clevelandFEScenter

Connect to Global Expertise in Neural Engineering

MOVEMENT RESTORATION

AUTONOMIC SYSTEM

BRAIN HEALTH

PAIN

TOOLS & TECHNOLOGY

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The Cleveland FES Center was established through the US Department of Veteran's Affairs, Office of Rehabilitation Research & Development Service in 1991. The FES Center, a consortium in neuromodulation and neurostimulation includes the Louis Stokes Cleveland VA Medical Center, Case Western Reserve University, MetroHealth Medical Center and University Hospitals of Cleveland.

The focus of the Cleveland FES Center is to improve people's lives by supporting fundamental research in the neuromuscular sciences, developing new technologies and methods, performing clinical evaluation and feasibility testing, and promoting the widespread deployment of new technologies through professional education and commercial partnerships.

Why FES?

"Over the last decade, basic neuroscience has provided us with a template of understanding the networks of neurons that can be interacted with. This is exciting, allowing for new and really groundbreaking science that now have opportunities for clinical application."

Cameron McIntyre, PhD
Associate Director of
Industrial Relations

"A number of the researchers here at the Center moved to Cleveland because we wanted to help people. We want to have a chance that the work we do actually end up in a device that can help a number of people. It is what motivates us to do what we do."

Ken Gustafson, PhD
Associate Director of
Research & Education

"A hallmark of our research activities has been collaboration. We have transdisciplinary teams of expertise in order to address the clinical problem at hand."

Bob Kirsch, PhD
Executive Director

"Collaborations, like the FES Center, between clinicians and engineers really require communication and an understanding how to speak different languages to ultimately serve our final mission, helping our patients."

Ron Riechers, MD
Medical Director

What is FES?

Functional Electrical Stimulation (FES), or neurostimulation, applies low-level electrical pulses to generate or suppress activity in the nervous system. Common applications of this approach are heart pacemakers and cochlear implants.

FES applications are expanding clinical solutions to:

- Enhance functional rehabilitative outcomes for everyday living following stroke and spinal cord injury
- Suppress unwanted activity, i.e., pain and spasticity
- Mitigate neurological and psychiatric disorders through Deep Brain Stimulation (DBS)

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Advancing Technology

Enhancing Life

Culture

A transdisciplinary **alliance** of active, passionate and committed professionals, students and trainees, in science and medicine, specializing in the fields of biomedical and neural research, engineering, medicine and rehabilitation who embrace an open-door, collaborative, compassionate and inquisitive engagement; Together, we are solving real medical problems that impact medical science and comfort a vulnerable veteran and civilian population.

Technology

Custom technologies crafted to meet individual goals and physiological needs are unique to the clinical research programs.

- Networked Neuroprosthetic (NNP) System
- Implantable Stimulator Telemeter (IST)
- Universal Control Module
- Implantable Electrodes (see below)

Impact

Individuals enjoy the return to their daily lives including work and social activities. From picking up a cup of coffee to standing to reach a book off the shelf, the Cleveland FES Center clinical research programs provide volunteers a greater level of independence.

"I've gotten great function so far, and a lot more will come with time. I'm able to do a lot of stuff that I didn't think I'd be able to do ever again."

Education

Dedicated to the integration of engineering and medical education, we serve to educate students with the clinical aspects of the FES Center research. Additionally, productive interactions are facilitated between those research investigators advancing the fundamental understanding of the nervous system and creating innovative technologies, and the medical students, residents and fellows, who will implement the technologies in the future.

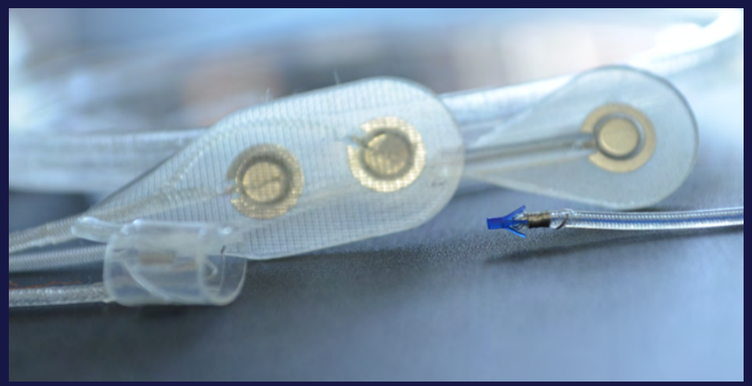
"While I was working in the lab for hours trying to get the circuits to work, I felt good knowing this was going to help someone."

Research

Research is an evolutionary process that depends on a complementary relationship between discovery and application. The Center is a global leader in the research and development of commercially adopted, patient-centric neurostimulation and neuromodulation applications.

Research Thrusts:

Brain Health | **Pain** | **Movement Restoration**
Autonomic System | **Tools & Technology**



Implantable Electrode Design

Epimysial & Intramuscular Electrodes
Both electrodes have a tandem conductor close coiled lead wire from the connector, covered with a silicone tube (“closed helix”). The epimysial electrode terminates in a Pt-10 Ir disc mounted in a silicone backing reinforced with Dacron. The intramuscular electrode has a stainless steel stimulating area wound around the lead’s distal end.

Myoelectric Signal (MES) Electrode
The MES electrodes are bipolar epimysial electrodes surgically implanted on the fascia of the target muscle. They are made of two 4mm diameter Pt-10 Ir discs mounted on a medical grade Dacron reinforced silicone backing. The discs are positioned 10mm apart. The distal lead wires for the bipolar MES electrodes begin with a Y-junction and run together to the distal recording electrode pair, with an impedance of 2 Ohms/cm.

Cuff Electrode
This automatic spiraling electrode is designed to form to the natural shape of the nerve. The cuff electrode has four contracts that can be grouped together to create a stimulation that will activate groups of muscles.

To place an order or for more information on electrodes contact:

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