PILOT HUMAN STUDY WITH THE ARK CRYSTAL

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Essential Results from a Pilot Human Clinical Study of the Efficacy of Electromagnetically Modulated Precision Geometric Quartz in Improving Key Physiologic Parameters of Cellular and Whole Systems Health

Abstract

A pilot human placebo controlled clinical study examined the efficacy of electromagnetically modulated precision geometry quartz (PGQ_{MEM}) to improve several physiologic outcome measures in 10 healthy subjects that were evaluated at 0, 21 and 42 day time points (baseline, after wearing the placebo, control and PGQ_{MEM} pendants) for 3 weeks each. The measures were: Heart Rate Variability (HRV) data, assessments derived from HRV data, a cognition test, hydration levels, phase angle and quality of sleep. Results demonstrate that wearing the PGQ_{MEM} Pendant for 21 days significantly increases several of the HRV and cognition measures. A slight Placebo effect was observed between the control and the PGQ_{MEM} group. However, the PGQ_{MEM} tests outperforms the placebo in nearly every experimental parameter where the placebo produced positive effects.

Five males and five females ranging in age from 31-69, were subjects in this study. Institutional Review Board approval was obtained by the Institute of Regenerative and Cellular Medicine (ICRM, https://ircm.org).

Summary of results

- A significant increase in processing speed was detected in the PGQ_{MEM} intervention group, while no change in the Placebo group was detected.
    - Processing speed increased by **9.8%** over baseline in the PGQ_{MEM}

- Significant increases in psychomotor speed were detected in both the Placebo and PGQ_{MEM} group.
    - Psychomotor speed increased by **15.2%** over baseline the PGQ_{MEM} test group

- Significant increases in Psychoemtional State (PES), a measurement of the capacity of the brain / body to handle stress.
    - PGQ_{MEM} test group had a **19.6%** increase in PES

- Significant increases in Vegetative Regulation Index (VRI), an assessment of overall autonomic nervous system balance and function was measured in the PGQ_{MEM} group
    - VRI increased by **15.8%** over baseline in the PGQ_{MEM} group

- Significant increases in Neurohormonal Regulation Index, how well the brain is communicating with the body via the neurohormones (NHI), Self-reported Energy

Levels (SREL) and Vitality Index (a measure of overall cellular vitality) were detected in the PGQ MEM intervention arm while no changes were detected in the Placebo arm.
    - **18.5%** increase in NHI
    - **46.4%** increase in SREL and Vitality Index
- A significant increase in the phase-angle was detected in the Placebo arm while no change was detected in the PGQ MEM intervention.
    - The PGQMEM intervention group had a mean increase in the Phase angle of 0.4°, bringing the phase angle much closer to the optimal level of 4.6°: indicating significant improvement in cellular function.

Results demonstrate that the PGQ MEM significantly increased five of the HRV measures (Total Power, Vegetative Regulation Index, Neurohormonal Regulation Index, Psychoemotional State and Vitality, with a trend Executive Functioning. For the cognition tests, the PGQ MEM significantly improved Psychomotor Speed, Processing Speed, with a trend towards significance for Composite Memory. The statistical significance for PES coincides with the subjects reported increased ability to deal with stress.

Conclusions

The results of this pilot study demonstrate that the PGQMEM produced a significant improvement in several of the assessed HRV and cognition measures. While placebo testing showed a slight increase over baseline, when the PGG placebo produced an effect, the PGQMEM outperformed the PGG placebo. A larger population of subjects is recommended to establish the effects on the addressed values. Finally, it is likely that the PGQMEM will produce greater or sustained effects when worn for longer periods.

Pilot Human Clinical Study of the Efficacy of Electromagnetically Modulated Precision Geometric Quartz in Improving Physiologic Parameters Extrapolated from Heart Rate Variability Data, Cognition, Hydration, Phase Angle and Quality of Sleep in Ten Healthy Subjects

October 21, 2019

Submitted by **Energy Medicine Research Institute**, Lisa Tully, PhD, founder

Abstract

A pilot human placebo controlled clinical study examined the efficacy of electromagnetically modulated precision geometry quartz (PGQ_{MEM}) to improve several physiologic outcome measures in 10 healthy subjects that were evaluated at 0, 21 and 42 day time points (baseline, after wearing the placebo, control and PGQ_{MEM} pendants) for 3 weeks each. The measures were: Heart Rate Variability (HRV) data, assessments derived from HRV data, a cognition test, hydration levels, phase angle and quality of sleep. Results demonstrate that wearing the PGQ_{MEM} Pendant for 21 days significantly increases several of the HRV and cognition measures. A slight Placebo effect was observed between the control and the PGQ_{MEM} group. However, the PGQ_{MEM} tests outperforms the placebo in nearly every experimental parameter where the placebo produced positive effects.

Introduction

Results are presented here that evaluate effects of the PGQ_{MEM} Pendant (https://arkcrystals.com/lifestyles/science/) in 10 healthy humans. Testing has been performed with PGQ treated with a circularly modulated electromagnetic (MEM) field producing dynamically interactive quartz referred to as precision geometric quartz modulated electromagnetically (PGQ_{MEM}). With the MEM of a harmonic resonator the PGQ_{MEM} has been specifically engineered to form resonant interactions based on fundamental physical constants—such as the Planck-to-Proton scale ratio—to induce

coupling with the quantum vacuum (QV) Planck-scale structure. By generating an EM-induced micro-gravitational gradient, QV energy that is normally canceled out from particle-to-antiparticle interactions can instead be transferred to the $PGQ_{MEM,}$ for instance in the form of QV phonon flux along the electromechanical axis of the quartz. Previous testing with PGQ_{MEM} have shown that there is a continuous electromagnetic emission generated from the QV phonon flux. Testing with plants has shown that the photon emissions from the PGQ_{MEM} have a beneficial interaction with the biological system, as all markers of health and vitality were shown to improve in PGQ_{MEM} test groups as compared to controls with no PGQ_{MEM} and controls where the photon emission from the PGQ_{MEM} have been blocked with a mu-metal EM-shield. To further characterize these beneficial effects on the biological system, a human placebo controlled clinical study has been performed with the PGQ_{MEM} outfitted with a wearable pendant for human participants.

Empirical investigations have demonstrated the high efficacy of this resonance-based technology: PGQ_{MEM} have been shown to have significant effects on water structuring, increasing system coherence and optimizing biology for growth and vitality (1,2). Experiments with radish test groups that were given water exposed to PGQ_{MEM} demonstrated statistically significant improvements, a more than 200% increased growth, as compared to controls in outcome measures including increased seed and fruit production, and stalk lengths (2). Other proposed parameters that may be affected are vitality, resiliency to adverse conditions, including increased pathogen resistance.

Based on the remarkable results that have been obtained after watering different plants with water that has been treated with the PGQ_{MEM} technology, we investigated the effect of this technology on humans. Two single blind placebo-controlled pilot studies were conducted to assess the effects of the PGQ_{MEM} Pendant on human physiologic parameters related to health and fitness.

The first study utilized athletic tests for flexibility, balance, strength and endurance. Results demonstrated that the PGQ_{MEM} significantly improved performance above baseline in every athletic test that was conducted in healthy humans after 21 days of wearing the active pendant. Furthermore, in all of the tests, the PGQ_{MEM} significantly increased athletic performance above baseline and when compared to the placebo group. Self-reported energy levels before and after the tests had a trend towards significance. The results of the second study are presented here.

We examined parameters that were derived from measures of HRV, which is the variation in time between each heartbeat. Individuals with high HRV are mentally and physically healthier than those who have low HRV, and HRV has the ability to evaluate the physiologic impact of any intervention or activity. Therefore, HRV and associated measures are a very useful m autonomic nervous system (ANS), formerly called the vegetative nervous system. The ANS regulates the physiologic processes below the level of human consciousness. It promptly reacts to the changes of internal and external environment by influencing the cardiovascular system, which determines the supply of

nutrients and oxygen and removal of waste. The two branches of the ANS are the sympathetic nervous system (SNS), which been called the fight or flight (stress) response and the parasympathetic (PNS), which has been called the rest and digest response. These two branches of the ANS control most physiological functions and the relative balance of the two can be very useful in diagnostics, for review, see (3).

Because many of the results from the previously reported plant studies are thought to occur through increased hydration of the plants, the ability of the PGQ_{MEM} to hydrate humans was investigated. Proper hydration, in particular, intracellular hydration, is essential for optimal health and this his can be measured by bio-impedance. Water loss from dehydration is associated with poor health outcomes such as disability and mortality in older people (4). The intracellular water (ICW) is the location of important cellular processes, and although it has many functions, a very important one is that it allows molecules to be transported to the different organelles inside the cell. In a healthy body, a ratio of ICW to extracellular (ECW) of 3:2 is considered ideal for optimal health and this value decreases as one ages. An addition, an increase in extracellular (ECW) has been associated with inflammation (8).

Another health-related parameter that was assessed was phase angle, an indicator of cellular health and integrity. It is becoming recognized as a global health marker in total body health assessment. People with illnesses, or those who are nutritionally deficient, exhibit low PAs. As expected, PAs also decrease with age as the body loses its capacity to repair and turn over new cells. Research in humans has shown that the relationship between phase angle and cellular health is increasing and linear (5,6,7). Many claims have been made by different individuals over the years as to the significance of phase angle (PA) measurements in a clinical setting. A prospective observational study in ICU patients shows that BIA-derived PA at ICU admission predicted 90-day mortality. Patients with a PA below 4.8° had a 3.7 times higher adjusted risk of dying (7). Essentially, a low phase angle is consistent with an inability of cells to store energy and a high phase angle is consistent with large quantities of intact cell membranes and body cell mass.

Methods

Five males and five females ranging in age from 31-69, were subjects in this study. Institutional Review Board approval was obtained by the Institute of Regenerative and Cellular Medicine (ICRM, https://ircm.org). Subjects were recruited with the following inclusion and exclusion criteria:

Inclusion Criteria:

1. Subjects who have signed a written informed consent consistent with required guidelines and meet prior to participation in the trial.
2. Subjects 25-75 years of age, any race and either sex.
3. Subjects who are able to follow the protocol as designed by the Energy Medicine Research Institute
4. In generally good health.

Exclusion Criteria:

1. History of serious diseases or illness diagnosed at this time, including cancer, or undergoing chemotherapy.
2. Subjects currently taking Tylenol, haloperidol or any prescribed or non-prescribed medication that may, in the opinion of the researchers, alter testing results.
3. History of alcohol addiction or currently consuming more than four drinks per day.
4. Females who are pregnant, lactating, or nursing or who may become pregnant during the course of the study.
5. Subjects with any condition not previously named that, in the opinion of the investigators or intake staff, would jeopardize the safety of the patient or affect the validity of the data collected in this study.
6. Subjects with a high fitness level.

The primary effects of the PGQ_{MEM} are thought to come from the electromagnetic modulation of the its piezoelectric axis. The piezoelectric axis of the PGQ are electromagnetically stimulated using an EM-resonance generator—referred to as the harmonic flux resonator (HFR)—producing a uniquely circularly modulated EM field. After an initial stimulation of the piezoelectric axis of the PGQ by the modulated rotating EM field of the HFR— after which they are referred to as PGQ_{MEM}.

The placebo pendants are glass tetrahedra shaped and identical to the quartz tetrahedra (PGQ_{MEM}, the active pendant). The glass units have no activity, as glass is amorphous and does not have a crystalline lattice, special optical properties and translational symmetry breaking, i.e. an electromechanical axis that the PGQ_{MEM} has. Here, we refer to the glass units as precision geometry glass, PGG) placebo and the active pendant as PGQ_{MEM}.

Tests (described below) were conducted at time points 0, 3 and 6 weeks (baseline, after wearing the placebo and active pendants for 3 weeks each). At the baseline testing, subjects were consented and told they given either the PGG or PGQ_{MEM} Pendant and instructed to wear the pendant daily for 3 weeks. They were also instructed to remove the pendant at the end of their day and place their pendant under an upside down glass bowl, with a glass of water on top of the bowl to "charge" or bring coherence to the water. They were instructed to drink the water the following day and return for testing in 3 weeks.

After the second tests, subjects were given the active pendant, told it was the pendant they did not wear before and instructed to wear the pendant daily and structure water with the pendant, as before. They were instructed to return for the final testing in 3 weeks. At the final visit, subjects were also asked for comments on their experience of wearing the pendant and offered a video interview opportunity about their experience of wearing the pendant.

All tests (described below) were conducted at time points 0, 3 and 6 weeks (baseline, after wearing the placebo control and the active PGQ_{MEM} Pendant for 3 weeks each). The placebo control pendant was a glass replica of the PGQ_{MEM} Pendant (Precision Glass

Geometric Glass, or PGG) and is referred to here as PGG placebo. The active PGQ MEM Pendant will be referred to here as the PGQ$_{MEM}$. At the initial visit, and after the baseline tests, the subjects were given the PGG Placebo to wear. They were told they would not know the identity of the pendants they were wearing during the study and they would test both pendants. Both batches of pendants were coded such that the subjects did not know the identity of the pendant that was tested. They were asked to wear the pendant they were given for at least 6 hours during waking hours until they return for testing in three weeks. They were instructed to wear the pendant and to take it off if they begin feeling uncomfortable (to avoid a potential detoxification effect). They were asked to take the pendant off before bedtime and place it under a container of water while they are sleeping and drink the water during the following day. Subjects were instructed to keep all of their routines as much the same as possible. At each visit, they were asked about their experience while wearing the pendant they had worn. They also completed a quality of sleep survey and rated their energy levels on a scale of 1-10 after each time point.

After the second tests, subjects were given the active pendant, told it was the pendant they did not wear before and instructed to wear the pendant daily and structure water with the pendant, as before. They were instructed to return for the final testing in 3 weeks. At the final visit, subjects were also asked for comments on their experience of wearing the pendant and offered an opportunity for a video interview about their experience.

All outcomes were summarized in terms of means, standard deviations and ranges. A nonparametric Wilcoxon signed rank test was used to evaluate changes from baseline within the placebo and active group. Comparisons of absolute and percentages changes from baseline between placebo vs. active group were conducted using a nonparametric Wilcoxon Rank Sum test. All reported P-values are two-sided and $P<0.05$ was used to define statistical significance.

Assessments

1. Heart rate variability measurements were taken with the HeartScientific, which is a sophisticated technology from Russia that is variation of the HeartQuest, It was developed by the same computer programmer as the HeartQuest, with extra programs (https://karenk.com/hrv/). Assessed parameters were derived from this measure using pattern recognition software.

2. An online test for cognition were performed with the online CNS Vital Signs test, https://cnsvs.com).
3. Hydration and phase angle (PA) tests were conducted by measuring and comparing the ratio of intracellular and extracellular water and phase angle with a RJL bioimpedance device (https://www.rjlsystems.com/about/about-bia/).
4. An online survey (the Pittsburg Quality of Sleep Index, PSQI) for sleep (https://outcometracker.org/library/PSQI.pdf).
5. Subjects were asked to rate their general energy levels at each time point.

Results

Table 1 shows results of assessments of different parameters extrapolated from HRV data and a definition of each is given here. As seen, the Total Power, or overall activity of the Automatic Nervous System (ANS) is significantly increased for both PGG placebo and PGQ_{MEM} groups (p=0.004 and 0.016, respectively). There was no statistical difference between the two groups.

As shown in Table 1, both the mean scores for the two branches of the ANS, the Sympathetic Nervous System (SNS) were not significantly changed from baseline by either the PGG placebo or PGQ_{MEM}. For the Vegetative Regulation Index (VRI), which has been renamed the ANS, and it summarizes the balance and function of the ANS, significant differences were observed for both groups (P=0.027), yet there was no significant difference between each group.

There was a trend towards significance for both the PGQ_{MEM} and PGG placebo and the groups for the Adaption Level, which is the body's ability to adapt to any physiologic change (P=0.063 and 0.059, respectively). This was reported by some of the subjects, yet there was no significant difference between the placebo and active groups for this test.

Both the PGQ_{MEM} and the PGG Placebo had a statistically significant effect on Psychoemotional State (PES), which reflects how the brain handles stress and it defines the degree of perceived devastating effects of stress on the body. This assessment is conducted by means of brain biorhythm mapping and spline mapping. The profile is the collection of information about a person's emotional characteristics, personality and behaviors. In addition to PES, pattern recognition software can determine brainwave frequencies. The percentage of delta brainwaves was assessed, as their presence indicates brain fog that occurs during neural inflammation or after injury. Both pendants produced a significant difference from baseline (P= 0.02), however the PGQ_{MEM} outperformed placebo (the mean change from baseline for placebo and active was 12.9 and 19.6, respectively). The level of Delta brainwaves was not reduced by either the active or placebo pendant.

Neurohormonal Regulation Index (NHI) is determined by means of neuro-dynamic analysis. The Neurohumoral regulation system regulates the composition and the structure of biochemical substances in the body, ensuring the constancy of internal environment and adaptation of the body to changing living conditions. The PGQ_{MEM} produced significantly different improvements about baseline (P=0.002). There was a trend towards significance for the PGG placebo-mediated effects on NHI (P=0.063). The PGQ_{MEM} outperformed the PGG placebo for this test (mean values of 10.5 and 18.5, respectively).

Vitality Index is an expression of the bodies cellular energy and overall strength and vitality. For this assessment, there was a significant improvement after wearing the PGQ_{MEM} (P=0.004), yet no statistical difference after wearing the PGG placebo. The mean response for placebo was 17.8% and for the PGQ_{MEM} was 41.2%, which was the largest observed improvement, yet there was not a significant difference between groups.

There was a significant increase in Self-reported Energy Levels (SREL) after the test period for the PGQ_{MEM}. and no difference between groups.

Table 1: Evaluation of Absolute Changes from Baseline Within Groups and Comparison of Absolute Changes Between Groups (Placebo vs. PGQ_{MEM}) of Heart Rate Variability Test Outcomes.

	Placebo (N=10)		PGQ_{MEM} (N=10)		
Outcome	**Mean ± SD Change**	**P-value[1]**	**Mean ± SD Change**	**P-value[1]**	**p-value[2]**
Total Power of ANS	1789.4 ± 2270.6	0.004*	1426 ± 1462.5	0.010*	0.557
SNS (%)	-3.8 ± 21	0.576	-1.4 ± 16.6	0.938	0.750
PSNS (%)	-2.6 ± 14.4	0.539	-1.5 ± 12.8	0.625	0.941
VRI (%)	15.5 ± 18.1	0.027*	15.8 ± 18.5	0.027*	0.813
AL (%)	12.4 ± 18.6	0.059	14.5 ± 21.1	0.063	0.891
NHI (%)	10.5 ± 17.2	0.068	18.5 ± 17.6	0.002*	0.416
PES (%)	12.9 ± 14.1	0.020*	19.6 ± 21.8	0.020*	0.539
Delta (%)	16.2 ± 33.1	0.113	5.6 ± 24.7	0.625	0.375
Vitality Index (%)	17.8 ± 40.3	0.322	46.4 ± 33.2	0.002	0.064
SREL	0.7 ± 1.6	0.266	1.8 ± 1.8	0.016*	0.107

[1]P-value for evaluating absolute changes from baseline
[2]P-value for comparing absolute changes from baseline between PGG Placebo vs. PGQ_{MEM} group
* $p<0.05$

Definition of statistical term in tables:
Mean=Average values for all subjects
SD=Standard Deviation, how much the data varies from the mean (average of all the data)
Min=Minimum or lowest value
Max=Maximum or highest value
P-value=The probability that the data is different than the comparison (baseline or placebo) value. A p-value of less than 0.05 indicates that the data is significantly different from the comparison measure. The lower the p-value, the more different the test value is from the comparison test value.

Key
SNS=Sympathetic Nervous System

PSNS=Parasympathetic Nervous System
VRI=Vegetative Regulation Index, overall autonomic nervous system balance and function
AL=Adaptation Level, ability to adapt
NRI=Neurohormonal Regulation Index, how well the brain is communicating with the body via the neurohormones
PES= Psychoemotional State, how the brain handles stress
Delta=Delta Brainwaves, which are increased during stress and neuroinflammation
Vitality=Overall Cellular Vitality
SREL=Self-reported Energy Levels

Graph 1 shows results of tests that were significantly improved for the PGQ_{MEM} compared to the PGG placebo to illustrate the effects of the PGG placebo pendant. As seen, the PGG placebo showed improvements that were outperformed by the PGQ_{MEM}
In the NHI and PES and Vitality measures. The placebo effect obscured the increase by the PGQ_{MEM}. There was some variability among the subjects that further obscured the assessments.

Graph 1. Graphical Representation of HRV Test Result

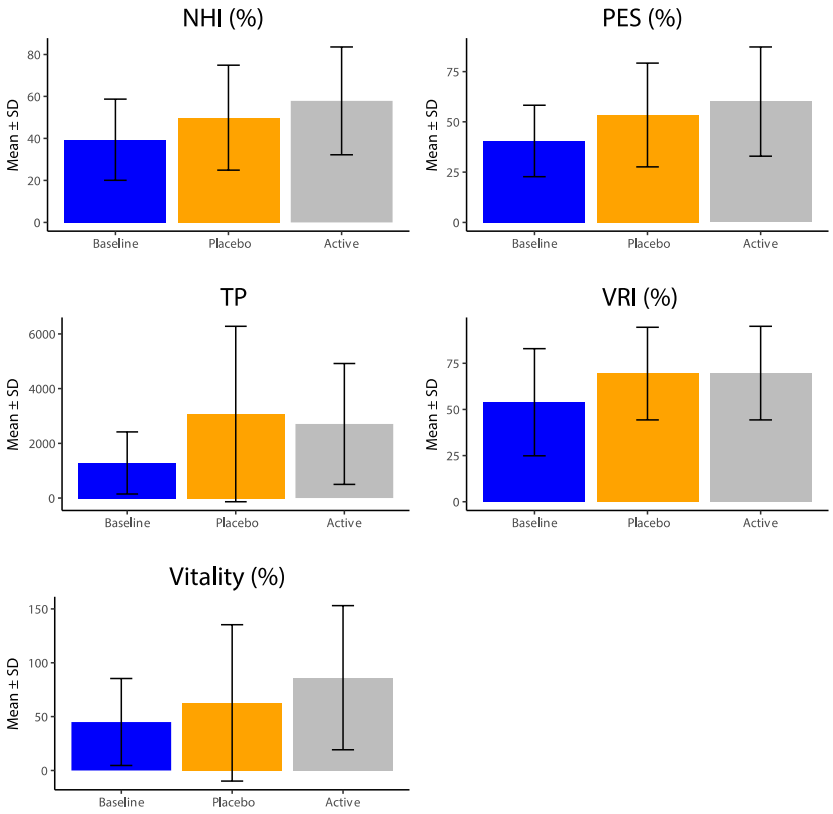


Table 2 shows results for cognition tests after wearing each pendant. As shown, there was a significant increase in Executive Functioning (P= 0.027), Processing Speed (P=0.012), and Psychomotor Speed (P=0.021) after wearing the PGQ_{MEM}. Executive Functioning is the ability to sequence tasks and manage multiple tasks simultaneously as well as tracking and responding to a set of instructions. Processing Speed which is how well a subject recognizes and processes information i.e., perceiving, attending/responding to incoming information, motor speed, fine motor coordination, and visual-perceptual ability. Psychomotor Speed, which is how well a subject perceives, attends, responds to complex visual-perceptual information and performs simple fine motor coordination). In contrast, the only test that showed a significant improvement after wearing the PGG placebo was the Psychomotor Speed (p=0.008) yet there was no significant difference between the groups.

Table 2. Evaluation of Absolute Changes from Baseline Within Groups and Comparison of Absolute Changes Between Groups (Placebo vs. PGQ_{MEM}) of Cognition Test Outcomes.

	Placebo (N=10)		PGQ_{MEM} (N=10)		
Outcome	**Mean ± SD Change**	**P-value[1]**	**Mean ± SD Change**	**P-value[1]**	**P-value[2]**
Cognitive Flexibility	5.9 ± 12.3	0.195	7.8 ± 11.8	0.123	0.406
Complex Attention	10.4 ± 38.6	0.999	3.9 ± 28.5	0.941	0.922
Composite Memory	2.8 ± 10.7	0.445	4.1 ± 6.8	0.078	0.406
Executive Functioning	5.4 ± 12.5	0.291	53.0 ± 138.2	0.027	0.086
Motor Speed	2.9 ± 11.6	0.541	5.1 ± 13.8	0.438	0.432
Processing Speed	5.6 ± 12.5	0.154	9.8 ± 9.1	0.012	0.139
Psychomotor Speed	10.6 ± 10.9	0.008	15.2 ± 17.3	0.021	0.219
Simple Attention	2.0 ± 4.1	0.125	2.4 ± 4.1	0.063	0.531
Sleep Quality	-0.9 ± 5.2	0.836	0.5 ± 4.2	0.418	0.166
Verbal Memory	6.4 ± 11.5	0.066	3.4 ± 5.2	0.109	0.508
Visual Memory	-0.6 ± 6.7	0.805	0.7 ± 4.6	0.617	0.410

[2]P-value for comparing absolute changes from baseline between Placebo vs. PGQ_{MEM} group

* $p<0.05$

Graph 2 represents results of tests that were significantly improved for the PGQ_{MEM} compared to the PGG placebo to illustrate the effects of the PGG placebo pendant and that the PGQ_{MEM} produced improved results over the PGG control.

Graph 2. Graphical Representation of Cognition Test Results.

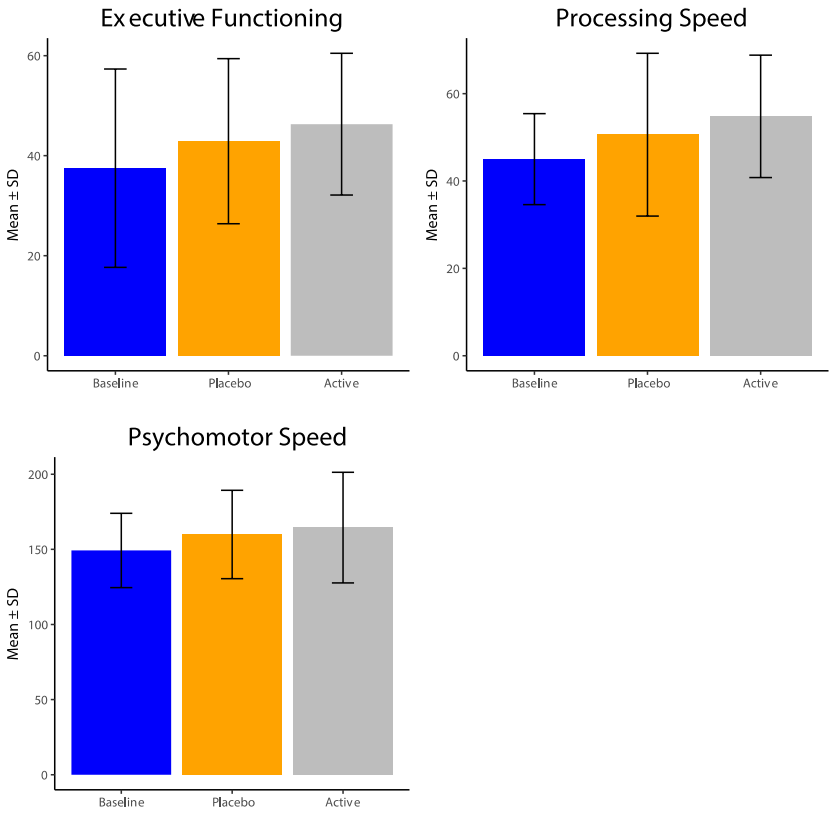


Table 3 shows results from hydration phase angle (PA) measurements. As seen, wearing the Placebo PGG Pendant produced a statistically significant increase in PA (p= 0.047), while wearing the PGQ**MEM** showed a trend towards significance (p=0.068). There were no significant differences between the groups for either test (p=.0576 and 0.656, respectively).

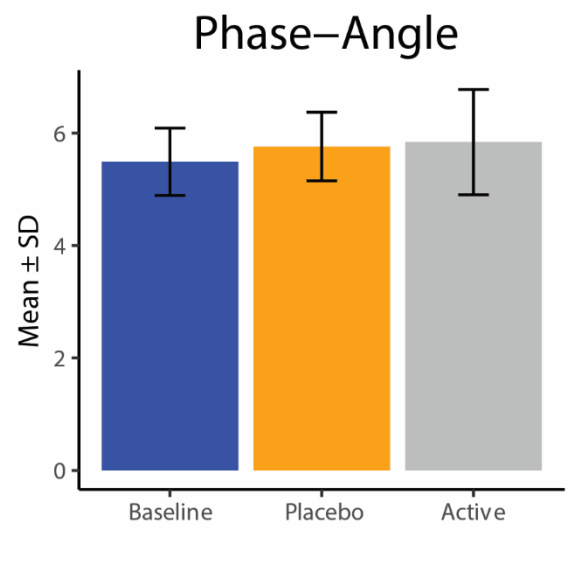
Table 3 Evaluation of Absolute Changes from Baseline Within Groups and Comparison of Absolute Changes Between Groups (Placebo vs. PGQ$_{MEM}$) of Hydration and Phase Angle Test Outcomes

	Placebo	PGQ$_{MEM}$ (N=10)	

	(N=10)				
Outcome	**Mean ± SD Change**	**P-value[1]**	**Mean ± SD Change**	**P-value[1]**	**P-value[2]**
Hydration	0.03 ± 0.07	0.322	0.01 ± 0.03	0.510	0.576
Phase-Angle	0.3 ± 0.3	0.047*	0.4 ± 0.5	0.068	0.656

[1]P-value for evaluating absolute changes from baseline
[2]P-value for comparing absolute changes from baseline between Placebo vs. PGQ MEM groups.
* p<0.05

Graph 3 represents results of tests for that were significantly improved for the PGQ_{MEM} compared to the PGG placebo to illustrate the effects of the PGG placebo pendant and that the PGQ_{MEM} produced improved results over the PGG control.



Nine of the subjects initially thought that the PGG placebo was the active pendant and they reported that was because it looked like the active pendant. Only two subjects reported at the end of the PGG placebo test period that they thought it was the PGG placebo because they didn't feel anything different after wearing it. One subject thought the PGG placebo was active and several of his measurements reflected that, which indicates a placebo effect. The rest of the subjects weren't sure about the identity of the pendant but didn't feel any difference after wearing the PGG placebo. The subjects who weren't sure about the identity of the pendant at the end of the PGG placebo test period reported that they felt a subtle difference (mostly increase in energy) after wearing the PGQ MEM, and they believed the second pendant was the active pendant, yet they couldn't identify any specific changes. One claimed it was a subtle comfort and one loved that the PGQ MEM and bought one. This subject reported that they had an inner ear problem with a symptom that their ear noticeably "clogs" and this was relieved after wearing the PGQ MEM.

During the course of the study, most of the subjects experienced a number of stressful physical and/or mental events. These were
issues that may have contributed to the results, and were mostly unforeseen, including selling a townhome, buying a small home and moving (the process was accelerated more quickly than she planned and felt that the PGQ MEM greatly facilitated her moving through these processes), bronchitis, a painful dental issue that will likely lead to a root canal, a work shortage that he had to cover during most of the entire study, a divorce court case that will determine his financial outcome. Everyone who experienced an unusual circumstance reported that the PGQ_{MEM} helped them handle their
stress. Furthermore, the two subjects who reported the most noticeable improvements noticed a decrease in their energy levels after they returned the pendant. They agreed to participate in a video interview about their experience of wearing the PGQ_{MEM}.

Discussion

Summary of results

- A significant increase in processing speed was detected in the PGQ_{MEM} intervention group, while no change in the Placebo group was detected.
- Significant increases in psychomotor speed were detected in both the Placebo and PGQ_{MEM} group.
- Significant increases in PES (%), TP and VRI (%) were detected in both the Placebo and PGQ_{MEM} group.
- Significant increases in NHI (%), SREL and Vitality (%) were detected in the PGQ_{MEM} intervention arm while no changes were detected in the Placebo arm.
- A significant increase in the phase-angle was detected in the Placebo arm while no change was detected in the PGQ_{MEM} intervention.

Results demonstrate that the PGQ_{MEM} significantly increased five of the HRV measures (Total Power, Vegetative Regulation Index, Neurohormonal Regulation Index, Psychoemotional State and Vitality, with a trend Executive Functioning. For the cognition tests, the PGQ_{MEM} significantly improved Psychomotor Speed, Processing Speed, with a trend towards significance for Composite Memory. The statistical significance on the for PES coincides with the subjects reported increased ability to deal with stress.

In contrast, the PGG placebo only significantly increased three of the HRV measurements (Total Power, Vegetative Regulation Index, Psychoemotional State, one of the cognition tests (Psychomotor Speed) and Phase Angle. There was a definite placebo effect, where the test subjects believed they were wearing a PGQ_{MEM} active unit demonstrated slight increases in the three HRV measurements due to psychological influence over physiological parameters. However, statistical analysis shows that when the PGG placebo produced an effect, the PGQ_{MEM} produced greater results. Therefore, when the two groups are compared in this way, one can discern an outcome of the PGQ_{MEM}. A larger population is recommended to further elucidate the difference between the groups.
Since the previous study that showed significant results between groups in every athletic test was not affected by a placebo effect and the population was recruited from a group

that did not understand or believe in the PGQ_{MEM}, this could be an important factor in recruiting for any future studies, although it may complicate it. Most of the individuals who are attracted to this type of study believe in this genre of products (and use them).

The larger population will increase the likelihood of detecting a significant effect. The limitations of the population size for this study— combined with the potential bias of the recruited subjects and the unusual circumstances that many of the subjects encountered (it is difficult to know how this affects results) are likely to have been contributing factors to an observed placebo effect. Yet, in nearly every parameter tested the PGQ_{MEM} tests showed statistically significant improvements over the baseline, indicating a direct effect of the PGQ_{MEM} on the biological system.

Conclusions

The results of this pilot study demonstrate that the PGQ_{MEM} produced a significant improvement in several of the assessed HRV and cognition measures. While placebo testing showed a slight increase over baseline, when the PGG placebo produced an effect, the PGQ_{MEM} outperformed the PGG placebo. A larger population of subjects is recommended to establish the effects on the addressed values. Finally, it is likely that the PGQ_{MEM} will produce greater or sustained effects when worn for longer periods.

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