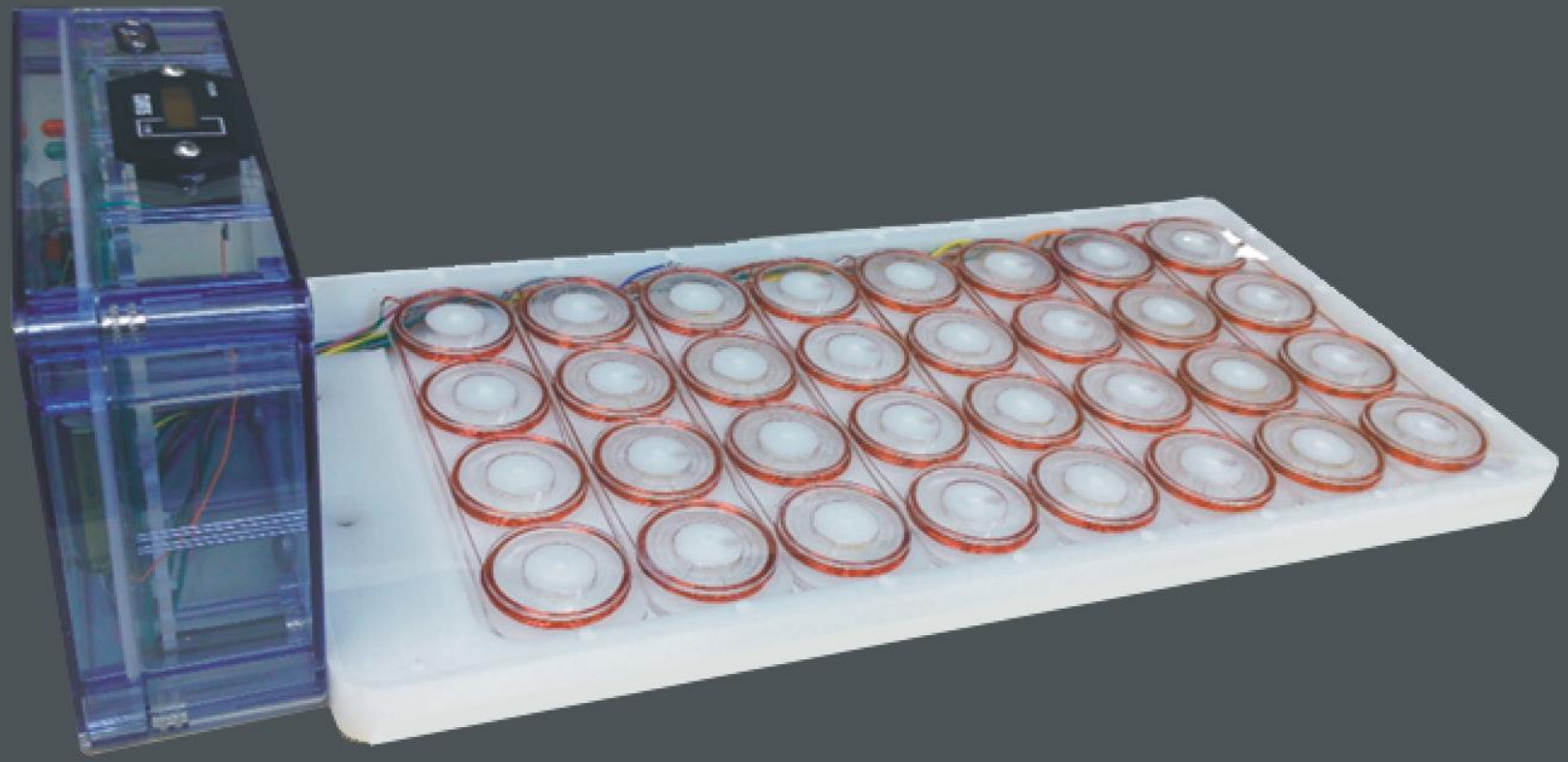
STANDARDIZING the SCIENCE of PEMF

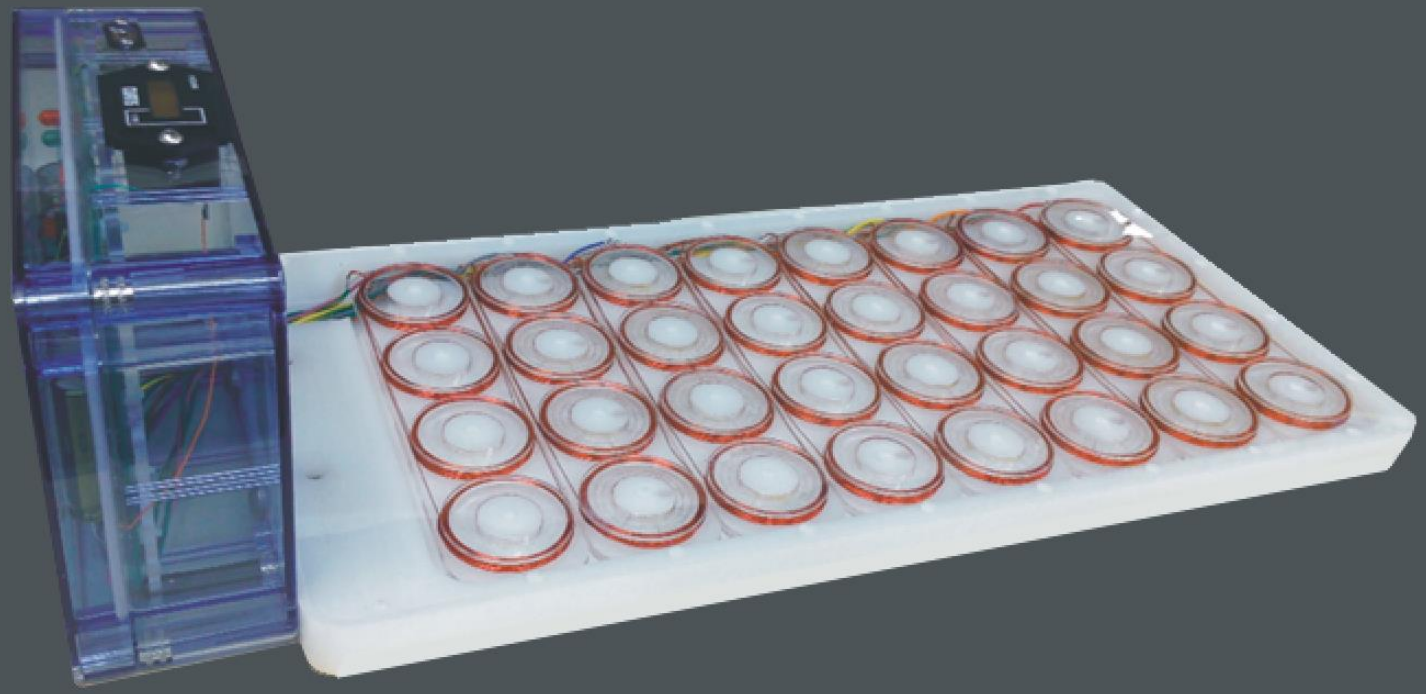
Introducing the Micro-Pulse

Models MCP48 and B5



Introducing the Micro-Pulse

Model MCP48



The first standardized scientific instrument for studying PEMF with small lab animal models

Reliable, repeatable, and significant biological effects

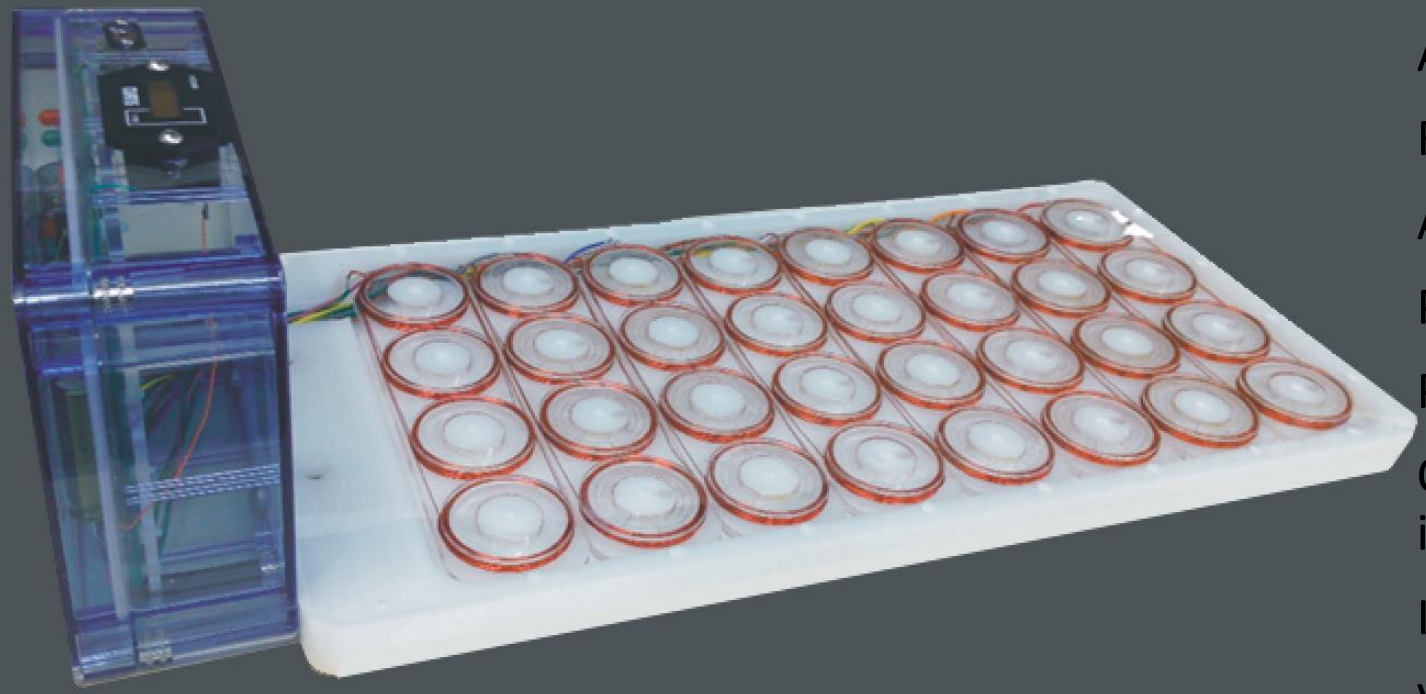
Based on original NASA research

Developed by the NASA consultant who developed the original systems for Johnson Space Center, Dr. Robert Dennis

Also available as a portable system (model B5) for large animals, pets, and approved human clinical research

Introducing the Micro-Pulse

Model MCP48



SPECIFICATIONS:

PEMF ACTIVE Pad size: 7” x 14”, large enough for:

- Bench-mount standard isolation cages for mice
- Rack-mount standard isolation cages for mice
- Cages for singly-housed rats

Animals free to move in cage untethered

Reliable, repeatable biological effects

Available as single units or in large quantities

Power: USB charger cable, 5 VDC, 2 AMP

PEMF field is fully characterized

Open architecture (not proprietary), all technical information is available for publication

Internal protections: voltage and temperature

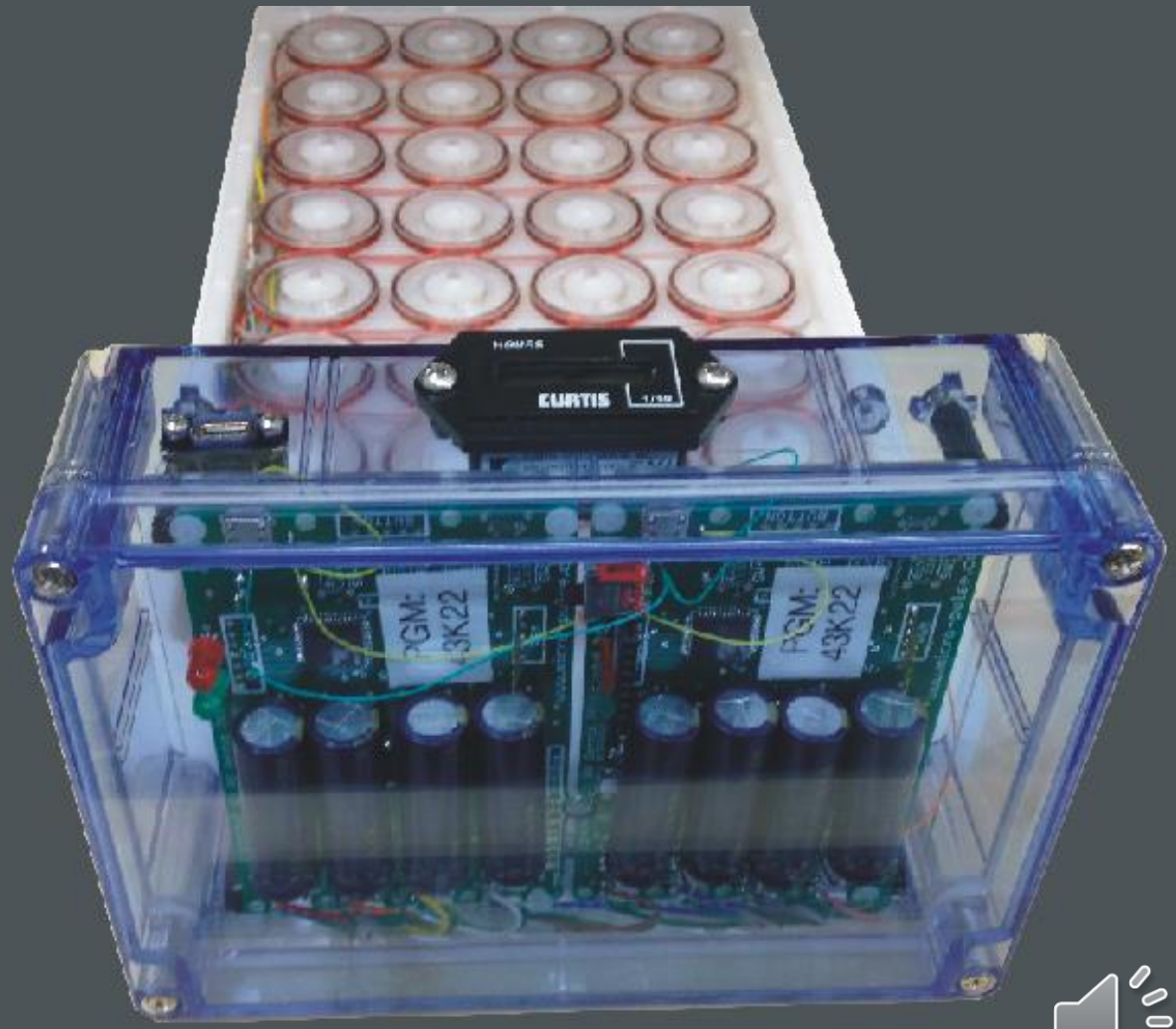
Visit our web page for pricing

www.micro-pulse.com

RESEARCH APPLICATIONS:

Non-invasive low RF energy non-ionizing electroceutical research
Inflammatory mechanisms and auto-immune signaling
Non-invasive modulation of autoimmune signaling
Elucidation of feedback mechanisms in cytokine signaling
Molecular mechanisms and biophysics of functional adaptation
Orthopedic injury, critical defect, non-union
Neuro-motor and musculo-skeletal injury
Implant engraftment and tissue interfaces
Accelerated recovery from injury with reduced scarring
Stem cell therapy, amplification, site preparation, defect correction
Brain injury and concussion, mild to severe TBI
Peripheral nerve injury and repair
Cardiovascular inflammation, reperfusion injury, and protection
Spinal cord injury and control of secondary functional loss
Burns and control of pathologic scarring
Wound closure, abdominal fistula, hernia repair
Mesh implant injury, meshoma treatment & recovery
Non-invasive modulation of autoimmune signaling
Inflammatory diseases of aging
Inflammatory diseases of organ systems:
 - liver, pancreas, urogenital, gastro-intestinal, kidney

MCP48



From the earliest studies at NASA, very significant changes in gene expression were detected

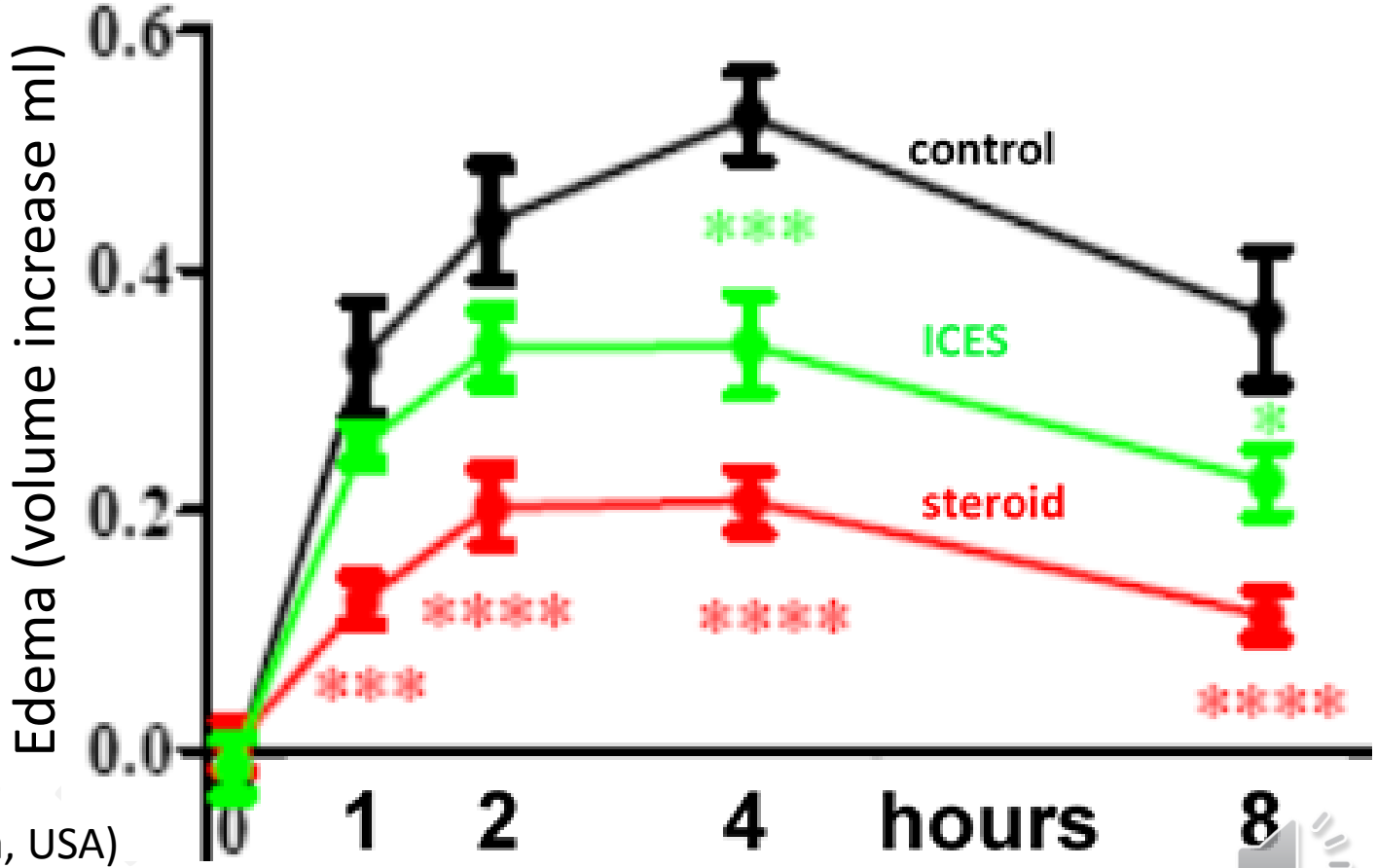
NASA/TP-2003-212054

PHYSIOLOGICAL AND MOLECULAR GENETIC EFFECTS OF TIME-VARYING ELECTROMAGNETIC FIELDS ON HUMAN NEURONAL CELLS

ICES Technology has widespread biological effects because it reduces inflammation, as verified independently by Charles River Labs (CRL)

Inflammation model:
carrageenan challenge, rat foot pad
8-hour inflammation response

CRL reports that "This is the only time any electro-medical device they have tested has shown significant effects on inflammation."



Data Verified in a second study: ICES Dose-Response
Conducted at Charles River Labs (RTP North Carolina, USA)

Molecular signaling data from various studies using ICES technology have shown large changes both in cell culture and in live animals

Responsive classes of molecules and signals include:

- IFN-x
- IL-x
- TNF-x, CD-x … and other cytokines

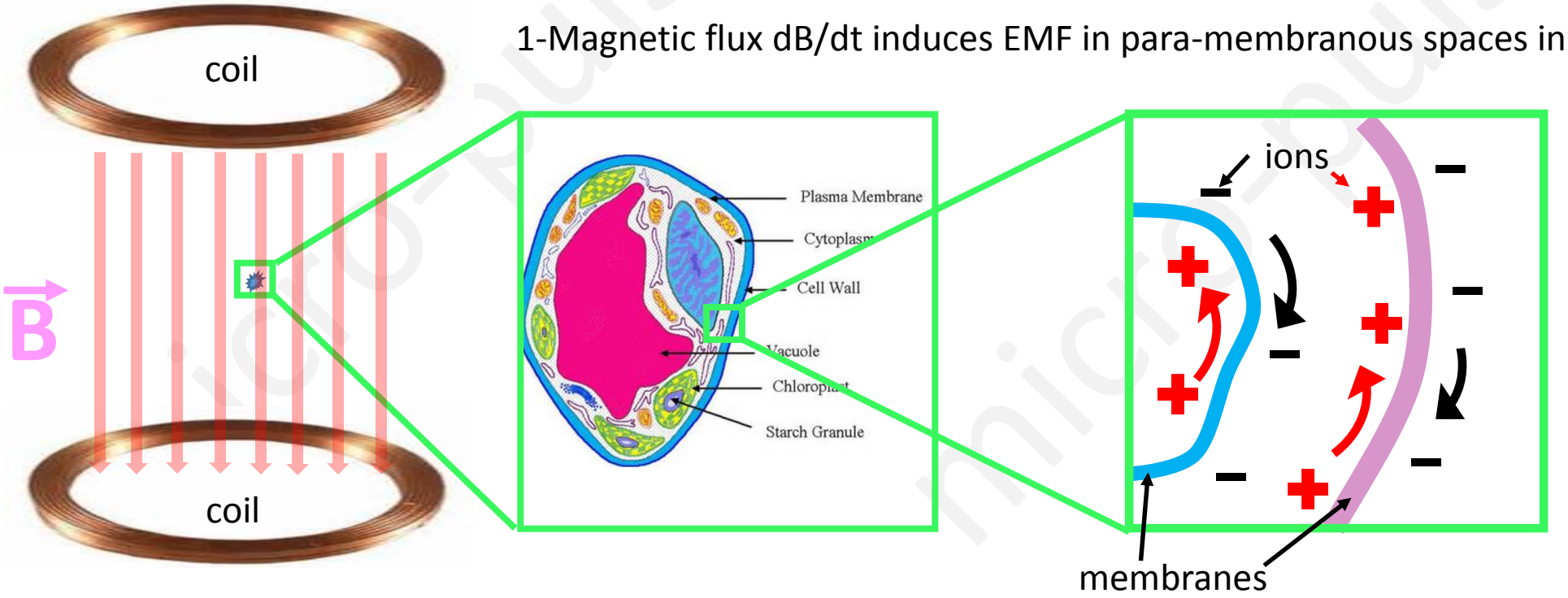
In multiple privately-funded studies we have detected significant changes when ICES technology is applied to living systems, but the underlying molecular mechanisms of the modulation of these signals remains open for detailed investigation. Elucidation of the biophysics of ICES may reveal entirely new classes of receptors. This is a new frontier in biomolecular research.

ICES: Theory of Operation

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

Electrical stimulation of cells through electro-magnetic induction. The ICES stimulation pattern emulates exercise.

$$\oint_{\partial\Sigma} \mathbf{E} \cdot d\boldsymbol{\ell} = -\int_{\Sigma} \frac{\partial \mathbf{B}}{\partial t} \cdot d\mathbf{A}$$



1-Magnetic flux dB/dt induces EMF in para-membranous spaces in and around cells

2-Induced eddy currents form in the thin para-membranous fluid spaces, causing net ion flux along membranes

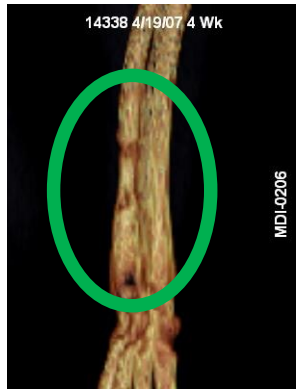
3-Hypothesis: *cells respond to signals from para-membrane ion charge flux receptors, not yet discovered*

3D CT rabbit ulna critical defect @ 4 weeks

Experimental Group

ICES ++

all 5 samples are shown

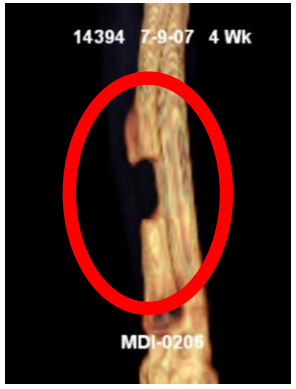


CRITICAL BONE GAPS SHOULD NEVER HEAL

Study performed at Texas A&M Vet School

ICES (low)

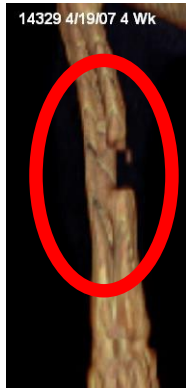
all 3 samples are shown

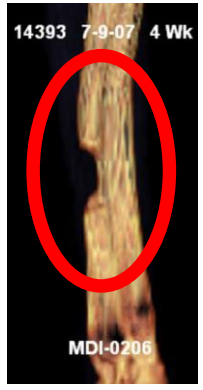


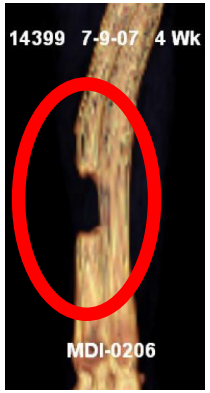
- **Healing: Very rapid, nearly total**
- **Partial Healing**
- **No Evidence of Healing**

sham

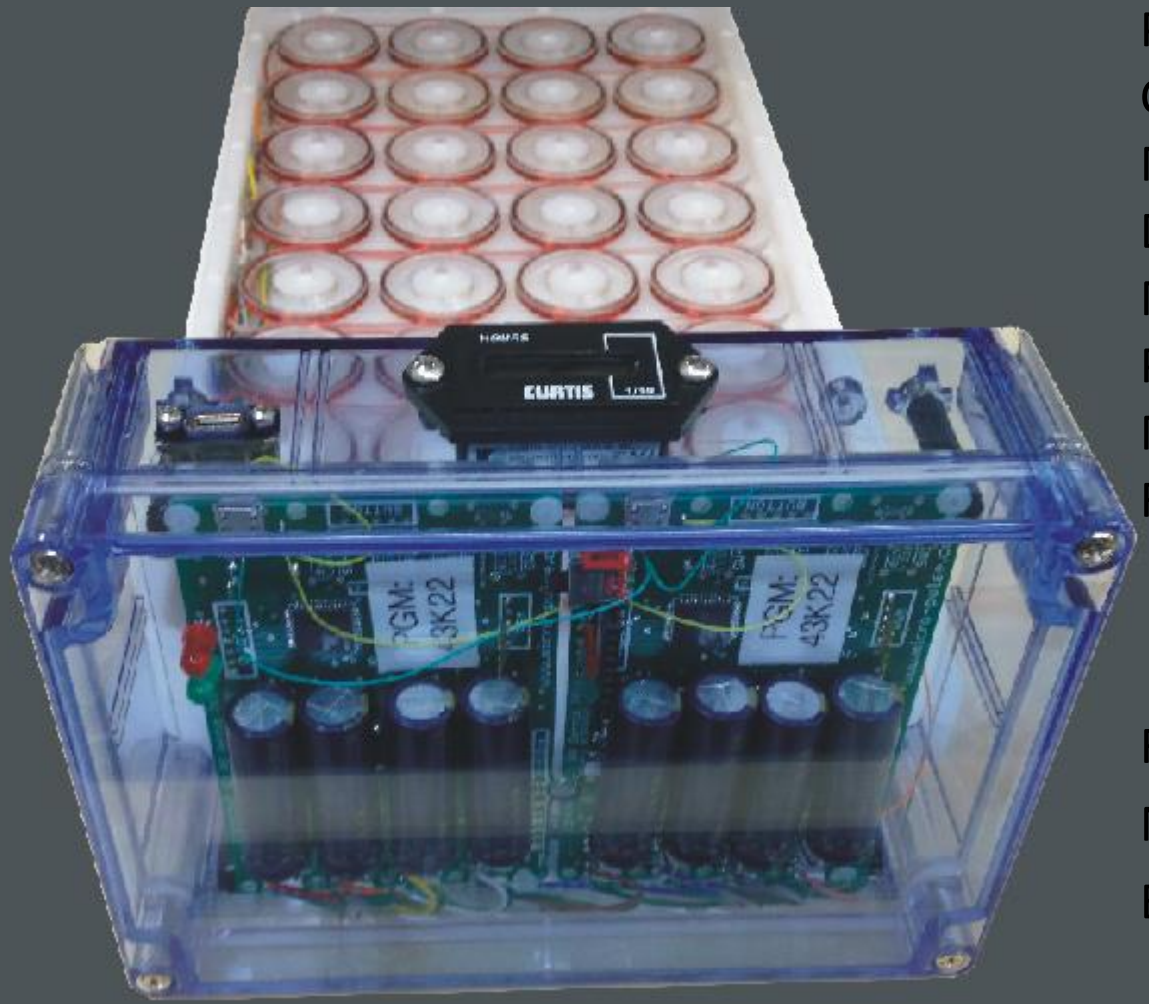
all 10 samples are shown







Micro-Pulse MCP48



SUPPORT:

All technical and scientific support is FREE OF CHARGE
Mechanical and electrical engineering support
Support for the development of animal use protocols
Previously approved protocols, images, and pilot data
Collaborative research program development
Methods & technical data for grant proposals and publications
Dimensional modifications to fit your facility
Mechanical design and fabrication support
Programming support, electronic design and fabrication
Many built-in standard protocols, programmable parameters
Firmware development for unique test protocols

REQUIREMENTS:

FOR USE ONLY IN PROFESSIONAL RESEARCH FACILITIES

NOT for HOME USE

Experiments must be approved by an animal use committee

Identical technology for clinical research: the Micro-Pulse **Model B5**

For use with large animals, pets, and humans in IRB-approved studies.

SPECIFICATIONS:

Identical circuit boards and firmware as the MCP48

Allows direct comparison: lab to clinic

Portable:

- mass: 130 g (4.6 ounces)
- size: 11.7 x 7.9 x 2.4 cm (4.7 x 3.1 x .95 inches)
- power: 5V USB (2.0 Amp max)
- 4 independent output ports for ICES coils/arrays
- protocols: 8 pre-set, millions can be programmed
- frequencies: 0.5 to 300 pulses per second
- internal protections: voltage and temperature
- display: OLED, high-contrast, impact isolated

Micro-Pulse Model B5

RESEARCH APPLICATIONS:

- Chronic pain and severe orthopedic injury
- Chronic inflammation
- Concussion, traumatic brain injury: mild to severe
- Peripheral neuropathy, diabetic ulcers
- Non-healing wounds, fistulas, hernias, bone non-unions
- Many other diseases and injuries involving inflammation

REQUIREMENTS:

- Humans: IRB - approved studies with approved consent
- Animals: Animal use approval or veterinary oversight

SUPPORT:

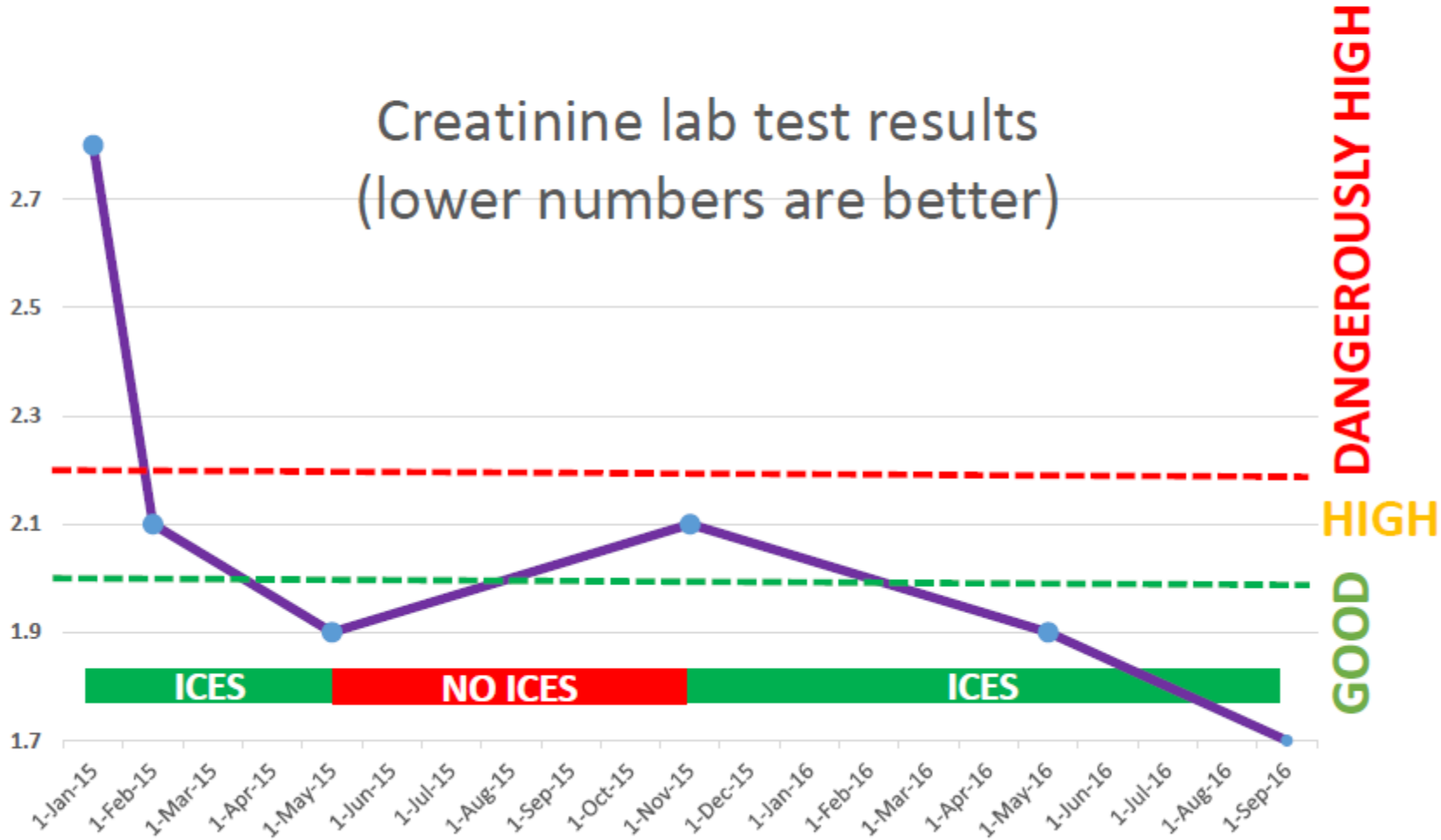
- All scientific and technical support is FREE OF CHARGE
- Technical documentation for IRB protocol development
- Firmware development if needed
- Technical support for individual users

Contact us for research configuration, delivery and pricing:

mzd@micro-pulse.com

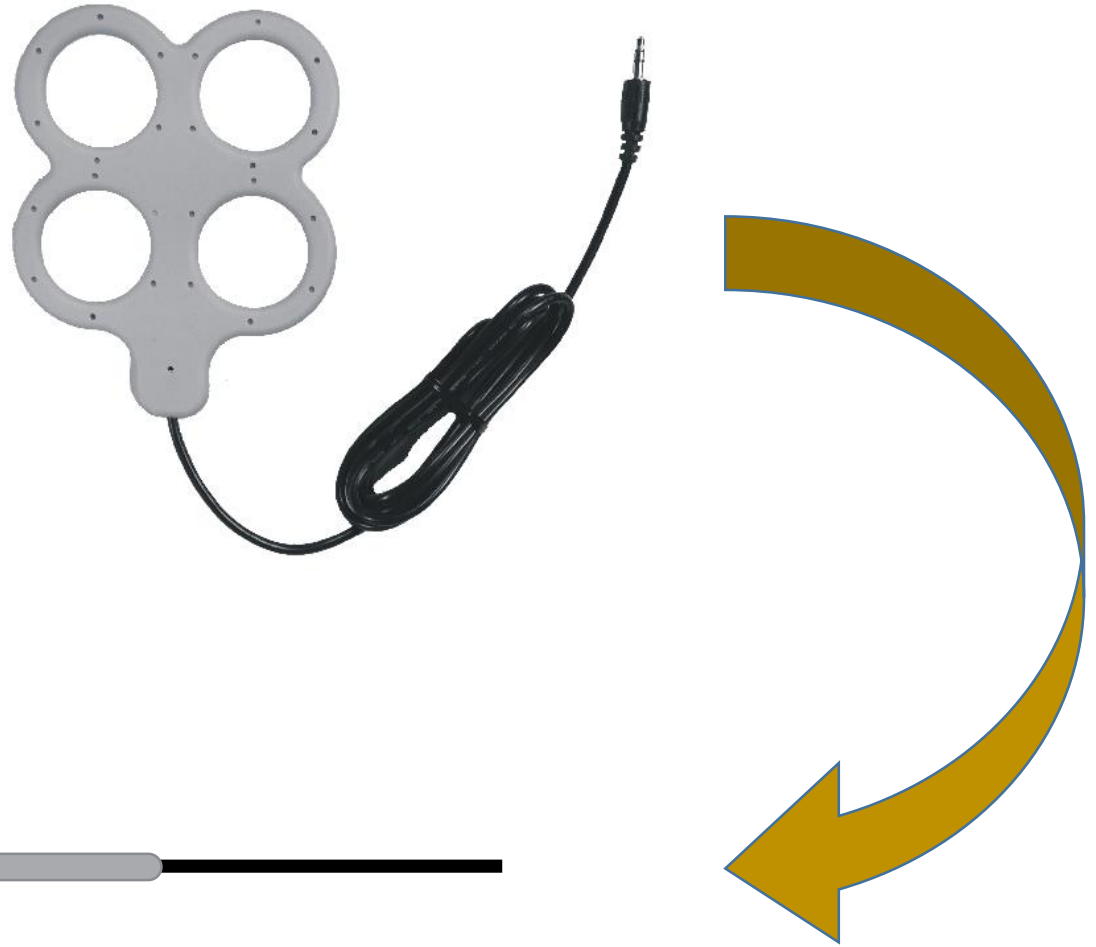
Feline Kidney Disease reversed by ICES

- Renal failure is the #1 cause of death in older cats
- The cat in this study was ~10 years old and unresponsive to other treatments
- Creatinine only dropped with ICES treatment. Without ICES, creatinine continued to rise out of control



ICES Treatment for Small Pets

Just slip the 2x2 coil array under the bedding of a small cat or dog while they sleep at low-medium power all night



Closure of Critical Defects

- Can be studied in small animals using the MCP48 small animal cage ICES platform
- Can be studied in large animals using the Model B5 or other portable ICES systems:

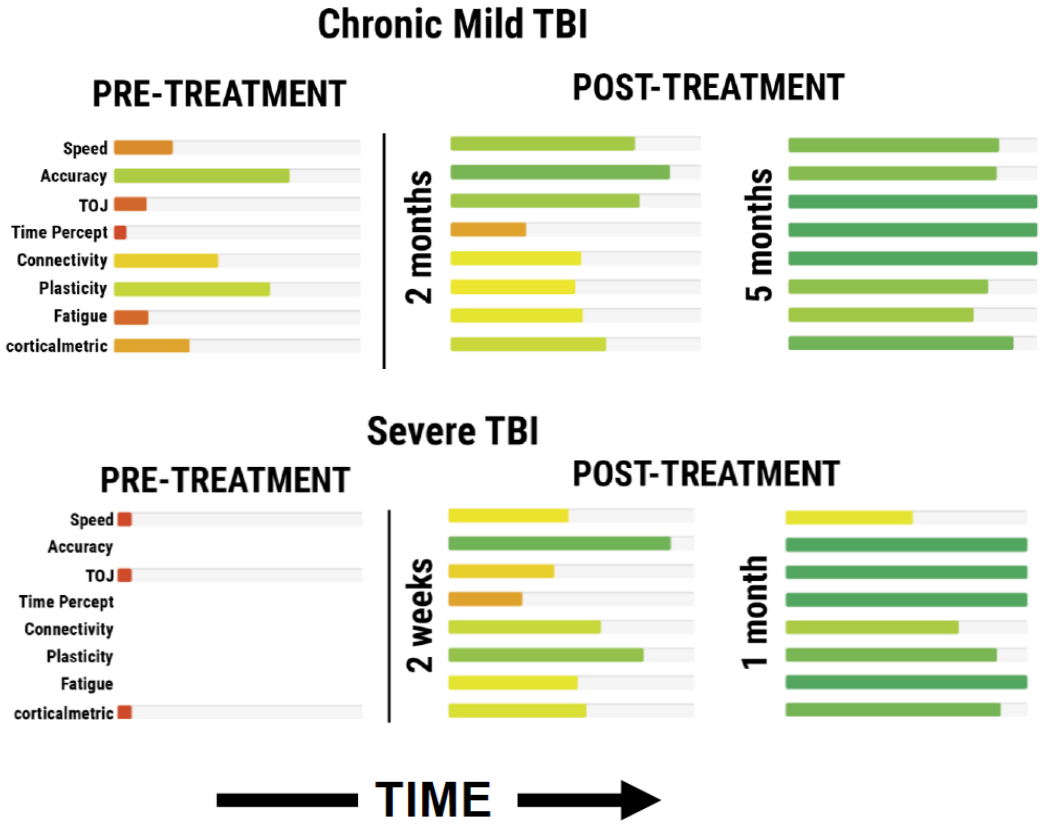
  horses

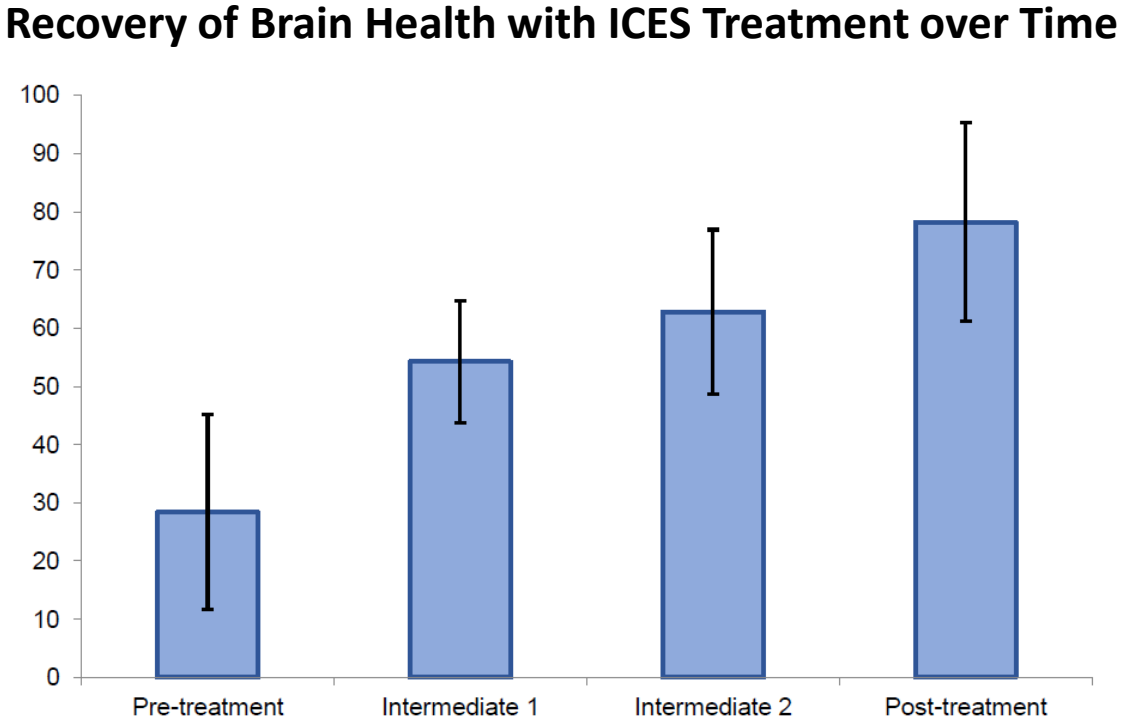
  large dogs

  pigs, sheep

  humans

CLINICAL PILOT STUDY: TBI/CONCUSSION





The full data set from this Cortical Metrics / Micro-Pulse TBI pilot study can be viewed from the PDF version of this presentation here or on our web page.

Micro-Pulse

Enabling Science

For technical questions and scientific support
contact: Dr. Robert Dennis mzd@micro-pulse.com