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\$3 Million Dollar Grant Funds Cleveland Area Rehabilitation Research

Cleveland, Ohio - The “Clinically Applied Rehabilitation Engineering (CARE)” project was awarded \$3M on May 26, 2010, from the Ohio Third Frontier program, a funding initiative designed to make Ohio a technological hub (www.development.ohio.gov/ohiothirdfrontier). The funding will support a consortium focused on improving rehabilitation devices and is comprised of some of the nation’s top talent in rehabilitation innovation at **Cleveland Clinic Lerner Research Institute** and the **Department of Physical Medicine & Rehabilitation of the Center of Geriatric Medicine, Case Western Reserve University** and the **Advanced Platform Technology (APT) Research Center of Excellence at the Louis Stokes Cleveland Department of Veterans Affairs**, in collaboration with **Bertec Corporation** of Columbus and **Parker Hannifin** of Cleveland. Together, this team will pool their expertise in biomechanics, translational research and development, commercialization success and clinical excellence to improve the understanding of mobility-related conditions and diseases, create and market state-of-the-art clinical rehabilitation devices, and establish Ohio as a rehabilitation destination.

The proposed CARE system is designed to facilitate healing, restore mobility, and increase a patient’s quality of life by promoting the ability to independently perform activities of daily living (ADL), such as showering, dressing, and transferring from beds, bath tubs, or chairs. Target populations are those requiring any of a broad range of rehabilitative intervention, whether due to injury (including sports-related), disease, and/or aging. Among the diseases to be addressed are: cardiovascular (*e.g.*, stroke, peripheral vascular disease), neurodegenerative (*e.g.*, Parkinson’s disease, multiple sclerosis), metabolic (*e.g.*, diabetes), and musculoskeletal (*e.g.*, arthritis).

Energy-efficient gait orthoses for multiple sclerosis and spinal cord injury patients, adaptive exercise systems for Parkinson’s Disease patients, and an integrated dressing for treating pressure ulcers, are all examples of products the CARE team proposes to develop and market. “All of these applications are possible only because of the interdisciplinary network of physicians and world-class researchers at the forefront of pursuing bench-to-bedside concepts in an environment that promotes innovation,” says the project’s Principle Investigator (PI), Margot Damaser, PhD, who will be carrying the project forward with Co-PI, Jay Alberts, PhD.

Commercialization will not only provide a completely new line of services, but will also help secure technology-based jobs in Ohio, a major goal of the Ohio Third Frontier. Bertec Corporation and Parker Hannifin, along with Cleveland Clinic, are committed to creating 33 new jobs over the next three years – an investment of over \$2M annually to Ohio’s economy.

The major piece of equipment for the CARE program is a CAREN rehabilitation system by Motek Medical and Bertec Corporation that will be housed at Cleveland Clinic. The military is currently using similar equipment for the rehabilitation of wounded soldiers. “We are now expanding on this available technology for clinical, research, and commercialization purposes,” says Dr. Damaser.



Until now, research and clinical application of rehabilitation devices has been severely limited by the inability of traditional technology to reliably assess feedback in a moving patient. Subsequently, reaching rehabilitation goals was often ineffective.

CAREN by Motek Medical without (left) and with (right) virtual reality screen in use

This has all changed with advanced technologies compiled by Motek Medical and Bertec Corporation. The system that will be used by the CARE project incorporates a “smart” platform that can move with six degrees of freedom using software to simulate everything from bomb-blasted terrain to bumps in a sidewalk. It can respond to input data in real-time so precisely that it can maintain a pencil balanced on end. Dual treadmills allow for mechanized assist to a patient’s mobility-challenged side. A virtual reality component adds a real-world touch while maintaining a safe, controlled environment and a five-meter-wide screen provides optimal visualization. These features will allow research, clinical, and product applications that have been previously impossible.

The project was originally submitted by Brian Davis, PhD, who has successfully landed a total of three Ohio Third Frontier grants. Although he recently relocated, he is confident in the Project’s current leadership and maintains a supportive relationship with them. Cleveland Clinic Innovations was also actively involved in the project’s development. Case Western Reserve University is committed to training rehabilitation engineers through specific coursework and interactive opportunities with CARE researchers. Collaborations with Case Western Reserve University and the VA Rehabilitation Research and Development Service’s APT Research Center of Excellence will provide advanced prototyping and training facilities, as well as development of ancillary technologies for complete bench-to-bedside device development within the CARE project.

As a beneficiary of the Ohio Third Frontier program, investigators of the CARE Project thank the voters who supported Issue 1 on May 4, 2010, with a 62% vote for the Ohio Third Frontier program, securing its funding through 2015. According to the May 26, 2010 news release of Wright Projects Program Funding recipients, the “Ohio Third Frontier [is] an unprecedented and bipartisan commitment to create new technology-based products, companies, industries, and jobs, [and] has commercialized or created more than 630 companies, attracted more than \$4.76 billion in private investment to Ohio, and has a nearly 9:1 return on investment since its inception” in 2002.

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In support of the CARE Project, **Case Western Reserve University** is committed to offering courses specific to rehabilitation engineering. The students in these classes will have the opportunity to learn firsthand on the equipment purchased using this Wright Projects grant and side-by-side with skilled engineers and designers. **Case Western Reserve University** is among the nation’s leading research institutions. Founded in 1826 and shaped by the unique merger of the Case Institute of Technology and Western Reserve University, Case Western Reserve is distinguished by its strengths in education, research, service, and experiential learning. Located in Cleveland, Case Western Reserve offers nationally recognized programs in the Arts and Sciences, Dental Medicine, Engineering, Law, Management, Medicine, Nursing, and Social Work. <http://www.case.edu>.





About the Ohio Third Frontier Project [TFP]: The Third Frontier Project (TFP) represents Ohio's largest ever commitment to promoting high technology economic development within the State. The strategy for achieving this development is to fund activities that will leverage Ohio's strengths by moving innovative technology from ideas to the marketplace. The role of the Wright Projects Program (WPP) is to enable these activities by providing grants for capital equipment to support product commercialization in the short term and workforce education/training in the long term.

About the APT Center: The APT Center is a VA Research Center of Excellence located at the Louis Stokes Cleveland Department of Veterans Affairs. APT Investigators have specific interest and documented technical expertise in implanted medical devices, microelectromechanical system (MEMs) design and fabrication,



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wireless communications and biotelemetry, biosignal acquisition, biomaterials, macromolecular science, biomechanics, robotics, and neural engineering. These technical skill sets are complemented by clinical professionals in trauma care, neurology, prosthetics/orthotics, rehabilitation medicine, SCI, urology, and cardiothoracic, head and neck, neuro, orthopaedic and vascular surgical specialties. APT creates an environment in which developers of advanced technologies can interact freely with clinicians, rehabilitation professionals and consumers. For additional information about the APT Center, please follow the link <http://www.aptcntr.research.va.gov/aptcntrresearch/>

About Cleveland Clinic: Cleveland Clinic, located in Cleveland, Ohio, is a not-for-profit multispecialty academic medical center that integrates clinical and hospital care with research and education. Cleveland Clinic was founded in 1921 by four renowned physicians with a vision of providing outstanding patient care based upon the principles of cooperation, compassion and innovation. *U.S. News & World Report* consistently names Cleveland Clinic as one of the nation's best hospitals in its annual "America's Best Hospitals" survey.



About 2,000 full-time salaried physicians and researchers and 7,600 nurses at Cleveland Clinic represent more than 100 medical specialties and subspecialties. In addition to its main campus, Cleveland Clinic operates nine regional hospitals in Northeast Ohio, Cleveland Clinic Florida, the Lou Ruvo Center for Brain Health in Las Vegas and Cleveland Clinic Canada. In 2008, there were more than 4.2 million visits throughout the Cleveland Clinic health system and 165,000 hospital admissions. Patients came for treatment from every state and from more than 80 countries. Visit Cleveland Clinic at clevelandclinic.org.

About Bertec Corporation: Bertec manufactures and supplies a variety of precision multi-component force transducers and related equipment to the world market. Bertec was established in 1987 in Columbus, Ohio, initially, to manufacture force plates for gait analysis. Our current product line extends to industrial, ergonomics, and sports applications, as well as the rehabilitation market. In addition to force plates,



Bertec's biomechanics products include balance plates and balance assessment systems, and fully instrumented dual and single belt treadmills. Bertec provides hardware, software, know-how and consulting services. More information is available at www.bertec.com.