. Vanodia is an assistant professor of physical medicine and rehabilitation at McGovern Medical School and specializes in physical medicine and rehabilitation, limb loss, limb preservation/salvage, pre- and post-operative amputee rehabilitation management, prosthetic design and prescription criteria, osseointegration and gait and mobility impairments, as well as bracing and orthotic needs. He accepted the position of director of the Amputee and Limb Loss Rehabilitation Program at TIRR Memorial Hermann in October 2022.

Dr. Vanodia received his medical degree from the American University of the Caribbean School of Medicine in Cupecoy, St. Maarten, and completed residency training in physical medicine and rehabilitation at Montefiore Medical Center / Albert Einstein College of Medicine in New York, where he was chief resident. He went on to complete fellowship training in amputee orthopedic trauma rehabilitation in the Department of Orthopedic Surgery and the Department of Physical Medicine and Rehabilitation at McGovern Medical School at UTHealth Houston.

In 2019, Dr. Vanodia was named to *Marquis Who's Who* for his dedication to the field of prosthetic medicine. In 2020, he received the Davidoff Award from Montefiore Medical Center for his exceptional contributions to his department in teaching and leadership. He is an assistant professor in the Department of Physical Medicine and Rehabilitation at McGovern Medical School at UTHealth Houston. Board certified in physical medicine and rehabilitation, he joins TIRR Memorial Hermann from the Spine Center at Kelsey Seybold Clinic in Houston. Under Dr. Vanodia's leadership, TIRR Memorial Hermann will continue its work in advanced technologies for limb loss, such as osseointegration. ■

Michael V. Nguyen, MD, MPH



Vinay P. Vanodia, MD

MESSAGE FROM THE CEO

For more than 60 years, TIRR Memorial Hermann has attracted visionary clinicians and researchers who have done groundbreaking work and built a reputation for innovation in clinical care, research, education and advocacy for people with traumatic brain injury, spinal cord injury and other disabilities. We are honored to be designated a National Rehabilitation Innovation Center by President Joe Biden and the U.S. Congress through the passage of the Dr. Joanne Smith Memorial Rehabilitation Innovation Centers Act of 2022. Over 10 years in the making, the act recognizes pioneering rehabilitation research facilities and ensures the dissemination of evidence-based practice to shape the future of post-acute care in ways that optimize patient outcomes.

We are also pleased that the National Institute of Disability, Independent Living, and Rehabilitation Research has awarded us another five-year cycle of funding as a Traumatic Brain Injury Model System and a Spinal Cord Injury Model System. Thanks to our NIDILRR funding, our designation as a National Rehabilitation Innovation Center and our dedicated team of clinicians and researchers, we continue to create hope for people with disabilities, develop leading-edge programs and protocols, and train future clinicians, here and around the world.

TIRR Memorial Hermann also is one of six sites in the U.S. chosen to be part of the Schwartz Center's Healing Healthcare Initiative (HHI), an education and support program for organizational change. HHI will help us reimagine the workplace in ways that support our team's well-being and enhance inclusion, allowing all of us to focus on providing compassionate care to the most complex patients in a highly supportive culture.

At some point in our lives, we will all be touched by disability–if not ourselves, then a family member. With that in mind, we continue to strive toward even more innovative solutions for our patients and their families, without forgetting the art of genuine caring.

Rhonda Abbott, PT, FTPTA, MBA
Senior Vice President and Chief Executive Officer
TIRR Memorial Hermann System Executive for Rehabilitation Services, Memorial Hermann Health System

Six Pilot Health Organizations Selected for Schwartz Center's Inaugural Healing Healthcare Initiative

The Schwartz Center for Compassionate Healthcare, a national nonprofit dedicated to putting compassion at the heart of healthcare, has selected six health organizations across the U.S. to participate in the Center's inaugural Healing Healthcare Initiative (HHI). The initiative aims to provide solutions that support and empower leaders with the resources and tools to better support their health workers' well-being so they can focus on delivering equitable, compassionate patient care.

The initiative will equip health care leaders from six organizations in developing and implementing a roadmap for their organization to ensure their organization, workforce and patients can continue to thrive. The organizations include Children's Hospitals and Clinics of Minnesota, Cincinnati Children's Hospital Medical Center, Denver Health Medical Center, New York City Health + Hospitals/Elmhurst, TIRR Memorial Hermann and University of Arkansas for Medical Sciences (UAMS) Medical Center. Specifically, HHI leaders will be equipped with evidenced-based resources, tools and support centered around six key principles: Diversity and Equity, Inclusion, Voice and Choice, Mental Health and Well-being, Psychological and Physical Safety, Team Cohesiveness and Collaboration, Trust and Trustworthiness.

The Schwartz Center for Compassionate Healthcare is a national organization whose mission is to put compassion at the heart of health care. Through programs, education and advocacy, the Schwartz Center supports the mental health and well-being of the health care workforce so it can provide compassionate care to patients and families.

The Schwartz Center for Compassionate Healthcare is a national organization whose mission is to put compassion at the heart of healthcare. Through programs, education and advocacy, the Schwartz Center supports the mental health and well-being of the healthcare workforce so they can provide compassionate care to patients and families. ■

SELECTED PUBLICATIONS

Chang S-H, Tseng S-C, Su H, **Francisco GE**. How Can Wearable Robotic and Sensor Technology Advance Neurorehabilitation? Published in Frontiers in Neurorobotics. 2022 Oct 11.

Chen Y-T, **Li S**, Zhang Y, Zhou P, **Li S**. Startling acoustic stimulation (SAS) has task-specific effects on intracortical facilitation and inhibition at rest and during visually guided isometric elbow flexion in health subjects. Motor Control. 2022 Nov;27(4):1-16.

Chen Y-T, Zhang C, Liu Y, **Magat E**, Zhou P, Zhang Y, **Li Sheng**. Comprehensive biomechanical, electrophysiological and neuro-motor control assessment of the botulinum toxin effects on spastic elbow flexors in stroke survivors with spastic hemiplegia: a cross sectional observation study. TOXINS. 2022;14(2):104. Published on Jan 28, 2022.

Costa F, Janela D, Molinos M, Lains J, **Francisco GE**, Bento V, Dias Correia F. Telerehabilitation of acute musculoskeletal multi-disorders: Prospective, single-arm, Interventional Study. BMC Musculoskeletal Disorders. 2022;23(1).

Dawson J, Engineer ND, Cramer SC, Wolf SL. Ali R, O'Dell MW, Pierce D, Prudente CN, Redgrave J, Feng W, Liu CY, **Francisco GE**, Brown BL, Dixit A, Alexander J, DeMark L, Krishna V, Kautz SA, Majid A, Kimberley TJ. Vagus Nerve Stimulation Paired With Rehabilitation for Upper Limb Motor Impairment and Function After Chronic Ischemic Stroke: Subgroup Analysis of the Randomized, Blinded, Pivotal, VNS-REHAB Device Trial. Neurorehabilitation and Neural Repair. 2022;15459683221129274.

Gonzalez-Buonomo J, Pham A, Ghuman J, Malik A, **Yozbatiran N, Francisco GE**, Frontera WR, Li S. Ultrasound assessment of spastic muscles demonstrates function-dependent changes in the upper and lower limbs in ambulatory chronic stroke survivors. Journal of Rehabilitation Medicine. 2022.

Holdoway A, Arsava EM, Ashford SA, Cereda E, Dziewas R, **Francisco GE**. Nutrition management across the stroke continuum of care to optimize outcome and recovery. J Int Soc Phys Rehabil Med 2022;5:121-8.

Huang C, Chen M, Zhang Y, **Li S**, Klein CS, Zhou P. A Novel Muscle Innervation Zone Estimation Method Using Monopolar High Density Surface Electromyography. Transactions on Neural Systems & Rehabilitation Engineering. 2022.

Hughes RB, Beers L, **Robinson-Whelen S**. Health information seeking by women with physical disabilities: A qualitative analysis. Disability and Health Journal. 2022;15:101268.

Hughes RB, **Robinson-Whelen S**, Knudson, C. Cancer disparities experience by people with disabilities. International Journal of Environmental Research and Public Health. 2022 Jul 27;19(15):9187.

Janela D, Costa F, Molinos M, Moulder RG, Lains J, **Francisco GE**, Bento V, Cohen SP, Correia FD. Asynchronous and tailored digital rehabilitation of chronic shoulder pain: A prospective longitudinal cohort study. Journal of Pain Research. 2022;15:53–66.

Jethani L, Kaner M, Hernandez **Jimenez I**. Traumatic Myelopathy Chapter. Spinal Cord Injury Medicine: Board Review edited by Blessen Eapen and David X. Cifu. First edition. 2023.

Juengst SB, Wright B, Sander AM, Preminger S, Nabasny A, Terhorst L. The Behavioral Assessment Screening Tool for Mobile Health (BASTm-Health): Development and Compliance in Two Weeks of Daily Reporting in Chronic Traumatic Brain Injury. Arch Phys Med Rehabil. 2022 Aug 12. Epub ahead of print.

Juengst SB, Vega M, Holland A, Herrera S, Higashi RT, Boix Braga M, Khera A, Kew CL, Silva V. Development of the Multidimensional Health Perceptions Questionnaire in English and Spanish. Journal of Patient-Reported Outcomes. 2022 Sept 24;6(1):104.

Juengst SB, Wright B, Driver S, Calhoun S, Muir A, Dart G, Goldin Y, Lengenfelder J, Bell K. Multisite randomized feasibility study of Problem-Solving Training for care partners of adults with traumatic brain injury during inpatient rehabilitation. Neurorehabilitation. [in press]. DOI:10.3233.NRE-220129.

Karri J, Doan J, Vangeison C, Catalanotto M, Nagpal A, **Li S**. Emerging Evidence for Intrathecal Management of Neuropathic Pain following Spinal Cord Injury. Frontiers in Pain Research. 2022;3:933422. Published online July 28, 2022.

continues on page 32

continued from page 31

Karri J, Nagpal A, **Li S**. Editorial: Translational Research in Neuropathic Pain: Current Status and Future Directions. Frontiers in Pain Research. 2022;3:1024013. Published online September 9, 2022.

Korupolu R, Malik A, Ratcliff C, **Robinson-Whelen S**, Taylor H. Feasibility, acceptability, and efficacy of mindfulness training in people with upper motor neuron disorders: A systematic review. Archives of Physical Medicine and Rehabilitation. 2022 June 24;S0003-993(22)00477-4. Online ahead of print.

Li S, Gonzalez-Buonomo J, Ghuman J, Huang X, Malik A, **Yozbatiran N, Magat E**, Wu H, **Francisco GE**, Frontera WR. Aging with stroke: how to define post-stroke sarcopenia and what are its risk factors? European Journal of Physical and Rehabilitation Medicine. 2022. Published online Sep 5, 2022.

Liu Y, Chen Y-T, Zhang C, Zhou P, **Li S**, Zhang Y. Motor Unit number estimation in spastic biceps brachii muscles of chronic stroke survivors before and after BoNT injection. IEEE TBME. 2022.

Liu Y, Chen Y-T, Zhang C, Zhou P, **Li S**, Zhang Y. Motor unit distribution and recruitment in spastic and non-spastic bilateral biceps brachii muscles of chronic stroke survivors. Journal of Neural Engineering 2022 Aug 24;19(4):10.1088/1741-2552/ac86f4.

Neumann D, **Juengst SB**, Bombardier CH, Finn JA, Miles SR, Zhang Y, Kennedy R, Rabinowitz AR, Thomas A, Dreer LE. Anxiety Trajectories the First 10 Years After a Traumatic Brain Injury (TBI): A TBI Model Systems Study. Arch Phys Med Rehabil. 2022 Nov;103(11):2105-2113. Epub 2022 Jul 26.

O'Neil-Pirozzi TM, Pinto SM, Sevigny M, Hammond FM, **Juengst SB**, Bombardier CH. Factors Associated With High and Low Life Satisfaction 10 Years After Traumatic Brain Injury. Arch Phys Med Rehabil. 2022 Nov;103(11):2164-2173. Epub 2022 Feb 22.

Rigot SK, Worobey L, Boninger ML, **Robinson-Whelen S**, Roach MJ, Heinemann AW, McKernan G. Changes in internet use over time among individuals with traumatic spinal cord injury, Archives of Physical Medicine and Rehabilitation. 2022;103(4):832-839.

Robinson-Whelen S, Hughes RB, Alhusen JL, Minard CG, Beers L, Davidson D. Health information seeking in the digital age: A national survey of women with disabilities. Disability Rehabilitation. 2022 Aug 2;1-10. Online ahead of print.

Sabharwal S, Kinney C L, Raddatz MM, Driscoll SW, **Francisco GE**, Robinson LR, Geis C, Micheo W. Current status and trends in subspecialty certification in physical medicine and rehabilitation. PM&R. 2022 Jan 17. Epub ahead of print.

Sherer M, Clark AN, **Sander AM**, Struchen MA, **Bogaards J**, Leon-Novelo L, Ngan E. Relationships of self-awareness and facial affect recognition to social communication ability in persons with traumatic brain injury. Neuropsychological Rehabilitation. 2022;32(8):2013-2028.

Stampas A, Hook M, **Korupolu R**, Jethani L, Kaner MH, Pemberton E, **Li S, Francisco GE**. Evidence of treating spasticity before it develops: a systematic review of spasticity outcomes in acute spinal cord injury interventional trials. Therapeutic Advances in Neurologic Disorders. 2022;15:1-16. Published on Feb 17, 2022.

Stampas A, Malesovas C, Burke M, Farooq S, Singh M, **Korupolu R**, Li S. Exploring 5-minute heart rate variability in spinal cord injury during acute inpatient rehabilitation. J Spinal Cord Medicine. Published on March 30 2022.

Vos L, Ngan E, Novelo LL, Williams MW, Hammond FM, Walker WC, Clark AN, Lopez APO, **Juengst SB**, **Sherer M**. Predictors of Missed Follow-up Visits in the National Traumatic Brain Injury Model Systems Cohort Study. Arch Phys Med Rehabil. 2022 Dec;103(12):2325-2337. Epub 2022 Jun 13.

Weaver JA, Cogan AM, **O'Brien KA**, Hansen P, Giacino JT, Whyte J, Bender Pape T, van der Wees P, Mallinson T. Determining the Hierarchy of Coma Recovery Scale-Revised Rating Scale Categories and Alignment with Aspen Consensus Criteria for Patients with Brain Injury: A Rasch Analysis. Jrl of Neurotrauma. 2022 Oct;39(19-20):1417-1428. Epub 2022 Jun 16.

Wen H, DeVivo MJ, Heinemann AW, Krause JS, **Robinson-Whelen S**, Chen Y. Mortality beyond the first year after spinal cord injury: Does body mass index matter? Archives of Physical Medicine and Rehabilitation. 2022;103 (4):711-721.

Zong Y, Lu Z, Xu P, Deng L, **Li S**, Zhang Y, Xie Q, Zhou P. MScanFit MUNE of the Abductor Pollicis Brevis in Healthy Subjects: Findings from Different Protocols and Centers. Frontiers in Aging Neuroscience. 2022;14:953173. Published online: Oct 17, 2022.

Radha Korupolu, Aila Malik , Chelsea Ratcliff, **Susan Robinson-Whelen, Heather B Taylor**. Feasibility, Acceptability, and Efficacy of Mindfulness Training in People With Upper Motor Neuron Disorders: A Systematic Review. Archives of Physical Medicine and Rehabilitation 2022.05.020. Published online: Oct 17, 2022.

Korupolu R, Stampas A, Jimenez IH, Cruz D, Di Giusto ML, Verduzco-Gutierrez M, **Davis ME**. Mechanical ventilation and weaning practices for adults with spinal cord injury - An international survey. J Int Soc Phys Rehabil Med [serial online] 2021 [cited 2023 Feb 5];4:131-40.

Rya K Clark, **Argyrios Stampas**, Kirk W Kerr , Jeffrey L Nelson, Suela Sulo, Luis Leon-Novelo, Esther Ngan, **Dehuti Pandya**. Evaluating the impact of using a wound-specific oral nutritional supplement to support wound healing in a rehabilitation setting. International Wound Journal. 10.1111/iwj.13849. Published online: June 9, 2022.

Nguyen, Michael V. & Goodman, Daniel A. Physical Medicine and Rehabilitation Pocketpedia, 4th Edition. Chapter 1: Physical Medicine and Rehabilitation Fundamentals and Overview. Published: January 9, 2023.

Sander, Angelle. Characterizing Health Literacy in Individuals With TBI. Paper presented in the Symposium, Social Determinants of Health: Characterization and Relationship to Outcomes in Persons With Traumatic Brain Injury, presented at the annual meeting of the American Congress of Rehabilitation Medicine, Nov. 11, 2022, Chicago, Illinois.

Sander, Angelle. Effectiveness of Self-Management in Individuals With Chronic Conditions Relevant to TBI. Paper presented in the Special Symposium, Development of a Chronic Care Model for Individuals With Traumatic Brain Injury, presented at the annual meeting of the American Congress of Rehabilitation Medicine, November 11, 2022, Chicago, Illinois.

Taylor, Heather, Robinson-Whelen, Susan, Delgado, Andrew, **Hoffman, Sarah**, Pappadis, Monique R., and Bryce, Thomas (2022, May 19). Healthcare Resources for Women with SCI (HeRe for Women with SCI). Presentation at the Annual Scientific Meeting of the American Spinal Injury Association (ASIA), May 19, 2022, New Orleans, Louisiana.

continues on page 34

continued from page 33

Taylor, Heather, Robinson-Whelen, Susan, Hughes, Rosemary B., and **Gonzalez, Diana**. Perceived Impact of the COVID-19 Pandemic on the Lives of Women with Spinal Cord Injury. Poster presentation at the Annual Scientific Meeting of the American Spinal Injury Association (ASIA), May 19, 2022, New Orleans, Louisiana.

Hernandez Jimenez, Isaac. De Viaje con el ISNCSCI (A Voyage with the ISNCSCI). Invited lecture at the 29th Congress of the Latin American Rehabilitation Medical Association, Oct.10, 2022, Cochabamba, Bolivia.

Hernandez Jimenez, Isaac. Elementos Basicos y Novedades del ISNCSCI (Basic Elements and Updates on the ISNCSCI). Invited virtual lecture at the Symposium on patients with Spinal Cord Injury, Nov. 4, 2022, Fleni. Buenos Aires, Argentina.

Juengst, Shannon. Behavioral Health Considerations Across Rehabilitation Medicine: What Works, What Doesn't, and Why?; Social Determinants of Health: Characteristics and Impact on Outcomes in Persons with Traumatic Brain Injury; Caregiver Adjustment to Traumatic Brain Injury: Findings from Recent TBI Model Systems Collaborative Projects; Digital Health Applications in Rehabilitation: Fostering Stakeholder Engagement and Design for Inclusion. Symposia presented at the American Congress of Rehabilitation Medicine, Oct. 30 – Nov. 2, 2023, Atlanta, Georgia.

Li, Sheng. Neuromechanical perspective of gait disorders in spastic hemiplegia post-stroke. Presentation at the American Academy of Physical Medicine and Rehabilitation, Oct. 22, 2022, Baltimore, Maryland.

Li, Sheng. Phenol neurolysis for spasticity management in the upper extremity. Presentation at the American Academy of Physical Medicine and Rehabilitation, Oct. 21, 2022, Baltimore, Maryland.

Li, Sheng. Post-stroke gait. Presentation at the University of Puerto Rico Department of Physical Medicine and Rehabilitation Grand Rounds, Sept. 30, 2022.

Francisco, Gerard. Evaluación y Tratamiento de la Espasticidad en Personas con Lesión Cerebral. Congreso Internaciónal de Neurorehabilitación del Daño. Virtual presentation at the Congreso Internatcional de Neurorrehabilitación del Daño Cerebral, May 28, 2022.

Francisco, Gerard. Research Updates in Stroke Treatment and Rehabilitation. Invited lecture at the XXI Congresso Nazionale di Societa Italiana di Riabilitazione Neurologica, June 11, 2022,

Francisco, Gerard. Vagus Nerve Stimulation Paired with Rehabilitation to Promote Post-stroke Motor Recovery. Invited lecture at the Virtual Congress of the International Society of Physical and Rehabilitation Medicine, June 15-21, 2022.

Francisco, Gerard. Paired Vagus Nerve Stimulation (VNS) and Upper Limb Rehabilitation in Chronic Stroke. Invited lecture at the 16th World Congress of the International Society of Physical and Rehabilitation Medicine, July 4, 2022, Lisbon, Portugal.

Francisco, Gerard. Lessons Learned in Incorporating Exoskeletons in Neurorehabilitation Research. Invited lecture at the 16th World Congress of the International Society of Physical and Rehabilitation Medicine, July 4, 2022, Lisbon, Portugal.

Robinson-Whelen, Susan, Hughes, Rosemary B., **Taylor, Heather B.**, Holmes, Sally A., **Rodriguez, Jessica**, Staggers, Kristen A., and Minard, Charles G. Examining Loneliness and Its Correlates in a Sample of People with Spinal Cord Injury. Presentation at the American Congress of Rehabilitation Medicine Annual Meeting, Nov. 2022, Chicago, Illinois.

Robinson-Whelen, Susan, Hughes, Rosemary B., **Taylor, Heather B.**, Holmes, Sally A., **Rodriguez, Jessica**. Examining Lifetime Abuse Experiences of People with Spinal Cord Injury. Poster presentation at the American Congress of Rehabilitation Medicine Annual Meeting, Nov. 2022, Chicago, Illinois.

Robinson-Whelen, Susan, Hughes, Rosemary B., **Gonzalez, Diana**, Norah-Davis, Laura, Leon-Novelo, Luis G., Ngan, Esther, and **Taylor, Heather B**. A Randomized Controlled Trial of a Psychological Health Promotion Program for Women with SCI: Examining Efficacy and Mechanisms. Presentation at the American Congress of Rehabilitation Medicine Annual Meeting, Nov. 2022, Chicago, Illinois.

Francisco, Gerard. Neurorehabilitation Treatment Strategies for Long COVID. Invited lecture at the First Congress of the Latin American Scientific Society of Rehabilitation (SOCILAR) and the 26th Mexican Congress of Physical Medicine and Rehabilitation, September 21, 2022, Mérida, Mexico.

Francisco, Gerard. Onabotulinumtoxin: A Treatment of Upper Limb Spasticity: Analysis of US Practice Patterns From the ASPIRE Study. Oral presentation at the 99th Annual Conference of the American Congress of Rehabilitation Medicine, Nov. 10, 2022, Chicago, Illinois.

Francisco, Gerard. Bringing Evidence-Based Paired Vagus Nerve Stimulation (VNS) Therapy to the Clinic. Oral presentation at the 99th Annual Conference of the American Congress of Rehabilitation Medicine, Nov. 11, 2022, Chicago, Illinois.

Francisco, Gerard. Neurologic Music Therapy at TIRR: Three Decades of Best Practice. Presentation at the Academy of Neurologic Music Therapy 1st International Clinical Consensus Symposium, Nov. 18, 2022.

Francisco, Gerard. Clinical implementation of paired VNS therapy to augment post-stroke upper limb recovery. Invited lecture at the 12th Congress for Neurorehabilitation. World Federation for Neurorehabilitation, Dec. 15, 2022, Vienna, Austria.

Francisco, Gerard. Breakthroughs in spasticity management. Invited lecture at the 12th Congress for Neurorehabilitation. World Federation for Neurorehabilitation. Dec. 15, 2022, Vienna, Austria.

Li, Sheng. Revisiting phenol neurolysis for spasticity management. Spasticity master course presented preconference at the American Academy of Physical Medicine and Rehabilitation, May 25, 2022.

Li, Sheng. Post-stroke spasticity: a new definition and clinical implications. International Symposium on Recent Evidence About Spasticity and Related Concepts, organized by CEN Academy (European Center of Neurosciences), March 5, 2022.

Robinson-Whelen, Susan. Promoting Psychological Health in Women with Spinal Cord Injury. Presentation at the 27th Annual Kentucky Spinal Cord and Head Injury Research Trust (KSCHIRT) Symposium, University of Kentucky Spinal Cord Injury Research Center, May 19, 2022, Louisville, Kentucky.

Robinson-Whelen, Susan, Hughes, Rosemary B., **Taylor, Heather B**., Holmes, Sally A., **Rodriguez, Jessica**. Examining the Impact of COVID-19 on People with Spinal Cord Injury: The Role of Gender and Other Personal Characteristics. Presentation at the Annual Scientific Meeting of the American Spinal Injury Association (ASIA), May 19, 2022, New Orleans, Louisiana.

Memorial Hermann Health System
TIRR MEMORIAL HERMANN
Rehabilitation & Research
7737 Southwest Freeway
Houston, TX 77074
tirr.memorialhermann.org

TIRR Memorial Hermann Journal is published throughout the year by TIRR Memorial Hermann. Please direct your comments or suggestions to Editor, TIRR Memorial Hermann Journal, TIRR Memorial Hermann, 1333 Moursund, Houston, TX 77030, tirrcommunications@memorialhermann.org

Rhonda Abbott, PT, FTPTA
Senior Vice President, CEO

Gerard E. Francisco, MD
Chief Medical Officer

Mark Sherer, PhD, ABPP, FACRM
Associate Vice President for Research

Susan Thomas, MPH
Editor, Director of Marketing

Karen Kephart
Writer

Freeman Design Associates
Designer

Spring 2023

About TIRR Memorial Hermann

TIRR Memorial Hermann, a leader in rehabilitation, does more than provide therapy. We provide rehabilitation beyond the healthcare setting for children and adults with a disabling injury or illness, and change lives by helping people regain the skills and confidence they need to reintegrate into the community and continue living full and meaningful lives. Our highly trained rehabilitation teams see the potential in every person they work with and develop that potential to the fullest through customized goal setting and treatment planning.

We work to maximize independence, restore function and improve the quality of life for our patients. To achieve these goals, we put the individual patient and their family at the center of the rehabilitation team and provide them with the information and skills they need to transition successfully to community settings.

TIRR Memorial Hermann is the best rehabilitation hospital in Texas and among the best in the nation, according to the *U.S. News & World Report's* Best Hospital rankings for 2022-2023. The rehabilitation hospital's ranking marks its 33rd consecutive year among the magazine's Best Hospital rankings.

To make referrals or schedule an appointment, call 800.44REHAB (800.447.3422) toll-free or 713.797.5942, or fax 713.797.5988.

We have opportunities for outstanding rehabilitation professionals. If you are interested in joining our team at one of U.S. News & World Report's leading rehabilitation hospitals, view all available opportunities at memorialhermann.org, tirr.memorialhermann.org, or ilru.org.

4416947-2/23