ORIGINAL RESEARCH

Changes in Salivary pH and General Health Status Following the Clinical Application of Bio-Energetic Synchronization

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Abstract — The present preliminary study investigated the relationship between autonomic nervous system imbalance, fasting salivary pH, and general health status following the clinical application of Bio-Energetic Synchronization. The clinical objective of Bio-Energetic Synchronization involves the updating or re-setting of inappropriate response physiology mediated through sensory engrams. Clinical observations indicate that the inappropriate expression of response physiology often reflects characteristics of autonomic imbalance. Thus, in view of other studies linking lower fasting salivary pH to sympathetic "stress," salivary pH was investigated as a possible index of physiological change reflecting the clinical objective of Bio-Energetic Synchronization. Twenty four patients attending a four day program, during which each patient received Bio-Energetic Synchronization, were separated into two gender and age matched groups of 12 subjects each. The two groups were categorized according to presenting symptoms or conditions which closely reflected predominantly sympathetic (S-Group) or parasympathetic imbalance (P-Group). Prior to, and four days following the administration of Bio-Energetic Synchronization, participants of the two groups were tested for fasting salivary pH and asked to complete the Rand-36 General Health Status survey. Results revealed, prior to care, that the P-Group had lower, but not significantly different, salivary pH values than the S-Group. Following the administration of Bio-Energetic Sychronization, pH values increased significantly in the S-Group, and decreased significantly in the P-Group. Moreover, the S-Group expressed lower total scores (lower perceived health status) than the P-Group in the Rand-36 survey both pre and post care although the S-Group showed significantly improved scores regarding general health, post-care. Greater pre-post improvement was observed in the S-Group, suggesting a greater overall treatment effect in the S-Group compared to the P-Group. The indication of a greater clinical effect for the S-Group was also supported by a large effect size of 0.80 for pH change, compared to a moderate effect size for the P-Group of 0.50. Based on these preliminary findings it is suggested that measurement of fasting salivary pH may be a reliable non-invasive means of substantiating pre/post intervention changes in autonomic imbalance. Additionally, lower fasting salivary pH values appear to be associated with sympathetic imbalance, while higher values appear to be associated with parasympathetic imbalance. As well, in the present study, subjects in both the S-Group and P-Groups self-reported overall improvement in general health status concomitant with pH changes following the application of Bio-Energetic Synchronization. These preliminary findings support clinical observations suggesting that this approach is associated with restoration of autonomic balance. The relevance of this process to the etiology and correction of vertebral subluxation is discussed.

Key words: Fasting Salivary pH, sympathetic and parasympathetic imbalance, Bio-Energetic Synchronization.

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Introduction

Many activities of the autonomic nervous system have been proposed to be responses to cortical engrams, or "motor patterns." Once sensory input has been acquired relative to an event, the information is believed to be stored in the neocortex and regions of the limbic system.

Regarding motor patterns, such as movement, Guyton[1] proposes that engrams, once established in the sensory cortex, are then used as a guide for the motor system to follow in reproducing the same pattern of movement. While this method of

"imprinting" may be useful for establishing necessary redundancy in every day activities, the inappropriate expression of engrams, especially those associated with trauma related events, can have unwanted effects. For example, Kolk and Hart[2] propose that future sensory input which mimics a given past experience may elicit the same motor response. This response often exhibits characteristics of sympathetic or parasympathetic imbalance such as fight or flight physiology, digestive problems, and a host of other "conditions" described as "psychosomatic disorders."[3]

As classically described by Janet,[4] Freud,[5] Pavlov,[6] and recently elaborated by Goleman,[7] the untimely, or "inappropriate" expression of motor responses associated with sensory engrams can manifest in an "out-of-date" fashion. The amygdala, which has been identified as the principal component of the brain which interprets incoming stimuli, via the thalamus, eliciting the appropriate fight or flight response is also recognized as a neural center capable of promoting these same responses in an inappropriate fashion. For example, Goleman[7] identifies the amygdala as sending "out-of-date" responses encompassing movement, norepinephrine secretion, cardiovacular activity, muscular activity, and gastro-intestinal activity. This is best appreciated in view of findings which suggest that neural input processed first through the thalamus travels through a single synapse to the amygdala, then to the neocortex, where it is rationalized.[8,9] This routing permits the amygdala to respond prior to rationalization by the neocortex which promotes stimulus specific responses. By virtue of this pathway, as the repository for emotional memory, the amygdala scans experiences, comparing what is happening now with what happened in the past. Thus, a stimulus occurring in the present, which the amygdala identifies with a past event, will elicit the same physiological response, although inappropriate to current circumstances.

The significance of this phenomenon is that many individuals present to various health care providers with symptoms or dysfunctions, often associated with autonomic nervous system imbalance, or other neurological problems, having no apparent etiology. In recognition of this link between "unexplained" symptoms and "out-of-date" or "inappropriate" responses by the thalamic/amygdala pathway, Bio-Energetic Synchronization[10,11] is a clinical approach which "updates" or "re-sets" engrams eliciting inappropriate physiology often associated with autonomic imbalance.[12] Thus, this approach of "updating" sensory engrams has relevance to a number of disciplines, since any disorder accompanied by an elusive etiology may impact on individual function and overall health. It is also of specific interest to chiropractic as it may provide insight into the etiology of vertebral subluxation, originally described by Palmer,[13] which is yet to be resolved.

Although the administration of Bio-Energetic Synchronization is extensive in scope,[10,11] one aspect of the initial patient evaluation involves the determination of fasting salivary pH, and the ability of the body to alter this pH in response to an acid challenge. While failure to neutralize the acid challenge may be related to the patient's intake of alkaline versus acid forming foods,[14] clinical observations, and other studies, also suggest that patients presenting with predominant sympathetic versus parasympathetic conditions show lower or higher fasting salivary pH, respectively. Moreover, stress and anxiety have been shown to decrease fasting salivary pH.[15-20] That is, human subjects exhibiting sympathetic "stress" demonstrate lower salivary pH values than control subjects. Conversely, there is a suggestion from the literature that salivary pH is higher during relaxation[19] (a time when parasympathetic tone to the salivary glands is greatest) compared to stressful situations. Changes in fasting salivary pH, therefore, may be one indicator of autonomic nervous system imbalance since other characteristics of salivary secretion and composition have also been shown to be regulated by both sympathetic and parasympathetic branches of the autonomic nervous system.[1]

Additionally, while a non-invasive physiological assessment of autonomic imbalance is important in the initial patient assessment prior to administration of Bio-Energetic Synchronization, an indication of self-perceived general health status is also attained. As pointed out by McDowell and Newell,[21] there exists a need to monitor, by valid survey instruments, the outcomes of care and the output of the health system, due to worldwide economic constraints on health care. It is also necessary to consider both objective and subjective (self reporting by patients) assessments which reflect on the efficacy of a particular health oriented care regimen, as each may provide evidence in support of the other. In consideration of these perspectives, the patient-reported information gathered in the present study has been correlated to clinical findings, including fasting salivary pH, to create a holistic health profile for the patient, as well as contributing to an understanding of the influence of Bio-Energetic Synchronization to general health.

Pilot Study

In light of the growing evidence that fasting salivary pH may be a reliable indicator of autonomic imbalance, the present pilot study was conducted to investigate the hypothesis that lower salivary pH would accompany excessive sympathetic stimulation, while higher pH values would accompany parasympathetic predominance. Moreover, since the clinical objective of Bio-Energetic Synchronization involves the restoration of autonomic balance by re-setting or updating sensory engrams, the hypothesis also predicted that salivary pH values would increase or decrease accordingly after administration of care. To provide a more thorough analysis of the significance of Bio-Energetic Synchronization, patient self-perceptions of general health were assessed in relationship to changes in fasting salivary pH.

Methods

Subjects

The study involved twenty four subjects selected from a group of 95 consecutive patients referred to the Morter Health Clinic, in Rogers Arkansas, during the months of August - September, 1996, for an intensive four day treatment regimen[22] of Bio-Energetic Synchronization[10,11] From the pool of 95 patients, only those that presented with complaints that could be reasonably associated with either sympathetic or parasympathetic predominance[1] were selected for the study. From the twenty

four subjects, matched for gender and age, a group of twelve patients presented with a condition or combination of conditions considered indicative of excessive sympathetic stimulation (i.e., heart palpitations, high blood pressure, chronic or acute stress, excessive fatigue), [S-Group], and another twelve with indications suggestive of a predominating parasympathetic imbalance (i.e., digestive problems, impotence), [P-Group] (Table 1). The nature of the study was described to each potential participant. Following the description and a question and answer period, verbal and written consent to participate in the study was obtained from each patient.

Measurements

Salivary pH

Twelve hour fasting salivary pH values were determined by clinic staff, using standard pH paper (with a range of 6.0-8.0) held by the patient in the oral cavity for 20 seconds. Fasting salivary pH was obtained for all subjects prior to the application of Bio-Energetic Synchronization and, again, after the four day period of care. All tests were done within a time frame of 10 minutes at the same time of day to minimize any diurnal influences.

General Health Status

General health status information was collected from all patients using the Rand-36-Item Health Survey.[23] The Survey has been designed to assess physical and emotional health through eight subscales, including: physical functioning (PF), role functioning in regard to physical problems (RPP), role functioning in regard to emotional problems (REP), energy/fatigue (EF), emotional well-being (EW), social functioning (SF), pain (P), and general overall health (GH). The Rand-36 is widely used and is considered a reliable, valid instrument for assessing the eight sub-scales described.[21] Clinic staff administered the survey after the pH measurement prior to the application of Bio-Energetic Synchronization, and again, after the four day period of care.

Analysis of Data

The S-Group and P-Group pH data were compared within

Table 1. General Profile of Gender, Age, and Presenting Conditions of Patients Receiving Bio-Energetic Synchronization

	Age	*Gender*	*Presenting Conditions*	
			Sympathetic	Parasympathetic
Patients				
S-Group				
1.	81	M	Fatigue	
2.	61	F	High Blood Pressure	
3.	54	F	Stress	
4.	64	M	Cardiac Problems	
5.	32	F	Stress	
6.	35	M	Fatigue	
7.	71	M	Tachycardia	
8.	35	F	Severe pain	
9.	38	F	Duodenal ulcer	
10.	68	M	High blood pressure	
11.	58	M	Cardiac arrhythmia	
12.	57	F	Heart palpatations	
P-Group				
1.	54	F		Food Allergy
2.	51	F		Mal-absorption
3.	62	M		Digestive problems
4.	53	M		Allergies
5.	64	M		Impotence
6.	58	M		Impotence
7.	61	M		Indigestion
8.	74	M		Indigestion
9.	36	F		Indigestion
10.	59	F		Indigestion
11.	48	F		Indigestion
12.	69	F		Stomach/Liver

Table 2. Changes in Fasting Salivary pH Before and After Bio-Energetic Synchronization

	pH			
	Pre Treatment (mean ± std. dev.)	*Post Treatment* (mean ± std. dev.)	*p value*	*Effect Size‡*
S-Group*	6.31 ± 0.43	6.67 ± 0.37	0.000	0.80
P-Group*	6.51 ± 0.49	6.29 ± 0.52	0.010	0.50

* The S-Group was composed of patients presenting with one or more conditions presumed to be associated with sympathetic stimulation (i.e., heart palpitations, high blood pressure, chronic or acute stress, excessive fatigue), while the P-Group presented with one or more conditions presumed to be associated with the parasympathetic system (i.e., digestive problems, impotence).

‡ Effect size is determined by Mean 1 - Mean 2 / Standard deviation of Mean 1. A value of 0.20 is a small effect, 0.50 moderate, and 0.80 is considered a large treatment effect.

groups, before and after care, by a paired sample two-tailed t-test with significant differences reported at a confidence interval of 0.05 ($p < 0.05$). Data between the S-Group and the P-Group were compared by a two-tailed t-test assuming unequal variances, with significance reported at $p < 0.05$. Gender and age effects were not evaluated as the distribution of the two groups was age and gender matched.

The Rand-36 survey responses were analyzed according to standard methods wherein higher scores indicated an improved status. Scores were also evaluated within each group by a paired sample two-tailed t-test, and across groups by a two-tailed t-test assuming unequal variances. Probability values of less than 0.05 were adjusted to account for multiple significance testing (0.05/ 8 [number of tests in the Rand-36 survey]) to yield an alpha of 0.006, used to determine significant differences.

Effect size[24] was used to assess clinical significance of both pH values and the Rand-36 scores in all eight sub-scales. Effect size measures the magnitude of mean changes in pre to post treatment values relative to the observed standard deviation of the pre-treatment mean. This statistic is considered a measure of the magnitude of treatment effect. Values of 0.20 represent a small effect, 0.50 a moderate effect, and 0.80 a large effect.

Results

Pre versus Post Treatment Salivary pH changes

Both the "sympathetic" (S-Group) and "parasympathetic" (P-Group) consisted of six females and six males. The average age for each group was 54.5 years ± 16.1, and 54.8 ± 10.3 years, respectively. The results of the pilot study (Table 1-3) show that fasting salivary pH values in the S-Group increased significantly under care from 6.31 ± 0.43 to 6.67 ± 0.37 ($p = 0.000$), whereas the P-Group decreased significantly from 6.51 ± 0.49 to 6.29 ± 0.52 ($p = 0.010$).

Although patients categorized as exhibiting a predominant parasympathetic imbalance (P-Group) demonstrated initially higher fasting salivary pH values than the group categorized as expressing predominant sympathetic imbalance (S-Group), the two groups did not differ significantly from one another prior to treatment. Moreover, post intervention fasting salivary pH values did not differ significantly between the two groups.

There was a larger mean difference between the two groups post-intervention (0.40) pH values compared to their pre-intervention pH values (0.20). This difference was apparently due to an increase in post treatment pH variation within the P-Group, following the application of Bio-Energetic Synchronization, as the standard deviation of the S-Group decreased post treatment. This suggested that the overall response in the P-Group was not as great as the S-Group. This suggestion was tested by determining the extent of the treatment effect for each group, i.e., effect sizes.

Effect sizes for the two groups revealed a large treatment effect in the S-Group (0.80) compared to a moderate effect in the P-Group (0.50). The lower post treatment effect in the P-Group is consistent with the larger variation of pH values observed in this group.

Rand-36 Scores

Changes within the S-Groups and P-Group

With regard to the Rand-36 self-assessment survey, although scores exhibited an increasing trend for 7 or the 8 sub-scales, significant differences were observed within the S-Group for only one of the eight subscales. Scores for the general health sub-scale (GH) increased significantly ($p = 0.000$) from pre to post intervention. Alternatively, while the same trend of increasing scores, pre to post intervention, was observed within the P-Group, Rand-36 scores did not increase significantly for any of the sub-scales. While not statistically significant, it was observed that substantially greater percent changes pre/post intervention occurred between the two groups with regard to the sub-scales. The S-Group showed percent increases in scores for physical functioning (PF) of 42%, compared to 12 % for the P-Group. The S-Groups increased 47% in the sub-scale of role functioning in regard to physical problems (RPP), compared to 8% in the P-Group. A similar large difference, which was significant ($p = 000$) was observed in regard to general health (GH), where an increase of 35% was recorded in the S-Groups compared to 15% in the P-Group.

Table 3. Changes in Rand-36 Item Health Survey Self Reported Scores Before and After Bio-Energetic Synchronization

	*Sub-scales**							
Group	PF	RPP	REP	EF	EW	SF	P	GH
S								
Pre	55 ± 31	32 ± 37	43 ± 43	40 ± 24	59 ± 22	66 ± 32	64 ± 21	51 ± 26
Post	78 ± 20	47 ± 45	47 ± 45	41 ± 25	58 ± 24	68 ± 27	62 ± 24	69 ± 21
p †	0.01	0.30	0.77	0.94	0.70	0.76	0.84	**0.00**
E.S ‡	0.80	0.40	0.10	0.01	0.10	0.10	0.10	0.70
% ±	42.00	47.00	9.00	3.00	-2.00	3.00	-1.00	35.00
P								
Pre	80 ± 20	73 ± 29	86 ± 33	57 ± 20	75 ± 13	86 ± 18	80 ± 19	71 ± 15
Post	90 ± 9	79 ± 26	84 ± 30	70 ± 21	80 ± 19	91 ± 16	78 ± 28	82 ± 14
p	0.07	0.46	0.80	0.13	0.26	0.02	0.77	0.01
E.S.	0.50	0.20	0.10	0.60	0.40	0.30	- 0.10	0.70
% ±	12.00	8.00	-2.00	23.00	7.00	6.00	- 3.00	15.00

* Refer to **Methods**, for sub-scale abbreviations. Increased scores represent improvement.
† Significant ($p < 0.006$) paired (pre- post) two-tailed t-test values are in bold type.
‡ Effect size (E.S.) is determined by Mean 1 - Mean 2 / Standard deviation of Mean 1. A value of 0.20 is a small effect, 0.50 is moderate, and 0.80 is considered a large treatment effect.
% ± Represents percent increase or percent decrease in score, pre/post intervention.

A reversal of substantial percent increase in scores was seen for the P-Group compared to the S-Group in the sub-scales of energy/fatigue (EF). In this sub-scale, an increase of 23% was recorded for the P-Group compared 3% in the S-Group. Changes in other sub-scales did not vary by more than 10%, and were not considered substantial.

The extent of these findings contributed to the apparent greater effect on the S-Group as compared to the P-Group.

Changes Across the S-Group and P-Group

Pre-treatment Comparisons

When comparing across groups, the adjustment for multiple significance testing was relaxed, and significance between the groups was determined at $p < 0.05$. Pre-treatment scores were significantly lower ($p = 0.029$) in the S-Group (55.0 ± 31.0) compared to the P-Group (80.4 ± 20.4) for the physical functioning (PF) sub-scale. Moreover, pre-treatment scores were also significantly different across the two groups for the role functioning regarding physical problems (RPP) sub-scale ($p = 0.010$). In the RPP sub-scale, again, the S-Group self-reported lower (31.8 ± 37.1) than the P-Group (72.9 ± 29.1). As well, the S-Group self-reported significantly lower (42.5 ± 42.9) than the P-Group (86.1 ± 33.3) relative to the role functioning regarding emotional problems (REP) sub-scale ($p = 0.009$). The two groups also differed significantly ($p = 0.038$) in regard to the general health (GH) sub-scale, with pre-treatment scores of 51.3 ± 26.2 versus 70.8 ± 15.1, respectively. In every sub-scale of the Rand-36 questionnaire where statistical differences were determined, the S-Group reported lower scores compared to the P-Group.

Post-treatment Comparisons

Post treatment comparisons were significantly different in the sub-scales for role functioning regarding emotional problems ($p = 0.03$), energy/fatigue ($p = 0.01$), emotional well being ($p = 0.02$), and social functioning ($p = 0.02$). Post intervention score comparisons between the two groups followed the same pattern as pre-treatment scores with the S-Group self-reporting lower scores compared to the P-Group. Scores for the S-Group and P-Group, respectively, were 46.8 ± 44.8 versus 84.2 ± 31.1 in the REP sub-scale, 40.9 ± 25.4 versus 70.4 ± 20.9 for EF, 57.5 ± 24.1 compared to 80.0 ± 19.1 regarding EW, and 68.4 ± 26.7 versus 90.7 ± 16.1 for the SF sub-scale.

In the sub-scales described, the S-Group self-reported lower Rand-36 scores both pre and post treatment, compared to the P-Group. However, with the exception of the REP sub-scale, in the other three sub-scales (described above; PF, RPP, and GH) where pre-treatment scores differed across the groups, post treat-

ment scores did not. As with changes in salivary pH, this also suggested a larger response in perceived health after treatment for the S-Group. This finding was also in agreement with the substantially different changes in percent improvement found in the same sub-scales in the S-Group compared to the P-Group. Effect size determinations for the three categories further substantiated this finding, with values for the S-Group of 0.80 (PF), 0.40 (RPP), and 0.70 (GH), with a mean for the three of 0.63 $\pm$ 0.21. By comparison, effect sizes for the same sub-scales within the P-Group were 0.50, 0.20, and 0.70, with a mean of 0.47 $\pm$ 0.25. In the one sub-scale where post treatment scores were also significantly different (REP), no treatment effect could be shown for either group as effect size for both was 0.10.

Discussion and Conclusions

The present pilot study focused on evaluating previous clinical observations that suggested an association between fasting salivary pH and presenting complaints suggestive of sympathetic and/or parasympathetic imbalance. A secondary focus was to assess self-reported perceptions of health status prior to and following Bio-Energetic Synchronization. This approach has provided information regarding the effects of treatment on an objective physiological indicator (fasting salivary pH), as well as effects on the subjective component of self-assessment of health. In regard to both components, the findings of this study are consistent with prior clinical observations, and are also consistent with other studies linking sympathetic "stress" with lower salivary pH values. Moreover, the self-reported improvement in the sub-scales of the Rand-36 health assessment instrument by the subject population of the present study confirms similar findings from a different population of patients receiving Bio-Energetic Synchronization.[23] Finally, the results of the present study also suggest, indirectly, that the application of Bio-Energetic Synchronization shows health benefits by reducing sympathetic imbalance. This conclusion is based in part on the observation that initial lower fasting salivary pH values increased significantly following treatment in those individuals presenting with conditions presumed to be associated with excessive sympathetic stimulation (i.e., heart palpitations, high blood pressure, chronic or acute stress, excessive fatigue). Evidence of improvement in the health status of these individuals, indicated by the significant increase in self reported scores of the general health sub-scale of the Rand-36, further supports this conclusion. Moreover, the effect size of 0.70 for this sub-scale attest to a substantial clinical effect.

While an association has been made in the literature between a lower fasting salivary pH and excessive sympathetic activity, to the best of the authors' knowledge, no information suggests how excessive parasympathetic activity may be detected in the same measure. The present study provides the first evidence that fasting salivary pH may be elevated during parasympathetic imbalance. In addition, it appears that following administration of Bio-Energetic Synchronization, parasympathetic balance may be restored. The significant decrease in post treatment fasting salivary pH values, coupled with substantial percent increase in Rand-36 scores in the general health sub-scale lend credence to this proposal.

Of further interest are the relative differences in treatment effect (effect sizes) among those patients presumed to have excessive sympathetic activity, compared to excessive parasympathetic activity. The larger treatment effects accompanied by overall lower self reported Rand-36 scores noted in the S-Group, when compared to the P-Group, may be partially explained by the nature of sympathetic versus parasympathetic problems. It is plausible that the putative sympathetic conditions prevalent in the population under study were more debilitating in nature, or impacted more dramatically on the subjects than those associated with the parasympathetic system. This could lead to a lower initial self assessment. Consequently, post treatment values would have a higher ceiling, allowing for a greater effect size. Moreover, there are a number of issues which have been considered as possible forms of population bias regarding self-reported assessments, [22] and consequently, the results of this study must be interpreted cautiously. The number of subjects is a concern that future study will address through a larger sample size. Also, the significance of short term self re-evaluation may contribute to bias, although evidence supporting this view point is, to the authors' knowledge, not available.

As symptoms of sympathetic and parasympathetic activity could readily be present in the same individual, with overlap occurring, it is difficult to know the extent of predominance of one or the other condition in patients participating in this study. This may account for the lack of significant difference in initial fasting salivary pH values. However, each group, categorized according to presumed sympathetic versus parasympathetic imbalance, did demonstrate changes in fasting salivary pH as predicted. This suggests, in retrospect, that one or the other condition of autonomic imbalance was predominating. This evidence indicates that measurement of fasting salivary pH before and after a course of treatment may be a viable approach to monitoring autonomic balance. This finding has application to other health related disciplines which seek a non-invasive measure of the status of autonomic balance within given patient populations. However, as several of the subjects in the present study presented with a combination of conditions, additional study will be necessary to determine if fasting salivary pH is more distinct in its range in individuals presenting with singular conditions.

Since normative data for fasting salivary pH in sympathetic versus parasympathetic predominance has yet to be documented, it is not currently possible to determine on initial evaluation if a subject is below or above a certain "normal" value. Moreover, in the absence of normative data, it is not known if "normal" is individual specific or if it falls within a predictable range. Therefore, future studies in which fasting salivary pH values are determined should be linked to the presumed state of autonomic balance in the subject pool. This would permit the development of a database of fasting salivary pH values across the spectrum of varying levels of balance between the sympathetic and parasympathetic.

While the present study was preliminary in nature, further investigation utilizing a pH meter for sensitive measurement, as well as more subjects will be necessary to substantiate the validity of these initial findings and to further diminish the possibility of type I or type II errors. For example, this study has

revealed changes in pH values as low as 0.22 units. Thus, for a power of 80% at an alpha of 0.05 for a two-tailed test, future studies will have to have a minimum of 66 subjects in each group to reliably detect differences of 20% between pH values. A similar number of subjects will be required to obtain the same level of power for the eight sub-scales of the Rand-36 General Health Questionnaire.

Although the present study was designed to reflect an even distribution of gender and age, it will be necessary in future investigations to consider the effects of gender and a broader range of age differences. Both of these factors could mask differences, accounting for the lack of significant findings between the groups in the areas studied. Additionally, while the present study was not designed to determine if any particular condition was corrected, it will important to follow the course of symptom reduction concomitant with other parameters which measure autonomic balance and self perceptions of health. While these issues will be addressed in future studies to thoroughly assess the repeatability of findings reported in this article, the information gained from this preliminary study suggests an interesting association between the application of Bio-Energetic Synchronization and sympathetic as well as parasympathetic balance. It is anticipated that further study will clarify if this approach to up-dating cortical engrams is consistently related to restoration of autonomic balance in subjects exhibiting sympathetic or parasympathetic predominance.

Moreover, the factors described as minimum to the vertebral subluxation are intimately linked to the type of responses associated with autonomic imbalance. These include hyper or hypo activity of the paraspinal musculature, change in juxtaposition of vertebrae and contiguous structures of the spine, as well as soft tissue aberrations and neurological involvement. It will be of interest to conduct double blind cross over studies assessing for the presence or reduction of vertebral subluxation following administration of Bio-Energetic Synchronization.

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