Amino Acid, Neurotransmitter, GDV and Physiological Testing of the LifeWave Y-Age AEON Patches

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1 author:

Melinda Connor
Akamai University, Hilo, Hawaii
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Melinda H. Connor, Ph.D., FAM
Optimal Healing Research

Jens Eickhoff, Ph.D.
JC Eickhoff Statistical Consulting

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Connor, M. and Eickhoff, J.

Abstract

Objective: This was a pilot study of 20 healthy subjects randomized in to 10 active and 10 control subjects aged 18 and above, to assess physiological changes of the sealed FDA registered homeopathic *Y-Age Aeon* patch made by the Lifewave Corporation.

Procedure: Subjects were consented and then the first baseline neuro-transmitter, amino acid samples were collected for hormonal testing. Additional tests were done on day 2. Gas Discharge Visualization device and Thought Technology ProCom with BioGraph Infinity and CardioPro software's physiology suite and HRV testing were taken as a baseline, patch application and then day 2.

The Telegen Absorption scale, Marlowe-Crowne Social Desirability scale, Profile of Mood States were all utilized during the study.

Participants: Participants were recruited by flyer and email. All participants were healthy, with no chronic conditions and over the age of 18.

Results:

Neurotransmitters and Amino Acids tests:

Significant changes were detected for Glutamate $p< 0.027$ and LDOPA $p<0.013$ within the active group and for LDOPA $p< 0.0046$ between active and controls for neurotransmitter parameters. Change was found to be significant in the non essential amino acids Cysteine $p< 0.025$, Glutamine $p< 0.031$, Serine $p< 0.0211$ and Proline $p< 0.037$ between groups.

Physiological Measures:

No significant changes from day 1 to day 2 in Heart Rate Variability.

GDV:

A significant change within the active group was found for total density of the gas emission and between active and control groups for both Spectrum Brightness $p<.0001$ and Spectrum Width $p<.0001$. This demonstrates that there was an increase in the gas emission spectrum width and brightness and supports findings that a body detoxification process had been engaged within 24 hours. Further, though there was no significant change between groups in total density there was significance in density deviation in fingers 4 $p< 0.0068$ and 5 $p< 0.0202$ between groups.

Questionnaires:

Marlowe-Crowne Scale showed that all active participants presented in the normal range for social correctness and desirability. Three individuals in the control group provided politically correct answers with the rest presenting in normal range.

No significance was found between groups based on the Profile of Moods states. So mood was not directly affected by participation in the study and would not account for the neurotransmitter and amino acid changes seen in the data.

No significant changes were detected for the Telegen Absorption Scale demonstrating that these were not easily suggestible or hypnotizable subjects.

Conclusion:
The significant changes detected for Glutamate $p< 0.027$ and LDOPA $p<0.013$ within the active group and for LDOPA $p< 0.0046$ between active and controls for neurotransmitter parameters would be consistent with increases in Dopamine production and is significant as Dopamine is necessary in smooth muscle motor coordination and the continued beating of a person's heart. The significant change in the amino acids Cysteine $p< 0.025$, Glutamine $p< 0.031$, Serine $p< 0.0211$ and Proline $p< 0.037$ in only a day is also relevant. Rapid positive change in LDOPA is consistent with the advertised function of the Y-Age Aeon product as is the increase in Glutamine. In addition, the anti-oxydent functions of Cystine and Proline are consistent with the Y-Age Aeon product.

No significant changes from day 1 to day 2 in Heart Rate Variability. However, since there were changes in both serotonin production in the gut and LDOPA neurotransmitter production within 24 hours a longer study may show significant change in heart rate variability.

The GDV data supports an increase in the gas emission spectrum width and brightness which is consistent with findings that a body detoxification process had been engaged within 24 hours.

No significant findings in the results of the questionnaires support the norming aspects of the groups and the lack of significant political correctness and suggestibility in the active group. This reinforces the data results as significant and not easily attributable to placebo effect.

Recommendations: A larger trial should be done to determine if significance of neurotransmitter and amino acid responses are consistent in a larger sample size and should be done over a longer period of time. This would provide the opportunity to determine the maximum effective length of treatment.

Key Words: Homeopathy, Amino Acids, Neurotransmitters HRV, EMG, GDV, Lifewave, Acrylic Patch

Amino Acid, Neurotransmitter, GDV and Physiological Testing of the LifeWave Y-Age AEON Patches

Connor, M. and Eickhoff, J.

Introduction

This study attempted to discover if there are specific physiological changes produced by the application of the LifeWave *Y-Age Aeon* patch. This is a sealed non-transdermal patch and is a FDA registered homeopathic product. The patches in this study are consistent with the commercial LifeWave product. The study design was a pilot single arm, longitudinal study with baseline, daily and post-treatment follow-up assessments with N=20 participants (10 active and 10 control) with data taken over two days. Baseline data was taken and all participants wore the LifeWave *Y-Age Aeon* patch for one day for a minimum of 8 hours. The placement of the patch at a specific acupuncture point supports changes in the electro-dermal skin conductance of that acupuncture point. It is possible that there is a signal strengthening effect produced by the patch.

Homeopathy

There has been significant misinformation and misunderstanding over the last 100 years as to the mechanisms through which homeopathy works on and with the human body. Various possible mechanisms have been proposed which include changes in cell membrane permeability to water, energy effects and stimulation of the autoimmune system.

Altering molecular properties of water.

Research performed at the Penn State Materials Science Laboratory by Roy et al. (2005) demonstrated that there were clear specific molecular changes in the structure of the water in homeopathic remedies. Research done by Chaplin, (2007) showed specific molecular clustering in water which was significantly different from the standard chemical understanding of H_2O. In addition, Chaplin, (2007[2]) showed that water may retain a level of memory related to epitaxy or the ability of a substance to form into the shape of its container. In this case we are considering the human body as the container. The work by Chaplin continues earlier work done by Del Giudice (1994) which demonstrated that water has unique characteristics among physical materials and might have the ability to retain a level of memory of a substance with which it had been in contact. Research done by Rao et al. (2007) using Raman Spectroscopy, showed that there were discrete differences between the molecular structures of water clusters at different homeopathic potencies.

Research done using TEMS microscopy Chikramane et al. (2010) demonstrated that in the case of homeopathic remedies containing metals, nanoparticles of the metals were imbedded in the molecular structure of the water even in ultra-high dilutions. This appears to be an exception to the earlier findings that with greater dilutions there are no particles of the original substance present. TEMS microscopy is a new way of examining the molecular structure of homeopathic products. This is one of the first studies using this technology.

The law of similars

Homeopathy is classically thought to work from the "law of similar." It suggests that loading the body with a reactant which produces a similar physical result to the current illness will

"wake the body up" to the fact that there is a problem and trigger a system wide response. In the non-linear dynamical theory of homeopathy introduced by Bell et al. (2004, 2006, 2010) and further characterized by Koithan at al. (2007) and Menk et al. (2010), it is suggested that a healthy body lives on the edge of chaos and is thus able to respond rapidly to changes in environmental stimuli. Disease is produced by the individual becoming stuck in one order and thus not being able to respond appropriately to stimuli. This theory is consistent with heart rate variability being significantly greater in healthy, relaxed people, than in those who are emotionally stressed (Task Force of The European Society of Cardiology, 1996). As a result, individuals with healthy body systems should produce oscillations in their responses to stimuli and when a homeopathic remedy is introduced into a "stuck" system it should produce a more significant stimulation and the resulting pattern of oscillation should disrupt the stuck system, eventually returning the individual to health.

Gas Discharge Visualization (GDV)

The GDV device was developed in the mid 1990's by Dr. Konstantin G. Korotkov, a Russian professor of Physics at the St. Petersburg Technical University in Russia. The device was developed as a way of photographing and measuring the spectrum of gas emission from the fingertips and the potential biophoton emission. When using the GDV device, the fingertip of the subject is placed on a dielectric plate. The image generated and captured by the camera results from the movement of electrons across the dielectric plate (assuming the finger has a positive potential) and the subsequent collision and ionization of the gas molecules surrounding the finger. The camera takes an image of this emission, which often appears as a corona or branch-like pattern around the finger. Each image takes 1 second to generate, and is stored in a computer for later analysis. Images are taken from each finger on both hands.

Computer software analyzes the spectrum, density and fractal patterns of the discharge from each finger-tip. Additional analysis can be done by specific sections of the finger tips which have been mapped to specific organs of the body. (See Appendix B: GDV development bibliography and Appendix C: Finger tip correlation chart).

Approved in Russia for clinical use after recommendation of the Russian Academy of Science, the device was approved by the Russian Health Authority for general clinical use without limitations in 1999. Though the device is still considered an experimental device in the US, it is in use in 20 countries and is considered a diagnostic and clinical treatment device in most of them. The largest area of conflict in the acceptance of the device in the US appears to be that the display and analysis programs are centered on the acupuncture meridian system which is in standard use in Russia and Asia, rather than on the organ system standard used in the United States. The GDV software standard display and analysis suite was done looking at specific regional data by finger-tip which is related to specific organs.

The Meridian System

The theory of balancing the body based on the Chinese meridian system is over 3000 years old. Current information now maps the meridian system to parts of the lymphatic system. The concept of the release of "Qi" or correlated with static electric overcharge, though not

established as representing a bioelectrical phenomenon, on an area of the lymphatic system is consistent with the evidence that the body has a variety of electrical-dermal potentials across its surface (Becker & Selden, 1985, Flick, 2004) and that acupuncture points are (at least in part) strategic conductors of electromagnetic signals (Feinstein, 2010).

The National Institute of Health in the US performed a detailed review of acupuncture research and published a Consensus Statement on Acupuncture:

> Acupuncture as a therapeutic intervention is widely practiced in the United States. While there have been many studies of its potential usefulness, many of these studies provide equivocal results because of design, sample size, and other factors. The issue is further complicated by inherent difficulties in the use of appropriate controls, such as placebos and sham acupuncture groups. However, promising results have emerged, for example, showing efficacy of acupuncture in adult postoperative and chemotherapy nausea and vomiting and in postoperative dental pain. There are other situations such as addiction, stroke rehabilitation, headache, menstrual cramps, tennis elbow, fibromyalgia, myofascial pain, osteoarthritis, low back pain, carpal tunnel syndrome, and asthma, in which acupuncture may be useful as an adjunct treatment or an acceptable alternative or be included in a comprehensive management program. Further research is likely to uncover additional areas where acupuncture interventions will be useful.

Saliva Testing for Amino Acids

Saliva testing receives mixed reviews in the literature since they produce different results than a blood test. Saliva testing measures the amount of free or unbound amino acids in the saliva. Saliva testing was selected for this study as it is much more convenient and is less invasive for subjects.

Subjects will self-administer the swab each day under the supervision of Dr. Connor when in the laboratory, which will then be placed back in the shipping container and labeled with the subject number. Samples were then kept in the freezer at -20F and were be shipped with ice by Federal Express to the Sabre Science lab on a daily basis. Tests include: Alanine, Arginine, Aspartic Acid, Asparagine, Beta-alanine, Carnosine, Citrulline, Systeine, Glutamine, Glutamic Acid, Glycine, 5-HTP, Histidine, Isoleucine, Leucine, Lysine, Methionine, Ornithine, Phenylalanine, Proline, Serine, Threonine, Tryptophan, Tyrosine and Valine.

Salavary and Urine Testing for Neurotransmitters

Standard urine testing for neurotransmitters was done at 10 am on day one and two. Experimental salivary neurotransmitter matching was done to discover if there was consistency between the two tests. Tests included: Melatonin, Serotonin, Dopamine, Serotonin/Dopamine ratio, Norepinephrine, Epinephrine, Gaba, Glutamate, and Histamine. Each vial was individually numbered and shipped overnight to Saber Sciences Laboratory for analysis.

Thought Technology ProCom Infiniti Physiology Suite

The physiology suite included testing for EMG, EKG, HRV, temperature, skin conductance, respiration, blood volume pulse and galvanic skin response. The ProCom Infinity is one of the most used biofeedback and portable physiology suites available with 2048 samples per second. It uses the BioGraph and CardioPro software to provide comprehensive data taking and analysis.

Materials

This study utilized *Y-Age Aeon* non-transdermal patch made by the Lifewave Corporation. The Thought Technology ProCom Infiniti Physiology Suite for Heart Rate Variability (HRV) and other physiological measures, a Gas Discharge Visualization device, saliva testing for hormones and amino acids, urine analysis for neurotransmitters and standardized psychological questionnaires. Specialized software developed by Thought Technologies was used to do the HRV analysis. Specialized software included in the GDV system was used to do the fingertip area and density analysis.

Questionnaires included the Marlowe-Crowne social desirability scale, the Telegen Absorption scale and the Profile of Mood scale.

Methods

Application for human studies permission was made to the National Foundation for Energy Healing internal review board and the study approved as NFFEH 10-17-11-18.

Study recruitment was begun and subjects were recruited by email announcement, through radio announcements and word of mouth. Flyers were also placed on public access bulletin boards. Interested persons were asked to call in to the study call number.

Inclusion criteria: Any healthy individuals with no chronic conditions who were not pregnant and were over the age of 18 were recruited. At the time individuals called by telephone, their eligibility to participate was reviewed and if they were over the age of 18 and met the inclusion/exclusion criterion they were asked to confirm that they did not have any of the following psychological/physical conditions:

1. A history of psychological disorders
2. A history of drug or alcohol abuse
3. A history of any major medical problems
4. Female subjects who are pregnant were also excluded.

Dr. Connor met with the subjects in person at 8:00am to review the consent form and consented subjects. After consenting the Telegen Absorption scale and the Marlow-Crowne Social Desirability Scale and Profile of Mood States questionnaire were administered. Baseline Gas Discharge Visualization data and Thought Technology measures were taken.

Schedule of Tests:
Initial Contact: Consenting, demographics and baseline questionnaires. Baseline GDV and Physiology measures.

Day One: Baseline Saliva/Urine Neuro-transmitter test taken at 10am. Salivary amino acids were taken during the next 24 hours. Questionnaires, GDV and Physiology measures were taken after neurotransmitters.

Day Two: Saliva/Urine Neuro-transmitter test taken at 10am. Salivary amino acid testing was taken during the next 24 hours. Questionnaires, GDV and Physiology measures were taken after neuro-transmitters.

The 20 subjects had two days of testing which included GDV, physiological measures (HRV, pulse, respiration, galvanic skin response, EMG, EKG), salivary/urine neurotransmitter testing (Serotonin, Dopamine, Serotonin/Dopamine ratio, Norepinephrine, Epinephrine, Gaba, Glutamate, and Histamine) and salivary amino acid testing (Alanine, Arginine, Aspartic acid, Asparagine, Beta-alanine, Carnosine, Citrulline, Systeine, Glutamine, Glutamic acid, Glycine, 5-HTP, Histidine, Isoleucine, Leucine, Lysine, Methionine, Ornithine, Phenylalanine, Proline, Serine, Threonine, Tryptophan, Tyrosine and Valine) and questionnaires.

The questionnaires include Tellegen Absorption Scale, Marlow-Crowne Social Desirability Scale and Profile of Mood States.

Statistical Methods

GDV and HRV parameters were summarized as percentage changes from baseline to the post-treatment assessment in terms of median and interquartile ranges (25^{th} and 75^{th} percentile). Amino acid and neurotransmitter parameters were summarized in terms of means and standard deviations (SD). Since the distributions of the GDV and HRV parameters were highly skewed, nonparametric analyses were performed to conduct the analyses. Specifically, the nonparametric Wilcoxon Signed Rank test was used to evaluate changes within each group from the baseline to the post-treatment. The nonparametric Wilcoxon Rank Sum test was performed to compare GDV,HRV, amino acid and neurotransmitter parameters between groups (active vs. control). All P-values were two-sided and $P<0.05$ was used to determine statistical significance.

Results

Study Design: Randomized controlled trial, with baseline and post-treatment follow-up assessments with N=20 participants, 10 active and 10 control. (Appendix A: Statistical result tables.)

Study Endpoints:
Neurotransmitter Parameters
Assessments:
Day 1, 2

Amino Acids

Assessments:
Day 1, 2

HRV and EMG
Assessments:
Day 1 baseline, 1 patch application, 2

GDV
Assessments:
Day 1 baseline, 1 patch application, 2

Questionnaires

Assessments:		
	1	2
Marlowe Crowne	X	
Telegen Absorption	X	
Profile of Mood States	X	X

Neurotransmitter and Amino Acid Parameters
Significant changes were detected for Glutamate $p< 0.027$ and LDOPA $p<0.013$ within the active group and for LDOPA $p< 0.0046$ between active and controls for neurotransmitter parameters. This would be consistent with increases in Dopamine production and is significant as Dopamine is necessary in smooth muscle motor coordination and the continued beating of a person's heart.

Change was found to be significant in the non essential amino acids Cysteine $p< 0.025$, Glutamine $p< 0.031$, Serine $p< 0.0211$ and Proline $p< 0.037$ between groups.

Analysis of HRV Parameters
No significant changes from day 1 to day 2 was detected.

GDV
A significant change within the active group was found for Total Density of the gas emission and between active and control groups for both Spectrum Brightness $p<.0001$ and Spectrum Width $p<.0001$. This demonstrates that there was an increase in the gas emission spectrum width and brightness and a body detoxification process had been engaged within 24 hours. Further, though there was no significant change between groups in total density there was significance in density deviation in fingers 4 $p< 0.0068$ and 5 $p< 0.0202$ between groups.

Questionnaires
Marlowe-Crowne Scale showed that all active participants presented in the normal range for social correctness and desirability. Three individuals in the control group provided politically correct answers with the rest presenting in normal range.

No significance was found between groups based on the Profile of Moods states. So mood was not directly affected by participation in the study and would not account for the neurotransmitter and amino acid changes seen in the data.

No significant changes were detected for the Telegen Absorption Scale demonstrating that these were not easily suggestible subjects.

Discussion

This study suffered from the small sample size and very short duration. It is interesting that in such a small study, significance was achieved in neurotransmitters, amino acids and in data which is consistent with the beginnings of the down regulation of stress parameters. Of particular importance was LDOPA results as these are so important in heart function and smooth muscle motor coordination. The increase in Glutamine production is important as it is known to increase cellular energy and regulates the acid-base balance in the kidneys where it helps to clear ammonium from the body. The increase in Cysteine production is necessary to support the production in Glutamine and individually Cysteine acts as an anti-oxidant which is consistent with the Y-age Aeon product. Just as an increase in Cystine production was consistent with Glutamine production so is Serine with Cystine necessary as a precursor to it's production. Also consistent with the Y-Age Aeon product is the change in Proline production as it is a hydrogen acceptor so it supports the anti-oxidant functions of the product.

The GDV data which shows an increase in the detoxification process is also consistent with these early markers of change. An increase in the total period during which data is taken on the next study should help determine the overall depth and consistency of change.

While there was no significance in the change in HRV response in a longer study there may be effects based on changes which did happen in the neurotransmitter, amino acid and GDV responses. While it is too soon to say that HRV changes will be a result of a longer study, the essential elements of the change in LDOPA production, GDV changes in emission spectrum and changes in the non-essential amino acids are in place that would be consistent with that eventual result. If these existing results remain consistent in a larger and longer study, an increase in HRV would be consistent.

There was no significant difference in the Marlowe-Crowne Social Desirability Scale total scores or the Telegen Absorption Scale Total scores detected between arms. The lack of significance in the Marlowe-Crowne would suggest that both groups were consistent in providing correct answers rather than providing answers which were motivated by a need to perform on the tests in a particular way. The lack of significance in the Telegen Absorption Scale would suggest that the results of the study were not based on the subjects being susceptible to hypnosis.

Conclusion

The significant change in the neurotransmitter LDOPA and the amino acids Serine, Glutamine, Cysteine, and Proline in only a day is relevant. Rapid positive change in LDOPA is consistent with the advertised function of the Y-Age Aeon product as is the increase in Glutamine. In addition, the anti-oxidant functions of Cystine and Proline are consistent with the Y-Age Aeon product. A longer study should be done to see how long and to what total degree these neurotransmitter and amino acid effects are produced.

The GDV data demonstrates that there was an increase in the gas emission spectrum width and brightness and a body detoxification process had been engaged within 24 hours. Further, though there was no significant change between groups in total density there was significance in density deviation in fingers 4 $p< 0.0068$ and 5 $p< 0.0202$ between groups. This is important as these fingers are connected with brain and central nervous system function and adrenal function. These results would be consistent with the function of the Y-Age Aeon patch.

No significant findings in the results of the questionnaires support the norming aspects of the groups and the lack of significant political correctness and suggestibility in the active group. This reinforces the data results as significant and not easily attributable to placebo effect.

Recommendations: A larger trial should be done to determine if significance of neurotransmitter and amino acid responses are consistent in a larger sample size. The study should be done over a longer period of time as it is possible this would provide an important insight to the evolving literature on amino acid function with respect to their functions in respect to protecting and promoting cell health. In addition, this would provide the opportunity to determine the maximum effective length of patch application.

Appendix A: Statistical Analysis Aeon Study

Study Design: Randomized, placebo control study.

Statistical Analysis: GDV and HRV parameters were summarized as percentage changes from baseline to the post-treatment assessment in terms of median and interquartile ranges (25^{th} and 75^{th} percentile). Amino acid and neurotransmitter parameters were summarized in terms of means and standard deviations (SD). Since the distributions of the GDV and HRV parameters were highly skewed, nonparametric analyses were performed to conduct the analyses. Specifically, the nonparametric Wilcoxon Signed Rank test was used to evaluate changes within each group from the baseline to the post-treatment. The nonparametric Wilcoxon Rank Sum test was performed to compare GDV,HRV, amino acid and neurotransmitter parameters between groups (active vs. control). All P-values were two-sided and $P<0.05$ was used to determine statistical significance.

1. **Comparison of GDV Parameters between Active versus Placebo**

Table 1: *Comparison of percentage changes (from baseline to post-treatment) in GDV parameters between Active versus Placebo group – Combined (across sides, fingers and section)*

	Active (N=10)				Placebo (N=10)				
	Median	**25th Percentile**	**75th Percentile**	**p-value[1]**	**Median**	**25th Percentile**	**75th Percentile**	**p-value[1]**	**p-value[2]**
Density Dev	3.5	-9.4	18.5	<0.0001	0.0	-11.7	10.6	0.9773	<.0001
Density Excess	-6.5	-55.4	94.5	0.0001	0.0	-50.2	81.5	0.0001	0.7477
Total Density	0.9	-4.6	5.9	0.0107	0.0	-4.9	6.2	0.0506	0.6342
Area	0.0	-14.9	17.0	0.2395	0.0	-14.4	15.8	0.1069	0.7627
Spectrum Bright	18.7	-9.4	62.3	<0.0001	-13.2	-51.0	22.9	0.0002	<.0001
Spectrum-W	7.9	-11.5	32.4	<0.0001	0.0	-24.8	16.3	0.0157	<.0001

[1]: p-value for evaluating changes from baseline to post-treatment within arm
[2]: p-value for comparing changes from baseline to post-treatment between arms

Table 2: *Comparison of percentage changes (from baseline to post-treatment) in GDV parameters between Active versus Placebo group – stratified by finger*

		Active (N=10)				Placebo (N=10)				
	Finger	Median	25th Percentile	75th Percentile	p-value[1]	Median	25th Percentile	75th Percentile	p-value[1]	p-value[2]
Density Dev	1	4.7	-7.9	15.0	0.0038	0.0	-9.5	13.9	0.1876	0.3081
Density Dev	2	1.8	-9.1	14.3	0.0641	-1.2	-14.4	6.4	0.1223	0.0224
Density Dev	3	1.0	-10.2	16.3	0.1626	0.0	-11.2	10.8	0.4190	0.6610
Density Dev	4	6.9	-9.7	21.7	0.0064	0.0	-15.7	9.0	0.4097	0.0068
Density Dev	5	4.8	-10.2	28.7	0.0007	0.0	-15.7	15.4	0.9588	0.0202
Density Excess	1	-3.5	-68.5	96.6	0.1148	-2.2	-56.0	51.9	0.7822	0.7922
Density Excess	2	-12.2	-59.9	73.9	0.3674	0.0	-42.6	74.6	0.1335	0.4162
Density Excess	3	0.0	-44.6	109.2	0.0012	0.0	-52.8	105.8	0.0056	0.3589
Density Excess	4	-8.1	-46.7	88.0	0.0526	0.0	-41.6	94.2	0.0047	0.7879
Density Excess	5	-11.0	-69.2	99.5	0.3098	0.0	-46.0	68.7	0.1119	0.3063
Total Density	1	1.0	-5.0	7.3	0.3583	0.2	-4.2	9.6	0.0198	0.2532
Total Density	2	1.4	-3.1	5.6	0.0575	0.0	-5.4	4.8	0.8254	0.1100
Total Density	3	0.8	-5.3	4.6	0.8093	0.0	-4.0	6.3	0.2568	0.5310
Total Density	4	0.1	-5.2	6.4	0.5444	0.0	-4.7	6.0	0.3865	0.8735
Total Density	5	1.2	-4.1	7.1	0.0296	0.0	-5.5	6.1	0.8734	0.1543
Area	1	0.8	-15.0	19.4	0.5005	0.0	-21.4	35.5	0.0392	0.4804
Area	2	-1.6	-10.6	12.1	0.6666	0.0	-9.7	11.1	0.6089	0.8630
Area	3	0.0	-14.0	12.4	0.7697	0.0	-9.8	10.8	0.7282	0.9160
Area	4	0.0	-17.4	16.9	0.7736	0.0	-15.8	15.3	0.8625	0.9927
Area	5	-0.7	-19.6	26.3	0.2128	0.0	-15.0	17.8	0.3460	0.8918
Spectrum Bright	1	11.4	-12.2	63.1	0.0000	-20.2	-53.7	14.5	0.0905	<.0001
Spectrum Bright	2	25.2	-8.9	61.9	0.0000	-6.1	-35.8	18.9	0.0917	<.0001
Spectrum Bright	3	24.5	-3.8	75.6	0.0000	-19.2	-53.5	20.6	0.0752	<.0001
Spectrum Bright	4	19.4	-6.3	47.3	0.0000	-10.9	-50.7	33.0	0.2871	<.0001
Spectrum Bright	5	9.9	-12.2	59.8	0.0000	-16.5	-48.1	23.4	0.0601	<.0001
Spectrum-W	1	5.8	-11.4	27.2	0.0005	-1.7	-24.7	14.0	0.2838	0.0010
Spectrum-W	2	9.0	-4.8	30.4	0.0000	0.0	-22.0	16.9	0.4410	<.0001
Spectrum-W	3	10.7	-8.4	43.7	0.0000	-1.2	-28.1	16.5	0.1372	<.0001
Spectrum-W	4	11.6	-12.0	34.0	0.0000	0.0	-25.5	16.4	0.1913	<.0001
Spectrum-W	5	5.3	-20.5	28.0	0.0282	0.0	-24.0	16.0	0.4240	0.0362

[1]: p-value for evaluating changes from baseline to post-treatment within arm
[2]: p-value for comparing changes from baseline to post-treatment between arms

Table 3: *Comparison of percentage changes (from baseline to post-treatment) in GDV parameters between Active versus Placebo group – stratified by finger and side*

			Active (N=10)				Placebo (N=10)				
	Side	**Finger**	**Median**	**25th Percentile**	**75th Percentile**	**p-value[1]**	**Median**	**25th Percentile**	**75th Percentile**	**p-value[1]**	**p-value[2]**
Area	right	5	-1.6	-16.7	19.3	0.5714	0.0	-15.0	16.9	0.6296	0.9959
Spectrum Bright	left	1	11.3	-7.3	55.7	0.0000	-23.6	-62.0	63.4	0.9819	<.0001
Spectrum Bright	left	2	21.9	-13.3	59.2	0.0000	-9.8	-42.5	18.2	0.1212	<.0001
Spectrum Bright	left	3	21.4	-3.7	74.1	0.0000	-25.5	-52.8	27.8	0.1838	<.0001
Spectrum Bright	left	4	15.6	-5.7	47.6	0.0000	-13.1	-52.7	15.6	0.2499	<.0001
Spectrum Bright	left	5	13.0	-7.9	60.0	0.0000	-20.0	-47.5	24.3	0.1226	<.0001
Spectrum Bright	right	1	12.2	-17.8	101.7	0.0001	-13.9	-35.2	7.9	0.0222	<.0001
Spectrum Bright	right	2	26.6	-0.6	91.0	0.0000	-1.6	-31.2	21.1	0.4099	<.0001
Spectrum Bright	right	3	26.4	-5.9	79.2	0.0000	-8.5	-57.0	20.6	0.2897	<.0001
Spectrum Bright	right	4	24.2	-7.6	47.2	0.0000	-2.7	-49.1	42.8	0.7422	0.0004
Spectrum Bright	right	5	7.6	-15.8	59.0	0.0012	-8.1	-59.2	23.4	0.2452	0.0004
Spectrum-W	left	1	6.6	-10.5	27.2	0.0058	-2.8	-28.1	26.3	0.6955	0.0205
Spectrum-W	left	2	6.0	-4.8	31.2	0.0010	-2.1	-25.4	16.9	0.2871	0.0014
Spectrum-W	left	3	11.5	-11.0	49.7	0.0002	-1.2	-31.5	14.8	0.2329	0.0006
Spectrum-W	left	4	10.2	-13.0	32.6	0.0044	-5.4	-28.9	10.5	0.0851	0.0010
Spectrum-W	left	5	7.6	-23.7	37.1	0.0750	0.0	-23.7	14.7	0.2506	0.0556
Spectrum-W	right	1	4.7	-11.8	29.5	0.0301	0.0	-19.7	13.0	0.3775	0.0272
Spectrum-W	right	2	11.6	-5.1	30.3	0.0000	0.0	-17.4	18.3	0.9842	0.0018
Spectrum-W	right	3	7.2	-5.5	30.4	0.0004	-1.5	-26.6	18.8	0.3233	0.0015
Spectrum-W	right	4	12.5	-11.1	34.7	0.0004	0.0	-25.0	22.1	0.9254	0.0125
Spectrum-W	right	5	2.0	-10.6	24.4	0.1895	0.0	-25.0	18.1	0.9621	0.0273

[1]: p-value for evaluating changes from baseline to post-treatment within arm
[2]: p-value for comparing changes from baseline to post-treatment between arms

2. **Comparison of HRV Parameters between Active versus Placebo**

Table 4: *Comparison of percentage changes (from baseline to post-treatment) in HRV parameters between Active versus Placebo group – stratified by source*

		Active (N=10)				Placebo (N=10)				
source	**Parameter**	**Median**	**25th Percentile**	**75th Percentile**	**p-value[1]**	**Median**	**25th Percentile**	**75th Percentile**	**p-value[1]**	**p-value[2]**
bvp	Sdnn	11.3	-29.6	59.6	0.4922	-67.5	-95.6	7.4	0.3223	0.1405
bvp	hf	214.9	-62.4	534.1	0.0840	-83.7	-99.8	327.6	1.0000	0.1620
bvp	lf	104.4	-16.9	1361.4	0.0840	-83.7	-98.5	58.2	0.5566	0.1041
bvp	Lf/hf	4.7	-55.0	147.3	0.6250	-48.2	-65.8	545.3	1.0000	0.6232
bvp	nn50	7.1	-35.3	25.0	0.7617	-62.3	-100.0	-12.5	0.4063	0.3147
bvp	pnn50	-3.4	-49.5	31.5	0.9102	-73.8	-100.0	-41.3	0.1563	0.2155
bvp	power	210.6	-66.4	897.1	0.0840	-79.2	-99.2	15.3	0.4922	0.1620
bvp	rmssd	18.8	-32.1	70.6	0.4316	-78.9	-94.5	80.9	0.6250	0.1859
bvp	vlf	307.0	-87.3	404.7	0.0840	-62.8	-99.4	27.6	0.6250	0.2413
ekg	Sdnn	28.2	-10.6	55.9	0.1934	-13.0	-43.9	3.6	0.2324	0.1041
ekg	hf	21.8	-21.1	154.8	0.2754	-24.6	-63.8	57.1	0.7695	0.3447
ekg	lf	145.2	-70.7	1392.6	0.0645	-79.5	-88.9	87.5	0.7695	0.1041
ekg	Lf/hf	66.1	-47.7	137.9	0.1309	-62.2	-76.1	-29.1	0.4316	0.0890
ekg	nn50	2.2	-20.0	10.0	0.9219	1.2	-20.8	14.3	0.7520	0.7913
ekg	pnn50	3.1	-10.6	10.8	0.6953	-2.0	-9.5	9.4	0.8457	0.7913
ekg	power	76.7	-58.8	966.7	0.1602	-53.7	-86.3	45.4	0.6953	0.2123
ekg	rmssd	28.2	-7.3	46.1	0.1934	-15.7	-41.9	1.2	0.1602	0.0757
ekg	Sdann(bvp)	32.7	-8.1	45.8	0.1309	-39.3	-65.1	35.1	0.5703	0.2057
ekg	Sdann(ekg)	22.4	-12.5	46.7	0.2754	-8.1	-32.9	5.7	0.7695	0.2123
ekg	vlf	200.0	-74.3	773.7	0.1934	-28.6	-94.4	168.7	0.9219	0.520

[1]: p-value for evaluating changes from baseline to post-treatment within arm
[2]: p-value for comparing changes from baseline to post-treatment between arms

3. **Comparison of Amino Acid Parameters between Active versus Placebo**

Table 5: *Comparison of percentage changes (from baseline to post-treatment) in amino acid parameters between Active versus Placebo group*

	Active (N=10)			**Placebo (N=10)**			
Parameter	**Mean**	**SD**	**p-value[1]**	**Mean**	**SD**	**p-value[1]**	**p-value[2]**
Ala	66.6	124.7	0.1602	-12.9	45.6	0.2754	0.0640
Arg	34.9	104.7	0.3223	30.7	117.8	0.8457	0.4727
Asn	102.8	152.6	0.1055	2.9	73.9	0.6250	0.1041
Asp	64.7	136.5	0.4316	43.5	195.7	0.6953	0.6232
Bala	73.4	119	0.1602	-10.9	70.5	0.1602	0.0757
Car	56.7	117.6	0.1934	49.3	114.6	0.1602	1.0000
Cit	52.5	103.6	0.1934	10.1	97.5	0.6250	0.2123
Cys	81.1	110.9	0.0273*	5.7	74.6	0.6953	0.0257*
Gln	54.3	68.4	0.0195*	-15.3	46.1	0.2754	0.0312*
Glu	33.7	74.1	0.3223	-1.8	35.1	0.4316	0.2123
Gly	31.9	49.2	0.0488*	6.8	83.8	0.9219	0.1859
HTP	-4.5	33	0.5566	12.1	49.6	0.7695	0.6232
His	30.1	93.3	0.5566	25.9	112.3	0.8457	0.6232
Ile	11.7	46.5	0.6953	-6.9	54.2	0.3223	0.3075
Leu	55	95.3	0.0273*	11.4	72.8	0.8457	0.1041
Lys	30.1	81.2	0.4316	27.1	139.1	0.6250	0.5205
Met	21.8	68	0.3223	0.8	58.8	0.7695	0.3447
Orn	30.7	100.4	0.4922	10.5	102.9	0.1934	0.3075
Phe	-7.9	30.5	0.6953	3	49.9	0.6250	0.9698
Pro	106	174.3	0.0645	-12.9	59.8	0.4922	0.0376*
Ser	88.7	124.9	0.0488*	-9	48.3	0.4922	0.0211*
Thr	100.7	141.1	0.0273*	10.1	79.7	0.9219	0.0539
Trp	18.7	90.7	0.7695	34.1	135.2	0.6953	1.0000
Tyr	36.6	101.7	0.3750	23.9	75.4	0.8457	0.6232
Val	77.3	104.8	0.0840	12.2	89	0.9219	0.0640

[1]: p-value for evaluating changes from baseline to post-treatment within arm
[2]: p-value for comparing changes from baseline to post-treatment between arms

4. Comparison of Neurotransmitter Parameters between Active versus Placebo

Table 6: *Comparison of percentage changes (from baseline to post-treatment) in neurotransmitter parameters between Active versus Placebo group*

	Active (N=10)			Placebo (N=10)			
	Mean	**SD**	**p-value[1]**	**Mean**	**SD**	**p-value[1]**	**p-value[2]**
ADR	121.5	302.6	0.9219	-9.9	64.4	0.2324	0.4274
Cre	-2.9	78.5	0.4316	43.4	93.1	0.3223	0.1859
DA	52.9	196.3	0.6953	9.2	50.8	0.8457	0.8501
GABA	81.3	113.3	0.1055	-1.7	53.6	0.6250	0.1041
Glu	71.1	84.8	0.0273*	3.3	88.2	0.5566	0.0539
Hist	96.8	253.7	0.1309	4.5	51.0	0.8457	0.2730
LDOPA	160.0	213.9	0.0137*	-12.9	41.2	0.3750	0.0046*
Metaneph	52.1	163.3	0.4316	10.3	79.7	0.8457	0.4727
Mtyramine	53.5	145.3	0.3223	110.3	124.4	0.0195	0.2123
NAD	15.6	50.3	0.5566	60.2	110.9	0.1602	0.4274
NAD/ADR	25.9	81.5	0.4922	118.8	186.5	0.0371	0.1859
Normetane	163.8	328.0	0.4316	-11.3	82.6	0.4922	0.1620
Ser	62.7	209.3	1.0000	21.8	49.3	0.1934	0.3847
Ser/DA	17.8	72.4	0.9336	39.8	108.0	0.3750	0.4727
Theanine	2.6	3.7	1.0000	-30.1	47.2	0.5000	0.7728

[1]: p-value for evaluating changes from baseline to post-treatment within arm
[2]: p-value for comparing changes from baseline to post-treatment between arms

Questionnaire Outcomes

5. Comparison of Marlowe Crowne Scale scores between groups

Table 7a: *Comparison of Marlowe-Crowne Scale scores between groups*

	Mean (SD)	**95% Confidence Interval**	**p-value**
Active	15.5 (2.6)	13.6 – 17.4	0.1958
Control	17.2 (3.0)	15.1 – 19.3	

Table 7b: *Comparison of Marlowe-Crowne Scale categories between groups*

	ACTIVE	**Control**	**p-value**
Low	0 (0%)	0 (0%)	0.2105
Moderate	10 (100%)	7 (70%)	
Severe	0 (0%)	3 (30%)	

3. Comparison of Tellegen Absorption Scale scores between groups

Table 8: *Comparison of Tellegen Absorption Scale scores between groups*

	Mean (SD)	**95% Confidence Interval**	**p-value**
Active	15.5 (2.1)	14.0 – 17.0	0.3664
Control	16.4 (2.2)	14.8 – 18.0	

4. **Comparison of Profile Mood State (POMS) Short Scale scores between groups**

Table 9: *Comparison of item specific POMS scores between groups*

	Active (N=10)		Control (N=10)		
Item	**Mean**	**SD**	**Mean**	**SD**	**p-value**
1	1.60	0.97	1.80	1.40	0.7142
2	2.00	1.41	0.80	0.79	0.0308
3	1.50	1.08	2.00	1.05	0.3087
4	1.10	1.29	1.00	1.05	0.8513
5	2.80	0.79	1.90	0.99	0.0378
6	0.90	1.10	0.80	0.92	0.8279
7	1.00	1.33	0.70	0.82	0.5525
8	0.90	1.29	1.40	1.35	0.4077
9	2.70	1.16	2.30	0.82	0.3855
10	1.20	1.03	1.20	1.14	0.9999
11	1.30	1.34	1.20	1.23	0.8638
12	1.10	1.45	1.30	1.42	0.7587
13	2.40	1.26	2.40	0.84	0.9999
14	1.00	1.41	0.30	0.67	0.1748
15	1.20	1.14	1.70	1.34	0.3794
16	0.80	0.79	1.40	1.26	0.2193
17	1.00	1.33	1.20	1.03	0.7120
18	1.10	1.20	1.70	0.95	0.2301
19	1.20	1.32	1.00	1.05	0.7120
20	1.20	1.14	1.40	1.17	0.7031
21	0.60	0.84	1.00	0.94	0.3306
22	0.90	1.10	1.50	1.18	0.2546
23	0.80	1.14	0.90	1.45	0.8655
24	2.50	1.27	2.20	0.92	0.5525
25	0.70	0.82	0.70	0.82	0.9999
26	1.60	1.43	1.90	0.99	0.5926
27	1.20	0.92	1.30	1.16	0.8332
28	0.70	1.06	0.20	0.42	0.1825
29	0.50	0.71	1.40	1.35	0.0782
30	0.80	1.40	0.90	0.88	0.8502
31	0.90	1.10	0.80	1.32	0.8559
32	2.20	1.32	1.70	0.95	0.3428
33	0.70	1.16	0.40	0.70	0.4925
34	0.90	1.10	1.00	0.94	0.8297
35	1.90	1.29	1.40	1.07	0.3582
36	1.80	1.14	1.11	0.87	0.1459
37	0.80	0.92	1.30	1.06	0.2744

Appendix B: Studies supporting the development of the GDV device

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Appendix C: Finger Analysis Table

Korotkov, K., "Human Energy Field"
fig.13