

# Micro-Pulse LLC Newsletter

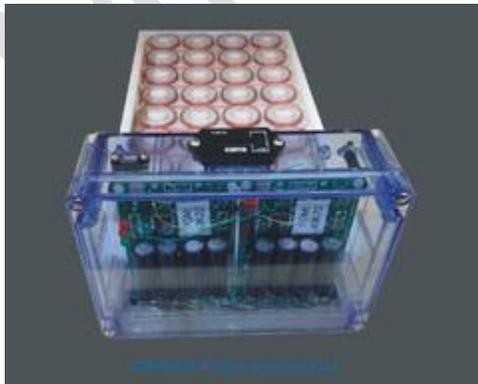
From the cluttered desk of Bob Dennis at Micro-Pulse LLC

28 April 2017

This Newsletter contains the following sections:

- 1- Scientific Status Report
- 2- Scientific Plans
- 3- New Micro-Pulse ICES products released this week: B5, MCP48, and 2x2 coil array

**A pre-view of our new Micro-Pulse ICES products:**



## SCIENTIFIC STATUS REPORT

In the past year we have been conducting studies and collecting data from users of ICES technology. Three of these are summarized below: TBI/Concussion, Feline Kidney Disease, and Inflammatory Signaling

### **TBI/concussion study.**

We have been working with several clinicians to study the effects of ICES-PEMF on human brain injury. The most advanced pilot study to date is the one we have been conducting with Dr. William Pawluk, M.D., in Baltimore.

In this study, we enrolled 8 individuals with various levels of TBI/concussion, ranging from chronic/mild to severe TBI. Before applying ICES-PEMF we assessed brain cortex function using the [Cortical Metrics BrainGauge technology](#), then assessed function again twice during the course of the study while ICES-PEMF was being used. The [BrainGauge uses somatosensory testing](#) to quantify the function and interconnectivity of the cortex of the brain. This approach is far more sensitive than imaging or behavioral testing. The [BrainGauge has won several grants and awards](#), including support from the US Navy and the GE/NFL Head Health Challenge. Many [peer-reviewed scientific papers](#) have been published based on Cortical Metrics and BrainGauge technology.

A current [summary and results of our BrainGauge/Micro-Pulse ICES TBI pilot study](#) have been posted on the Cortical Metrics web site. The [ICES protocol in use in this pilot study is available from this link](#).

For the ICES-PEMF intervention in this study, we used a modified ICES model A9a, with only the first mode (5 pps) active. These are designated "10 Hz ONLY", but they generate 5 pulses per second of alternating bipolar ICES pulses. The reason for the use of the 10 Hz designation is based on the induced E-field both at the leading-edge and the trailing-edge of each ICES trapezoidal pulse, thus  $5 \times 2 = 10$ . The 10 Hz reference is to the induced E-field in the tissues, not the pulse rate from the ICES A9 system.

While an ICES model A9 can be modified with special firmware to deliver this constant 5 pps, the new model B5 ICES (see below) can be easily set by the user to deliver an identical 5 pps, or many other selectable pulse rates or pre-set ICES protocols.

**Disclosure:** *Bob Dennis is the inventor of Micro-Pulse ICES technology and the co-inventor of Cortical Metrics BrainGauge technology, and has a financial interest in both companies and both products. Dr. Dennis was not involved in the collection or analysis of data from this pilot study. Please consider these facts when assessing the potential for scientific bias and professional/personal conflicts of interest.*

## **FELINE KIDNEY DISEASE:**

Several reports from veterinarians and cat owners suggest that ICES is very beneficial for feline kidney disease. In one case this clinical report was accompanied by enough data to show a very [interesting graph](#).

The graph shows the kidney function of a 10-year-old cat with progressive kidney disease. On the graph, the lab test results (creatinine level) are shown at each veterinary clinic visit date with a blue dot. On the horizontal axis, the thick GREEN lines show the range of dates when ICES was applied to the cat while it was sleeping (ICES coils were placed under its bedding). The thick RED line shows the dates when ICES was NOT used.

This data shows how, for this one cat, the creatinine level started very high, in the range considered clinically dangerous. The cat had been unresponsive to other treatments. After several months with ICES, the creatinine levels fell back to the normal range. Then, when ICES was temporarily discontinued, the creatinine levels began to climb back toward the dangerous range again. Finally, when ICES treatment was resumed, the creatinine levels returned to normal once again. Throughout this series of tests the diet and lifestyle of the cat was not altered. The only treatment during this time was the application of ICES for two periods of several months each, between which ICES was not used. This compellingly suggests that the feline kidney disease in this case was greatly reduced by the use of ICES.

We have an interest in expanding this into a full study to understand the clinical value of ICES in the treatment of feline kidney disease. If you are interested please contact us or have your veterinarian contact us: [mzd@micro-pulse.com](mailto:mzd@micro-pulse.com)

## **INFLAMMATORY SIGNALING (DIABETIC MICE):**

For about the past 6 months we have been collaborating with immunologists at UNC to conduct controlled scientific studies on laboratory mice known as NOD (non-obese diabetic) mice. This type of mouse, and several transgenic variants of the NOD type, are a mainstay of diabetes research.

In these studies we use the new [Micro-Pulse ICES MCP48 platform](#), which we discuss in more detail later in this letter.

The study involves subjecting the mice to continuous ICES stimulation from the bottom of their cage while they age to adulthood. NOD mice will typically develop type-1 diabetes over a several month period, beginning when they are very young, similar to the development of type-1 diabetes in humans (childhood diabetes). The diabetic status of the mice, as well as a panel of inflammatory signal molecules, was monitored to track the progression of the disease and the underlying biochemical messaging.

The study is still in the pilot phase, but the results are very interesting, including the observation that the mice had very large changes in several pro-inflammatory cytokines. This was accompanied by alterations in the mouse phenotype during development. These experiments are planned to continue throughout 2017 and 2018.

## Scientific Plans for 2017 - 2018

### Diabetes and inflammatory signaling

We are continuing the diabetic mouse studies through 2017 and 2018 to elucidate the biomolecular signaling mechanisms of ICES-PEMF. We hope to learn the following:

Which molecular signals are modulated by ICES?

Is it a linear dose-response, sigmoidal, threshold, all-or-none, or biphasic/hormesis response?

Do different ICES protocols change the type of the molecular signal, or change the modulation?

Can specific pathways be differentially influenced?

Where in the signaling pathway does ICES exert influence:

gene expression

signal origination

messaging

amplification

within a feedback loop?

What are the likely locations/mechanisms of the biophysical transduction of the ICES signal?

We are also seeking wider collaborations to help elucidate the molecular signaling and biophysics of ICES-PEMF.

### TBI/concussion

We will continue to enroll subjects in our ongoing pilot studies. We also plan to offer kits of the BrainGauge bundled with the A9 or B5 at attractive pricing for any individual or clinician who wishes to take part in an expanded study of TBI/concussion using both technologies. We have a vision for a future in which people are free to engage in crowd-sourced scientific research in health and medicine, and this is one major step in that direction. Contact us for more information:

<https://www.corticalmetrics.com/contact>

We also plan to expand these studies to incorporate special new ICES protocols optimized for maximum benefit for brain health and recovery from brain injury. This will involve the development and testing of new ICES coil array configurations and the development of new firmware for use on the Model B5 scientific system to deliver novel stimulus patterns that are sequenced in time and space around the head.

## **Cardiovascular, cardioprotection, and reperfusion injury**

We have established a close collaboration with the Texas Heart Institute (THI) in Houston, TX to study the cardio protective effects of ICES. We are currently at the stage of getting institutional approvals for animal research, and we expect these studies to become a large part of our research portfolio in 2017-2018.

The theory behind this is that most of the injury done to tissues when they have had a temporary loss of circulation, such as a heart attack, is due to a phenomenon called [reperfusion injury](#). If the blood supply has been cut off for too long, when the circulation is restored the result can be inflammation and oxidative stress. This is one reason why freeing a person who has been trapped with a limb pinned and circulation cut-off for more than about an hour, such as in a building collapse or car accident, can be very dangerous and should only be done by trained professionals. Any tissue, not just the heart muscle, can be seriously damaged if circulation is abruptly restored after a period of lost circulation.

Our working hypothesis is that ICES can partly suppress the reperfusion inflammatory response, thus reducing the damage to tissues from reperfusion injury. In the case of cardioprotection after a heart attack, even a small improvement in the ability to protect the heart muscle after a heart attack can lead to very large differences in the person's ability to recover and regain normal every-day function.

## **Feline Kidney disease**

We are seeking cat owners and veterinarians to participate in a large, long-term publicly accessible study on the effects of ICES-PEMF in the control of age-related feline kidney disease. This study will be conducted in the style of crowd-sourced research. Instructions will be provided to each participant for the use of devices and the collection and reporting of data. We believe that crowd-sourced science will greatly improve the rate, quality and relevance of medical research in the near future, and we want you to have access to this new process as it emerges. If you are a veterinarian or a cat owner with an interest in participating, please contact us at [mzd@micro-pulse.com](mailto:mzd@micro-pulse.com)

## **Pathological scarring**

We are in the early stages of development of a research program with plastic surgeons at U-Michigan and UCLA to study the effects of ICES-PEMF in pathological scarring and the control of scar formation. We plan to expand this research to address issues of incisional herniation, abdominal fistulas, and other difficult-to-treat conditions of improper wound healing of the skin and underlying tissues.

We are considering opening this up as a crowd-sourced research project as well for abdominal fistula treatment. If you or someone you know has an interest in this please contact us at: [mzd@micro-pulse.com](mailto:mzd@micro-pulse.com)

## New Products

We have recently released three new Micro-Pulse ICES products:

- [The new 2x2 coil array](#)
- [The model B5 ICES personal scientific system](#)
- [The Model MCP48 Scientific Research Platform](#)

### **2x2 Coil Array**

The [new 2x2 coil array](#) allows quick and easy placement of an ICES coil array on the surface of the body or under the bedding of a small pet such as a cat or dog.

Both sides of the array are identical, so you don't need to keep track of which side to use.

With the model B5 ices system (below) you can stack up to 4 of these 2x2 arrays for maximum penetration, or you can arrange the 2x2 arrays into larger mats for applying ICES to larger areas.



### **B5 - Personal PEMF Science**

The new [Model B5 Advanced ICES system](#) is now available. The B5 is intended as a scientific instrument for the advanced Micro-Pulse ICES user, for researchers, and for very serious self-hackers. This system has been developed to enable the research and development of the next phase of ICES technology (gen 7.0). It is a complex, very flexible system intended for use by people who have experience with ICES technology. We believe this is the most sophisticated and flexible PEMF-type device ever brought to market. As scientific instruments go, the B5 is extraordinarily affordable and portable. The B5 system is intended for serious experimenters, so please be sure to watch the videos on YouTube (search ICES model B5) or on the [ICES model B5 product web page](#), or at the links below. We plan to update and expand these video tutorials and other documentation for the model B5 over the next year.



## ICES model B5 documents and videos:

**Introducing the Model B5: Micro-Pulse Gen 6.0 ICES PEMF:** [Video](#) [PDF](#)

**ICES Model B5 - Basic Setup Instructions:** [Video](#) [PDF](#)

**Philosophy of the design of Model B5:** [Video](#) [PDF](#)

**A9 and B5 Comparison:** [Video](#) [PDF](#)

**Quick Start:** [Video](#) [PDF](#)

**Model B5 User Manual:** [PDF](#)

### Brief description of the ICES model B5:

The model B5 has 8 different protocols, each of which is adjustable by the user. It is possible to set trillions of different protocols on the B5, but they all use the proven ICES pulse with reliable biological effects. The user can choose from over 100 different pulse rates, ranging from 0.5 to 300 pulses per second. There are 5 standard adjustable protocols based on previous and current ICES technology, so your B5 can perform exactly like your trusty old P2, A9, AllevaWave, or any other legacy ICES device. Or you can choose a new standard protocol such as the Omni-1, Schumann, or B5 protocol. Or you can choose a single pulse frequency, or you can choose a range of frequencies and a wave ramp time, to simulate a range of pulse frequencies, such as alpha- or delta-waves.

The model B5 has 4 independently-powered ICES output ports, so it can simultaneously send full-power pulses to 4 sets of coils, or 4 sets of the new 2x2 coil array or any combination up to four coils/arrays.

The model B5 also has 16 intensity levels (compared to only 4 on the model A9). The model B5 generates the same output power on each of its four channels as the model A9, but all 4 channels are independent, and the B5 has much finer control over the intensity. At its simplest level, the model B5 is equivalent to four separate model A9 systems, but with a lot more flexibility and control and the option to use or to create many different pulse protocols.

Since the four ICES output channels on the B5 are independently powered, the coils or arrays can be stacked to generate more penetration, or they can be arranged into larger coil arrays and mats.

Each model B5 is built-to-order. They are not mass produced.

For current ICES model A9 owners, please contact us for very significant discounts on the purchase price of a new model B5: [mzd@micro-pulse.com](mailto:mzd@micro-pulse.com)

## **MCP48 - Professional, calibrated scientific ICES-PEMF research platforms**

The MCP48 is intended for use in approved research facilities, for experiments on mice and rats. The system is placed below and outside of standard animal cages. It is calibrated, durable, easy to keep clean, and has reliable biological effects so it vastly reduces the number of animals necessary for the advancement of science.

The model B5 system architecture is based directly upon the Model MCP48 ICES Scientific Research Platform, so the scientific results are compatible and the ICES protocols can be exactly the same on both technology platforms. The MCP48 is the device that we are using for the scientific study of the molecular signaling of ICES (the diabetic mice, as discussed above). The MCP48 is only for scientific use in approved research facilities.

You can find out more about the MCP48 on our [product page](#).

The B5 and the MCP48 use identical electronic hardware and firmware, they are just built into in a different outer package, so the scientific results from ongoing scientific studies using the MCP48 can be used immediately in the B5, and vice versa. The B5 is also currently in use in approved human clinical studies, so the scientific protocols being used are incorporated into the model B5 firmware. If you own a model B5, you can keep right up with the most current science as it emerges.

