

Research, *accelerated.*

A crash survivor who can now walk. A service member with a brain injury who can focus. An adult with a disability who can hold a new job.

This can be your legacy.

CERSE, the VCU Center for Rehabilitation Science and Engineering, is ...

Identifying risks and preventing dementia for veterans with traumatic brain injury.

Applying neurostimulation to help people with spinal cord injuries walk.

Analyzing big data to identify beneficial health services.

Customizing on-the-job training for adults with developmental disabilities.

Delivering virtual reality treatments to improve mobility and pain.

Creating behavioral interventions that help people with neurotrauma adapt.

Developing personalized treatments to improve health conditions.

Using technology to help patients self-manage their health.

Case study: The SCI Epidural Stimulation Accelerating research can lead to walking.

The idea could prove transformative for hundreds of thousands of people living with SCI (spinal cord injuries). CERSE researchers had developed a new noninvasive procedure — applying a stimulator in combination with an exoskeleton — to help people with SCI walk.

Five participants volunteered and were on the waitlist, ready to go as soon as the project was approved and funded. But the researchers found themselves bogged down in U.S. Food and Drug Administration, Institutional Review Board and resource requirements. They called on CERSE.

CERSE provided a highly experienced research coordinator who refined the procedures, resolved regulatory issues and obtained review board approvals in three months. The CERSE team was able to link the researchers to a foundation, which paid for FDA-required device testing.

CERSE also:

- Helped complete the FDA application, which led to FDA approval for the experimental use of the device.
- Worked with VCU to create a faculty position, so that the project could better utilize VCU's CERSE resources.
- Supported the submission of several grant applications through Central Virginia VA Health Care System and the university.

The grant submissions were funded by VA Rehab Research and Development and the Department of Defense within four months — for over \$4 million — and the intervention will soon help people with SCI walk.

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Before scientists make a breakthrough in research, they have to break through barriers.

Obtaining funds. Finding collaborators. Connecting with mentors. Cutting red tape. In rehabilitation research, every world-changing idea comes with down-to-earth challenges.

VCU's Center for Rehabilitation Science and Engineering helps interdisciplinary research teams overcome obstacles and accelerate their research. With CERSE, ideas can become realities — and lives can become fuller.

We connect researchers and accelerate rehabilitation breakthroughs that empower people to overcome barriers and thrive.

How researchers benefit from CERSE

CERSE is a collective powerhouse of researchers and staff with the expertise, connections and passion to get things done. CERSE accelerates research across VCU schools and colleges, Sheltering Arms Institute, and Central Virginia VA Health Care System by providing:

Development resources

CERSE connects researchers with resources they normally wouldn't have. With CERSE's help, researchers can garner seed money, startup funds, "harvest" funds and financial support for salaries, equipment and software. CERSE also supplies teams with technical assistance related to data management, statistical analysis, writing, research coordination, grant application preparation and regulatory support.

Training and consultation

CERSE offers researchers face-to-face consulting and mentoring, open-door advisory services and a steady connection to the CERSE team. CERSE researchers also guide career development through group mentoring, workshops and seminars. Subject matter experts provide just-in-time consultation on study design, project implementation, problem-solving, biostatistics and grant application pre-submission reviews.

A deep and diverse network

CERSE leaders reach across academic and professional silos to connect great minds. This team serves as the liaison for interdisciplinary rehabilitation collaborations across VCU departments, throughout the community and across the world.

In rehab science, collaboration leads to innovation and life changes.

CERSE is a truly collaborative effort. Through CERSE's efforts, interdisciplinary researchers throughout Virginia Commonwealth University, Central Virginia VA Health Care System, and Sheltering Arms Institute work together across eight broad research areas, called consortia. In these consortia, researchers develop innovative tests and treatments to accelerate breakthroughs. VCU schools and colleges involved in these interdisciplinary consortia include medicine, arts, education, engineering, health professions, humanities and sciences, nursing and pharmacy.

Central Virginia VA Health Care System researchers in areas such as regenerative medicine, applied robotics, artificial intelligence, virtual reality and alternative medicine collaborate in CERSE consortia, as well as receive support. By working together, CERSE's interdisciplinary research consortia have been awarded more than \$30 million a year in grant and contract research sponsorship — and that number continues to grow.

Sheltering Arms Institute, a new 114-bed rehab facility in greater Richmond's West Creek Medical Park, also has clinician researchers who participate in CERSE consortia and receive support for health care services and knowledge translation projects.

Also, thanks to a generous gift from the Children's Hospital Foundation, CERSE supports the advancement of pediatric traumatic brain injury access, care, research and training at VCU Health.

How patients benefit from CERSE

People with:

- Traumatic brain injury can manage their health and improve their relationships.
- Life-altering diseases and injuries are able to use exoskeletons and other assistive devices to walk.
- Developmental neuromuscular conditions can work to sit and stand upright and interact with their parents and siblings.
- Parkinson's disease can avoid falls and walk more safely in their homes and communities.
- Low back pain can find relief, increase mobility and return to activities.
- Cancer can regain their strength and stamina, and re-engage in life.
- Developmental and intellectual disabilities are able to obtain skills and work.
- Self-control issues and addictions can develop resilience and make good decisions.

CERSE Research Consortia Making great advances in all aspects of rehabilitation.



Veterans' health and wellness CERSE's Veterans' Health and Wellness Consortium promotes applied research on the general health of veterans, as well as neurodegeneration and prevention efforts. This research collaboration leads the national Chronic Effects of Neurotrauma/Long-Term Impact of Military Relevant Brain Injury Consortium, with more than \$110 million in VA/DoD funding. Future goals include the development of a national veterans clinical trials network to fasttrack turning effective treatments into practice.

Regenerative and rehabilitation medicine

Also known as rehabilitation engineering, this research consortium develops and tests advanced noninvasive and implanted technologies to improve body and brain function and everyday activities. This team has garnered multimillion-dollar grant funding for cutting-edge epidural stimulation and exoskeleton research for SCI. Future goals are to obtain national Rehabilitation Engineering and Research Center grants to advance neuromodulation, brain-computer interface and haptics research, and to accelerate additional breakthroughs.

Policy and advocacy

CERSE's Health Services and Policy Consortium analyzes large datasets to inform applied research and public policy on how social situations, health financing, organizational processes, clinical interventions, technology and people's behavior affect health outcomes. Created in 2019, this CERSE consortium serves as the data and statistical hub for VCU-purchased Medicare, National Trauma and other datasets. In the future, the consortium aims to establish a health services training program and to obtain a national Policy and Advocacy Center grant to advance value-based interventions, programs and policies for the improvement of people's health.

Vocational rehabilitation

This research consortium focuses on workforce readiness, employer practices and transitioning young adults with intellectual and development disabilities. Among its accomplishments are three national Rehabilitation and Research Training Centers for the employment of individuals with disabilities, with more than \$13 million in National Institute on Disability, Independent Living, and Rehabilitation Research funding. Future goals are to build academic-industry and academic Department of Defense partnerships on employing individuals with disabilities.



Physical function and health

The Physical Function and Health Research Consortium develops and tests new rehabilitation intervention strategies in areas such as physical rehab, pain and virtual reality to improve functional abilities, health and activities. They have received several National Institutes of Health-funded grant awards to conduct clinical trials on virtual reality interventions that improve mobility and reduce pain. This consortium has a goal to be the virtual reality and gaming research hub for interdisciplinary research across VCU and Central Virginia VA Health Care System.

Digital health

The Digital Health Consortium conducts studies on using health information technology, telehealth, mobile health and wearable devices to generate health care data that improves outcomes. Initiated in 2019, this consortium aims to lead VCU research on self-management and longterm supports and services for people with neurotrauma-related disabilities and multiple chronic conditions. This new initiative is currently seeking startup funds to support preliminary research and obtain larger grants.



Personalized rehabilitation

The Personalized Rehabilitation Consortium conducts research on individuals' abilities, biomarkers, decision-making and social circumstances to develop personalized treatment approaches. This new initiative has received a handful of startup and implementation grants focused on factors that influence decision-making when managing mental health and medical conditions. This consortium is also aiming to obtain funding to support postdoctoral trainees and clinical trials.

Participation and adaptation

The Participation and Adaptation Research Consortium creates and tests applied interventions for people with acquired disabilities and their family members in areas such as cognitive and behavioral rehab, adaptation and community re-entry. This consortium has led the Virginia TBI Model Systems Center grant for more than 30 years, with funding exceeding \$20 million. Next steps include expanding research interventions from primarily traumatic brain injury to other neurotrauma and neurodegenerative diagnoses.

Case study: The Data Hub Using big data to inform care.

In Virginia and throughout the country, health providers are challenged with making decisions on care transitions and providing long-term supports and services after neurotrauma. VCU researchers are asked to identify the best continuum of care (acute to post-acute to community) and lessen the risk for long-term nursing home placement. They also try to identify which types of settings (inpatient rehab facility vs. skilled nursing facility vs. home health) can best manage these complex patients and which services and supports are likely to be effective and affordable.

VCU researchers have had limited access to current, nationally representative Medicare, Medicaid and other health payer claims data. The data that VCU did possess was often siloed and unavailable to all schools and colleges doing health services research.

CERSE recruited Amol Karmarkar, Ph.D., a national expert in health services and health policy research. CERSE developed a data hub to provide health services researchers across VCU with:

- Shared access to existing claims data.
- Newly purchased, current Medicare and other claims data.
- Optimized functionality of the TriNetX system to study VCU Health patient populations, service utilization and outcomes.
- Training and expert consultation on using big data to improve health policy and care.

Long-term goals of the Data Hub project include translating generated evidence into the development of pragmatic clinical trials. These trials will integrate new interventions into clinical workflows and test their effectiveness in real-world settings. ta Hul

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Meet the CERSE leadership team.

CERSE is guided by national research leaders with decades of expertise directing and supporting interdisciplinary rehabilitative research programs.

Ronald T. Seel, Ph.D., FACRM, is professor and executive director of CERSE. Dr. Seel facilitates disability-related research collaborations across VCU schools and colleges; Central Virginia VA Health Care System; Sheltering Arms Institute; commonwealth of Virginia agencies; industries; and national academic, private sector and not-for-profit partners.



David X. Cifu, M.D., is the associate dean for innovation and system integration in the VCU School of Medicine, and the chairman and Herman J. Flax M.D. Endowed Professor of the Department of Physical Medicine and Rehabilitation in Richmond, Va. He is also chief of PM&R services for the VCU Health System and founding director of CERSE.

Paul Wehman, Ph.D., is a professor in the VCU Department of PM&R with joint positions in the departments of Rehabilitation Counseling and Special Education. Dr. Wehman serves as director of three VCU Rehabilitation Research and Training Centers on Employment for people with neurodevelopmental disabilities, brain injury, mental illness and spinal cord injury.

Henry J. Donahue, Ph.D., is the Alice T. and William H. Goodwin Jr. Distinguished Chair of the Department of Biomedical Engineering and codirector of the Institute for Engineering and Medicine at the VCU College of Engineering.

Patricia Kinser, Ph.D., R.N., FAAN, is an associate professor in the Department of Family and Community Health Nursing at the VCU School of Nursing and leads research programs that promote positive health behaviors and interventions for mental and physical wellness. Gretchen M. Brophy, Pharm.D., FCCP, FCCM, FNCS, is a professor of pharmacotherapy and outcomes science and neurosurgery in the VCU School of Pharmacy and leads biomarker and intervention development research programs in neurocritical care.

James Thomas, P.T., Ph.D., is a professor in the Department of Physical Therapy, VCU College of Health Professions and Department of PM&R, VCU School of Medicine. He directs the VCU Motor Control Lab, developing and testing virtual reality-based treatments for pain and mobility.

Paul Perrin, Ph.D., is an associate professor in the Department of Psychology, VCU College of Humanities and Sciences. He is the director of the health psychology program and develops and tests interventions to improve adaption to traumatic injury and neurodegenerative disease.



CERSE Emerging Leaders

Amma Agyemang, Ph.D., is an assistant professor in the Department of Physical Medicine and Rehabilitation, director of the LIMBIC-CENC National Data and Statistical Core, and recipient of a VCU Clinical and Translational Science KL2 diversity scholarship. Jane Chung, Ph.D., R.N., is an assistant professor in the Department of Family and Community Health Nursing, leader of an emerging technologies for healthy aging research program, and recipient of the 2017 Western Institute of Nursing Geriatric Nursing New Researcher Award. Carrie Peterson, Ph.D., is an assistant professor in the Department of Biomedical Engineering, director of the Rehabilitation Engineering to Advance Ability Lab, and recipient of the 2018 NIH National Center for Simulation in Rehabilitation Research Outstanding Researcher Award.

CERSE research is changing lives. And they need your help to do it.

It's not just researchers who make life-changing breakthroughs. Donors who support this research are the cornerstone to success. By partnering with CERSE and giving to this highly successful center, you can launch startups that accelerate ideas to reach solutions faster, invest in talented young researchers, and bring world-renowned researchers together to make discoveries in the local community.

Here are a few ways you can contribute or leave a legacy:

- A named center for rehabilitation science and engineering
- Named professorships for consortia leaders
- Sponsored educational events or conferences to spark innovation and accelerate collaboration

As a CERSE donor, you're an engaged partner, so you'll be able to see the difference your generosity is making.

Learn more about CERSE and how you can support their work. Contact the team at **cerse@vcuhealth.org**, or call **(804) 828-4231**. Your generosity can accelerate breakthroughs that change lives for the better.

Accelerating research that drives rehabilitation breakthroughs.



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