



Review Article

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# Cardio Stress, Cartilage, HSP70, and Memory Improvement with PEMF

Thomas F Valone, PhD, PE\*

Integrity Research Institute, USA

\*Corresponding author: Thomas F Valone, PhD, PE, Integrity Research Institute, 5020 Sunnyside Avenue Suite 209, Beltsville, Maryland 20705, USA.

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## Abstract

Specified features of NASA research find a home in a commercial biomagnetic device, providing tissue repair, cardio protection, and cartilage regeneration. In addition, by activating the Heat Shock Protein (HSP 70) locally, it has been shown to provide rapid pain relief from inflammation caused by impact trauma, tissue injuries, organ malfunction, some diseases, and occasionally, even some chronic conditions, all noninvasively.

## Introduction

Some have proposed that future widespread use of energy medicine will save health care [1]. An electrotherapeutic product called the EM Pulser Model 78 is a portable, battery-powered Pulsed Electromagnetic Field (PEMF) therapy device designed to relieve pain, accelerate healing, and support cardiovascular health. It delivers low-frequency magnetic pulses at the Earth's natural Schumann frequency of 7.8 Hz, a rate clinically validated by NASA

scientists for its ability to promote tissue repair [2] and cartilage regeneration [3].

The EM Pulser 78 from Integrity Research Institute (IRI), designed by Glen Gordon, a medical doctor following a four-year NASA PEMF Study [4], activates the heat shock protein (HSP 70) within just 10 minutes, offering a targeted, non-invasive approach to reducing, and if used quickly, completely stopping the inflammatory response and speeding recovery (Figure 1).



Figure 1

## Heat Shock Protein (HSP70) is a Natural Life-saver

Heat Shock Protein is a vital protein cited by Glen Gordon, MD as being drawn to an area of the body activated by nanosecond

pulse rise time PEMF, as found in the four-year NASA Study noted previously. It is amazing in that HSP seems to have

intelligent intervention capability that overrides less desirable response functions of the human body, especially in arresting the



inflammation that immediately accompanies trauma in any form. It originally was identified by its ability to protect cells in the case of rapidly increasing heat exposure. For example, one source emphasized, "Animals with higher heat-shock protein levels can thrive in triple-digit temperatures." Furthermore, we find that "HSP70 proteins can act to protect cells from thermal or oxidative stress." Oxidative stress is a fancy way of describing free radical damage. And free radicals are formed daily in the body, from a wide range of sources, including chlorinated municipal tap water flowing directly onto the warm naked human skin in a shower without a good shower filter that removes chlorine, since chlorine dissociates at body temperature into monochlorine radicals, each of which replicate other free radicals about 10,000 times [5]. HSP70 is also regarded as a "chaperone" protein, which also helps protect against "stress-induced apoptosis" which is self-destructive cell death [6].

Members of the HSP70 family are very strongly upregulated by heat stress and toxic chemicals where upregulate means to support, catalyze, and encourage biophysically and biochemically. HSP70 also aids in transmembrane transport of proteins. HSP70 seems to be able to participate in disposal of damaged or defective proteins. Finally, in addition to improving overall protein integrity, HSP70

directly inhibits apoptosis, revitalizing cells.

One recommended reference paperback is the Malyshev book pictured here on the effect of HSP70 on tumors and immunity. Other references listed in the Bibliography include an article on inhibiting motor and sensory neuron degeneration (which means that stimulating HSP70 to a site may reverse nerve damage perhaps [7]. Another one talks about preventing skeletal muscle atrophy, which we all need as we get older [8]. A third citation indicates how HSP70 can have beneficial effects on Parkinson disease, Alzheimer's, cerebral ischemic injury, and even in the immune response to multiple sclerosis [9]. One more interestingly offers protection against Tumor Necrosis Factor (TNF) which can be lethal. The authors used heat shock (HS) to attract HSP70 to the organ being tested for the antitumor protocol [10].

Hopefully, this information will help the reader appreciate the wide range of HSP70 effects and benefits. In addition, the subsequent articles by Dr. Gordon in this manual shows that HSP70 may also be stimulated and attracted toward a particular site in the body to benefit and repair cellular tissues, primarily in that area targeted by nanosecond rise time PEMF (Figure 2).

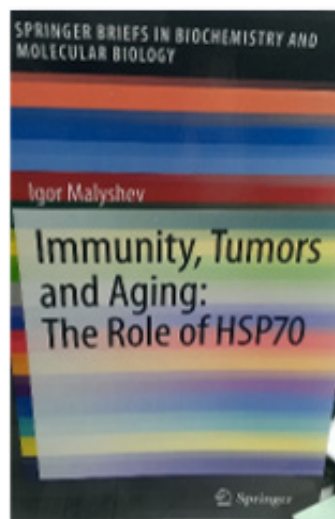


Figure 2

## Summary of Heat Shock Proteins' Health Benefits

1. Heat Shock Proteins Act as Chaperones
2. HSPs Prevent Cell Death
3. HSPs Play a Role in Immune Response
4. HSPs Make Sure Steroid Hormone Receptors Function
5. HSPs Protect the Heart
6. Heat Shock Proteins May Help Prevent Diabetes [11]

## Foods and Supplements That Increase HSP70

- Broccoli sprouts/Sulforaphane [12]
- Extra Virgin Olive Oil [13]
- Zinc [14]
- Curcumin [15]
- Resveratrol [16]
- Blueberry [17]

- Graviola [18]
- Lavender Essential Oil [19]

## Bio-Magnetic Pulsed Therapy has Multiple Benefits, Recently Discovered

Magnetic field therapy is not just a futuristic concept—it's

a proven method for reducing pain and promoting healing at a cellular level," said a company spokesperson, Dr. Jacqueline Panting, who is a naturopath. She further explained, "The EM Pulser Model 78 brings this technology to anyone looking for a safe, non-invasive way to manage pain and recover from injuries. It is used by our client physicians even in the ER (Figure 3).

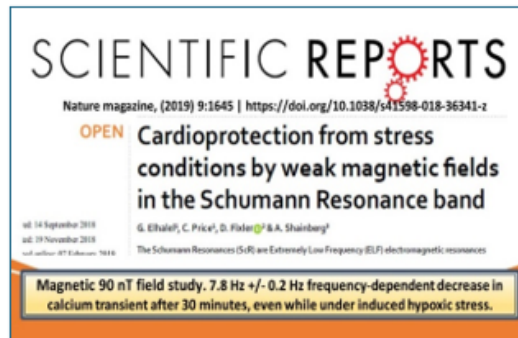


Figure 3

Designed for convenience, the device weighs just two ounces and features a rechargeable lithium-ion battery. The EM Pulser also has an AC recharger, a soft blue rubber boot including a belt loop used with the free double-sided Velcro strap, and a magnetic compass to confirm the strength and oscillation of the pulsed magnetic field. Research about the EM Pulser Model 78 has previously been introduced by this author [20].

The EM Pulser Model 78 can be used to treat a range of conditions, including sprains, fractures, back pain, sciatica, post-surgical healing, migraines, and gynecologic pain. It also offers cardioprotective benefits by matching the earth's Schumann Resonance frequency of 7.8 Hz, as shown in a 2019 study published in Nature Scientific Reports [21].

The Schumann resonances (or frequencies) are nearly standing electromagnetic waves that exist in the cavity (or space) between the Earth's surface and the ionosphere. In 1952, German physicist Professor Winfried Otto Schumann of the Technical University of Munich started exploring whether the Earth itself has a frequency – a pulse. His idea about this frequency stemmed from his understanding that when a sphere exists inside another sphere, electrical tension is created. Since the negatively charged Earth exists inside the positively charged ionosphere, there must be tension between the two, which gives the Earth a specific frequency. After a series of calculations, he deduced a frequency he believed was the pulse of the Earth-ionosphere space. Two years later, in 1954, Schumann and Herbert König reported consistent and predictable frequencies in the atmosphere that occurred in the space between the Earth's surface and the ionosphere. Although several frequencies occur between 6 and 50 cycles per second, the fundamental frequency they identified was 7.83 Hz.

For enhanced functionality, the EM Pulser device can be paired with optional accessories, such as the near-infrared red light LED probe for deep tissue penetration and improved vision for a three-minute exposure on a weekly basis [22]. The complete combination pack also includes a UV probe for disinfection, a separate magnetic coil probe, and the PulsePad for broader coverage on tender areas. These add-ons are available separately or as part of the full package for a reasonable fee.

A recent customer shared, "I love this new model 78. I just had to buy a second one, so I am never without it. It has helped me to sleep soundly, and I feel more alert. I am 78 years old and have lots of aches and pains, and this device is helping a lot. So grateful for this product, great price too." Interested parties can find additional information by visiting [www.BioenergyDevice.org](http://www.BioenergyDevice.org). The Scientific Reports article also explains the benefit (cardioprotection from stress) from using a device with the same pulsed waveform and pulse rate (7.8 Hz) as the EM Pulser (Figure 4).

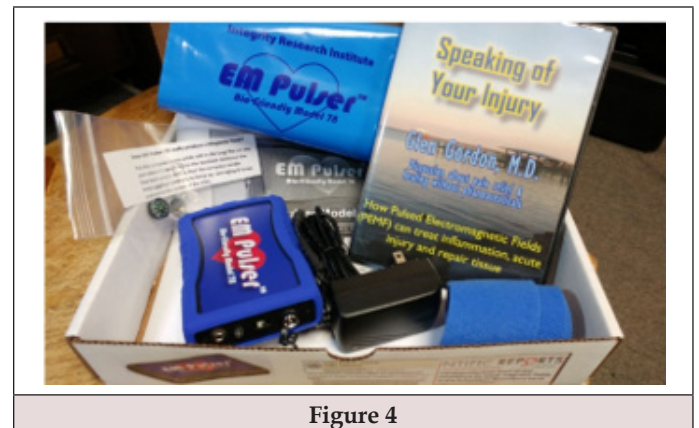


Figure 4

## NASA Confirms Cartilage Restoration with High Slew Rate PEMF

NASA has also found more benefits from Pulsed Electro Magnetic Field (PEMF) devices that have major implications for restoring health and well-being for astronauts in space. At least two of their recent patented discoveries explicitly use a 9-volt device just like the EM Pulser 78 electrotherapy PEMF device that IRI has been manufacturing and marketing to over one thousand people already. It serves as an endorsement from NASA for their studies on cartilage and tissue repair from such a product like IRI which has the same specifications such as waveform, wrap-around pad, high slew rate and pulse rate.

## NASA Technology Transfer Program

### Noninvasive Therapy for Cartilage Regeneration

A device that can alleviate cartilage degradation in synovial joints by promoting the growth of new cartilage.

Innovators at NASA Johnson Space Centre researching Time Variance Magnetic Field (TVMF) therapies have developed a Pulsed Electromagnetic Field (PEMF) device that can alleviate cartilage degradation in synovial joints by promoting the growth of new cartilage.

NASA Tech Briefs specifically highlight the “device that can alleviate cartilage degradation in synovial joints by promoting the

growth of new cartilage.” Furthermore, their conclusion is even broader for possible treatment:

Results show that variation of waveform used in PEMF therapies, independent of flux intensity, influences genetic regulation of HCH from patients with early-stage osteoarthritis. The device has potential to be used in the treatment of cartilage degenerative joint disorders in patients resulting from rheumatism, trauma, or surgery.

Scientists at IRI realized that our mentor and inventor of the EMpulse, Glen Gordon MD, obtained his original design for his PEMF device from a NASA study [23] finding that a fast rise time of the pulse stimulates the Heat Shock Protein (HSP 70) which helps heal tissue trauma quickly and also counters inflammation more effectively than icepacks or aspirin. Therefore, IRI followed his design years ago and perfected the EM Pulser 78 with a 7.8 Hertz pulse rate that Dr. *Gordon* recommended, based on the earth’s Schumann Resonance and the brain’s alpha rhythm. It also has a nanosecond rise time as well, which has satisfied over 1000 clients who use the affordable electrotherapeutic product [www.BioenergyDevice.org](http://www.BioenergyDevice.org). Since NASA found that a wrap-around pad was also helpful for joints, to stimulate new cartilage growth, IRI produced an attachment called the EM Pulse Pad (see photo) years ago, which is a 4” x 6” pad specially designed with a flexible, pancake coil to produce the same 7.8 Hz magnetic PEMF in the pad, similar to but smaller than NASA’s wrap-around pad, and can be placed under clothing (Figure 5).



Figure 5

## NASA Finds Tissue Repair is Enhanced with PEMF

NASA has also presented a patent collection for a pancake coil pad, with a square wave PEMF design and this time with additional details such as being driven by a 9 V battery that can be wrapped around an area of the body that needs healing. Released in 2023, it comes years after IRI has been selling exactly the same type of product with our EM Pulser 78 combined with a small EM PulsePad

or optionally an OsteoPad accessory pad. However, NASA has a better technical name for this invention. Therefore, people can either apply to license the NASA invention or visit the IRI dedicated webpage [www.BioenergyDevice.org](http://www.BioenergyDevice.org) and try one for themselves today, with a 30-day return policy, which also includes the other NASA-discovered benefit of cartilage regeneration and HSP70 stimulation. A snapshot of NASA’s promotion through its Tech Briefs is also shown here [2] (Figure 6).



Figure 6


### Memory Improvement Research with PEMF Offers Sustained Results

Grover, et al. reported in Nature Neuroscience that a theta


modulation frequency of 4 Hz was utilized for stimulating and improving working memory (WM), which is the first subharmonic of the EM Pulser fundamental of 8 Hz [24] (Figure 7).

**Our EM Pulser 78 improves memory with long lasting effects**

[Nature Neuroscience](#) (August 2022) reports “repetitive (4-day) transcranial alternating current stimulation (tACS) protocols for the selective, sustainable enhancement of auditory-verbal working memory and long-term memory in 65–88-year-old people.”



**Experiment #1**, IRI reproduced the protocol shown on the monitor (from Nature, Aug. 2022) with the EM Pulser for working memory improvement. Our **EM PULSER** does this for you! For us seniors, this is good news, with “preferentially improved long-term memory on days 2–4 and 1 month after intervention.” So with my Sherlock Holmes hat on, I decided to investigate what neuromodulation of “synchronous low frequency” the Boston University scientists were using. Their focus was simple: (1) **Working Memory (WM)** for brief information storage and (2) **Long Term Memory (LTM)** for sustained maintenance of information. They did stimulate for 20 minutes, four days in a row, and tested for a month afterward. The findings are remarkable and reproducible with the **IRI EM Pulser 78**, which has a 7.8 Hz Schumann Resonance pulse rate. See complete article online at <https://doi.org/10.1038/s41593-022-01132-3>. The first protocol used by the scientists was to electrode the left side of the skull (IPL), focusing on the spot above the ear with a theta brainwave 4 Hz pulse rate to stimulate WM. Many of us know that many electrode(s) to the body experiment has often resulted in noninvasive improvements with magnetic pulsing instead (which causes internal electric currents by Faraday’s Law). The bone healing research of Drs. Bassett, Pilla, and Becker are the prime example that I always cite as medical doctors who preferred the noninvasive magnetic coil pulsing over electrodes. Therefore, also knowing that 8 Hz is the first harmonic of 4 Hz, we can scientifically and confidently apply our EM Pulser 78 to the same spot on the skull for 20 minutes per day, four days in a row, to get very similar results. See the EM Pulser 78 on the left side of my head with the supplied Velcro headband.



**Experiment #2**, IRI reproduced an equivalent setup with the EM Pulser 78 for Long Term Memory (LTM) improvement. The second protocol at Boston University was to electrode the left front of the forehead focusing on the spot above the left eye with a 60 Hz pulse rate for LTM. Here, a little research reveals that the gamma brainwaves vary a lot more and average about 40 Hz, which is the fifth harmonic of 8 Hz, so the application of an 8 Hz magnetic pulse on the left forehead may approximate the more involved electrode placement over the forehead and skull. This is accomplished with the EM Pulser 78 placed on the left forehead above the eye with the same Velcro strap.

For those who already have the EM Pulser 78 you are invited to let us know if this additional use for improving memory helped you.

Figure 7

## Conclusion - Open Access Journal Articles Supporting the EM Pulser 7.8 Hz Design

This examination of the recently discovered health benefits of fast rise time pulsed electromagnetic fields would not be complete without a literature review as well. The amazing and attractive features of electromedicine are the complete lack of side effects or contraindications, with the exception of the usual warning concerning anyone with a pacemaker, which normally has a sensitive electronic circuit.

- Cardioprotection from stress conditions by weak magnetic fields in the Schumann Resonance band Nature Scientific Reports, (2019) 9:1645

“We show that applying 7.8Hz, 90nT magnetic fields (MF) causes a gradual decrease in the spontaneous calcium transients’ amplitude.... However, the effect is frequency dependent; the described changes occurred only in the 7.6–8Hz range...We show that the Schumann Resonance field-induced reduction in Creatine Kinase release is associated with a stress response process and has a protective character.”

- Long-Term Study of Heart Rate Variability Responses to Changes in the Solar and Geomagnetic Environment

Nature Scientific Reports, (2018) 8:2663

“Overall, the study confirms that daily Autonomic Nervous System activity responds to changes in geomagnetic and solar activity during periods of normal undisturbed activity and it is initiated at different times after the changes in the various environmental factors and persist over varying time periods.... Increase in cosmic rays, solar radio flux, and Schumann resonance power was all associated with increased HRV and parasympathetic activity”

- Does Schumann resonance affect our blood pressure?

Biomedicine & Pharmacotherapy, Volume 59, Supplement 1, October 2005, Pages S10-S14

“Disease-Related Illnesses [were] negatively associated with Blood Pressure Reactivity to Schumann Resonance (BPR-SR)... suggesting a better health status for those who showed lower BP on enhanced SR days. Males showed higher BPR-SR...than females (P=0.004–0.016).”

- Does exposure to extremely low-frequency magnetic fields produce functional changes in human brain?

Basic Neurosciences, Genetics and Immunology, Feb. 3, 2009

“Behavioral and neurophysiological changes have been reported after exposure to extremely low frequency magnetic fields (ELF-MF) both in animals and in humans... The increase in paired-pulse facilitation...suggests that PEMFs exposure may produce an enhancement in cortical excitatory neurotransmission. This study

suggests that PEMFs may produce functional changes in human brain.”

- Electromagnetic Forces and Life Processes

Technology Review, December 1972, Robert O. Becker (author of The Body Electric)

“The concept that electromagnetic forces might have any effect upon living organisms-other than the thermal effect due to Joule heating was for many years rejected by the organized biomedical community. But under the weight of experimental evidence this attitude is changing; indeed, the medical community is now expressing considerable interest in the possible therapeutic effects of direct application of small amounts of electrical energy.”

- Long-lasting, dissociable improvements in working memory and long-term memory in older adults with repetitive neuromodulation

Nature Neuroscience | VOL 25 | September 2022 | 1237–1246 | [www.nature.com/natureneuroscience](http://www.nature.com/natureneuroscience)

“The development of technologies to protect or enhance memory in older people is an enduring goal of translational medicine. Here we describe repetitive (4-day) transcranial alternating current stimulation (tACS) protocols for the selective, sustainable enhancement of auditory–verbal working memory and long-term memory in 65–88-year-old people.”

- Magnetic Therapy Alzheimer’s Pulsed Electromagnetic Field Therapy PEMF Bibliography

Magnetic Field Enhancement, Transcranial Magnetic Stimulation, 8/14/2019, p. 1-16

<https://earthpulse.net/magnetic-therapy-alzheimers/>

## Acknowledgement

None.

## Conflict of Interest

None.

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