

Experimental

REDUCTION OF FREE RADICALS BY ELECTRICAL STIMULATION OF SPECIFIC ACUPUNCTURE POINTS

C. Norman Shealy, M.D., Ph.D.; Vera Borgmeyer, R.N., M.S.
& K. Paul Thomlinson, Ph.D.

ABSTRACT

Thirty individuals with positive urinary tests for malondialdehyde, a major marker for free radicals, used one of two types of transcutaneous electrical nerve stimulators for two to four days on thirteen acupressure points, the Ring of Crystal. There was a significant reduction of free radicals after two to four days of stimulation. The potential anti-aging and health enhancement benefits of this approach are worthy of further study.

KEYWORDS: Free radicals, acupuncture points, electrical stimulation

INTRODUCTION

Oxidative stress, or free radicals, appear to be major contributors to virtually every known illness, as well as aging itself. Although this is well known and antioxidants are widely used in attempts to prevent free radical pathology, the evidence is not conclusive. Furthermore, it is clear from our own studies that some individuals taking rather huge doses of antioxidants still have evidence of significant free radical production. This paper reports the results of an innovative approach to the reduction of free radicals; electrical stimulation of thirteen specific acupuncture points that we have called the Ring of Crystal.

RESEARCH PROTOCOL

Thirty adult volunteers with positive urinary tests for malondialdehyde (VesPro Life Sciences, LLC) applied one of two TENS devices to thirteen specific acupuncture points, which we have named the Ring of Crystal, five minutes per point, daily for two to four days. The two stimulators have been used in several previous studies and it appears that about 80% of the time, either stimulator may be effective, but about 20% of individuals respond positively only to the She-Li TENS™.^{1,2}

DESCRIPTION OF THE TENS UNITS

The Liss TENS unit was developed by Saul Liss and first used at the Shealy Institute in 1975. It emits 1 to 4 milliamps of current with 15,000 pulses per second modulated 15 times and 500 times per second. We have used it in well over 20,000 patients with no complications.

The She-Li TENS™ is a modification of the original old Electreat, which gave us the idea in the mid 60s for the modern TENS. It is the first modern TENS that has the wide range of frequencies of its antique predecessor and it is the only TENS, other than the Liss, that we have found capable of activating acupuncture points neurochemically.

Table I
Lipid Peroxidase (nanomols/ml)

Subject	Sex	Age	Before	After	Stimulator Used
JP	F	41	1.2	0.9	She-Li
JJ	M	63	1.2	1.0	She-Li
CF	F	49	0.8	0.8	LISS
RP	F	20	1.2	1.0	She-Li
MC	F	50	1.6	1.3	She-Li

THE RING OF CRYSTAL POINTS

Bilateral: SP 4; GB 30.5; GB 11
Midline, front: CV 8.5; CV 14.5; CV 23
Midline, back: GV 4.5; GV 7.5; GV 14.5
Top of head: GV 20

In addition, five of the subjects had blood drawn before and after the stimulation for measurement of lipid peroxidase, with serum frozen and sent to MetaMetrix Clinical Laboratory, Norcross, Georgia.

RESULTS

All four who had elevated lipid peroxidase experienced reductions, three of them to the normal range. The Normal range is up to 1.0 nanomols/ml (Table I).

Thirteen of thirty individuals had no excess free radicals after stimulation; eleven had reductions and only six had no reduction (Table II). NS initially had no effect from the LISS but responded well to the She-Li TENS™. Ideally, those who do not respond to the LISS should also try the She-Li TENS™, as we have found in an earlier study that the higher frequencies are necessary for some individuals.³

Of some importance is the fact that 13 individuals had no excess free radicals at initial testing.

Table II
Urinary Malondialdehyde (0 to 3 scale)

Subject	Sex	Age	Before	After	Equipment Used
JP	F	41	2.5	0	She-Li TENS
JJ	M	63	1.5	0.5	She-Li TENS
CF	F	49	1.5	0.5	LISS
RP	F	20	3	2	She-Li TENS
MC	F	50	3	0	She-Li TENS
JE	F	48	2	0	LISS
CF	M	60	2	2	LISS
JS	M	26	1	0	LISS
PS	F	72	1	0	LISS
WD	M	55	2	1	LISS
DV	F	60	1	0	LISS
SA	M	40	2	0	LISS
BC	F	21	3	3	She-Li TENS
NS	M	69	3	0	LISS & She-Li TENS
JS	F	45	3	0	LISS
SW	M	42	1	0	LISS
AL	M	47	1	0	LISS
PT	M	38	1.5	0.5	She-Li TENS
NK	M	51	2.5	1.0	LISS
FL	M	55	3	0.5	LISS
DJ	F	50	2	0	LISS
AC	M	27	3	3	LISS
LS	M	53	1.5	0.5	She-Li TENS
RK	M	28	3.0	1.0	LISS
NW	M	25	3.0	2.5	LISS
RC	F	39	2.0	2.0	LISS
CM	M	42	3.0	3.0	She-Li TENS
DO	F	46	2.0	0	She-Li TENS
CB	F	45	3.0	3.0	She-Li, GIGA, LISS
MM	F	54	3.0	1.5	LISS

Taken as a whole, the 30 research participants showed a dramatic reduction in free radical activity as measured by the urinary malondialdehyde test. Specifically, the paired sample *t*-test revealed that the mean change in free radical levels from pretest (2.20) to post-test (0.92) was statistically significant [$t(29) = 7.45, p < 0.001$].

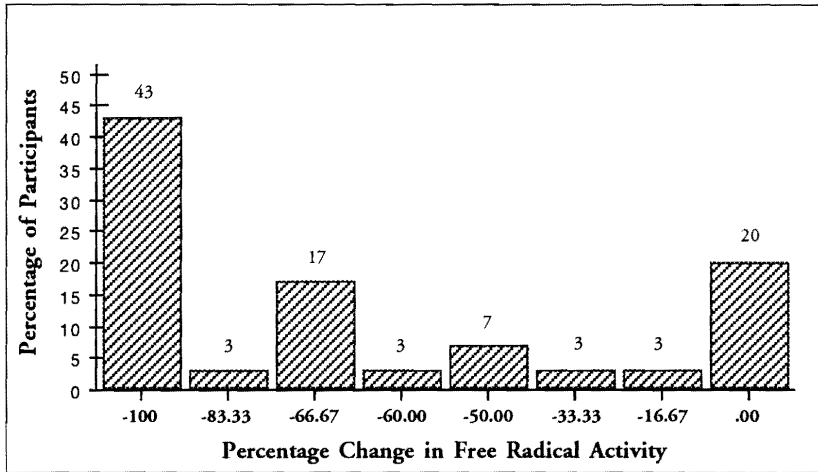


Figure 1. Change in free radicals from pre-test to post-test

Figure 1 summarizes the change in free radicals among the 30 participants. It is important to note that the magnitude of the reduction in free radical activity was significantly related to age among the research participants. That is, the older the participant, the greater the percentage of reduction at post-testing [$r(28) = 0.37, p = 0.04$]. There was no significant effect for gender of the participants.

DISCUSSION

Most living organisms generate energy by reducing molecular oxygen (O_2) to water. This reaction involves transfer of four electrons to oxygen, often producing reactive oxygen species (ROS), most particularly the superoxide anion, hydroxyl radicals, and hydrogen peroxide. These are known as “free radicals.” The highly reactive molecules are widely considered to be agents of disease, as well as of aging itself. Only since 1967 has this principle been increasingly understood, after Irwin Fridovitch and Joe McCord discovered an antioxidant enzyme superoxide dismutase (SOD). The potential role of ROS has been identified in a wide variety of diseases from atherosclerosis to cancer, inflammatory diseases, cataracts, and even wrinkling,

as well as many of the neurodegenerative diseases such as amyotrophic lateral sclerosis, Parkinson's disease, Alzheimer's, etc.⁴ The discovery of free radicals has led to extensive research into the benefits of antioxidants and there is significant evidence that a wide variety of antioxidants exist and may be useful.

Free radicals occur in rather minute quantities in biological tissues and their cellular levels and actions cannot be directly measured in living tissue. However, markers of ROS are widely used including thiobarbituric acid-reactive substances, erythrocyte glutathione, and glutathione peroxidase.⁵ Malondialdehyde (MBA) levels both in blood and urine have been one of the most widely used markers of ROS.⁶⁻⁸ A statistically significant difference between MBA and common carotid artery wall intima-media thickness has been demonstrated.⁹

Measurement of malondialdehyde excretion in the urine became available in 1964. Malondialdehyde is the end product of lipid peroxidation and this urinary colorimetric assay represents by far the simplest approach to measurement of free radical activity. Furthermore, the colorimetric assay has been highly statistically significantly correlated with the fluorometric approach.¹⁰⁻¹⁴

For the purposes of our study, we have primarily used the Free Radical Test™ urine test provided by Vespro Life Sciences, LLC. The test is read on a 4 point scale from clear to pink, red and dark red, or 0, +1, +2 and +3. Zero suggests "possible low electron potential," 1+ is low oxidation, 2+ moderate, and 3+ heavy oxidation. Although it is suggested that the test be done in a fasting state, we have tested at various times during the day and found no significant difference in a given individual. In addition, in five individuals we compared the results of serum lipid peroxides, one of the other standards of free radical activity.

Despite the extensive research in the use of antioxidants, there is not a clear-cut consensus that these antioxidants are totally successful in reducing free radicals.^{15,16} Although cancer tissue has significant decreases in glutathione, vitamin C and vitamin E, there is no evidence that taking the supplements actually prevents cancer.¹⁷ On the other hand, there is considerable evidence that the antioxidants found in natural sources, such as vegetables and fruit, do have a beneficial effect.¹⁸ At least in vitro testing with vitamin E, vitamin C,

alpha-lipoic acid and taurine suggests that all of these protect against cataracts.¹⁹ Despite the lack of great clinical significance in the use of antioxidants, there is a great argument for the use of micronutrient antioxidants as a standard in many diseases, including cancer and Type 2 diabetes.^{20,21} And finally, it is of some interest that the antioxidants themselves apparently should not ordinarily cross the blood brain barrier, a significant problem in reducing the known negative effects of free radicals in many degenerative central nervous system diseases such as Alzheimer's.²²

Other than antioxidants, at this point in time we have found only one non-antioxidant technique for reducing free radicals. Interestingly, that is 6 degrees head down bed rest but that required 17 days of simulated weightlessness. Furthermore, bed rest and inactivity have also been demonstrated to increase ROS.^{23,24}

In the current study, in thirty individuals with positive urinary evidence of free radicals, there is a significant 78.6% reduction in total free radical activity, with reductions in 87% of the subjects. It is conceivable that three of the four who did not have reductions might have had a response to the She-Li TENS™. Unfortunately, we have not been able to have them use the other stimulator; we do have some evidence that the higher frequency of the She-Li TENS™ may be effective when the LISS is not.³ Also unknown at this time is the long-term effect of prolonged daily stimulation of the Ring of Crystal. Can the beneficial effects be maintained with stimulation only once or twice a week?

At least half the individuals with excess free radicals were already taking significant oral anti-oxidants. And, some of those with no urinary free radicals were not taking antioxidants. Much remains to be learned. However, the preliminary findings suggest that there could be significant anti-aging and health benefits from stimulation of these thirteen acupuncture points. We have used both the stimulators in this study in many thousands of patients over a period of more than twenty-seven years with no known ill effects.

Finally, our confirmation of the reduction of free radicals as measured by lipid peroxidase is gratifying. On the other hand, the urinary test appears to be more sensitive, is much less expensive, and much easier to do.

Four other circuits have also been found to have specific neurochemical effects. The combined effects of these circuits in increasing DHEA, neurotensin, aldosterone and calcitonin, with reduction of free radicals by the Ring of Crystal, may indeed also provide even further health benefits.^{1,2} For instance, we now know that the Ring of Fire not only raises DHEA but also has benefits in migraine, diabetic neuropathy, and rheumatoid arthritis. These benefits do not occur unless all of the points are stimulated. If all of the five circuits were stimulated in a systematic plan, we might see enhanced overall results, possibly providing overall anti-aging benefit.

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CORRESPONDENCE: C. Norman Shealy • Holos Institutes of Health, Inc. • 5607 S. 222nd Road • Fair Grove, MO 65648 • Phone: 417-267-2900 • FAX: 417-267-3011 • e-mail: norm@shealyhealthnet.com

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