CEO (OSTEOPATHIC STUDIES) INC
HALIFAX PROGRAM

THE INFLUENCE OF OSTEOPATHIC TREATMENT ON CHILDREN WITH AUTISM SPECTRUM DISORDERS (ASD)

by
JENNIFER JANE WILLIAMSON

MAY 2018
THESIS
PRESENTED BEFORE JURY

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HYPOTHESES

Children diagnosed with Autism Spectrum Disorder (ASD) will have improvement in their:

1. Degree of autism severity (Speech, Sociability, Sensory/Cognitive Awareness, Health/Physical/Behavior) and total autism score;

2. Autonomic Nervous System (ANS) regulation;

3. Emotional Pressure (anxiety); and

4. Energy Levels,

if exposed to an osteopathic treatment that incorporates the use of palpation protocols to address all three dimensions of matter, fluid, and field work.

ABSTRACT

Autism spectrum disorder (ASD) can vary widely in severity and encompass a wide range of symptoms and behaviors characterized by three core symptoms: social interaction difficulties, language impairment, and repetitive behaviors. This is a severe developmental disorder that begins within in the first three years after conception and now affects 1 in 68 children in the US. The prevalence figures are growing and it is the fastest growing developmental disorder in the US.

The cause of ASD is still unclear, but scientific advances challenge the traditional view of autism as being untreatable because of the belief that it is genetically hard-wired.

The Autism Research Institute has coined the phrase "Autism Is Treatable", however, the gold standards for treating children on the autism spectrum do not include osteopathy.

This within-subjects repeated measures design pilot study was used to conduct an osteopathic study on 9 children, ages 3 to 13 years. Inclusion criteria consisted of: ASD diagnosis by a physician or psychologist, and a total score between 25 and 120 on the Autism Treatment Evaluation Checklist (ATEC). The measuring tools used were: Autism Treatment Evaluation Checklist (ATEC), which measured the severity of autism. Second, the HeartQuest™ Heart Rate Variability (HRV) system, which assessed the Autonomic Nervous System (ANS), Stress Index (SI) and Heart Rate Variability of the RR interval on the ECG. Third, the Bio-Well™, which assessed the Emotional Pressure (anxiety) and Energy levels of the children. The 9 recruited children diagnosed with ASD were tested prior to the commencement of the osteopathic treatments in order to establish a baseline score. The ATEC form was completed by the child's parent and the two other tests in the battery were conducted by a technician well-versed in the use of both apparatus and who was not an osteopath. The children underwent 3 weeks of testing using the three measurement tools at a frequency of once per week. For the following 8 weeks, the subjects underwent weekly osteopathic treatments, combined with the same data collection method used in the pre-treatment phase. After the treatment phase was terminated, the subjects were tested again once a week for a period of 3 weeks. Each child served as their own control. The experimental phase consisted of general osteopathic treatment, incorporating all three dimensions of matter, fluid, and field work, by the researcher and Andrea Mounce-Halasz, D.Sc.O.

The data analysis consisted of the following: using SPSS (23.0), the aggregate mean scores for participants were compared at baseline and post treatment measurement times using the paired T-test. Levene's test for Equality of Variances was used and data reported appropriately. Data was analyzed to detect differences between pre- and post- mean scores on each of the study measures of ATEC, HeartQuest™ and Bio-Well™ findings. Visual analysis was used to present the trends over time from baseline, treatment phases and post treatment assessments for each participant.

Results: significant reduction in the severity of autism is measured by the ATEC with a p value equal to 0.05. The vital force (VF) dependent variable from HeartQuest™ data had significantly reduced with a p value of 0.02. There were no other significant changes in the HeartQuest™ data, relating to the ANS dependent variables. However, there were individual changes that support an improved ability of the child to utilize their parasympathetic nervous system (PSNS). There was no change in the Emotional Pressure (anxiety) scores. It was revealed during the initial testing phase, using Bio-Well™, that the children showed no significant level of anxiety to begin with. Their Emotional Pressure (anxiety) levels had values of 0-2 on the Bio-Well™ scale at baseline indicating a possible inflammatory depressed state or a calm meditative state that increased to an optimal state of 2-3 on the Bio-Well™ reading. A significant reduction in the Energy levels scores were found, with a p value of 0.04. Energy levels measured by Bio-Well™ correlates to a reduction in inflammation levels according to the Bio-Well™ inventor, Dr. Korotkov.

Discussion: This pilot study suggests that these children may have excessive inflammation in their body resulting in an inability to access their parasympathetic nervous system (PSNS). Globally, from the HeartQuest™ data, it was seen that all of the children in this study used either the hormonal or sympathetic nervous system (SNS) to regulate the autonomic nervous system (ANS) the majority of the time. The significant decrease in VF may indicate that the children were now using their energy stores to regulate the nervous system correctly. Additionally it was felt that by restoring consciousness to the tissues, the children were able to use their energy (VF) during treatment and access their innate potency and help reduce inflammation in their body. The children in this study display severe emotional reactions possibly from: excessive hormonal reliance for regulation of the ANS; inflamed emotional centres; and weight bearing on vital centers rather than on the fascial and structural network.

Conclusion: Osteopathically, it was felt the improvements were largely due to: restoring the tissues' consciousness to the body allowing them to access their vital force (vitality) to auto regulate; and removing barriers for increase drainage of the inflammation prior to profusion. Therefore, with the consciousness restored in the tissues and the inflammation reduced, the children's physiology was able to access their ANS and CNS more harmoniously with dynamic coherence. Fulford, Frymann and Still all felt that if we do not appreciate the Human Energy Field, osteopathic treatments would not be complete (Fulford, 2003; Frymann, 1998). Hence, it is stated by Fulford and proclaimed by Still, Frymann and Druelle, that osteopathy is not seeing the patient as a disease process but requires the osteopath to assist with balancing the physical, emotional, mental, and spiritual dimensions/structures for optimal function (Fulford, 2003).

Implications suggest that: children with ASD may not have anxiety but have excessive SNS or hormonal CNS regulation due to a lack of PSNS resulting in an emotional behavior; ASD may be an autoimmune disease; and that treating in the human energy field and restoring consciousness is essential to optimize recovery.

Key Words: Manual Osteopathic Treatment in Matter, Fluids and Field, Causes & Pathophysiology in Children with ASD, Heart Rate Variance, Bio field Science; Human Energy Field, bidirectional vagal, autoimmunity, birth trauma, and PSNS (vagus).

RÉSUMÉ

Le Trouble du spectre de l'autisme (TSA) se manifeste à différents niveaux de sévérité et comprend des comportements venant selon trois symptômes caractéristiques: les difficultés d'intégration sociale, le trouble du langage et les comportements répétitifs. C'est un désordre développemental sévère qui se manifeste dans les trois premières années après la conception affectant près d'un enfant sur 68 aux ÉU. La prévalence est en hausse et il s'agit du désordre développemental qui croît le plus rapidement aux ÉU.

La cause du TSA reste nébuleuse, mais les avancées scientifiques bousculent la croyance qui veut que l'autisme soit impossible à traiter en raison du postulat sur son origine génétique. L'Autism Research Institute valorise l'idée que l'«autisme est traitable», mais la règle d'or en traitement de l'autisme ne tient pas compte de l'ostéopathie.

Cette étude pilote à mesures répétées intra-sujet a été retenue pour conduire une étude ostéopathique sur 9 enfants âgés de 3 à 13 ans. Le critère d'inclusion est le diagnostic du TSA par un médecin ou psychologue et un score total entre 25 et 120 sur la liste de contrôle pour l'évaluation du traitement de l'autisme (ATEC). Les outils de mesure de l'autisme sont: Un, l'ATEC qui mesure la sévérité de l'autisme; Deux, le HeartQuest ™ Système de variabilité de la fréquence cardiaque (HRV), lequel évalue le Système nerveux autonome (SNA), l'Indice de stress (IS) et la variabilité de la fréquence cardiaque l'intervalle RR sur l'ECG; Trois, Bio-Well™, évaluant la pression émotionnelle (anxiété) et le niveau d'énergie de l'enfant. Les 9 enfants diagnostiqués TSA recrutés furent testés avant le début des traitements ostéopathiques en vue d'établir un score de référence. Le formulaire de l'ATEC fut complété par le parent de l'enfant et les deux autres batteries de tests furent exécutées par un technicien aguerri avec les deux appareils et qui n'est pas ostéopathe. Les enfants ont été soumis à 3 semaines de tests en utilisant les trois mesures à raison d'une fois par semaine. Pour les 8 semaines suivantes, les sujets furent soumis à des traitements ostéopathiques une fois par semaine, en plus de la batterie de tests prétraitement. Une fois la phase ostéopathie terminée, les sujets furent soumis à 3 semaines de batterie de tests additionnelles. Chaque enfant fut son propre contrôle. La phase de traitements ostéopathiques généraux incorpora les trois dimensions de la matière, soit la matière, le fluide et le champ, selon le chercheur et d'après Andrea Mounce-Halasz, D.Sc.O.

L'analyse des données consiste à: en utilisant SPSS (23.0), le score moyen global des participants fut comparé à la base de référence et aux temps de mesure post traitement en utilisant le test t de comparaisons pairées. Le test de Levene pour l'égalité des variances fut utilisé et les données rapportées comformément. Les données furent analysées pour détecter les différences entre les scores moyens pré et post sur chacune des mesures de l'étude, pour l'ATEC, le HeartQuest ™ et les détections avec Bio-Well. Une analyse visuelle fut utilisée pour présenter la tendance dans le temps à partir du point de référence, pendant le traitement, et lors des mesures post traitement pour chaque participant.

Résultats: une réduction significative de l'autisme fut mesurée par l'ATEC avec une valeur p égale à 0,05. Les données de la variable dépendante vital force (VF) de HeartQuest™ ont baissé

significativement jusqu'à une valeur de p égale à 0,02. Il n'y avait aucun autre changement significatif dans les données de HeartQuest™ étant relieés au variables dépendantes du SNA. Cependant, il y eu des changements supportant un amélioration dans la capacité de l'enfant à utiliser leur système nerveux parasympathique (SNPS). Il n'y a pas eu de changement pour les scores du niveau de pression émotionnelle (anxiété). Il était déjà clair lors de la phase de test initiale avec Bio-Well que les enfants ne démontraient aucun niveau significatif d'anxiété dès le départ. Leurs niveaux de pression émotionnelle (anxiété) se trouvaient entre 0 et 2 sur l'échelle du Bio-Well™ au point de référence, indiquant ou bien un état inflammatoire dépressif, ou un état de calme méditatif s'étant élevé à un niveau optimal de 2-3 sur la lecture du Bio-Well™. Une réduction significative dans les scores de niveau d'énergie fut trouvée avec une valeur p de 0,04. Les niveaux d'énergie mesurés par Bio-Well™ sont en corrélation avec une réduction dans les niveaux d'inflammation, selon l'inventeur du Bio-Well™, Dr Korotkov.

Discussion: Cette étude pilote suggère que les enfants pourraient avoir de l'inflammation excessive dans leur corps résultant d'une inaptitude à accéder à leur système nerveux parasympathique (SNPS). Globalement, d'après les données du HeartQuest™, il a été vu que tous les enfants de cette étude ont utilisé ou bien leur système hormonal ou leur système nerveux sympathique (SNS) pour régulariser leur système nerveux autonome (SNA) la plupart du temps. La baisse significative du VF pourraient indiquer que les enfants utilisent maintenant leurs réserves d'énergie pour régulariser leur système nerveux correctement. De plus, en ramenant la conscience dans les tissus, on a eu l'impression que les enfants furent aptes à utiliser leur énergie (VF) durant le traitement et à accéder à leur plein potentiel inné, de même qu'à réduire l'inflammation dans leur corps. Les enfants de cette étude ont démontré des réactions émotionnelles sévères, possiblement dues à un excès hormonal relié à la régulation du SNA; les centre émotionnels inflammés; une charge oppressive sur les centre vitaux plutôt que sur les réseaux fasciaux et structuraux.

Conclusion: Ostéopathiquement, il a été ressenti que les signes d'amélioration sont largement dus à: le rétablissement de la conscience dans les tissus permettent au corps d'accéder à sa force vitale et ainsi de s'autoréguler; et l'enlèvement des barrières pour accroître le drainage de l'inflammation avant la profusion. Ainsi, avec la conscience rétablies dans les tissus et l'inflammation réduite, la physiologie des enfants put accéder au SNA et au système nerveux central (SNC) plus harmonieusement avec la cohérence dynamique. Fulford, Frymann et Still ont tous ressenti que si nous ne tenons pas compte du champ d'énergie humaine, les traitements ostéopathiques ne seraient pas complets (Fulford, 2003; Frymann, 1998). Par conséquent, il a été établi par Fulford et démontré par Still, Frymann et Druelle, que l'ostéopathie n'est pas de considérer le patient comme un malade en voie de guérison, mais requiert que l'ostéopathe participe à l'équilibre des dimensions/structures physique, émotionelle, mentale et spirituelle, pour un fonctionnement optimal (Fulford, 2003).

Les implications suggèrent que: les enfants avec un TSA ne souffrent pas d'anxiété, mais ont un SNS excessif ou une régulation hormonale du SNC due à un manque au SNPS résultant d'un comportement émotionnel; le TSA serait une maladie auto-immunitaire et que traiter le champ d'énergie humaine et rétablir la conscience sont essentiels à une guérison optimale.

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LIST OF ACRONYMS

5-HT	5-hydroxytryptamine (Serotonin)
A	Anteflexion
ABA	Applied Behavior Analysis
ADD	Attention Deficit Disorder
ADHD	Attention Deficit Hyperactivity Disorder
ANS	Autonomic Nervous System
A/P	Anterior/Posterior
ARI	Autism Research Institute
AS	Asperger's Syndrome
ASD	Autism Spectrum Disorder
ATEC	Autism Treatment Evaluation Checklist
BOL	Breath of Life
BRT	Balance reciprocal tension
C	Cervical
C1	Atlas (Cervical 1)
CBT	Cognitive Behavior Therapy
CC	Central Chain
CEO	Collège d'Études Ostéopathiques de Montréal
CF	Chaotic Field
CFD	Cerebral Folate Deficiency
CNS	Central Nervous System
CSF	Cerebrospinal Fluid
DHEA	Dehydroepiandrosterone
DO	Doctor of Osteopathy (USA)
DO (Q)	Diploma of Osteopathy (Quebec)
DScO	Diploma in the Science of Osteopathy (CEO, Canada)
DTT	Discrete Trial Training

DV	Dependent Variable
ECG	Electrocardiogram
EIBI	Early Intensive Behavioral Intervention
ENS	Enteric Nervous System
EP	Emotional Pressure
ER	External rotation
FCT	Functional Communication Training
FM	Foramen magnum
fMRI	Functional Magnetic Resonance Images
GALT	Gut Associated Lymphoid Tissue
GBA	Gut Brian Axis
GDV	Gas Discharge Visualization
GI	Gastrointestinal
GSH	Glutathione
HEF	Human Energy Field
HF	High frequency
HPA	Hypothalamic Pituitary Adrenal
HRV	Heart Rate Variability
IR	Internal rotation
LA	Long Arm
LF	Low frequency
ms	milliseconds
MSK	Musculoskeletal
mt DNA	Mitochondrial DNA
MTHFR	Methylenetetrahydrofolate Reductase
CSERB	Canadian SHIELD Ethics Review Board
NST	Nucleus Solitary Tract
OCC	Osteopathic Center for Children
OCD	Obsessive Compulsive Disorder
P	Postflexion
P1	Protocol 1 Palpation

P2	Protocol 2 Palpation
P3	Protocol 3 Palpation
PDD-NOS	Pervasive Developmental Disorders, Not Otherwise Specified
PECS	Picture Exchange Communication System
PEG	Polyethylene Glycol
PHI	Protected Health Information
PHIA	Personal Health Information Act
PNS	Peripheral Nervous System
PKU	phenylketonuria (PKU)
PRM	Primary Respiratory Mechanism
PRT	Pivotal Response Training
PSNS	Parasympathetic Nervous System
PTSD	Post Traumatic Stress Disorder
R1	Reasercher 1 (Jennifer Williamson MSc. BSc. PT)
R2	Researcher 2 (Mounce-Halasz, D.Sc.O.)
RAS	Reticular Activation System
RF	Reticular Formation
RNS	Reactive Nitrogen Species
ROS	Reactive Oxygen Species
RRNNms	R-R interval Normal to Normal milliseconds
RS	Rotation and Side Bending same direction
RTM	Reciprocal Tension Membrane
SA	Short Arm
SB	Side Bending
SBR	Side Bending Rotation
SBS	Sphenobasilar Synchondrosis
SCG	Superior Cervical Ganglion
SDNN	Standard Deviation of Normal-to-Normal
SI	Stress Index
SMD	Sensory Modulation Disorder
SMA	Superior Mesentery Artery

SNS	Sympathetic Nervous System
SPG	Sphenoid Palatine Ganglion
SOR	Sensory Over-Responsivity
SPD	Sensory Processing Disorder
SR	Side Bending and Rotation occur opposite
SS	Sensory Seeking/Craving
SUR	Sensory Under-Responsivity
T	Thoracic
VF	Vital Force
VLF	Very low frequency
VOT	Visceral Osteopathic Technique

1. PROBLEM STATEMENT

Autism spectrum disorder (ASD) can vary widely in severity and encompass a wide range of symptoms and behaviours characterized by four core areas which are: social interaction difficulties, language impairment, repetitive behaviors and hyper or hypo reaction to sensory input (American Psychiatric Association, 2013). Children with ASD can have associated neurological issues like sleep deficits, mood dysregulation, anxiety, seizures and hyperactivity. These children can also have associated systemic issues such as immune dysfunction and gastrointestinal (GI) issues along with other related disorders such Obsessive Compulsive Disorder (OCD) and Attention Deficit Hyperactivity Disorder (ADHD) (Autism Speaks, 2016). This is a severe developmental disorder that begins within the first three years after conception and now affects 1 in 68 children in the US (1 in 42 boys, and 1 in 189 girls). The prevalence figures are growing; it is the fastest growing developmental disorder in the US (Autism Speaks, 2016).

1.1. Introduction to the Problematics of the Research

The cause of ASD is still unclear but scientific advances challenge the traditional view of autism being untreatable because of the belief that it is genetically hard-wired (Autism Research Institute [ARI], 2016). The Autism Research Institute (ARI) has maintained that Autism is treatable. Bernard Rimland, Ph.D., (1964), a psychologist and renowned father of modern autism research, argued that autism was biologically based and was one of the first to propose a possible genetic basis for autism. In 1967, he included environmental insult as a possible contributing factor to autism causation (ARI, 2016). Collectively, recent research

has demonstrated that children with ASD are not only afflicted with a central nervous system (CNS) dysfunction but also have systemic physiological and metabolic abnormalities. Comprehending the latest research of ASD is essential as it provides a pathway for systematically approaching diagnosis and treatments for children with ASD (Frye & Rossignol, 2012a). ARI has stated more research needs to be done to understand the biology and causes of autism, however, overall there has been great progress made (ARI, 2016).

1.2. Statement of the Problem

The main outcome from the recent increased interest in research and clinical care is that children on the autism spectrum are treatable. Traditionally, therapies used have targeted specific physical problems and treatments have been neurologically, medically, nutritionally, or sensory, based. However, despite the evolving information in the literature, there still needs to be more done for our understanding of cause and care for children with ASD (ARI, 2016).

Treatments that are supported by scientific evidence or gold standard care for children with ASD do not include osteopathy in that care. The gold standard care consists of: early intensive behavioral intervention programs; Applied Behavior Analysis (ABA), including Discrete Trial Training (DTT) and Functional Communication Training (FCT); Pivotal Response Training (PRT); Cognitive Behavior Therapy (CBT); social skills training; visual supports; Picture Exchange Communication System (PECS) when taught through ABA strategies; and medication (Lindgren & Doobay, 2011).

1.3. Goals and Objectives

The areas under investigation in this research project included:

1. Degree of autism severity (Speech, Sociabililty, Sensory/Cognitive Awareness, Health/ Physical/Behaviour) and total autism score;

2. Autonomic nervous system (ANS) regulation capacity;

3. Emotional Pressure (EP) (anxiety) level;

4. Energy levels.

1.4. Reasons for Study

The goal of this paper is to show, through the recent understanding of the systemic pathophysiology of the gut, brain, autoimmunity, metabolic abnormalities and ANS imbalances occurring in children diagnosed with ASD, how osteopathy can normalize these metabolic disturbances. It is quite possible that using an osteopathic approach to treat the appropriate health mechanisms, organ systems, and physiology related to the disturbed metabolic processes involved will return dynamic coherence to the children who have ASD and will complement and enhance the gold standard of care offered to them.

1.5. Definition of Technical Terms and Concepts

1.5.1. Autism Treatment Evaluation Checklist (ATEC)

The Autism Treatment Evaluation Checklist (ATEC) is a form designed to determine the level of severity of autism and can be completed by parents, teachers, or caretakers. It consists of four subtests; see Table 1 below for the ATEC Score Distributions:

I. Speech/Language Communication (14 items): evaluates aspects such as, knowing their name, responding to "No", following commands, and has normal ability to communicate for his/her age - scoring in a range from 0-28;

II. Sociability (20 items): evaluates aspects such as, ignoring other people, uncooperative and resistant, no eye contact, shows no affection, and lacks friends - scores in a range from 0 to 48;

III. Sensory/Cognitive Awareness (18 items): evaluates aspects such as, responds to own name, responds to praise, appropriate fascial expression, and dresses himself - scores in a range from 0-36;

IV. Health/Physical/Behavior (25 items): evaluates aspects such as, bed-wetting, diarrhea, sleep problems, and hits or injures others- scoring in a range from 0-75.

V. And a Autism Severity Score derived from combining the 4 subset scores giving the total level of severity of the autism with the total scores for severity ranging from 0-180 (ARI, 2016).

Table 1. ATEC Score Distributions.

AUTISM SEVERITY	SPEECH	SOCIABLITY	SENSORY (COGNITIVE)	HEALTH (PHYSICAL)	TOTAL RANGE
0-99	**0-28**	**0-48**	**0-36**	**0-75**	**0-180**
MILD	0-2	0-4	0-5	0-8	0-30
0-9	3-5	5-7	6-8	9-12	31-41
10-19	6-7	8-10	9-11	13-15	42-50
20-29	8-10	11	12-13	16-18	51-57
30-39	11-12	12-13	14-15	19-21	58-64
40-49	13-15	14-15	16-17	22-24	65-71
50-59	16-19	16-18	18-19	25-28	72-79
60-69	20-21	19-21	20-21	29-32	80-89
70-79	22-24	22-25	22-25	33-39	90-
80-89	25-28	26-40	26-36	40-75	103
90-99					104-
SEVERE					179

1.5.2. HeartQuest™ Heart Rate Variability (HQHRV)

The degree to which the heart can speed up or slow down is called heart rate variability (HRV). The healthier a person is the greater the variability they have in their heart rate. An HRV system is valuable as it can show how well the body's "regulatory systems are maintaining their adaptive capabilities within a certain variable range". An accurate way to assess the body's ability to recover from stress and strain is by measuring the changing intervals between two heart beats (HRVHQ, 2017). HRV is a reflection of the autonomic nervous system (ANS) that controls 90% of the body's functions while the last 10% is controlled by hormonal regulation via the CNS. The CNS hormonal system will take over if the ANS is unable to respond in a proper fashion to its regulatory work, however, this is a much slower process resulting in an exhausted hormonal system (Kessler & Karimov, 2014b).

HeartQuest™ electrocardiogram (ECG) is able to look at the beat-to-beat (R-to-R) changes in the Q-R-S-T complex. This measures changes between one heart contraction and the next, which indicates how well the ANS is adapting to internal and external stressors (Karimov, 2014). The HRV R-to-R interval normal to normal measured in milliseconds (RRNNms) from the QRS waves in the ECG illustrates the adaptive capabilities of the autonomic nervous system. A healthy adult range is 700-1000 milliseconds (ms) with the difference being 250-300 ms. This is called the "variation range" which is the difference between the shortest and the longest normal to normal R-R interval (Karimov, 2014).

High HRV, shown in the RRNNms number, indicates good autonomic balance with adaptability and means that the time domain between each successive heartbeat shows a variation between one R wave to the next (R-R) (Karimov, 2014).

Normality for an adult RRNNms is between 700 to 1000 ms as a normal heart rate is between 60-85 bpm, which is divided by 60000 ms (or 60 seconds). In normality, children have faster heart rates. For ages 6 to 11, they range from 75-118 beats per minute and ages 3-5 range from 80-120 beats per minute. For children that are age 6-11 the RRNNms works out to 60000/118 bpm= 508 and 60000 ms/75 pbm= 800 ms giving a healthy RRNN range between 508-800 ms. A RRNN for a 3-5 year old with HR of 80-120 will be 60000 ms/120 bpm = 500ms and 60000 ms/80 bpm= 750 giving a healthy RRNN range between 500-750 ms (J. Karimov, personal communication, October 25, 2017).

Low HRV means it lacks variability and that the time domain between each R wave is constant. These are people who have lost their adaptability and are either stuck in sympathetic or parasympathetic tone (Karimov, 2014).

The Low Frequency (LF) band corresponds to sympathetic nervous system (SNS) regulation. High levels of LF indicate the fight or flight response being invoked due to stress and there is a release of epinephrine or adrenaline. Long periods in this state can deregulate the neurohormonal balance such as the dehydroepiandrosterone (DHEA)/cortisol ratio. (Kessler & Karimov, 2014a).

The High frequency (HF) band corresponds to parasympathetic (PSNS) regulation and combined with high Vital Force (VF) values indicates the ability to quickly recover after physical activity, predominantly an anabolic metabolism. However, if HF is combined with a low VF and a high stress index it can indicate adrenal insufficiency (Kessler & Karimov, 2014a).

The Very Low Frequency (VLF) band reading reflects the state of the central nervous system (CNS) and its regulation through its downstream hormones controlling the remaining 10 percent of the body. It is a frequency that reflects primarily the limbic and/thalamus stress and a high level signifies the person has psychoemotional stress. VLF is a slow neurohormonal back up system secondary to the ANS (HF and LF system). The VLF is called upon by the ANS over time in response to long-term stress. It is less efficient as a regulatory system as it does not act as fast as the HF and LF, ANS. The VLF system releases hormones into the bloodstream and it takes time to reach the target organ whereas the ANS is a rapid nerve conducting system (Kessler & Karimov, 2014a).

Overall, a balanced percentage of LF, HF, and VLF, each around 30% with a range between 25% to 35%, is normal. For optimal ANS regulation, there should be a slightly greater percentage of HF than LF and VLF and a high Vital Force.

The hypothalamus is the link between neurological and hormonal regulation. The internal inputs, such as pain, emotions, body temperature, fluid, electrolyte balance, appetite, and sleep cycles, go through the hypothalamus, on to other parts of the brain to be interpreted and then are sent back to the hypothalamus. The hypothalamus translates the information and sends its own signals to the ANS, if the ANS cannot perform its regulatory work in the proper fashion then the hormonal system will take over (Kessler, M & Karimov, J, 2014a). Children with ASD typically showed an increase in the VLF, or neurohormonal, portion of the spectral analysis, indicating that the central nervous system (CNS) regulation was more predominant than the ANS. Therefore, children with ASD use their cortico-hypothalamic-hormonal regulatory system predominantly, which is slower reacting and a more energy-consuming regulatory system. This can result in an over-stimulated hypothalamic-pituitary

axis and, over time, the HPA axis can become exhausted. The ANS regulation is a more efficient and less energy-consuming system (Kessler & Karimov, J, 2014b).

Figure 1, from Kessler & Karimov (2014b), shows A for Cardiovascular Adaptation, B for Autonomic Regulation, C for Neurohormonal Regulation and D for Psycho-Emotional State. Kessler and Karimov use neurodynamic coding to establish values for these regulatory systems. They explain that scientists have used neurodynamic coding to interpret and translate CNS signals into two terminologies, the ANS and hormonal input. The EKG reading from the heart recording can trace the information from where it started to its final end point. Each R-R interval from the EKG is turned vertical to make a rythmogram, which will decrypt the EKG information to understand the body's regulatory systems (A, B, C, and D). The rythmogram is translated into Neurodynamic coding to accurately reflect regulatory changes A, B, C, & D occurring in the body (Kessler & Karimov, 2014b). Kessler & Karimov have done this by:

> Measuring 5 different intervals in the EKG, and then specifically evaluating how well these measured intervals are following the fractals and golden ratio, or natural laws of nature. These mathematical measurements from the Q-R-S-T complex of an EKG are used to extract a neurohormonal (or neurodynamic) code from the rhythmogram. Using the neurodynamic coding from the EKG rhythmogram, we get the information about ABCD in Figure 1, which provides a comprehensive view of a patient. To decipher the code from the cardiorhythm (a combination of the EKG and the rhythmogram), we utilize mathematics that are applicable to all complex living things and all material structures within the universe. This is the "golden ratio" in mathematics and is seen in

fractals or repeating patterns in nature. All physiological processes in the body have similar patterns, just in different time scales. For example, the body's response to external stressors is reflected in brain electrical activity in a fraction of a second, whereas changes in the activity of the heart occur in seconds; blood pressure changes over tens of seconds, and even more time is needed for adaptation of other bodily systems. Because of the similarity between patterns, however, examining the dynamics of the heart simultaneously reveals the structure and dynamics of other systems. (Kessler & Karimov, 2014b, pp. 3-6)

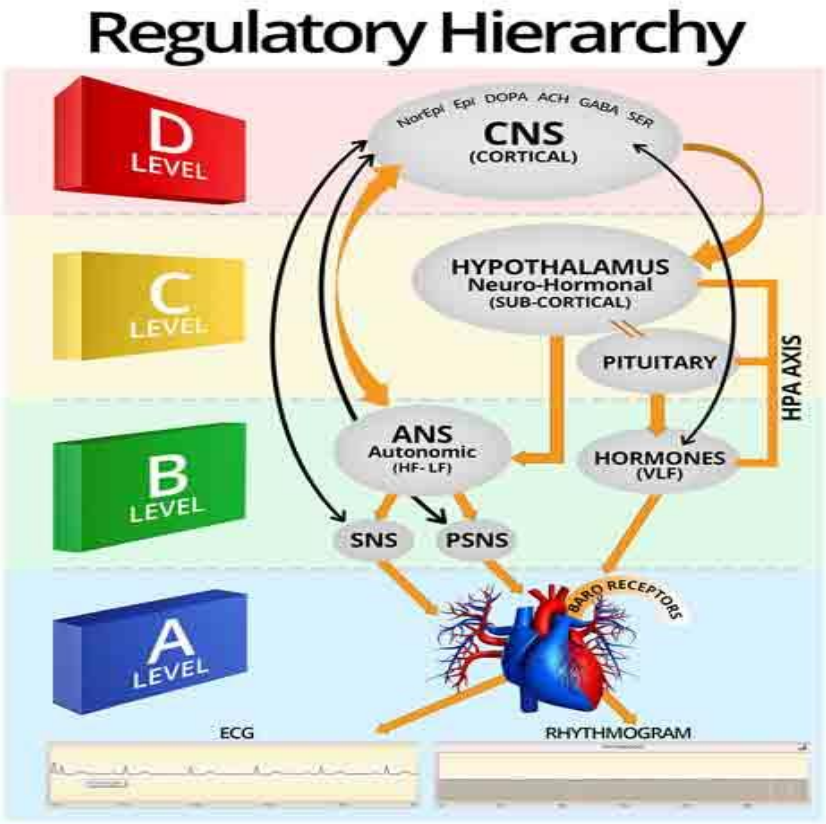


Figure 1. Regulatory hierarchy : CNS Dominance (Kessler & Karimov, 2014b).

ANS balance index is detected by the HeartQuest™ program as a self-healing potential and is the balance between the sympathetic and parasympathetic nervous system. A balanced ANS index ranges from 35-145 in normality and is color coded by HeartQuest™.

An “Optimal Balance” ANS uses level A physiology for regulation, as shown in Figure 1, and is color coded as blue in Figure 2.

A “Stable Balance” ANS uses the physiological systems shown in level A and B in Figure 1 for regulation, and is color coded as blue/green in Figure 2.

A “Balanced Within Normal Limits” ANS uses the physiological systems shown in level B in Figure 1 for regulation, and is colored as green in Figure 2.

An “Unstable ANS” uses the physiological systems B, C and D shown in Figure 1 for regulation and is color coded as green/yellow/red in Figure 2.

A “Disrupted ANS” uses the physiological systems shown in level C and D illustrated in Figure 1 for regulation, and is color coded as orange/red/black in Figure 2.

A “Poor ANS” uses D level physiological systems for regulation, shown in Figure 1, and is color coded as dark red/black in Figure 2 (Kessler & Karimov, 2014b; HRVHQ, 2016).

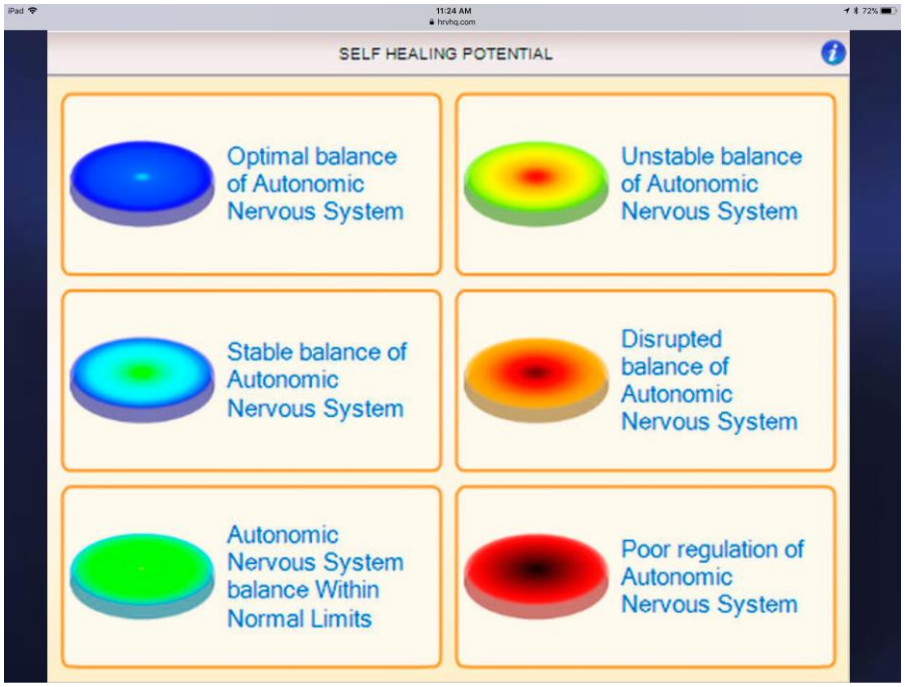


Figure 2. ANS Balance Colour Code Ledger (HRVHQ, 2016).

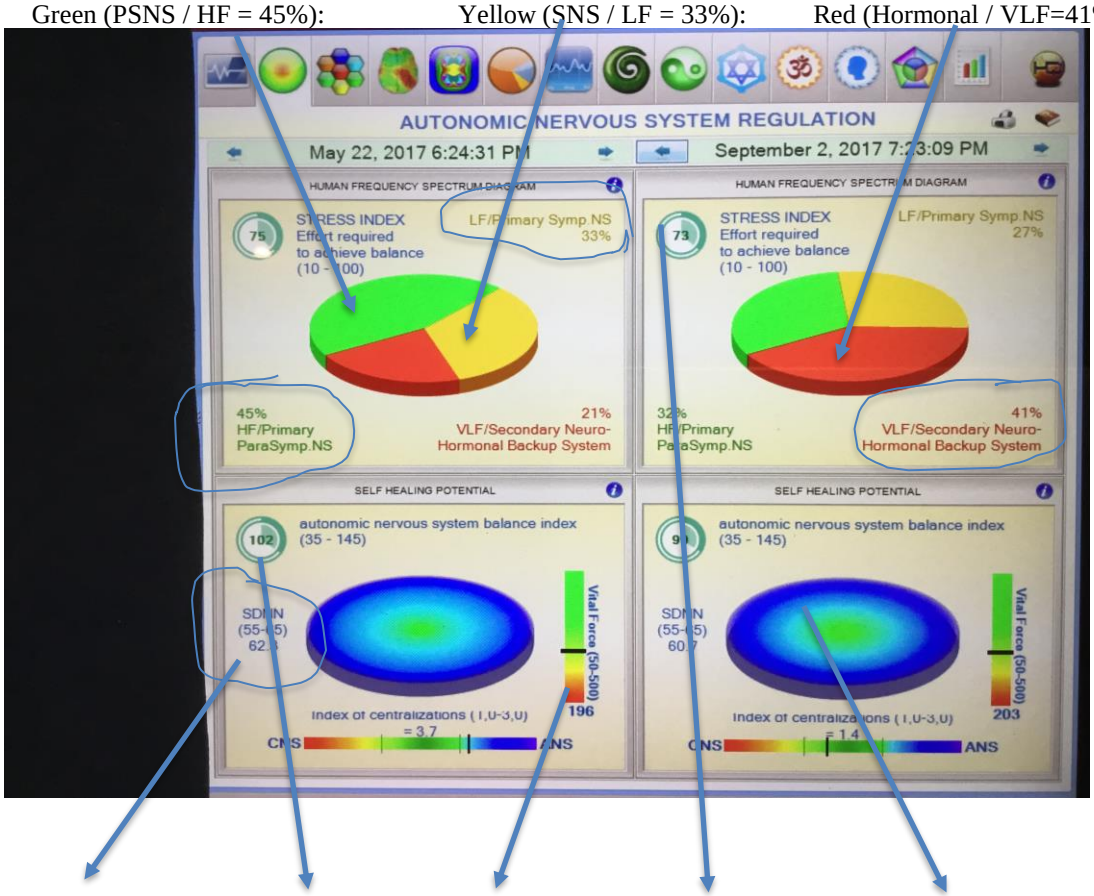
Stress Index (SI) is a common mathematical value found in some HRV systems, and tells us how hard the ANS has to work to maintain balance (Karimov, 2014). Normality for the SI ranges from 10-100 in the HeartQuest™ program. Therefore, an SI of 10-100 means that the ANS did not have to work too hard to maintain a balance. A SI number greater than 100 indicates the system is working harder and harder to maintain balance. A normal stress index is between 10-100 and a high stress index is any number above 100.

The Standard Deviation of Normal-to-Normal (SDNN) beats is the most common index of overall HRV and is the standard deviation of normal reference range intervals between consecutive sinus beats (Kessler, M & Karimov, J, 2014b). SDNN reflects the ability to respond quickly, dynamically, and effectively to a stressor (Karimov, 2014). Normality for the SDNN ranges from 55-65 in the HeartQuest™ program.

Vital Force (VF) tells how much "energy" the patient has in his or her body, also called the vitality of a person (Karimov, 2014). VF ranges from 50-500 in the HeartQuest™ program illustrating that anything above a 50 will be enough energy to maintain a balanced ANS. However, the higher the VF more optimal it is to balance the ANS system and maintain ANS balance. If the VF is high, it indicates that the metabolic state of that person is able to switch easily and frequently between anabolic and catabolic metabolism, based on the body's needs. VF maintains the balance between catabolic shifting to anabolic, and vice versa so a low VF can result in either catabolic reactions dominating the metabolism (and premature aging), or the progression of anabolic reactions (and eventual tumour growth). A low Vital Force could also mean adrenal exhaustion (Kessler & Karimov, 2014b).

Figure 3 is an example of a 7-year-old boy who, at age 3, following severe trauma, was diagnosed as hyperactive, with PTSD and an HRV worse than some children with ASD. This is his stable balanced ANS and hormonal regulation after 4 years of osteopathic treatments.

Green (PSNS / HF = 45%): Yellow (SNS / LF = 33%): Red (Hormonal / VLF=41%)



SDNN = 62.3: ANS Balance = 102: VF=196 : SI=73: Stable Balance ANS

Figure 3. Stable balanced ANS HeartQuest™ Heart Rate Variability findings for a seven year old boy.

1.5.3. Bio-Well™

Emotional Pressure (EP), as defined by the Bio-Well™ technology, is calculated from a quantitative assessment of the stress level based on a 10-point scale. People who are in a deep meditative state and inner peace score 0-1 but it can also mean a deep state of depression or, in some cases inflammation, indicating severe disease. Very "Calm", relaxed people score 0-2. An "Optimal" quiescent state is scored between 2-3. "Anxiety" is scored between 3-4 and is a state of permanent anxiety, meaning they do not have the ability to relax indicating a possible serious problem. The excited state "Stress" is between 4-6 and is characteristic of active work, excitement, and intense activity but can also indicate high anxiety levels. High levels of stress "Heightened" are scored as 6-8 and can be indicative

of: a previous stressful situation like failure, illness, driving in stressful conditions, or unpleasant conversations. It can also be a result of an increase in nervousness that has accumulated over extended periods of time involving constant stressful events, emotional stress, or autonomic dysfunction. Children can have this state because of nervous excitement. It is also indicative of athletes who overtrain, are fatigued and at risk of injury. An extremely "High" level of stress is indicated between 8-10, the peak of emotional excitement. This "High" level (8-10) is dangerous if the person appears calm and it is a serious situation. The person is on a verge of a nervous breakdown (Korotkov, 2017).

Energy is defined by the Bio-Well™ technology as a quantitative assessment of the level of energy of a particular person in a percentage from 0 to 100 related to a database of apparently healthy people. "Low Energy" people would rate between 0% to 20%, which is related to energy deficiency but can also mean a meditative state. "Decreased Energy" is depicted on the scale as 20% to 40%. "Optimal Energy" is scored as 40% to 70%. People with high levels of energy are found in the "Heightened Energy" range from 70% to 90%. "High Energy" is seen in athletes, top mangers, yet may be indicative of inflammation and is scored from 90% to 100% (Korotkov, 2017).

1.6. Limits of the Research

This study has only 9 subjects which limits its statistical power. The treatment approach has never been formally researched prior to this trial. Reasons for the cause of ASD have not been determined concretely; therefore, no clear pathway has been established for research guidelines.

The fundamental disadvantage of the within-subjects design is the "carryover effects" of practice and fatigue (Hall, 1998). The children may get more comfortable with the data collection tools reducing their anxiety and/or may fatigue thereby modifying their ANS.

Parents will not be able to get verbal feedback from children with ASD as they typically lack the ability to describe their own symptoms, leaving it difficult to determine how the child feels and therefore making it hard to complete the ATEC form. This could result in a bias of the parents over or under estimating the improvements of the child on the ATEC, although this scale has been shown to have excellent reliability and validity.

Another limitation to this trial is that it is not designed as a randomised control trial and, therefore, it does not compare two interventions or placebo group measures that could potentially minimise bias. However, ethically, all children will be treated and each child poses as their own control allowing for small changes to be detected that might not be detected in an experimental study.

Another limitation could be the time necessary to effect a change at the level of the metabolic system and that oftentimes with osteopathic treatment the patient can go through a healing crisis and need integration before improvements can be seen which might show worsening scores on data collection. We know that in metabolic and neuroplasticity cases we would need a longer time period than 8 weeks to see substantial lasting improvements.

2. STATE OF KNOWLEDGE AND RESEARCH JUSTIFICATION

There are four main types of ASD according to the American Psychiatric Association, which include: Asperger's Syndrome (AS); Pervasive Developmental Disorders, Not Otherwise Specified (PDD-NOS); Autistic disorders; and childhood disintegrative disorder (American Psychiatric Association, 2013). A child with ASD can develop their delay at birth or can appear with normal development until social and language skills are suddenly lost and/or until they have enough language to demonstrate unusual thoughts and preoccupations (American Psychiatric Association, 2013).

2.1. Possible Causes

There are many theories on the causes of ASD but more research has to be done in this area to determine the exact causes, which are still unknown (ARI, 2016). Recent research has attributed several possible factors such as genetic (heredity), epigenetic, metabolic with neurological factors, toxicity, and problems occurring at birth (Frye & Rossignol, 2012a; Rimland, 2015).

2.1.1. Genetic and Epigenetic

Numerous studies have shown that genetic syndrome (simple gene or chromosomal disorder) only accounts for a minority of ASD cases, and many fields of medicine have documented evidence of these children with ASD having multiple systemic physiological abnormalities (Frye & Rossignol, 2012a). This suggests that ASD arises from systemic,

rather than organ specific, abnormalities and is not purely arising from CNS dysfunction seen in the cognitive and behavioral dysfunction presented with ASD (Schaefer, Mendelsohn, & Professional Practice & Guidelines Committee 2013; Frye & Rossignol, 2012a; Rimland, 2015). It is becoming clear in the literature that there are complex interactions between genetic pre-disposition and environmental exposures (epigenetic) that explain the etiology of ASD (Frye & James, 2014). As an example, nearly 89 percent of children diagnosed with ASD have a gene variant called methylenetetrahydrofolate reductase (MTHFR), and research supports the hypothesis that ASD syndromes are associated with mutations in the MTHFR gene (Boris, Goldblatt, Galanko, & James, 2004). The MTHFR gene variants alter the structure and cascade of events required for the processing of folate (Vitamin B9) into a usable form for its proper function. In Dr. A. T. Still, D.O.'s first principle, structure governs function we can see that osteopathy's preoccupation with returning function to the body lies in our ability to modify its structure (Centers, 2012).

2.1.2. Metabolic with Neurological Factors

The research recently supports that children with ASD have specific organ dysfunction that occurs from systemic physiological and metabolic abnormalities such as immune dysfunction, inflammation, oxidative stress, mitochondrial dysfunction and other metabolic disorders (Frye & Rossignol, 2012a). The most common metabolic disorders associated with ASD are mitochondrial dysfunction and cerebral folate abnormalities (Frye & Rossignol, 2012a). Mitochondrial dysfunction is thought to arise from different factors such as a mutated gene variant of mitochondrial DNA (mtDNA) and/or toxins changing the cell and affecting the electron transport chain embedded in the mitochondrial inner membrane

(Kendall, 2012; Frye & Rossignol, 2012b). The organs and systems most affected in people with mitochondrial disorders are the ones requiring the highest energy demands, as the role of mitochondria is to produce cellular energy converting food into energy needed for bodily functions (Frye, Rose, Slattery, & MacFabe, 2015; Kendall, 2012). In Rossignol and Frye's review (2012), they found that mitochondria are not only energy producers but are also closely implicated in programmed cell death (apoptosis), calcium homeostasis, synaptic plasticity and neurotransmitter release. Injury to the mitochondria results in a broad spectrum of clinical symptoms from healthy and asymptomatic to severe impacts, as seen in children with ASD, because the mutation load varies by tissue type, age, and specific mutation (Frye et al., 2015; Kendall, 2012; Frye & Rossignol, 2012b). Children with ASD develop mitochondrial dysfunction in a variety of ways such as: having a gene variant or abnormal biomarkers for mitochondrial dysfunction; encountering environmental stressors that negatively affect both GI function and mitochondria; having an overrepresented GI tract of enteric bacteria, predominantly with Clostridia spp., that synthesizes short-chain fatty acid metabolites that can be toxic to the mitochondria; and having increased GI permeability permitting toxins into the system (Adams, Johansen, Powell, Quig, & Rubin, 2011; Frye et al., 2015; Kendall, 2012; Krajmalnik-Brown, Lozupone, Kang, & Adams, 2015; Frye Rossignol, 2012b). The organs and systems affected by mitochondrial dysfunction are: the CNS, manifested as developmental regression; the peripheral nervous system (PNS); GI systems; muscles; and the immune system, all of which are commonly affected in children with ASD (Frye et al., 2015; Frye & Rossignol, 2012a; Rossignol & Frye, 2012).

Clinical features that are associated with cerebral folate deficiency (CFD) for children with ASD can be: ataxia; pyramidal signs, e.g., corticospinal tract disturbance, which is

concerned with voluntary, discrete, skilled movements; acquired microcephaly (not always observed); dyskinesias; and visual and hearing loss (Frye & Rossignol, 2012a). Rossignol & Frye's review in Trends and Physiological Abnormalities in Autism (2012), found a large percentage of publications implicating an association between ASD and oxidative stress (115/115) and mitochondrial dysfunction (145 of 153, 95%). Oxidative stress is defined as damage to cellular tissue caused by free radicals such as high levels of reactive oxygen species (ROS) or reactive nitrogen species (RNS), this is found in children with ASD (Rossignol & Frye, 2012; Frye & James, 2014). "Oxidative stress occurs when cellular antioxidant defense mechanisms are unable to counterbalance the ROS/RNS generated from oxidative metabolism or pro-oxidant environmental exposures" (Frye & James, 2014, p. 322). Low-level reactive species are physiologically necessary, as refined changes in redox status are vital for: regulation of mitochondria; immune system activation; gene expression; enzyme activity regulation; cell differentiation and cycle regulation; neurodevelopment; and a combined cell response to environmental triggers (Frye & James, 2014). Rossignol and Frye (2014) propose that there is a clear biological foundation for children on the autistic spectrum, as they studied the evidence connecting oxidative stress, mitochondrial dysfunction and immune dysregulation/inflammation in the brains of individuals with ASD. Reactive species (ROS/RNS) are important in neurodevelopment and are essential for: learning, memory, stimulating pathways responsible for synaptic strength and synaptic vesicles recycling, and maintaining normal neuronal communication and connectivity (Frye & James, 2014). They found evidence supporting the notion of increased levels of oxidative stress in key regions of the brain in individuals with ASD.

However, most importantly, the main metabolic pathway impacted in children with ASD is glutathione-redox metabolism, which is connected to the abnormalities found with folate and methylation metabolism. Frye and James (2014) noted that "Together, these metabolic abnormalities define a distinct ASD endophenotype that is closely associated with genetic, epigenetic and mitochondrial abnormalities, as well as environmental factors related to ASD" (p. 321). "Glutathione metabolism is important for maintaining redox homeostasis and control of the levels of reactive oxygen and nitrogen species in the cell, and is important for detoxification and elimination of environmental toxins from the cell" (p. 328). This is significant because metabolic disorders can be treated and there are no treatments for most genetic mutations.

Osteopaths help normalize metabolic disturbances by treating the appropriate mechanisms, systems (organs/viscera), and physiology that impact the imbalanced metabolic processes occurring, bringing back "dynamic coherence" (Still, 1902; Druelle, 2015). Still (1902) presented in his writings "that the abdominal viscera are responsible for our good health, and that they are the sole dependence for our normal physical forms and forces" (p. 166). The organs most involved in metabolic performance affected by mitochondrial dysfunction for the body are the liver, pancreas, and intestines (Frye et al., 2015).

The Collège d'Études Ostéopathiques de Montréal (CEO) teaches osteopaths how to normalize the parenchyma of organs and viscera by rebooting the function of the tissue and normalizing cellular exchange through the vitality and motility of the structure, and primary respiratory mechanism (PRM). The CEO also teaches osteopaths they can normalize the fluids using a level Protocol 2 palpation (P2) while treating the parenchyma to address emotional blocks or imprints held in the tissue (Camirand & Lafrance, 2015).

2.1.3. Toxicities and Autoimmunity

There has been strong evidence of wide spread environmental toxins that are important contributors to neurodevelopmental toxicity. Industrial chemicals are among the causes and may be responsible for the increased frequency of ASD diagnosis in children and other neurodevelopmental disabilities (Grandjean & Landrigan, 2014). Chemicals can cause permanent brain injury even at low level exposure. They have an effect on the vulnerable developmental window occurring in utero, during infancy and early childhood that might not affect the adult (Goh, 2016).

Environmental toxins change the genetic risk of a child developing ASD into illness. These environmental factors turn on the immune system, releasing antibodies and producing chronic inflammation that affects the brain. Immune reactions are triggered because the toxins are foreign to the body and many children with ASD have immune system abnormalities and overactive immune systems. Babies today are exposed to toxins in the womb and are pre-polluted at birth. Many of these toxins are direct neurotoxins resulting in chronic brain inflammation (Doidge, 2015). Overall, these factors overwhelm the developing brain of children before and after birth, resulting in the brain neurons not connecting or communicating properly with one another. Imaging of the neuronal networks of children with ASD has shown them to have prefrontal and frontal areas that are “under-connected” and other areas that show “overconnectivity” possibly causing seizures (Doidge, 2015). ASD has been linked with exposure to toxins like heavy metals and organophosphates that likely deplete glutathione (GSH), which regulates oxidative stress, and might be a mechanism influencing the aetiology of ASD (Herbert, 2010). As well, mercury toxicity bio-markers were associated to GSH irregularities, resulting in increased

oxidative stress and decreased detoxification, and increased severity of ASD (Geier et al., 2009). Neurodevelopmental disorders are caused by exposures to environmental toxicants, such as mercury, lead, arsenic, polychlorinated biphenyls and toluene (Rossignol & Frye, 2012). Mercury toxicity has been the one toxin that has carried through history from when Still began his quest to understand why conventional medicine had failed his children, following their deaths, up until the present time when Rimland shows mercury to be a main source of toxicity to the sensitive systems of children with ASD (Still, 1910, Rimland, 2003). There are obvious, extremely complex interactions between genetic pre-disposition and environmental triggers/toxins that are implicated in the etiology of ASD (Frye & James, 2014).

Rossignol & Frye's review in Trends and Physiological Abnormalities in Autism (2012), found a large percentage of publications implicating an association between ASD and immune dysregulation/inflammation (416 out of 437 publications, 95%) and toxicant exposures (170 of 190, 89%). In the first half of the 20th century infantile acrodynia was identified as a risk factor for ASD (Shandley & Austin, 2011). Infantile acrodynia (Pink Eye) was due to mercury (Hg) exposure found in teething powders and as a result some of these children stopped talking, were irritable, sometimes aggressive and became unaware or unaffected by the world around them (Shandley & Austin, 2011; Centers, 2015). Dr. Josef Warkany in 1948, discovered infantile acrodynia which was caused by mercury poisoning and children developed acrodynia because their small bodies could not detoxify the metals (Centers, 2015). Shandley & Austin (2011), suggested that the children who have ASD present sensitivities to mercury and that is why only some children were affected. Rimland stated that mercury, which is one of the most toxic substances known, is used as a

preservative in many vaccinations. He felt that certain genes of children with ASD were more sensitive to mercury and the exposure manifested as ASD in these children (Rimland, 2015). Ethylmercury has been shown to be a mitochondrial toxin and studies show children with ASD have mitochondrial dysfunction (Poling, Frye, Shoffner, & Zimmerman, 2006; Frye et al., 2015). Other mitochondrial toxins include: arsenic which disrupts ATP production; lead and mercury which impair oxidative phosphorylation; toluene, an organic solvent that results in mitochondrial uncoupling and ATP depletion; tetrachloroethylene, an organic solvent which inhibits respiration and reduces cellular ATP; and chlorpyrifos which results in impaired oxidative phosphorylation (Goh, 2016). Frye et al. (2015), have shown that lymphoblastoid cell lines, derived from children with ASD, display increased mitochondrial respiratory activity and vulnerability to oxidative challenges suggesting these cell lines may be more vulnerable to endogenous and exogenous stressors. Exposure to environmental stressor associated with ASD can affect both the mitochondrial function and GI function (Frye et al., 2015).

Autoimmune diseases continue to increase radically over the years and may be linked to mast cells. Mast cells are tissue immune cells responsible for allergies, however they have the ability to release multiple mediators in response to a large diversity of triggers resulting in an increasingly large participation in innate and acquired immunity, as well as inflammation. Mast cells contain everything that pertains to immunology from the triggers that activate the mast cells such as: immunoglobulins, C3A and C5A which are part of the complement system that clots blood, viruses, and endotoxins. Releasing factors of mast cells include mediators such as: histamine; cytokines; tumor necrosis factor; and 50 other molecules involved in autism. The mast cells can release factors that cause degranulation

and nerve damage but never show damage to the mast cell itself. Mast cells can release its chemicals selectively and are not isolated to certain stimulants. Once it releases these different factors they can talk to different pathogens and immune cells. Mast cells orchestrate how the brain or body responds to toxins. They are found all over the body: such as in the gut; in the skin; eyes; tongue; and there are concentrated amounts in the diencephalon and Broca's area of the brain which are areas affected in children with ASD. Mercury, environmental toxins, infectious agents and stress can all stimulate mast cells (Theoharides, 2013). Mast cells were found to be the "immune gate to the brain" (Theoharides et al., 1990). Theoharides' paper "suggests that mast cells may serve as a link between the immune, endocrine and nervous systems and could have an important role in the access of lymphocytes and pathogens to the brain" (p. 607). The mast cells attach to the outside of the red blood cells. These, together with the endothelial cells and parasites that line the wall of the blood vessel, regulate the blood brain barrier. However, the mast cells in the brain don't get triggered by allergens but instead by stress hormones such as corticotrophin-releasing hormone. The autism rate has been shown to increase due to prenatal stress (Theoharides, 2013). The brain has its own immune system mediated by microglial cells and the microglial densities were also found significantly greater in individuals with autism versus controls in a study by Tetreault, et al., (2012). Theoharides, Asadi, Panagiotidou, & Weng (2013), published "that activation of mast cells is accompanied by mitochondrial fission and translocation to the cell surface from where they secrete at least ATP and DNA outside the cell without cell damage" (p. 1136). As a result, these components are extracellular mitochondrial and misinterpreted by the body as "innate pathogens" causing a potent autocrine and paracrine auto-immune/auto-inflammatory response. They showed that young children with ASD have an increased amount of

mitochondrial DNA in their serum, a condition that could involve "focal brain allergy/encephalitis". A suggested therapy for these children with ASD would be to stop the secretion of extracellular mitochondrial components (Theoharides, Asadi, Panagiotidou, & Weng, 2013). In summary, stress releases corticotrophin releasing factor in the brain and together with other triggers (stressors) stimulate the mast cells, making the blood brain barrier leaky, allowing new cells, that are circulating, into the brain creating more cerebral inflammation (Theoharides, 2013). Overall, evidence in the literature is mounting and shows that children with ASD are characterized by certain physiological abnormalities, including immune dysregulation/inflammation, oxidative stress, brain inflammation, gastrointestinal (GI) dysfunction, and mitochondrial dysfunction (Rossignol & Frye, 2012; Theoharides, Asadi, Panagiotidou, 2012). Thoeharides, et al., 2012, indicate that “flavone luteolin has anti-oxidant, anti-inflammatory, anti-allergy and neuroprotective properties” (p. 317). They developed a dietary supplement that contained olive kernel oil as a base to increased the absorption of luteolin with the related flavonoids quercetin and rutin in a liposomal formulation. The children with ASD in Thoeharides’ study (n=37, 4-14 years old) used this formula for 4 months with no adverse effects. The results were 75 percent of the children’s GI and allergy symptoms improved, 50 percent improved in eye contact and attention in, 25 percent improved in social interaction and abount 10 percent had a resumption of speech (Thoeharides, et al., 2012). The researchers suggested: “even though these results represent an uncontrolled open case series, they are encouraging because they suggest good tolerability and potential effectiveness” (p.317).

2.1.4. Birth Trauma

According to Dr. Viola M. Frymann, D.O., (1998), "At least 80 percent of children with developmental delays, such as ASD, have a history of birth trauma" (p. 200). Birth trauma occurs 12 times more frequently to children on the autistic spectrum than their non-autistic siblings (Centers, 2012). Frymann (1998) found in her research and others that the birth process left "scars on the autonomic-physiologic mechanism, which encloses, protects, and influences the immature and developing CNS" (p. 16). She concluded from her research that the main area of the infant impacted directly during birth was the base of the skull, specifically strain patterns within the developing parts of the occiput (p. 16). The developing parts of the occiput and atlas, or 1st cervical (C1), are extremely important in the formation and development of: the nervous system, specifically the brain stem; the skull; the equilibrium system; and the sensorimotor system (Frymann, 1998, p. 16; Bourgeois, Dufresne, & Robinson, 2014). As an example, the vagus nerve, which is primarily parasympathetic, when irritated and compressed can cause widespread problems and is associated with children with ASD. Blood to the brain is distributed in a specific order and sequence with the greatest amount going to the base of the skull and less going to the peripheral areas, e.g., speech. "As it happens, the areas that receive a decreased amount of blood flow are the same areas involved in autism" (Centers, 2012, p. 462). Hypoxia, or low levels of oxygen to the brain, is a result of numerous birth traumas, which are recognized as an increased risk for children to develop ASD (Autism Speaks, 2016). Rimland emphasised that prenatal factors such as: infection; environment toxicities; chemical exposures; and lack of folic acid during the first two months are linked to children with ASD (Rimland, 2015). Although researchers in a meta-analysis could not implicate any one prenatal factor to the

aetiology of autism they did associate a few risk factors that included: “advanced parental age at birth, maternal prenatal medication used, bleeding, gestational diabetes, being first born vs. third or later, and having a mother born abroad” (Gardener, Spiegelman, & Buka, 2009, p. 7). Geri Dawson, PhD, Chief Science Officer at Autism Speaks, also notes from Gardeners 2011 analysis “that no one birth trauma increases the risk of autism” (Autism Speaks, 2016). Dawson says, “Rather it appears that increased risk is associated with a combination of several factors that may reflect what is referred to as suboptimal birth. And even then the risk may only be present when combined with a genetic vulnerability” (Autism Speaks, 2016). However, another study in 2016 showed a significant association between perinatal ($p=0.03$) and postnatal ($p=0.042$) factors and ASD. The perinatal factors were acute fetal suffering or distress, long duration of labour, and prematurity. The postnatal factor primarily included respiratory infection. They found no correlation between ASD and the advanced age of the parent. This survey verified that a high prevalence of prenatal, perinatal and post-natal factors exist in children with ASD, and propose the convergence of some of these elements such as acute fetal distress, difficult labor, and respiratory infections as contributing variables for the genesis of ASD (Hadjkacem, et al., 2016). Rimland illustrates in his book “Infantile Autism” that it is not just one cause but multiple factors and interrelationship of many systems that superimpose a child developing autism (Rimland, 2015). Rimland and Dawson strongly suggest that further studies are required to explore the link between low oxygen levels and autism risk (Rimland, 2015; Autism Speaks, 2016).

2.2. Pathophysiology

“From the osteopathic perspective, autism is, first and foremost, a collection of symptoms—not a disease—found in susceptible children” (Centers, 2012, p. 459). The physiological

implications to children with ASD are vast but must be understood in depth for precision in treatment and include primarily: gut brain axis dysregulation, autonomic nervous system (ANS) imbalances, and neurological comorbidities (Still, 1902; Hsiao, 2014; Frye et al., 2015; Rimland, 2015).

2.2.1. Gut Brain Axis (GBA)

Rimland suggested that children with ASD had autoimmunity injury both in the gut and brain (ARI, 2016). Recent studies have shown that children with ASD have an altered microbiome (Clostridium, Desulfovibrio), high rates of GI complaints and abnormalities, dysregulated intestinal mucosal immunity with enhanced pro-inflammatory cytokine production, duodenal ulcerations, and increased GI permeability (Parracho, Bingham, Gibson, & McCartney, 2005; Krajmalnik-Brown et al., 2015; Adams et al., 2011). The enteric microbiome metabolic by-products can have intense and widespread effects on metabolism, immune function, and gene expression in many organs, including the GBA in children with ASD (Frye et al., 2015). Recent advances in the literature have shown that the enteric microbiota are responsible for the interaction between the central nervous system and the intestines by means of immune, hormonal, endocrine and neural links (Carabotti, Scirocco, Antonietta, & Severi, 2015). Gut associated lymphoid tissue (GALT), the immune system of the GI tract, is closely associated with microbiome intestinal cells and is dysfunctional in children with ASD (Carabotti et al. 2015; Hsiao, 2014). The gut hosts 70 % of the immune tissue in the body, collectively known as GALT (Korotkov, 2017). The composition of the microbiome is extremely important because damage increases permeability resulting in harmful bacteria entering systemic circulation: affecting the blood brain barrier which will have direct negative effects on the brain; and induce an immune

response/inflammation (Evrensel & Ceylan, 2015). There are many environmental factors that influence gut microbiome permeability that include: diet, pharmaceuticals, geography, stress, infant feeding method, birthing process and lifecycle stages that can result in an immune reaction (Ursliak, 2015). Thyroid hormones, especially active T3, are key to influencing the junctions in the stomach and small intestines to form an impenetrable barrier. However, in order to make active T3, to keep the gut junctions tight, sulfatase is required which comes from the healthy gut bacteria, microbiome. Therefore, if the microbiome is damaged there will be less sulfatase, to make active T3, therefore increasing gut permeability. As well, inflammation in the gut will signal the body to release cortisol which will in turn reduce T3 further, resulting in less ability to make active T3, increasing the permeability of the gut. Thyroid hormone dysfunction is also an autoimmune disease (Korotkov, 2017). The subjects in this study show high inflammatory readings and high levels of thyroid factor index as measured by the HeartQuest™ technology. They also show high energy levels on the data gathered by the BioWell™, which is indicative of inflammation issues within the body. These findings seem to support Rimland's theory that ASD is an autoimmune inflammatory disease. Additionally, the literature has significant evidence that there is a gut microbiome change allowing permeability of toxins increasing an inflammatory autoimmune reaction.

The hypothalamic–pituitary–adrenal (HPA) axis, the enteroendocrine system and the mucosal immune system are all hormonal aspects of the GBA that impact children on the autistic spectrum (Mulle, Sharp, & Cubells, 2013; Collins, Surette, & Bercik, 2012; Hollocks, Howlin, Papadopoulos, Khondoker, & Simonoff, 2014). The GI tract is the main manufacturer of serotonin (5-hydroxytryptamine (5-HT)) in the body where it is a valuable

regulator of GI physiology (particularly motility), however, the CNS does manufacture 10% of 5-HT, which contributes to mood (Collins et al., 2012; Manocha & Khan, 2012). 5-HT acts as a neurotransmitter in the mature brain and plays a significant role in brain development. Disturbance of serotonergic development, which is shown in children with ASD, can leave permanent changes in their brain function and behaviour (Whitaker-Azmitia, 2001). The most important breakthrough in neuroscience in the twentieth century has been "neuroplasticity". Scientists have shown that if brain cells die they can often be replaced, that even basic reflexes that were felt to be hard wired are not, and children through thinking, acting, and learning can turn their genes on and off shaping out their brain anatomy and behaviour (Doidge, 2007). Both components of the autonomic nervous system, namely the parasympathetic and the sympathetic nerves, line the gut. Valuable information is carried from the gut to the brainstem primarily via the parasympathetic vagus nerve. The vagus nerve delivers the information to the limbic system. Children with ASD have been shown to have a dysfunctional mechanism of the gut–brain axis. This vagus nerve mechanism is suggested by the literature to be a possible source of the dysfunction (Hsiao, 2014; Craig, 2002; Collins et al., 2012).

Visceral manipulation has been an element of osteopathy since the beginning (Still, 1892). A.T. Still, D.O., shares a story about an abdominal visceral treatment where a 4-year-old boy was suffering from dysentery. He said:

> I began at the base of the brain, and thought by pressures and rubbings I could push some of the hot to the cold places, and in so doing I found rigid and loose places on the muscles and ligaments of the whole spine, while the lumbar was in a very congested condition. I worked for a few minutes on that philosophy, and told the mother to report

> next day, and if I could do anything more for her boy I would cheerfully do so. She came early next morning with the news that her child was well. (Still, 1908, pp. 105-106)
>
> Dr. Still also counselled:
>
> Be very particular to bring the third, fourth, and fifth lumbar far enough forward to give free passage of the nerve and blood supply to sacral and lower abdominal viscera. Fill the lower bowels with gruel, not starch, in order to take off any irritation that undigested food is producing because this irritation has much to do with infant convulsions. (Still, 1910, p. 327)

Still's counsel predicted the recent literature on the GBA, in particular Murch et al., 1998 found significant bowel pathology in 47 out of 50 autistic children along with many other researchers (Parracho, et al., 2005; Adames, et al., 2011; Hsiao, 2014).

2.2.2. Neurological Impacts

A review of the literature has shown an extensive range of "neurological comorbidities" displayed in children with ASD that include: intellectual disability, epilepsy, anxiety, and mood disorders (Hsiao, 2014). Additionally, these children display "non-neurological comorbidities" that included: blood hyperserotonemia, immune dysregulation, and GI abnormalities (Hsiao, 2014). Children with ASD present with specific regions of excess growth of the brain with encompassing physiological abnormalities involving: speech and auditory processing, social behaviour, memory, and sensory and motor coordination (Rossignol & Frye, 2014). Rossignol and Frye (2014) discovered evidence that the brain areas affected were connected to oxidative stress, mitochondrial dysfunction and immune

dysregulation/inflammation (Rossignol & Frye, 2014). Neuropathology in children with ASD suggests abnormalities in the: frontal cortex, amygdala, temporal, hippocampus, and cerebellum, as well as trauma to the brain stem (Rossignol & Frye, 2014; Rimland, 2015; Courchesne, Carper, & Akshoomoff, 2003; Jou, et al., 2013). Studies have illustrated that children with ASD have larger brain volumes, with white and grey matter significantly larger in the cerebrum (Courchesne et al., 2001; Courchesne et al., 2003). Carper and Courchesne (2000) observed in children with ASD that a number of consequences in brain structure and function were linked to abnormal neural growth patterns early in development. Frymann (1998) discusses the CNS and its major pathways at birth as immature and that the myelination is first detected at the fourth fetal month showing slow development until birth when it rapidly accelerates completing at 2 years of age. It seemed apparent to Frymann that the most important function of the CNS was myelination, which in turn is fundamental to healthy organisation and integration. Myelination is what protects the nerves from damaging EMF waves (Fraser, Massey & Wilcox, 2008). Frymann states that it is appropriate to apply osteopathic techniques to achieve normalization before this critical period has passed (Frymann, 1998). Overall, for children with ASD, early life is a key period. A new theory of "neuro mal-development", with abnormalities in both the actively developing neural circuitry and the first behavioural signs of autism, is emerging (Autism Center of Excellence, 2016).

Rimland's theories also state that in children with ASD crucial areas of the brain may receive an inadequate supply of blood, indicating hypoxia in the cerebrum or oxygen intolerance to the cerebral vasculature (Rimland, 2015). He suggests, as does Frymann, that oxygen deprivation may occur at birth, specifically at the brain stem level (RF), illustrating Still's

principle; structure governs function (Rimland, 2015; Frymann, 1998). Sutherland, a student and study of Still's concepts, discovered the cranial bones moved and that the motion of the structure (cranial bones) reflected the function of the tissues beneath. "The palpable motion of the skull, described as the cranial rhythmic impulse, is the manifestation of the dynamic fluctuation of cerebrospinal fluid (CSF) and the inherent motility of the CNS within, controlled and influenced by the RTM" (Frymann, 1998, p.98). We can see from the literature that children with ASD are often severely impacted by the artery and CSF fluctuation, resulting in significant neurological dysfunction.

Rimland (2015) states, from the literature, that there are differences in neural circuitry connectivity in children with ASD, with abnormal white matter and enhanced connectivity between the thalamus and cerebral cortex ("sensory gateway") which may suggest that this subcortico-cortical extra connectivity may be hyperfunctional (Rimland, 2015; Mizuno, et al., 2006). Just, Keller and Kana (2013) felt "The abnormalities in white matter in autism, including myelination and corpus callosum size, form a plausible neural basis for disrupted systems-level connectivity in autism" (p. 37). The amygdala is another important region of the brain that presents abnormalities in children with ASD (Brothers, 1990; Baron-Cohena, et al., 2000). The amygdala has been represented as a fundamental part of the social brain functioning and considered by Porges as part of the social behaviour system of the ANS; social behaviour has been seen to be severely disrupted in children with ASD (Brothers, 1990; Baron-Cohena et al., 2000; Porges, 2011; Rossignol & Frye, 2014). Interestingly, the vagus nerve supplies nearly 90 percent of all the nerve impulses delivered to the amygdala and a vagal nerve dysfunction results in a dysfunction of the amygdala, which is found in children with ASD (Brothers, 1990; Baron-Cohena et al., 2000; Porges, 2011; Centers,

2012). The book "The Polyvagal Theory" beautifully illustrates the complex role of the parasympathetic nervous system PSNS (vagal tone) as it is heavily involved in the social engagement, cardiovascular regulation, and immune regulation; all systems found to be in dysregulation in children with ASD. It is well known that children with ASD specifically have breakdowns in their social engagement system and, according to polyvagal theory, this is the result of losing the sedative effect of the myelinated vagus system leading to anxiety and hyper-vigilant states (Porges, 2011; Rimland, 2015). The literature clearly shows children with ASD have social behaviour issues and are dysfunctional in multiple systems including: HPA axis, ANS, and GBA that Porges specifically links to social behaviour issues (Porges, 2011; Rimland, 2015; Hsiao, 2014). Studies have also illustrated the vagus nerve's under activity or reduced PSNS may be linked to sensory modulation disorders seen in children with ASD (Schaaf, Miller, Seawell, & O'Keefe, 2003: Rimland, 2015).

It is apparent from the literature that children with ASD have significant physiological changes to the neural function and anatomical changes to the structures at the base of the skull, resulting in a reduced PSNS system, primarily via the vagus nerve/nucleus solitary tract (NST), and possibly insult to the RF which contains the reticular activation system (RAS), (Rimland, 2015; Frymann, 1998; Hsiao, 2014). The RAS balances and focuses the vagus nerve and gives the vagus impulses on what to respond to or how to react (Barsotti, 2010). RAS is a bundle of nerves in the brain stem with projections all the way up to the mid-brain. It is a complex collection of neurons functioning as an area of convergence between the external environment and the internal thoughts and feelings. The RAS receives information directly from the sensory ascending tract projections which play a significant role in determining whether a person: can learn; remember things well or not; is impulsive

or self-controlled; has high or low motor activity levels; and is highly motivated or bored easily. Individuals will be distracted by "noise," both from the outside environment and internally if they do not have proper filtering by the RAS. The development of neural connections and the essential neural density, which is required for processing the incoming information, will depend on whether the RAS is activated or not. Therefore, the RAS is concerned with the “number of brain cells, the size of the brain cells, and the number of connections between brain cells”. The RAS modulates consciousness and functions throughout the body to maintain balance for the other systems such as those involved in learning, self-control or inhibition, and motivation (Reticular Activating System: ADHD Neurology, 2012). One important function for children with ASD is that the RAS must filter out information such as images, words, and conversations. RAS is the filter between what you are hearing and your subconscious mind, a gatekeeper. If the RAS is pre-set to particular information then it will only allow that information to be allowed in but if the RAS is not pre-set then that set of information will not enter your consciousness. Therefore, RAS needs to be set to what we want in order to act on the information coming in and have the correct responses. The RAS works with the law of attraction by setting the intention to what we want and how we want to feel, filtering out the rest. The RAS is the mechanism used to focus our brain on what we allow into our world and what we keep in the subconscious. RAS works like a feedback loop, starting with all the different sensory input entering in from the environment becoming a belief system (thoughts) of the internal environment and finally resulting in an action taken by the person (Young, 2012).

Barsotti, 2010, explains that the RAS is said to be the system that awakens the diencephalon (the hypothalamus, pineal gland and thalamus) as well as the cortical areas of the brain. The

hypothalamus is the link between the endocrine and nervous system maintaining internal balance. Additionally, the pineal gland connects the endocrine system with the nervous system, converting nerve signals from the sympathetic peripheral nervous system into hormonal signals. The thalamus has multiple functions but essentially it is a relay and processing center for sensory input (Stedman, 1990). The present research revealed, through data collected from both the HeartQuest™ and Bio-Well™, that most of the children showed excessive use of their endocrine/hormonal system instead of the more optimally utilized PSNS. The RAS sits centrally in the brainstem. It may be the chief gateway for afferent (sensory) and efferent (motor) messenger molecules to distribute throughout the nervous system. Unfortunately, neural maps, through Functional Magnetic Resonance Images (fMRI), only show which brain cortices have become activated with thoughts, emotions and memories. They have left out the vital afferent and efferent messenger molecules through the brainstem where the RAS is located. Borsotti states that without a functioning RAS there is no bodily connection. There is instead a type of disconnection akin to being "comatose" or "locked-in". Regardless of the state of consciousness, (e.g., sleeping, awake or altered states) the RAS responds through its afferent and efferent pathways to stimuli from all sensory systems integrating sensory, visceral, limbic, and motor function. The present research demonstrates that the children in this study, who were diagnosed with ASD, were found to be in a calm state as measured by the Bio-Well™ technology. They predominantly expressed delta waves in their HeartQuest™ data demonstrating that they were in a state of being "locked-in" and unable to maintain conscious awareness. The osteopathic findings gathered in this present research, with respect to the condition of the base of the cranium, were a lack of vitality and numerous structural and functional lesions. The areas most affected include: C0/C1/C2/C3; foramen magnum; the cranial base and its underlying

physiology. Barsotti explains that essential influences on the autonomic regulation of vital organ systems, sleep cycles, levels of alertness, pain modulation, somatic motor activities, and behavior are effected by the reticular circuits which branch throughout the central nervous system. Dorsal to the RAS is the vagus nerve which originates in the medulla oblongata, a part of the brainstem. The vagus nerve is the main nerve of the ANS and has an extensive distribution throughout the body. The vagus nerve is bidirectional between the brain and the body communicating both sensory and motor information. Borsotti's review of the literature suggests that there is emerging experimental evidence demonstrating "that immune and inflammatory responses are modulated by communications along the vagus nerve" (Barsotti & Mills, 2011, p. 23). This has definitely been demonstrated with the GBA literature and correlated to children with ASD as dysfunctional. Barsotti & Mills write, the main area for regulating sympathetic and parasympathetic vagal branches discharge to the heart and blood vessels is in the medulla. As well, sensory input from various systemic sensory receptors and mechano- receptors, such as chemoreceptors, baroreceptors, thermoreceptors and osmoreceptors are received by the NST in the medulla. There is controversy in the literature whether it is the hypothalamus or RAS or medulla that is the main control centre regarding the visceral sensory receptors (Barsotti & Mills, 2011). Borsotti states:

At this time it has become increasingly apparent that the RAS is not only a neuronal superhighway, but also an active conduit by which messenger molecules (e.g., neuropeptides, neurotransmitters, hormones, neuromodulators) conduct signals along long and short pathways, afferent and efferent. Without its principal and crucial involvement, any

other cortical activity in the so-called “higher brain” cannot be registered throughout the body. (Barsotti & Mills, 2011, p. 22).

Therefore, direct osteopathic treatment to the brain stem and to the base of the skull should be a consideration for children with ASD. Preferably, there should be a predominance of PSNS function in the body (Centers, 2012). As early as 1947, evidence based research illustrated that there was an effect from an osteopathic approach on the autonomic nervous system (Korr, 1947). More recent research by Henley, Ivins, Mills, Wen, and Benjamin (2008) also demonstrated that osteopathic manipulation can help normalize ANS function. Frymann (1998) demonstrated in her research that osteopathic manipulation enhances the body’s inherent therapeutic capacity, stimulating neurological development, integration, and function (pp. 44-56). Osteopathic procedures are based on the law of mind, matter and motion. “Osteopathy is indeed the recognition, utilization and restoration or motion in every aspect of life, in every phase of matter designed by the divine mind” (p. 251). Dr. Centers (2012) expresses that “From a structural point of view, then, the osteopathic physician’s first objective is to restore motion in the area of the jugular foramen to decrease tension on the vagus nerve” (p. 463). “Bringing the sympathetic and parasympathetic nervous systems (also called the autonomic nervous system) into balance has long been a core goal of osteopathic treatment, guided by studies done in the 1950s and 1960s confirming the benefits of osteopathic manipulation for autonomic nervous system functioning” (p. 463).

It is apparent from the findings in this research paper, and the above literature, that children with ASD have significant inflammatory autoimmune reactions from a leaky gut. This impacts the bidirectional vagal system and brain stem along with the RAS, reducing the PSNS expression resulting in an overriding endocrine CNS hormonal regulation of the

body's autonomic functions. As well, a two-year longitudinal pilot MRI study of the brainstems of children with autism suggested developmental brainstem abnormalities, primarily involving the gray matter structures. Although these findings represented a small sample of a more global development, the brainstem cannot be ignored. The brainstem plays an essential role in the vital phenotypic expression of ASD "given its potential role in emotion/behavior regulation and under-reactivity and/or over-reactivity to sensory stimuli" (Jou, et al., 2013, p. 8). As well, the insights of Borsotti and Jou et al., coincide with Frymann's belief to address the exceedingly important structures at the base of the skull and its underlying physiology, the brainstem with the RAS and vagus nuclei.

The literature clearly illustrates that children with ASD have concomitant GI problems and an over reactive immune system and now, combined with the evidence that the brain, GI, immune system, and toxins are intricately connected, gives a deeper understanding of how to approach these children medically and osteopathically (Centers, 2012; Hsiao, 2014; Rimland, 2015).

2.2.3. Hormonal Implications

2.2.3.1. Hypothalamic–Pituitary–Adrenal (HPA) Axis

The hypothalamic–pituitary–adrenal axis (HPA), the enteroendocrine system, and the mucosal immune system are all hormonal aspects of the GBA that impact all children on the autistic spectrum (Mulle et al., 2013; Collins et al., 2012; Hollocks, et al., 2014). The HPA axis is accountable for stress reactions which cause a release of noradrenaline, adrenaline, and corticosterone. Anxiety and emotions can change the environment of the microbiota and influence the gut physiology through the release of these stress hormones that affect the

microbial composition (Collins et al., 2012). The HPA axis is part of the limbic system, a vital area implicated in memory and emotional responses. Activation of the HPA axis occurs from environmental stress and/or elevated systemic pro-inflammatory cytokines from disrupted enteric microbiota. This results in the hypothalamus secreting corticotrophin-releasing factor (CRF), stimulating the pituitary to secrete adrenocorticotropic hormone resulting in cortisol being released from the adrenal glands. Cortisol release is driven by a multifaceted communication between the amygdala, hippocampus, and hypothalamus, comprising the limbic system. Many human organs, including the brain are affected by cortisol, which is a major stress hormone (Carabotti et al., 2015). Imbalances in HPA function have been implicated in children on the autism spectrum (Hollocks et al., 2014). The gut microbiome has been found to influence the development and function of the endocrine hormone system, primarily the HPA axis (Carabotti et al., 2015). Therefore, enteric microbiota imbalances can cause imbalances in HPA axis development during early life and this imbalance has the potential to trigger autism in children (Mulle et al., 2013; Carabotti et al., 2015). Enteric microbiota is vulnerable to birth practices (C-section vs. natural), antibiotic use, antibiotics in food, pesticides, herbicides, and stress, illustrating the enteric microbiota susceptibility to environmental stress at early life which can trigger autism (Ursliak, 2015; Frye et al., 2015).

2.2.3.2. Serotonin (5-hydroxytryptamine/5-HT),

Enteroendocrine cells of the gut synthesise hormones that regulate appetite such as cholecystokinin and ghrelin, and serotonin (5-hydroxytryptamine), and have a wide range of effects on gut and brain functions. Gastrointestinal (GI) tract is the main manufacturer of serotonin (5-hydroxytryptamine (5-HT)) in the body where it is a valuable regulator of GI

physiology (particularly motility), however, the CNS does manufacture 10% of 5-HT, which contributes to mood (Collins et al., 2012). Serotonin is produced by the enterochromaffin (EC) cells and is an important enteric mucosal signaling molecule. It is implicated in a number of GI disorders, including inflammatory issues. Manocha and Khan's review of the literature, on serotonin and GI disorders, found that many serotonergic receptors were discovered on immune cells such as B and T lymphocytes, monocytes, macrophage, and dendritic cells. Furthermore, mast cells, macrophage, and T cells have the capability to produce 5-HT from tryptophan. In conclusion, from Manocha and Khan's review, it is apparent that mediators from immune cells such as cytokines have a significant role in EC cell biology and synthesis of 5-HT in the gut. 5-HT produces a wide span of influences in the GI, chiefly due to the existence of multiple receptor subtypes that are on smooth muscle, enteric neurons, enterocytes, and immune cells (Manocha & Khan, 2012). The problem is that serotonin does so many things to the bowel that it is difficult to determine which of these actions are physiologically important (Gershon & Tack, 2007). Serotonin [5-hydroxytryptamine (5-HT)] acts as a neurotransmitter in the mature brain and plays a significant role in brain development. It plays a significant role as a growth factor in brain development, directing proliferation and maturation. Disturbance of serotonergic development, which is shown in autistic children, can leave permanent changes in their brain function and behaviour (Whitaker-Azmitia, 2001).

Over the past 50 years, one of the most recurrent findings is platelet hyperserotonemia in children on the autistic spectrum. The reproducibility of elevated serotonin (5-HT) levels in blood platelets as a finding in children with autism suggests that the many gene variants involved in autism affect a small number of biological networks and play a role in the early

development of the autistic brain (Janušonis, 2008). Serotonin has a large role in neural transmission and has extensive CNS projections. 5-HT plays a significant role in a wide range of behaviors and processes including sensory gating, behavioral inhibition, appetite, aggression, sleep, mood, affiliation, and neuroendocrine secretion. By 4 months gestation, 5-HTs has been found to have a large role as a regulator for neurodevelopment and as a growth factor, having profound effects on neurogenesis, morphogenesis, and synaptogenesis. Serotonergic projections have a rich innervation of limbic areas essential for emotional expression and social behavior, that involve a wide range of behaviors often observed in individuals with autism. The rostral limbic system, including the amygdala, septum, medial orbitofrontal cortex, anterior insular cortex, anterior cingulate cortex, accumbens, and hippocampus are the main areas of the brain that are impacted affecting the core social deficits in children on the autism spectrum. The cerebellum also receives intensive study in autism due to its role in attention regulation and motor control. As well the raphe nuclei of the brainstem contain serotonergic neuron cell bodies, which project caudally to the spinal cord and cephalically to the brain. There is a particularly rich innervation in the basal ganglia, amygdala, hippocampus, and hypothalamus (Anderson, 2002).

Collective proof in the literature shows that the serotonergic system is plastic and 5-HT projections continue to undergo age-related modification through early adulthood (Anderson, 2002). The most important breakthrough in neuroscience of the twentieth century is “neuroplasticity”. Scientists have shown that if brain cells die they can often be replaced, that even basic reflexes that were felt to be hard wired are not, and even children through thinking, acting, and learning can turn their genes on and off shaping out our brain

anatomy and behaviour (Doidge, 2007). A.T. Still's first principle of structure governs function falls in line with the notion of how the brain can change its own structure and function through thought and activity (Still, 1902; Doidge, 2007). Unfortunately, neuroplasticity is not all wonderful as it also makes our brain more vulnerable to environmental influences. We see this throughout the literature with children on the autistic spectrum who are impacted neurodevelopmentally from environmental toxicity and in part by epigenetic issues (Doidge, 2007).

Osteopathy specifically treats the inter-relationships of the entire body and the mechanism of health. We can see from the above literature that children on the autistic spectrum are affected on several systems that are all inter-connected. As osteopaths, we can target neuroplasticity with techniques that involve normalization of the cranial bones, the reciprocal tension membrane (RTM) or dura, venous sinuses, ventricles and brain parenchyma (Druelle, 2016). Normalisation of the RTM and venous sinus specifically helps to establish a balance between the reciprocal tension of membranes and the liquid aspect of the brain resulting in the best performance of brain tissues, vessels, and neurons or neuroplasticity. Normalisation of the RTM, or the dura, allows the brain to expand and retract acting as a pump for the sinuses creating a balance between the fluids, brain and dura like hydraulic joints. The CSF has a "cushion effect" between the brain and the dura (RTM) and acts as a filter, producer, and has the potentiality to reduce infection and inflammation. CSF is created in the ventricles; therefore, the ventricle techniques are very important as they will boost the brain's health as they work directly on the CSF production, flow and circulation. Twenty-five percent of the CSF passes across the walls of the ventricles (Druelle, 2014a). A.T. Still states, "the cerebrospinal fluid is the highest known element that

is contained in the human body and unless the brain furnishes this fluid in abundance a disabled condition of the body will remain" (Still, 1899, p. 39). Lastly, Sutherland in 1939, gives a glowing picture of the primary respiratory mechanism (PRM) "in which the movement of the articulation mechanism of the cranial bones and of the sacrum between the ilia is controlled and influenced by the reciprocal tension membrane of the dura mater in response to the fluctuant motion of the cerebrospinal fluid, which is motivated by the inherent motility of the central nervous system" (Frymann, 1998, p. 283).

2.2.4. Enteric Nervous System (ENS) and ANS

The enteric nervous system (ENS) is another pathway by which the brain and enteric microbiota communicate. The ENS efferent pathway combines physiological responses, such as gut motility and secretion which govern the digestive tract, and immune activity regulation (most immune cells possess receptors for neurotransmitters). Reflexes within the gut relay information to the brain via the afferent sensory nerves of the ENS. The sensory afferent information from the ENS includes indicators about noxious stimuli, such as gut distension, and hazardous signals that can consist of bacterial endotoxins or pro-inflammatory cytokines. This information is expressed to the brain with the responses aimed at re-establishing homeostasis; these reactions can involve alterations in the GI physiology or immune function (Collins et al., 2012). Rimland, (2015) in his book "Infantile Autism", and other researchers illustrate that children with ASD have both GI physiology and immune dysfunction (Krajmalnik-Brown et al., 2015; Parracho et al., 2005; Frye et al., 2015)

The ANS is composed of parasympathetic and sympathetic nerves which innervate many places, including the lining of the gut for regulation of the GI. The GI communicates with the brain primarily by the parasympathetic system and, more specifically, the vagus nerve

which is a major pathway for signals originating from the foregut and the proximal colon. This pathway terminates at the solitary nucleus tract of the vagus nerve. It is located in the brain stem and it carries valuable sensory information to its destination in the limbic system. This pathway is dysfunctional in children with ASD (Hsiao, 2014; Craig, 2002; Collins et al., 2012). "The limbic system is responsible for a range of brain processes: the amygdala integrates responses of fear and arousal, whereas the hippocampus is responsible for memory and spatial navigation, and the limbic cortex regulates olfaction and integrates sensory and motor functions" (Collins et al., 2012, p. 737). "The limbic system receives input from other brain regions that are responsible for a range of behaviours; these regions include the prefrontal cortex, the anterior cingulated gyrus, the temporal lobe and basal ganglia. Communication between the limbic and autonomic systems provides the neural circuitry underlying the strong link between behaviour and gut function in health" and has been shown in a review of the literature to be severely impacted in children with ASD (Collins et al., 2012, p. 737 ; Hsiao, 2014). Many of these areas of the brain are affected in children with ASD (Rimland, 2015; Rossignol & Frye, 2014).

The inhibitory effect on the gut is mainly by the sympathetic system, reducing intestinal motor function and secretion by discharging neurotransmitters (Collins et al., 2012). Reaction to stress, which is a primary symptom in children with ASD, is expressed through the sympathetic system and the hypothalamic–pituitary–adrenal axis (Rimland, B., 2015; Collins et al., 2012; Hollocks et al., 2014). Studies have shown that children with ASD have an HPA imbalance demonstrating higher peak responses and longer recovery times (Spratt et al., 2012). Other studies have illustrated children with ASD to have either heightened

levels of cortisol as a reaction to stress or to have a chronic stress response of lower cortisol levels (Spratt, et al., 2012; Corbett, Schupp, Levine, & Mendoza, 2009).

The CEO teaches how to normalize the ANS via techniques such as: passive CV4; normalization of solar plexus; foramen magnum normalization and core link (Drerup, 2014; Laett, Van Vliet, & Drew, 2015). An osteopathic study conducted in 2008 demonstrated that osteopathic manipulation plays a role in rebalancing the ANS function (Henley et al., 2008). Camirand teaches advanced training at the CEO on how to normalize the adrenals and pituitary to engage the HPA axis (Camirand, 2016). The CEO also teaches brain parenchyma work and normalisation of the SBS (structure) and RTM of the cranium, allowing optimal amounts of CSF to bathe the brain tissue (such as: pituitary, thalamus and hypothalamus) for nourishment and repair (Druelle, 2016; Forget, 2017). Sutherland and Still spoke of the CSF as "one of the highest elements in the body" and recognized its potency (Frymann, 1998).

Overall, the literature clearly demonstrates a large role of the gut microbiota in the presentation and severity of children with ASD along with an expanding approval of a connection between the gut and the brain impacting numerous physiological systems in children with ASD (Mulle et al., 2013; Krajmalnik-Brown et al., 2015; Frye et al., 2015; Hsiao, 2014).

2.2.5. Sensory Implications

Sensory processing disorder (SPD) is refined into three classical categories: sensory modulation disorder (SMD); sensory-based motor disorder, and sensory discriminative disorder. SMD occurs at the CNS regulating the neural message about sensory stimuli and

is broken down into three subtypes: sensory over-responsivity (SOR); sensory under-responsivity (SUR); and sensory seeking/craving (SS) (Miller et al., 2007). Children with ASD have been found to have these three subtypes of SMD. We have seen patterns emerge in the literature: hyper-responsiveness; hypo-responsiveness; and sensory seeking (Rimland, 2015; Boyd et al., 2010). Children with SOR results in them responding to sensation faster, with more intensity, or for a longer duration preventing them from making an effective functional response. This occurs particularly when transitioning from one event to another and in new situations, here the response maybe be seen as a willful behavior, illogical and inconsistent. These are the children who can't stand to have tags on their clothes and need to have them cut off or they throw a fit. Children with SUR do not respond to sensory stimuli and their environment, failing to respond to pain like falls and temperature. These children are frequently referred to as withdrawn, difficult to engage, inattentive, or self-absorbed. SS children desire an abnormal amount of sensory input with a limitless need for more intense sensations. These are the children who hit themselves in the head and yell a lot. They enthusiastically engage their bodies into activities such as: constant spinning or stemming; loud noises; and visual stimulating objects such as video games. Stemming refers to the most common symptoms and specific behaviors seen in children who have ASD such as: hand-flapping, rocking, spinning, or repetitive words and phrases. These behaviors are interpreted as demanding and attention-seeking. If the sensory need is not met these children can become explosive and aggressive, potentially resulting in destroying property, and can be seen as dangerous (Miller et al., 2007). However, in this research study, the researcher found that the stemming behavior increased their PSNS on HeartQuest™ allowing the child to eventually calm down their nervous system after trauma such as falling off their bike. This was their way to help regulate their fight flight response. Another subject in this research

study did become destructive, to the point where the police had to be called after the treatement, because the subject was not getting what they asked for in terms of video game playing time. This child had more than ASD as a diagnosis and was referred to the hospital for further psychiatric evaluation.

> Some children with SOR will engage in SS behaviors as an attempt at self- regulation (stereotypical in a child with autism). A challenge is that overactive and impulsive symptoms in SS can easily be confused with (and often co-occur with) attention deficit hyperactivity disorder (ADHD). (Miller et al., 2007, p. 137)

A meta-analysis of sensory modulation looked at 14 studies of people with ASD, with a heterogeneous presentation, suggested that under-responsivity may be the most common sensory symptom of the three followed by over-responsivity and sensation seeking (Ben-Sasson et al., 2008). In the Boyd et al. study, their finding suggested that children with ASD demonstrated high levels of hyper-responsiveness that predicted high levels of repetitive behaviour, suggesting shared neurobiological mechanisms (Boyd et al., 2010). “Significant correlations were found between the degree of sensory abnormalities and amount of restricted and repetitive behaviours reported” (Chen, Rodgers, & McConachie, 2009, p. 635). The neurological regions found responsible for the abnormal over reactive responses to sensory stimuli in children with ASD were: primary sensory cortices; amygdala, hippocampus, frontal and pre-frontal cortex (Green et al., 2013). Dr. Rimland felt, since confirmed by modern researchers, that the hypo-responsiveness in children with ASD might be “an impairment in the ability to attach meaning to sensory input and an inability to link sensation with experience” (Rimland, 2015, p. 151).

Disturbances in neural systems at the sensory processing level of children with ASD involve: temporal synchrony, unimodal and multi-sensory processing and attention processing. The increase in neurophysiologic data illustrates possibly that the modifications in sensory processing of children with ASD may produce their fundamental features of language delay (auditory processing) and trouble with interpretation of emotion from faces (visual processing). Sensory information is processed, modulated, and integrated in several brain areas, however, from a review by Marco, Hinkley, Hill, & Nargarajan in 2011, there has been a particular focus in the literature on the superior colliculus, the cerebellum, and the frontal lobes in children with ASD in interpretation of this fast, multidirectional flow of information. Marco et al., 2011 "suggest that this multidirectional flow of information is impaired for individuals with ASD and that this disruption in cortical communication underlies the individual's inability to attend to their environment in a flexible, productive, and meaningful way". (pp. 6-7)

The brain stem, specifically the reticular formation, which is the first rely station for sensory information transmission to higher brain centers has been felt by Rimland and others as a possible source of sensory symptoms for children with ASD (Rimland, 2015). Rimland's theories of children with ASD having deficits in the brain stem have been supported in the literature with findings such as: a two year MRI study showed differences in the brain stem in children with ASD; another study showed differences in brain stem functioning, structure, and growth trajectories in children with ASD; and studies have illustrated considerable alterations in the brain stem in response to varied pitches and speech sounds with noise creating early auditory pathways (Rimland, 2015; Jou et al., 2013; Russo, et al., 2009; Russo, et al., 2008). Although, neural symptomatology in children with ASD includes brainstem

abnormalities, the literature advocates that it does not explain the deficits for all individuals on the autism spectrum, that there is other brain involvement (Rimland, 2015; Marco et al., 2011).

Interoception is a sensory system possibly disrupted in children with ASD. Broadly defined as your awareness of your internal body state it includes physical and emotional body states such as heartbeat, breathing, and related to emotional experiences that impact children with ASD (Schauder, Mash, Bryant, & Cascio, 2015). It is seen as the process of visceral afferent information reaching conscious awareness and the perception of these signals impacting behavior (Cameron, 2002). Therefore, internal body experiences such as pain, temperature, itch, sensual touch, muscular and visceral sensations, vasomotor activity, hunger, and thirst, which are all sensory signals, access conscious awareness through this encompassing process coined interoception (Craig, 2003, & 2015). Interoception integrates "bottom-up afferent signals from the body and top-down predictive signals from higher order cortical structures in the frontal and sensorimotor regions, the anterior insula plays a key role in interoceptive processes" (Dubois et al., 2016, p. 105). A summary review of scientific articles on interoception and children with ASD results concluded:

> Interoception, which occurs due to multisensory connections and integration of internal afferents in cortical and subcortical areas, is atypical in ASD, but the degree and directionality of this abnormality is not yet clear due to the heterogeneity of the condition. Between-group interoceptive differences in individuals with and without ASD have been repeatedly demonstrated, with a slight tendency towards hyporeactivity in interoceptive awareness in individuals with ASD. (Dubois et al., 2016, p. 104)

2.2.6. ANS function in children with ASD

The ANS involvement in children with sensory-modulation disruption, illustrated in children with ASD, has been shown to be imbalanced, illustrating an increase and/or decrease in SNS response depending on if the child has hyper-responsive or hypo-responsive sensory response patterns respectively (McIntosh, Miller, & Hagerman, 1999). A pilot study done on children with a disturbance in sensory processing, like children with ASD, looked at the PSNS and found that they had lower cardiac vagal tone measurements, illustrating a reduced PSNS function (Schaff et al., 2003). The symptoms presented in children with ASD have implied an ANS dysfunction (Casanova et al, 2014; Rimland, 2015). Children with ASD have been found to have decreased baseline parasympathetic activity and increased sympathetic (Ming et al., 2011). As well, researchers feel that the over-arousal SNS in children with ASD may be the effect of dis-inhibition from the compromised baseline PSNS tone (Casanova et al., 2014). This would fall in line with Porges' theory, that the healthy myelinated vagal system (PSNS) suppresses SNS activity and when the myelinated vagus is damaged it results in a heightened SNS response (Porges, 2011).

Other studies suggest that the extreme increase in the SNS in children with ASD may be the result of reduced pre-frontal tonic inhibitory control over the limbic system and reduced frontal-limbic connection (Loveland, Bachevalier, Pearson, & Lane, 2007). We know from the literature children with ASD have disturbances in sensory processing and ANS therefore interoception is crucial to remember (Cozzolino, 2015). Interoception represents a complex phenomenon of visceral afferent information reaching conscious awareness and the manner in which perception of these afferent signals may affect human behavior (Cameron, 2002). Interoception classifies the afferent peripheral and central activity, that relays to the NST

guiding a thalamocortical representation of the state of the body, complement to the efferent autonomic nervous system (Craig, 2002). The cortical representation of interoception is located in the limbic lobe which is the primary brain region affected in children with ASD (Craig, 2002; Rimland, 2015).

Cozzolino, V., M.D., D.O., feels based on his review of the literature and "experience on the effect of osteopathic treatments coinciding with an improving state of perceptual condition and consequently a more appropriate behaviour in children with ASD, may be related to the supposed capacity of the osteopathic manipulative treatment on the function of interoceptive system" (Cozzolino, 2015). This would be in line with Still's principle of structure governs function; "disease is the result of anatomical abnormalities followed by physiological discord" (Frymann, 1998, p. 280).

It is apparent from the literature that children with ASD have significant physiological changes to the neural function and anatomical changes to the structure at the base of the skull resulting in a reduced PSN system, primarily via the vagus nerve/NST and possibly insult to the RF (Rimland, 2015; Frymann, 1998; Hsiao, 2014). Therefore, direct osteopathic treatment to the brain stem and base of the skull should be a consideration for children with ASD (Centers, 2011). Preferably, there should be a predominance of parasympathetic function in the body (Centers, 2011). As early as 1947, I. M. Korr's evidence based research illustrated that there was an effect from an osteopathic approach on the autonomic nervous system and more recent research by Henley et al., 2008 also demonstrated that osteopathic manipulation can help normalize ANS function (Korr, 1947; Henley, 2008). Dr. Frymann demonstrated in her research that osteopathic manipulation enhances the body's inherent therapeutic capacity, stimulating neurological development, integration, and function.

Osteopathic procedures are based on the law of mind, matter and motion (Frymann, 1998). "Osteopathy is indeed the recognition, utilization and restoration of motion in every aspect of life, in every phase of matter designed by the divine mind" (Frymann, 1998, p. 251). Dr. Centers expresses that:

From a structural point of view, then, the osteopathic physician's first objective is to restore motion in the area of the jugular foramen to decrease tension on the vagus nerve. Bringing the sympathetic and parasympathetic nervous systems (also called the autonomic nervous system) into balance has long been a core goal of osteopathic treatment, guided by studies done in the 1950s and 1960s confirming the benefits of osteopathic manipulation for autonomic nervous system functioning. (Centers, 2011, p. 107)

2.3. Osteopathic Principles

The Principles of Osteopathy:

"Traditional osteopaths, who remain dedicated to understanding the anatomy and physiology of the human organism, use their hands to diagnose and treat the body, words to comfort and touch the mind, and hearts to encourage and find health for their patients" (Centers, 2011, p. 101). Andrew Taylor Still created the four basic principles of Osteopathy in 1874:

1. The structure governs function

2. The body is a functional unit

3. The body has an innate self-healing or vital force within, called auto-regulation

4. The role of the artery is absolute

2.3.1. The Structure Governs Function

An elementary lesson of the biological sciences is the principle of the reciprocal interrelationship of structure and function. Therefore, from the smallest microscopic or chemical level to the largest bone within the organism, every structure within the body has a function (Center, 2011). For example, if the structure such as the gene variant MTHFR, found in children with ASD, is altered then the proper function of folate required for cellular growth and regeneration is impaired (Centers, 2011; Edward, 2014). Dr. Frymann writes that it is "not just functions like circulation, respiration, digestion and so forth but also includes activities as thought, feelings, creative expression, meditation and spiritual aspirations" that will be affected by structural changes (Frymann, 1998, p. 280). Dr. Frymann states the structure can also be in the energetic/etheric field distorted by an energy impact leaving a patient complaining of: depression, irritability, and confusion. Resolution in the field allows the patient to return rapidly to being themselves (Frymann, 1998). As found in this research study, the consciousness of the physical structure in children with ASD was distorted in a particular field with breaks resulting in a functional discord in their behavior, feelings, thoughts, and karma illustrating the reciprocity of structure and function.

Philippe Druelle, D.O., also saw beyond the MSK and PRM system, like Still, Frymann, and Fulford, into the spiritual realm. From this quest to understand if there was a central unifying structure that allowed the physiology (function) to have a reference point to work around, he discovered the concept of the central chain. This functional unit creates a central organization which allows coherence between it and the rest of the body. The elements of the central chain, in any realm, should never carry a load for if they do, it can impact the

function of the body (Forget, 2017). These fulcra and the central chain's connection and continuity with the central fulcrum can be structural (fascial or biomechanical, P1), liquid (biodynamic, P2), or electromagnetic (bioenergetic, P3) (Drerup, 2014). Druelle speaks of three different energetic realities of the central chain: an electromagnetic; morphogenic, and life field reality (Wood-Reucassel, 2006). The central chain is formed during embryological development at the 4th fetal week during the folding stage, changing from a 2-D primitive streak into a 3-D central chain structure. The cells at the top of the primitive streak migrate to the centre to make mesoderm tissue (Forget, 2017; Lulic, 2016). Children with ASD were found to weight-bear on various elements of the central chain such as the: heart, 3rd ventricle, mesentery, endocrine glands such as, thalamus-thyroid-pancreas and hypothalamus-pituitary-adrenals (HPA) axis. Hence, if the structure of the central chain elements changes and becomes weight bearing, the functional physiology of that element will be disrupted. Pressure on these important structures can cause functional impairments and possibly reduced immunity, especially the structure of the vagus nerve and NST. The vagus nerve, when activated, through its cholinergic anti-inflammatory pathway improves inflammation and suppressed the serum proinflammatory cytokines levels, such as tumour necrosis factor-alpha. (Levine et al, 2014; Zhao et al., 2012). The stimulation of the vagus nerve increases acetylcholine production in white blood cells reducing the inflammation caused by excess production of cytokines in the immune system. The NST and vagus nerve pathway were found to be compressed in all the children in this study potentially contributing to their excess inflammation and possible autoimmunity.

Druelle (2016) outlines that the dialogue used to access the energy fields and all its levels of the body is via the Pure Consciousness (spiritual realm). He says that the "Breath of Life"

(BOL) dialogues with all the cells, via the, PRM with spiritual doors at head, heart and T2. Fulford discusses the electromagnetic field in depth in his book "Are you on the Path" and he wrote in the book, "Body Signs" that the third cervical vertebra was the direct gateway to the spiritual truth of the patient. Fulford states that Sutherland said, "stay close to your maker" when doing CV4 as the hands are in contact with the third cervical vertebra. The third cervical vertebra is also the center for the primary control that involves the oculo-motor-vestibular apparatus and sub-occipital triangle where the primitive reflexes of the infant is found, explained by Alexander in 1904 (Fulford, 2003). It is further discussed by Fulford and Frymann the importance of the base of the skull, atlas, axis, and third cervical vertebra in birth and the significant consequences if trauma occur to this area in a child's neurodevelopment (Fulford, 2003; Frymann, 1998). We know from the literature that some children with ASD may have suffered birth trauma, impacting the C0/C1/C2/C3 region (Centers, 2011) and their associated functions (RF and vagus nuclei). Biomechanically, Fulford states that Fryette's and Still's interest was between C2/C3 and they felt this was the key to the body's problems (Fulford, 2003). It is also well known that the diaphragmatic branches are C3, C4, C5, and according to A.T. Still we live and die by this muscle (Still, 1892). As well, "the third cervical receives the spiritual truth while the third lumbar is the center of gravity and expresses the physical reality" (Fulford, 2003, p. 26). Frymann says that the physical is only a quarter of what we need to walk on earth that people are "equipped with a vital body that energizes every stream and every cell in the physical body" (Frymann, 1998, p. 284).

The only vital function that can be brought into our conscious mind is breathing, a mediator between body, mind, and consciousness. The physical body is enlivened and vitalized with

life energy by the breath. The CSF is the “primary ‘Conductor’ for the life energy in our body” and Still states that “the cerebrospinal fluid is the highest known element that is contained in the human body, and unless this fluid is furnished in abundance a disabled condition of the body will remain”. “So, breathing, both conscious and unconscious, becomes the vital factor in the flow of the cerebrospinal fluid that carries the life energy” (Fulford, 2003, p. 67). Fulford explains that the slightest trauma on any of the levels “causes activation of the solar plexus, which produces emotional stimuli and the holding of the breath” (p. 70).

2.3.2. The Body is a Functional Unit

Dr. Still’s second principle is that the whole body is united by fascia in a fluid matrix from head to toe and, therefore, fascia is a fluid mechanism of profound functional significance (Still,1892). Still said, “The fascia is the meeting ground of vegetative functions of inner maintenance, the musculoskeletal activates of outer performance, and the creative endeavours of spiritual life” and "the soul of a man with all the streams of pure living water seems to dwell in the fascia of his body" (Still, 1892, p. 61). Forget teaches that the fascial body tissue matrix serves as the underlying frame and support for the fluidic and vibrational mediums. The fascial body provides biotensegrity with its fractalization and micro vacuoles that distributes forces and load throughout the network, and is constantly adaptable. It has piezoelectric properties that allow it to have a semi conductive fascial structure. Forget explains that we have piezoelectric properties that are distributed through our network, which means that being under constant compressive and tensile forces we change our electric charge and modify our polarity and therefore the surrounding body field that it creates. This piezoelectric property of fascia therefore creates the link between our fascial

matrix and the vibrational body realm (Forget, 2017). Hence, the fascial continuum to the field linking the whole physical body to the field creating a unit from physical to spiritual life. The children in this study where found to have fascial adhesions from the excessive inflammation which created scar tissue in the fluid matrix limiting their link to the vibrational body, forcing them to seek consciousness in another realm such as the chaotic field.

2.3.3. The Body has Innate Self-healing or Vital Force Within, Auto-Regulation

The third principal is there is a natural auto regulation system within the organism, "the therapeutic force within, that the body contains to overcome disease" (Frymann, 1998, p. 312). Dr. Frymann reminds us in her writings that osteopaths are not healers but "assist in producing conditions for the body to heal itself" using the force within the body, the principle of autoregulation (Frymann, 1998, p. 312). Dr. Frymann proclaims that the body has an "inherent immunity and when structurally and functionally optimum the body has the capacity to resist disease" (Frymann, 1998, p. 312). Dr. Still believed the body would heal itself and achieve physiological homeostasis if it had: physiological balance, proper nutritional means along with the capacity to eliminate toxins, structural insufficiencies normalized, and toxic thought patterns changed (Centers, 2011).

"If one recognizes that the body will always attempt to adapt to and compensate for stressors, then it becomes apparent that disease can only develop when stressors accumulate beyond the body's ability to compensate" (Centers, 2011, p.104). Dr. Still felt disease was the result of three areas creating stress: the mind (divine, one's beliefs); matter (physical interactions like food, environment, or atmosphere); and motion (life) (Centers, 2011). Overall, children with ASD have an accumulation of physical, mental, and emotional barriers that overcome

their body's ability to adapt (self-regulate), resulting in multiple inter-related dysfunctions. It is clear that treating children with ASD from this point of view will be extremely valuable as they have many systems that are imbalanced or have lost their homeostasis (self-regulating ability) (Rimland, 2015). Osteopaths help normalize systematic disturbances by treating the appropriate mechanisms, systems (organs/viscera), and physiology that impact the imbalanced systems or mechanisms, bringing back "dynamic coherence" (Still, 1902; Druelle, 2015).

2.3.4. The Role of the Artery is Absolute

The role of the artery is absolute; tissues can only be healthy if blood supply and drainage are adequate (Still,1892). "The artery and its nerves must constantly deliver, on time and in quantity sufficient: the venous system and its nerves must perform their function and allow no accumulation. These two demands are absolute" (Still, 1910, p. 175). Where nutrition ceases dysfunction arises. If nutrition, delivered via the arteries to brain tissue, ceases the first symptoms are disturbances in motion (Clark, 1906). Rimland discusses the impact of birth trauma with hypoxia and children developing ASD (Rimland, 2015). Frymann discusses the many implications of birth trauma, which impact children with ASD, such as arterial compression and a compromised central nervous system from lesions at the cranial base (Frymann, 1998). Dr. Centers elaborates on the role of the artery from birth trauma and explains that the areas at the base of the skull (for movement, respiration, and hormone regulation) receive the greatest amounts of blood, while the peripheral areas (e.g., speech) receive less. In other words, it is more important for the heart to beat and the body to take in oxygen and metabolize food than it is to speak (Centers, 2011). He explains that the areas that are involved in children with ASD are the same areas receiving a reduced amount of

blood flow. As well, from the literature, it is well understood that children with ASD experience different traumatic causes such as: birth trauma; metabolic dysfunction; and toxicities that impact the body, traumatic events in osteopathy are termed shock imprints. According to Fulford, from Reich's writings, shock settles, regardless of the type of incident the body experiences, at the attachment of the 6th rib on the left side of the xiphoid process and, in turn, pulls the diaphragm up and under the sternum limiting the diaphragm excursion, affecting the liver, spleen, lymphatic system and solar plexus functions. Therefore, blood purification, which occurs in the liver, is affected; the defense body's mechanism that is controlled, in part, by the spleen for immunity is affected; and the largest reservoir of energy in the human body, which is held in the solar plexus, is affected. Hence, vitality is reduced. Fulford explains that the body's expression of lack of vitality is a result of shock or injury to the bioelectric field, also called the etheric field (Fulford, 2003). Hence, "the bioenergetic field supports the physical stream, without this life support system, the body would be lifeless" (Fulford, 2003, p. 217). The psychological aspects of the solar plexus are represented as our self-expression and affirmation or emotionality and is considered the emotional fluid centre of the body but with significant ganglions (computers for ANS balance) that the mental body flows through (Fulford, 2003; Frymann, 1998; Brennan, 1988). Interestingly, from the literature, it is inferred that children with ASD are well known to have emotional conflict affecting their mental state, autoimmunity dysfunction (fluidic) and metabolic issue (liver) and these bodily dysfunctions can be associated to were shock imprints are held.

The CNS has functional lymphatic vessels lining the dural sinuses, called the glymphatic system. The literature suggests that in children with ASD and other neurological disorders,

who have an altered immunity, a malfunction of the meningeal lymphatic vessels could be a root cause or passage and this system needs to be closely evaluated for its possible importance to brain development (Louveau, et al., 2015; Bradstreet, Ruggiero, & Pacini, 2015). As well, immune cells (Kupffer cells or macrophages) are in close proximity to the metabolic cells (adipocytes or hepatocytes) of adipose tissue and the liver that have a structural arrangement connecting inflammation and metabolism (Ursliak, 2016; Hotamisligil, 2006). This demonstrates how the immune system, the liver, and the GI system are not all only interconnected but have immediate access to a vast network of blood vessels (Hotamisligil, 2006). The literature illustrates children who are on the autistic spectrum are associated with GI problems and an over reactive immune system and now combined with the evidence that the brain, GI; immune system; and toxins are intricately connected, gives a deeper understanding on how to approach these children medically and osteopathically (Hsiao, 2014; Centers, 2011). Additionally, some researchers feel ASD may be an autoimmune disease, particularly due to mast cell activation from stress hormones and toxins that results in excessive inflammation in the: brain; gut; blood brain barrier; and brain stem function, specifically the RAS and the vagus bidirectional ability to carry inflammation. A problematic birth can result in hyper-stimulation to the vagus nerve leading to hypersensitivity of the GI tract, causing it to be more sensitive to various viral and toxic influences (Frymann, 1998; Centers, 2011). A hypersensitive vagal nerve, from the tissue of the GI tract becoming dysfunctional, will send impulses from the intestinal tract back to the amygdala, possible creating a reaction that may be responsible for some types of seizures as well as autism symptoms (Hsiao, 2014; Centers, 2011). The literature shows a well-known link between GI disorders and seizures and can be referred to as abdominal epilepsy when severe in children (Centers, 2011). Dr. Still did address childhood epilepsy in his writings

but did not speak of autism, however, they are structurally and functionally closely related (Centers, 2011; Ballaban-Gil, & Tuchman, 2000). Dr. Still composed the subsequent concerning infant seizures:

> Not a single author has hinted or in any way intimated that the cause of [the] disease is a failure of the passing of the blood, chyle, and other substances to and from the abdomen to nourish and renovate the abdominal viscera, that are diseased owing to a lapsed diaphragm, which would cause resistance to blood flow in the aorta, through which passes arterial blood, and the vena cava, through which the venous blood returns. The afflicted one is intoxicated. (Still, 1892, p. 304)

All the children in this study presented with excessive stagnant inflammation throughout their body, as felt through the fluidic palpation (P2), specifically at the level of C0/C1/C2, the gut, and the cranium.

2.4. Energetic Treatment Approach

2.4.1. Quantum Physics and Biofield Science

Einstein said, “field before particle”. Einstein, in 1905, felt his one true revolutionary discovery was that light, which is a wave, is a stream of photons. Louis de Broglie in 1924, a French Ph.D. student, brought that theory full circle and found that particles act like waves. Over time quantum physics/mechanics evolved, which is the theory of interaction between light and matter, everything has particles and waves (Encyclopaedia Britannica, 2017). Quantum, in physics is the minimum amount of any physical entity involved in an interaction, and involves something coming in a discrete form. The smaller the particle the larger the waves form it emits (Orzel, 2015). In Oschman’s book, Energy Medicine, he

discusses vibrational medicine and how light arises from the vibrations of electrons in an object. He discusses how in the living body each atom, electron, chemical bond, molecule, cell, tissue, organ and the body as a whole vibrate in their own organized meaningful patterns. These biological vibrations contribute information to a dynamic vibratory network that extends throughout the body and are emitted into the environment with many different frequencies and are all properties of the body. The vibrations provide signals that integrate processes like growth, injury repair, defences and organism function. When the body moves, these electric fields, produced from the vibrations, gives information that directs the activity of "generative" cells so they can adapt to the way the body is used. This concept dates back to Wolff's law, in 1892, which states that bone or other connective tissue change how they repair and grow depending on the direction and amount of functional pressures placed on the structure, allowing the body to adapt to the way it is being used (Oschman, 2000). In osteopathy, this is an example of Still's principle of the interdependence of structure and function. A well know example would be the structural changes in the occiput from the pressure exerted on the infant during delivery producing compression of the vagus nerve exiting the jugular foramen, resulting in vomiting. However, function does not just apply to the vegetative occurrences of the organism but also to phenomena's such as thought, feeling, creative expression, mediation, and spiritual aspirations. This is seen in people who have car accidents but have not hit their head but have symptoms of a concussion like confusion, irritability, feeling of being scattered and an inability to concentrate, the structure injured here would be the bioenergetics field (Frymann, 1998). The energetic systems of the body, called the living matrix, consist of: circulation, nervous system, MSK system, digestive tract, organs, and glands which are part of a continuous connective tissue called fascia. Fascia can carry bioelectric signals, as it is a semiconducting network, between every part of the body

and every other part (Oschman, 2000). Fascia is a fluid matrix uniting the whole body so it functions as a harmonious unit not as individual separate units (Frymann, 1998). Still quoted "the soul of a man with all the streams of pure living water seems to dwell in the fascia of his body" (Still, 1892, p. 61). Frymann wrote,

> Still realized that man dwells within his body but is not this body. It is within the fascia that the wisdom exists to know the route of correction and the designation of resolution. The fascia is a meeting ground of vegetative function of inner maintenance, the musculoskeletal activities of outer performance, and the creative endeavours of spiritual life. (Frymann, 1998, p. 281)

Robert Fulford, D.O., quotes "The human body is composed of complex interflowing streams of moving energy. When these energy streams become blocked or constricted we lose the physical, emotional, and mental fluidity potentially available to us. If the blockage lasts long enough or is great enough, the result is pain discomfort, illness and distress." (Fulford, 2003, p. xxxix).

Human Energy Field (HEF), or bioenergetics field, is a result of biological electrical activity arising due to polarity changes across cell membranes and the ability of these membranes to temporarily depolarize and repolarize. This process allows effects such as: nerves to conduct signals, muscle to contract, and the brain and heart to carry out their activities (Oschman, 2000). The scientific foundation for energy medicine lies in the rudiments of bio-field science (biological field), which is "energy medicine" also called HEF, which is a complex organizing energy field engaged in the generation, maintenance, and regulation of biological homeodynamics (Rubic, Muehsam, Hammerschlag, & Jain, 2015). The energy field

permeates all tissue, cells of the body, and into the space around it, it doesn't just surround it (Oschman, 2000). We know western medicine examines electromagnetic fields such as ECG from the heart and EEG from the brain to determine pathologies and we know from the literature above that cell biology and biophysics provide evidence of electromagnetic fields which play active roles in development, tissue repair and array of homeodynamic processes. Hence, it seems reasonable that we should be treating children who have ASD as they have shown imbalances in their ANS and brain electrical activity from the perspective of treating in the bioenergetics field. The bio-field bridges the gap between traditional and contemporary explanation of energy medicine and understanding the body-mind interaction (Rubic, Muehsam, Hammerschlag, & Jain, 2015).

Our physical body starts as one cell that encompasses the entire DNA required for the rest of your life. This original cell is astounding because it moves from being one cell to a whole functional individual. Everything is composed of organized energy and all life is energy. All experiences come from that one cell that is the DNA from its parents and from its ancestors which has the ability to form the individual, its capabilities to heal itself, and regenerate itself. The information around the cell is multidimensional and not seen, it is quantum. Dr. Ryan expresses that is was not just a quantum field of energy, it is also the consciousness of your divine nature that is part of the field of energy of the original cell that is your DNA. Dr. Ryan suggests that “Consciousness” has an influence over matter and that there is quantum energy around DNA (Ryan, 2016). Luc Montagnier, Nobel prize winner, illustrated this suggestion scientifically by showing that DNA can encode electromagnetic imprints on itself in water and that water can be used to make DNA without the DNA being present. Together, from Dr. Masaru Emoto research that shows you can imprint crystalline patterns

in water and now that DNA, which is a quantum molecule, place in water will order the water, illustrates there has to be a field of energy. Only 10 percent of DNA codes for genes, the rest of DNA stores information and has a regulatory function to regulate DNA expression. Dr. Ryan suggest that spiritual information is pre-coded in our quantum field of energy as instructions to the DNA and is coded into our DNA, called Spiritual DNA. This is an important concept with epigenetics, which investigates external influences on DNA expression and has an enormous impact on children who are on the autistic spectrum. Dr. Ryan illustrates that it is the quantum field of information, which comes from our spiritual "level of consciousness", that is entangled and communicates with our physical DNA. DNA on a physical level is like a structural waveform that is subject to information from epigenetic world of environmental influence but also influenced from a spiritual realm (Ryan, 2016).

Luc Montagnier's research findings coincide with many biophysicists who confirm the pioneering research of Dr. Kim Bonghan, who found that the DNA combined in water became liquid crystalline structures which permeated the body through the acupuncture network acting as a coherent quantum system. The liquid crystalline structures were found to be adaptable and change their properties according to the electrical field applied. Numerous organisms were tested by Dr. Kim Bonghan illustrating all multicelled living beings occupy an acupuncture system. Dr. Kim Bonghan found the acupuncture system to develop in a growing fetus before their circulatory system, nervous system, or lymphatic system. The liquid within this acupuncture network was found to have large quantities of RNA and DNA, hyaluronic acid, and twice the concentration of adrenaline compared to blood. The acupuncture system is felt to partake in a valuable role in the morphological

differentiation and specialization of the growing organism, conveying the structure and shape information called the “blue- print” of the body. According to Dr. Bonghan, and many followers who replicated his theory, this system participates in the important part of regulating growth and how cells specialize. Even more interesting, they illustrated the meridian system to serve as a receiver and transmitter of bio-photons. Hence, when photons are emitted from the body they are largely coherent and from this point of view it suggests that the meridian system may also be used as an antenna, not only linking the physical body to its own cells and organs but to the universe (Swanson, 2011). Dr. Ryan presented and spoke as well that the DNA has a direct connection to the universe and higher self (Ryan, 2016).

2.4.2. Human Energy Field (HEF) or Electromagnetic Field (EMF)

The Human Energy Field (HEF) is the location of the primary interface; here is where disturbance occurs first. All pain and dysfunction begins or occurs first in the HEF, then continues and ends in the HEF (Hunt, 1996). Shock or dysfunction in the HEF can cause dysfunction in the body both physically and emotionally (Fulford, 2003). Fulford, recommends Dr. Hunt’s book Infinite Mind. Dr. Hunt’s work validates the change in patient’s symptoms by intentional manipulation of the patient’s field. Fulford, taught that with guided intention or wishing the patient well the energy of the therapist could interact with the field to form a type of manipulation. Dr. Ryan states “we are truly capable of ‘spiritually mastering’ and re-ordering the quality and content of these energy bodies (HEF). It is this understanding that can open us to ‘healing’ or ‘manifesting healing’ from the ‘inside out’” (Ryan, 2016).

Ryan (2016), illustrates life as energy and how it begins with consciousness, as our truer nature of spiritual beings, which manifest through many energy forms of the body. The model shown in Dr. Ryan's presentation coincides with Dr. Frymann's model in her writings. They both speak of these energy forms: as the physical body, the etheric body that organizes the field of energy and life force, and then the mental and emotional bodies which are energetic structural bodies holding our thoughts and feelings (Frymann, 1998; Ryan, 2016) These bodies present in a different dimension and interface with our nervous system (Ryan, 2016). Dr. Ryan beautifully writes his findings that fall in line with the writings of Fulford, Brennan, Frymann, and Druelle, that "when connected to your higher self or consciousness with a spiritual level of reality it can bring restorative healing to the mental, emotional, and etheric bodies and can heal the past, psychological patterns, and genetic tendencies towards disease expression" (Ryan, 2016; Fulford, 2003; Frymann, 1998; Druelle, 2015).

Dr. Barbara Brennan, the founder and president of the Barbara Brennan School of Healing, has specialised in working with the human energy field as a therapeutic modality for more than 40 years as both a therapist and researcher. She is a former NASA atmospheric physicist and states that, based on observations in research, the aura surrounding the body is perceived as layers and are defined by location, color, density, fluidity, and function. The first three layers that include the etheric, emotional, and mental bodies are grouped together, called the physical plane. The astral plane has the astral body within it and bridges the physical and spiritual planes. The last three bodies encompass the etheric template, the celestial body and the ketheric body and combined are known as the spiritual plane. Each energetic body is an extension of our physical body and are not divided into separate layers but each layer

contains the layer below, intertwining amongst each other. The etheric, mental, etheric template and ketheric bodies, that form more of a structure, all contain and affect the tissues of the physical body (Brennan, 1988). Figure 4 illustrates Brennan model of the seven energy layers to the human energy field. Each field connects with the physical body through the chakras. One important chakra that resides in the etheric field is Alta Major as it is located anatomically where most children with ASD have dysfunction (Barsotti & Centers, 2016). Alta Major aligns with the location of the: cerebellum; medulla oblongata; the RAS; and NST and dorsal nucleus of the vagus (Barsotti & Mills, 2017). The seven fields are represented under three subtitles: the physical plane, astral plane, and spiritual plane to encompass the entire HEF. Forget, 2017 illustrates these light fields that coincide with chakras as the electromagnetic field (EMF).

Brennan's Model of First Seven Layers of Human Energy Field:

- Physical Plane: Etheric body, Emotional body, and Mental body
- Astral Plane: connects physical and spiritual plane
- Spiritual Plane: Etheric template, Celestial plane, and Ketheric template.

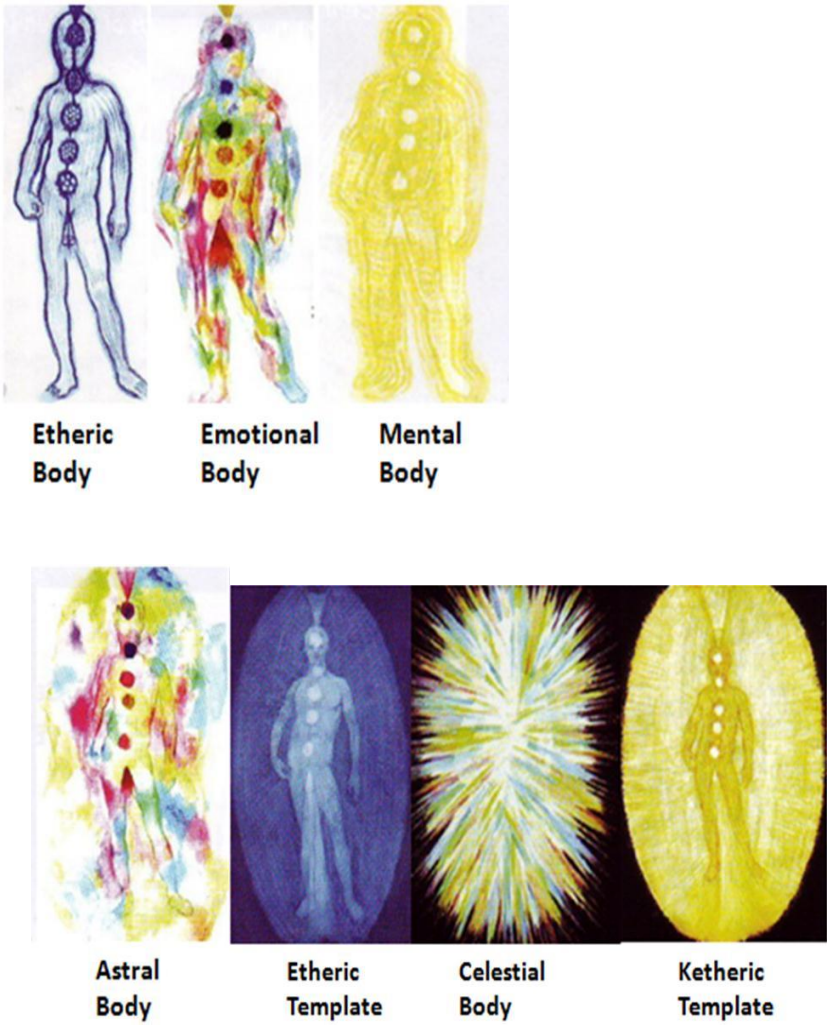


Figure 4. Brennan Model of First Seven Layers of Human Energy Field (Brennan, 1988).

2.4.2.1. Physical Plane

Etheric body, from the word ether meaning the state between energy and matter, ends 0,25 -2 inches off the physical body radiating energy in perpendicular straight lines from the skin (Brennan, 1988; Frymann, 1998). Dr. Frymann expresses that a sensitive hand at this level will find a resistance and is comparable to the "skin" on a body of water. The etheric body is described by Dr. Frymann as the “electricity necessary before the bulb can function to light up the darkness” and, as eluded to above, is “the periphery of the energy body that

vitalizes and activates every function of the physical organism" (Frymann, 1998, p. 330). Dr. Fulford, defines it the as a web of energy that acts as a matrix or inner scaffold for the body, the blueprint for the physical structure that conveys vitality (Fulford, 2003). It is the framework within which the physical body is constructed and flows through the root chakra to the physical body. The root chakra is in the frequency red on the electromagnetic spectrum and is located near the central tendon of the perineal part of Druelle's central chain (Bio Well, 2016; Fulford, 2003; Dale, C., 2009). The root chakra is associated with:

> Physical aspects such as adrenal gland, skeleton, vertebral column, spinal cord, kidney, and rectum. The functional manifestations linked to the root chakra are movement functions, endurance, vital capacity, inner strength, love of living via body fitness. The psychological aspects linked to the root chakra include safety, prudence, patience, vigilance, selfishness, self-defense, and struggle. (Bio Well, 2016)

Dr. Fulford and Dr. Frymann both believed that the physical body relied on the etheric body for its health. They both felt that treating both the energetic and physical body with the osteopathic approach would create improvements in somatic dysfunctions (Fulford, 2003). In good health Dr. Frymann explains that the energy in the etheric body is an "intense, vibrant motion, coursing along those radiations with strong centrifugal force" (Frymann, 1998, p. 331).

The emotional body is muted energies extending 12 to 18 inches off the body but does not duplicate the physical body like the etheric. It looks like coloured pastel clouds, a kaleidoscope of colours in continual motion from the head to the feet and associated with feelings (Brennan, 1988; Frymann, 1998). Frymann expresses, "the human being is more

than an extraordinary mechanical device, it also has the capacity to feel love, hate, joy, sorrow, jealousy, and a whole gamete of emotions" (Frymann, 1998, p. 331). The colours change with changes in emotions and Frymann believed that it was impossible for the patient to hide behind any feeling whether negative or positive if the practitioner had eyes to see this emotional body (Frymann, 1998). The emotional body flows through the second chakra, which coincides with orange on the electromagnetic spectrum (Bio Well, 2016; Dale, 2009). The second charka is associated with emotional life and feelings, the sacrum, ovaries, and testes (creativity) (Dale, 2009).

> The psychological traits linked to this chakra are passion, self-appraisal, fear, authority, aggressiveness, contempt, egoism, and thrift. The physical characteristics linked to this chakra include digestive apparatus; bowels, urogenital system and the functional manifestations include sexual power, will of destruction, and high sensitivity of taste. (Bio Well, 2016)

The mental body of the human being has the ability to think, to analyze a concept and put it into its components. The mental body has finer diminutions of energy and is not usually fully developed in the human body because "pure logical thought, untainted with emotion, is infrequently practiced" (Frymann, 1998, p. 331). It is found 3-8 inches from the body and is a structured field like the etheric (Brennan, 1988). The mental body flows through the third chakra/solar plexus, which is emotional and is yellow in colour (Dale, 2009; Bio Well, 2016). The psychological aspects of this chakra are linked to: "self-expression, self-affirmation, courage, and emotionality" (Bio Well, 2016). Anatomically, the solar plexus contains three important ganglion (celiac, superior mesenteric, and aorticorenal ganglions) which Druelle describe as the computer or plexus of the body

(Druelle, 2014). The CEO teaches techniques to rebalance the solar plexus as it normalizes the ANS. There is a fascial approach to its correction by addressing the clockwise and counterclockwise mechanical movement, as well as an energetic approach to address the vortex component introduced by Frymann. The vortex method is a very deep energy field palpation but a light to physical palpation with normality being a continuous clockwise motion felt volumetrically (Laett, et al., 2015). Druelle teaches that if it is counterclockwise it is indicative of negative energy and must be normalized into a clockwise movement to restore positive energy (Druelle, 2014).

2.4.2.2. Astral Plane

The astral body is free of time and space and extends 0.5 to 1 foot from the physical body (Brennan, 1988; Dale, 2009). It links or bridges the spiritual and physical plane (Dale, 2009). Visually it looks like a cloud of pastel colors that is mostly rose (Brennan, 1988). It is very similar in range of color as the emotional body but more rose light (Brennan, 1988). The astral body flows through the heart chakra, which is green in color (Dale, 2009). The heart chakra metabolizes love and is associated with the thymus gland and heart (Bio Well, 2016; Centers, personal conversation, 2014). The psychological aspects linked to this chakra are:

> Obligation, responsibility, empathy, love for one's neighbour, and indecision. Physically the aspects associated with the heart chakra are: cardiovascular system, circulation of the blood, lungs, thyroid gland, and mammary glands. Functionally the heart chakra represents manifestations of: love to oneself and others, tactile sensitivity through the motor activity of nerves, capability to obtain the desirable. (Bio Well, 2016)

Osteopathically we are taught that the heart is the center fulcrum of the being, fluid center and one of the main subunits of Druelle's central chain concept (Forget, 2017).

2.4.2.3. Spiritual Plane

The etheric template extends 1.5 - 2 feet from the physical body and is the blueprint of the etheric body and must be treated if the etheric body is disrupted to provide support for the etheric layer to return to health (Brennan, 1988). It represents the ultimate blueprint for well-being and possesses the highest ideals for existence. It flows through the throat chakra, which is blue in colour and connects to the power of words (Dale, 2009). The psychological aspects associated with the throat chakra are:

> Emotion, inspiration, creation, sociability, and emotional-spiritual activity. Physically this chakra represents aspect such as: spinal cord, throat, neck, oesophagus, heart, and lungs. The functional manifestations that are associated with this chakra are: breathing, sigh and utterance of sound, swallowing, represents creativity of all kinds, and the last zone related to time and space. (Bio Well, 2016)

The celestial body extends 2-2.75 feet from the body and is the emotional body of the spiritual plane. It looks like shimmering lights of long thin light bulbs composed of different pastel colours or kaleidoscope (Brennan, 1988). It flows through the third eye or sixth chakra, which is violet in colour and is associated with the pituitary and celestial love, which is love that encompasses all life (Dale, 2009). The psychological aspects associated with the third eye chakra are:

> Reason, will, intellect, logic, empathy, inspiration, directivity, analysis, and imagination. Physically this chakra represents aspect such as: brain, hypophysis,

> hypothalamus, head, and nervous system. The functional manifestations that are associated with this chakra: ability to create visions (creative imagination) and to understand the significance (responsibility) of one's abilities, understanding of concepts, clairvoyance, and responsible for the sixth sense (instinct). (Bio Well, 20016)

The ketheric template is the mental level of the spiritual plane extending 2.5 - 3.5 feet off the physical body. Out of all the auric field levels it is the strongest and most resilient. It holds the aura (HEF) together and is gold and silver in light (Brennan, 1988). It flows through the crown chakra, which is white and located at the vertex. The crown chakra is linked with the pineal gland and unites to the higher mind (Dale, 2009). The psychological aspects associated with the crown chakra are: "spirituality, wisdom, enlightenment, self-actualization, unselfishness, and integrity" (Bio Well, 2016). Physically this chakra represents aspect such as:

> Brain, pineal gland, skin, reproduction, hormone balance. The functional manifestations that are associated with this chakra: superior abstract and philosophical thinking, super- consciousness, pure intuition, unites the notion of reason (geometrical figures of mental body), and transformation of thought into energy via brain activation. (Bio Well, 20016)

2.4.2.4. Major Alta Chakra

The Alta Major chakra, is an energy centre located at the base of the skull with the atlas as it's physical counterpart identified by old spiritual traditions. The carotid body shown in Figure 5, which monitors oxygen content in the blood and controls respiration, is very important and connected to Alta Major.

Figure 5. Alta Major Chakra connected to the carotid body which regulates oxygen to the body (Towards One World, 2017).

Figure 6 illustrates the triangle signifying the connection between the three aspects of man - Body, Soul and Spirit - as well as their unity.

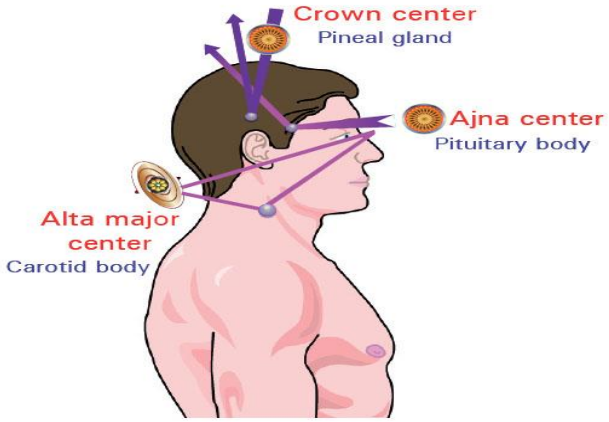


Figure 6. Body, Soul and Spirit Triangle (Towards One World, 2017) .

Structurally, the atlas connects: C2/3, foramen magnum, and the vital centres within the brainstem beneath these structures which are, according to Frymann and many others, extremely important in the formation and development of the nervous system, the key to neurodevelopmental health and a spiritual doorway. It is the centre of Divine Inspiration or intuition, it stores past lives and the ability to find life's true purpose (karma). Ancient traditions named it 'the mouth of God'/'the mouth of the Goddess'. Light coming into this

chakra is very limited when the atlas is misaligned causing a reduction in the diameter of the aperture at the base of the skull and vertebral canal. The information between the brain and body is disrupted through the vertebral and carotid arteries, the lymphatic system, the cerebrospinal fluid, the meningeal system and the spinal cord. “The atlas carries not only the skull, but also facilitates, suspension, balance and control of the human spine and skeletal system”. A misaligned atlas can cause significant adverse changes to the blood flow and drainage of the head resulting in disrupted brain function (del Mar Fernandez de la Calle, 2017). “Major Alta is a place of implants and energetic restrictions restricting past life access and ability to find life’s true purpose. Rudolph Steiner refers to ahrimanic implants being placed in the body before birth to deepen earthly struggle to access life purpose” (ArthurWallis.com, 2017). Alta Major forms a communication center between vital energy of the spinal column (KUNDALINI) and the energy of the two head centers (Crown and Ajna) with powerful links to the cerebellum (voluntary muscle movements), and medulla oblongata (RF) that regulates breathing, heart rate, blood pressure and sleep. It has links to the throat, heart center, and spine but most important it is the conscious link for the healer to the Higher Mind. A developing Alta Major leads to an “acquired and conscious control of one’s dharma or Soul work on earth and has the power to bring down intuitive vision into consciousness. The Spiritual Will of the Crown center is balanced through the Alta Major center” (Towards One World, 2017). Barsotti suggests that the link between communication from higher Consciousness to the physical and subtle energy bodies of the human being is the RAS-Vagus Nerve-Alta Major Chakra Axis. Here “Higher Consciousness” is used to represent human connection to God not the consciousness held within our physical bodies referred to a state of being alert and focused (Barsotti & Mills, 2017). Barsotti & Mills (2017) explain,

Dedication to the path of Consciousness means that the activated alta major chakra becomes the distribution center of life-force energy. It is life-force energy that moves down and up the antahkarana, the energetic spinal column, radiating magnetically to open the chakra centers. (Barsotti & Mills, 2017, p. 25). Within the etheric field lives the alta major chakra which is physically in line with the anatomical position of the cerebellum, medulla oblongata and the RAS. The RAS is the complex nucleus that emits and accepts signals, generating connections using the endogenous hormones, neurotransmitters and neuropeptides that move throughout the body. The signals that coordinate these combined movements and activations, producing a hemodynamically balanced nervous system within the body are carried out by the vagus nerve (Barsotti & Mills, 2017).

> The RAS-Vagus Nerve-Alta Major Chakra axis speaks to the anatomy of the Spirit in the self and may serve as a communication nexus between the physical systems and Consciousness, which when activated, consciously arouses profound spiritual connection. (Barsotti & Mills, 2017, p.26).

2.4.3. Morphogenic and Embryological Field

Medically morphogenic is defined as "the differentiation of cells and tissues in the early embryo that establishes the form and structure of the various organs and parts of the body" (Stedman, 1990, p. 982). Genes enable organisms to make particular proteins, they are also involved in the control of protein synthesis, and encode for various proteins to come together like a jigsaw puzzle to create energy (Kendall, 2012; Sheldrake, 2017). However, many forces must come into play to produce the right proteins at the correct times in order to explain complex skeletal structures. According to Sheldrake, morphogenesis is not simply

understanding genes and gene product it also depends on organized fields. Morphogenetic fields work by imposing patterns that are transmitted through a morphic resonance from past members of the species. The activity of the nervous system is organized by fields which are inherited through morphic resonance, transmitting a collective, instinctive memory. Each person contributes and extracts these collective memories resulting in the ability to spread new patterns of behavior rapidly. Our perceptions, mental activities, and new theories of vison are triggered by morphic fields. The morphic fields of mental activity extend far beyond our brain though intention and attention, not limited to our brain (Sheldrake, 2017).

> We are already familiar with the idea of fields extending beyond the material objects in which they are rooted: for example, magnetic fields extend beyond the surfaces of magnets; the earth's gravitational field extends far beyond the surface of the earth, keeping the moon in its orbit; and the fields of a cell phone stretch out far beyond the phone itself. Likewise, the fields of our minds extend far beyond our brains. (Sheldrake, 2017)

Nutri-Energetics System literature explain that the human body-field is the governing field of the body and each of the cells, tissues, and organs of the body have their own individual energy fields that govern their actions. In turn, the proper activity of the cell or organ creates more of its supporting energy field. That is basically the force, human body-field, that creates the form (cells/tissues/organs). The human body-field is the energy system that holds the information (in the form of frequency or vibration) that is needed by each of the cells, tissues, and organs to function correctly (Fraser, Massey, & Wilcox, 2008).

In a flow chart, Forget, shows the morphogenic field as existing between the electromagnetic (EMF) fields of the chakras and the Life Field. Druelle (2016), illustrated Life Field, as quantum particles where each atom's electrons link with fluid flow and electromagnetic force. Forget, illustrates the Breath of Life on the outside permeating down through the layers in succession from the: Life Field; Morphogenic field; and EMF; fluids of the body; and to a more solid form of matter; the physical. Forget describes the morphogenic field as vibrational and having the perfect form or blue print (2017). It is well known that children with ASD present with gene mutations that express dysfuntion from environmental insult, and epigenetics (Frye & James, 2014). From the above knowledge, it might be fair to say that if some children with ASD learn a new health/behaviour by treating them in the morphogenic field, then it will be easier for other children with ASD to learn the new behavior from morphogenic resonance. The researcher did notice that the first child of each day, seemed to show a pattern that was observed in the other children that followed that day. This pattern helped the researchers recognize the morphic resonance of information that was guiding the children's tissues and HEF to correct itself.

Dr. Ryan also presents that there is more to life than physical DNA, there is also quantum energy around DNA which is illustrated in Noble Prize winner Luc Montagnier's research experiment on DNA teleportation. It was found that "DNA can encode electromagnetic imprints of itself into distant fluid and that enzymes can copy them to produce DNA". Dr. Ryan presents that it is the "consciousness that has a potent influence over matter, Spiritual DNA". Dr. Ryan explains "spiritual information that is pre-coded in our quantum field of energy gives instructions to the DNA which is our life purpose; Karma; and past life experiences". Spiritual DNA is a vital concept referring to a quantum field conveying

information to our physical DNA from a “spiritual “level” of consciousness”, that is separate from what epigenetics explores which is human regulatory influences on DNA (Ryan, 2016). There is also reference in literature that children with ASD can have different gene variants affecting metabolism and hormones regulation (Boris, et. al., 2004; Frye & James, 2014), suggesting to the researcher an issue with the morphology of the DNA and hence a possible morphological lesion.

The literature reveals in several places that there is potentially some morphological insult to the physiological systems affecting children with ASD (Schaefer et. al., 2013; Frye & Rossignol, 2012a; Rimland, 2015). Myelination in the CNS, specifically along the dorsal nucleus vagal pathway to the heart, often presents a reduced PSNS indicating a possible insult to children with ASD (Casanova et al, 2014; Just, et al., 2013; Schaff et al., 2003). Frymann discusses that the most important function of the CNS is myelination that is first detected at the forth fetal month, indicating a prime time to influence heath (Frymann, 1998). Porges' (2011) theory of the facial muscles linked with the vagus nerve and digestion with social behaviour and the embryological development of the pharyngeal arches highly associated with the “social nervous” system and trauma, indicates another example of these children possibly requiring treatment in the morphogenic field or in the embryological development. Bouchard, D.O., gave a wonderful presentation in Montreal on the viscera cranium axis (facial bones) and pharyngeal arches impacting gut function in children with ADHD, hyperactivity, and dyslexia. Bouchard, found a major change in the digestion and a reduction in symptoms in these children when he did advance cranial work engaging the pharyngeal arches volumetrically (Bouchard, 2015). Forget (2017) teaches the pharyngeal arches act as an important weight bearing framework or structure of fascial bands in the

cranium needed to be restored. In turn, this will reduce stress and weight bearing on the vital centres such as the endocrine system that children with ASD seem to have illustrated with HeartQuest™ data. In embryology it is important to understand motion; the embryo does things as a growth gesture or motion before we do it physiologically. PRM is the echo of embryologic journey of those tissues; the heart gets beaten long before it can beat (Murray, 2014). Finally, Frymann believes that the fetus growing in the in the womb, during embryological development, is the first place to start osteopathic treatments on children (1998).

Several times when treating the children, the researcher had to first treat the embryological shock imprint. This was felt as a tiny embryological form and the child's inner wisdom would show the researcher's consciousness the memory from the mother's history of specific trauma they experienced during embryo development. Once the shock imprint was released, the inner wisdom of the child would show the researcher their perfect morphologic field allowing the BOL to permeate to the structure in lesion to find health.

2.4.4. Created Field Terminology

"*Not In The Body*" described as follows:

> Listen and assess the PRM of the tissue. If none present, ask Sutherland's question: "Where are you living?" The tissue will draw you to where its consciousness is expressing itself in the human energy field. Look for the passage that the tissues' consciousness took to leave the physical body. Holding the tissues consciousness in the field retrace the passage it took in leaving the physical body to return it to the physical body. If it returns you will feel normal PRM return to the tissue or another lesion will

> present itself to be treated. If this technique fails to return the tissue's consciousness to the physical body it may be because a foreign energy is occupying this space. In this case you need to perform the foreign energy release technique to clear that space for the tissue's consciousness to return. (Mounce-Halasz, 2014)

"*Foreign Energies*" described as follows:

> Occasionally, the consciousness would not return to its physical location in the tissues after performing the Tissue Expression of Consciousness in the Field technique. This indicated to the researcher that a foreign energy was present in the physical body's tissue and was impeding the subject's consciousness from returning to its correct position. It was found that normalization of the tissues allowed a return of PRM. To release this foreign energy, the researcher raised the vibration of the tissue by connecting to it and with intention increased the vibrational frequency of the molecules (or feeling of unconditional love) in that tissue. Once this vibration was raised, the foreign energy left and the healthy consciousness of the tissue returned to the physical body creating a feeling of balance within the tissue. (Mounce-Halasz, 2014)

"*Chaotic Field*" (CF) was discovered by Andrea Mounce-Halasz, D.Sc.O., and Jennifer Williamson BSc. PT & MSc. PT. Each child's consciousness of the tissues was not expressing itself in the physical body and it was the consciousness lesion imprint from in the body that showed us a path to where it was living. The path was found by going to the horizon of limitlessness, which will show you the calm abiding, a place where the practitioner or mediator has the ability to stay on a single-pointed concentration until a "blissful pliancy of the body and mind" occurs (The Dalai Lama, 2001, p. 144) and, beyond

that, the chaotic field pattern presented. It was within this chaotic pattern the Autistic consciousness of the tissues resided. The chaotic field was discovered by the researchers first by doing a technique developed by Druelle to normalise petrous lesions by accessing the eye orbit axis. Please see Appendix I, number 44, for details of Druelle's petrous-orbital technique. The researchers followed the consciousness spiral motion of the eye orbit and petrous bone taking them to the chaotic field. The concept of the CF, discovered when following this energetic spiral from the petrous-orbit technique, brought the researchers into another reality unbeknownst to them from any other teachings. They also found that the eye orbit axis was broken energetically. This is similar to how the physio-electrical heart axis can present without an axis or staccato. Expanding the lesion pattern of the eye orbit with the opposite petrous in expansion/retraction following the frequency wave of the energetic pattern until its displaced consciousness is located. This consciousness health was found in the center of the CF (the eye of the hurricane) and was brought back through the horizon in the calm abiding to the HEF and physical to achieve normality in the structure. It was later found that by asking the consciousness of the child to accompany the therapist to retrieve the tissue's consciousness, it was less invasive. At times the child's consciousness was resistant but when the practitioner would show the benefits of them joining the researcher, the child's consciousness quickly joined. The researchers described the CF similar to a hurricane; chaos outside with an eye as a peaceful center. It is within this eye of the "hurricane" that the consciousness health of the tissues resides. It was later suggested by advisor, Joan Seaman, to research Chaos Theory. It was discovered that the CF did represent a hurricane and that Chaos Theory is nonlinear, unpredictable, and impossible to control. Chaos Theory is described by fractal mathematics, capturing the infinite complexity of nature. It is a way to express that small changes in an initial condition leads to drastic

changes as a result (Fractal Foundation, 2003-2017). The children require only a small change in the environment for a drastic result which is what is found with children who have ASD. It was found that the child's consciousness of their tissues lived in the quiet eye of the hurricane, locked and unable to exit. However, it is important to recognize that new insight, wisdom, and power can come from the chaotic, fractal nature of our world. A fractal is a never-ending pattern with infinitely complex patterns that are self-similar across different scales, created by repeating a simple process over and over in an ongoing feedback loop (Fractal Foundation, 2003-2017). Fractal is seen in our fascial pattern, biotensegrity with its fractalization, and the repetitive stemming pattern seen in children with ASD. The children have a repetitive pattern that oscillate them into a CF where they reside in the centre of the calm eye. The researchers followed the repetitive oscillating pattern as described in this chaos theory. It is felt by the researcher that the hypersensitivity of the child is regulated by the RF. If the RF is not normalized the tissue's consciousness will send it back to the CF. It is this sensory deregulation that creates the repetitive pattern oscillating them back to the CF. See Appendix I for CF technique description.

2.4.5. CEO Energetic Techniques

Prior to even contacting the patient, Druelle explains you must first connect with the true nature of yourself and the true nature of the patient. Druelle explains that the mind connects the body with the consciousness and by combining the belief of oneself (consciousness) and the force that moves the blood (mechanism), the patient will return to their true sense of life allowing the patient to transcend in evolution (Druelle, 2016). A long-term dysfunction of the physiology results in a decrease in the manifestation of the patient's life force which produces a disconnect along with an under active thymus (Fulford, 2003). A healthy active

thymus makes for vibrant and positive health (Fulford, 2003). Once you have connected to the patient's true nature the osteopath needs to determine if the person is centered in the plane. Children with ASD may have no dialogue with their inner physician because it is too painful, hypersensitive or hyposensitive, to be in body. The osteopath needs to re-center and harmonize them around the central fulcrum in order to have a minimally centered state of this person to dialogue with her deepest needs (Forget, Auto-regulation, 2017). This technique taught by the CEO is called Harmonization of the Organism around the Central Fulcrum by Philippe Druelle, D.O., also referred to as putting the "Pilot in the Plane". This gives the patient a fulcrum to organize around. When the technique is finished and the patient has a fulcrum you feel an anterior/posterior (A/P) axis pumping motion along the axis of the A/P axis for the heart (index and 3rd finger on the intercostal of rib 3 or 4 on the left with intention an A/P axis) and sacral listening position with the 3rd finger in contact with the Lippincott point while visualizing an A/P axis (Druelle & Forget, Autoregulation, 2000). Other regional techniques used to establish a dialogue with the inner physician are: Solar Plexus by Dr. Frymann which is effective with these children as it accesses the HPA axis and emotionally charged beings; and Mesentery Normalization with lumbar spine ganglion inhibition when it is difficult to get an axis doorway to the patient, as it has a soothing effect with an embryological umbilical cord connection and GBA serotonin effect (Forget, 2017), which is excellent for children with ASD. "Centering the Pilot" can follow the "Pilot in the Plane", also called the Balancing Technique of the Sacrum and the Angle of Louis, and is a way to centre the child inside their body reducing restlessness and inducing a calming effect (Lulic, van Vliet, & Endo, 2011).

2.4.6. Osteopathy and HEF

Triangles are powerful forces that treat from a spiritual standpoint and are structurally the strongest. Fulford gives several examples of triangles such as: Body, Mind and Spirit; Life, Light, and Love; Heaven, Earth, and Man; and Father, Son, and Holy Ghost (Fulford, 2003). Forget comments, in an interview, the three most important central chain elements to restore a fulcrum to are: heart, third ventricle and mesentery. Fulcrums hold the potential for expression of life force. Fulcrums can be energetic, fascial, fluidic and, therefore, not always in the same plane of expression. Forget states, "present three fulcrums and have them function correctly results in restoring a continuum, bringing back the axis of each, and then enhancing their expression all results in improving and restoring the patient's auto regulation and improving their well-being" (Wood-Reucassel, 2006).

According to Dr. Fulford (2003), the "light of divine mind centres over the pineal gland" (p. 96). The pineal gland forms the triangle of one of the three fulcrums that form and control the human being. The three fulcrums to control the human being are: the skull crista galli; Sutherland's still point fulcrum in the etheric field, which is a constant point on the straight sinus but not fixed due to changes in the RTM; and the pineal gland (Fulford, 2003). Physiologically, the pineal gland is important as it connects the endocrine system with the nervous system by converting nerve signals from the sympathetic peripheral nervous system into hormones signals (Stedman, 1990). We know from the literature review that children with ASD have hormonal and ANS dysfunctions. Children with ASD in this pilot study demonstrated from HeartQuest™ findings and osteopathically that they used their endocrine system, hormones, to regulate their body's autonomic responses. Anatomically, the pineal gland is located between the cerebral hemispheres and is attached to the third ventricle part

of central chain. Facially, "converging forces of the 5 fascial chains meet at the sphenopetrous region, in front of the pineal gland" (Wood-Reucassel, 2006).

HEF is very important, as treating the body, mind and spirit using the triangle deepens the release of the trauma (Fulford, 2003). Osteopathic techniques combined with treating in the HEF is necessary and the results are exceptional healing with total wellness (Frymann, 1998; Fulford, 2003).

> He or she may be compared to an orchestra conductor, who must call on each musician to make a particular contribution to the performance of a composition. The state of harmony between all octaves of vibration is a vivid illustration of a state of health, well-being, harmony among all the instruments of this human being. Holistic healing is the outcome of compassionate interaction of a whole physician and a whole patient in the conscious presence of the Great Healer. (Frymann, 1998, pp. 330-332)

Frymann, Fulford, and Ryan describe that your connection with consciousness requires awareness (Frymann, 1998; Fulford, 2003; Ryan, 2016). In a talk given by Deepak Chopra (2016), he says, “consciousness is awareness”. Ryan presents that consciousness “involves: learning to align yourself with greater self-care and authentic responsibility; healing from past issues and the energy distorted by these patterns; greater awareness of our ego and truth; a greater understanding of our spiritual power and manifest change; and opening to transformation through our ‘spiritual DNA’” (Ryan, 2016).

Overall, it is evident from the review of the literature that, from an osteopathic view, it is essential to treat in the energetic fields as well as in the structure and fascia with particular focus on: the thymus (life energy), spleen (holds childhood trauma); pineal gland (light of

divine mind) and full endocrine system (Central Chain/vital systems); C3 (spiritual entry); the base of the skull and underlying physiology (birth trauma and RAS-Vagus Nerve-Alta Major Chakra Axis); pharyngeal arches (visceral cranium and structural bands); GBA (vagus, immunity, hormones; microbiome); RTM and venous sinuses (brain tissue vitality and health); and the liver (metabolic, toxins, inflammation) in a child with ASD.

2.5. Research Justification

There has been research to show that osteopathic treatments specific to the cranium and the reciprocal tension membrane (RTM) statistically improve the lives of children that have: Attention Deficit Disorder (ADD), ADHD, hyperactivity, learning difficulties, and emotional and social problems (Bouchard, 2015; Magoun, 1976; Frymann, 1998; Accorsi et al., 2014; Bierent-Vass, Lang & Neumann, 2004). The literature review has indicated that little manual osteopathic research has been conducted specifically on children with ASD. One study did measure the influence of visceral osteopathic technique (VOT) on 46 children with ASD that had GI issues and impaired social interactions and found a statistically significant improvement ($p< 0.05$) in social behavior and communication and digestive signs as well as an improvement in vomiting, ($p=0.0029$), poor appetite ($P= 0.039$), and eye contact ($p= 0.035$ (Bramati-Castellarin, Patel, & Drysdale, 2016). It can be inferred from presentations on children with ASD by Dr. Centers, D.O., and Dr. Cozzolino, M.D., D.O., at the 2015 Global Conference on Pediatric Osteopathy and IPC 2015, as well as from past writings of our prominent osteopaths from the past, Still, Sutherland, and Frymann, that with the increasing research and profound findings in knowledge on children with ASD it is producing a significant role for an Osteopathic approach in their therapy.

3. METHODS

A within-subjects repeated measures design was chosen to test the research hypotheses. This quantitative osteopathic care research study was conducted on nine children, ages 3 to 13 years. The nine recruited children diagnosed with ASD were tested prior to the commencement of the osteopathic treatments in order to establish a baseline score. The Autism Treatment Evaluation Checklist (ATEC) was completed by the parents of the child and the two other tests in the battery (HeartQuest™ and Bio-Well™) were conducted by a technician well-versed in the use of both apparatus and who was not an osteopath. All the children had 1 or 2 qualification testing weeks prior to the baseline measurements to reduce any stress or white coat syndrome around the dependent variables. The children underwent 3 weeks of testing using the three measurement tools at a frequency of once per week. Each child was shown a picture of the second person who would be helping to treat them, designated as researcher 2 (R2), daily by their mother. The primary researcher (R1) also showed them a picture of R2 during the week before the first treatment, on the last baseline data collection day. For the next 8 weeks, the subjects underwent weekly osteopathic treatments, combined with the same data collection method used in the pre-treatment phase. The testing was administered before the treatments on each treatment day. After the treatment phase had terminated, the subjects were tested again once a week for a period of 3 weeks. The post-data collection helped confirm whether or not the independent variable was responsible for any improvement observed, and revealed the possibility of a non-reversal effect of the intervention. Each child served as their own control.

3.1. The Participants

Nine children who met the criteria, based on responses to the New Patient Questionnaire in Appendix A and the inclusion/exclusions criteria below, were recruited through: South Shore Regional School Board Consultant for Autism, Catherine Rahey; Autism Nova Scotia; Bridgeway Academy across Nova Scotia; Birch Hill Academy; select HRM & South Shore physicians; and select psychologists who specifically work with children who have ASD. Please see the Informed Consent Form to Participate in a Clinical Research Study (Appendix B), and the Minor Information Sheet & Assent Form (Appendix C) that introduced the study, researchers and consent from patients completed to participate in the study. Recruitment for the study did not occur until the Canadian SHIELD Ethics Review Board (CSERB) had approved the study (see Appendix D).

3.1.1. Inclusion Criteria

Diagnosed with ASD by a physician or psychologist

Under treatment by a physician for a minimum of one month

All scoring between 20-120 range on the ATEC scale

Children between the ages of 3 years to 13 years

Parents consenting to the study and to their child's participation

3.1.2. Exclusion Criteria

A genetic issue too difficult to change

Not diagnosed with ASD by a physician or psychologist

Outside the 20-120 range on the ATEC scale

Children younger than 3 years or older than 13 years of age

If a child developed a condition that could put their general health at risk, e.g., serious infections, epilepsy or any acute pathology such as fractures or recent surgeries

If a child was unable to cooperate or illustrated being overly distressed

Unstable medications

Any child that needed their current medication changed and/or gold standard therapy changed during the study

3.2. Dependent Variables and Instruments

The first dependent variable being assessed was the severity of autism using the ATEC (see Appendix E). Secondly, the autonomic nervous system (ANS) regulation was measured, using HeartQuest™ (see Appendix F), and represented by the following scores: HRV, RRNNms; ANS balance index; SI; SDNN; LF; HF; VLF; and, VF. Thirdly, Emotional Pressure levels (anxiety) and Energy of the children were measured by Bio-Well™ (see Appendix G). There was no baseline measurement stabilization required prior to the commencement of the experimental phase. The possible stabilization of the symptoms of the children could be seen as a positive treatment effect and might be missed if a stabilization of these measurements prior to the treatment phase was sought.

3.3. Independent Variable

The experimental phase consisted of osteopathic treatment, incorporating all three dimensions of matter, fluid, and field work, by R1 and R2. Therefore, osteopathic treatment was provided in different palpation protocols, as defined by Philippe Druelle, D.O., and others. Protocol 1 Palpation (P1) was used to address structural issues, Protocol 2 Palpation (P2) to address fluidic issues, and Protocol 3 Palpation (P3) to address energetic field issues. See Appendix H for additional descriptions of P1, P2, and P3. An osteopathic assessment and treatment was administered, following the sequencing outlined in Appendix I, called the osteopathic assessment and treatment protocol with consciousness (HEF). In summary, as outlined in Appendix I, the children were assessed using Dr. Frymann's sequencing followed by her treatment protocol on the physical level, while using Protocol 3 to deepen the releases during the treatment. Dr. Sutherland's questions were used during Dr. Frymann's sequence of assessment and treatment protocols. The first Sutherland question, "How and/or where are you living?" in the body showed: it's posture of the structure; the fluidic state; the possible field location of the structure's consciousness; and the primary palpation protocol level which is necessary for optimal release as directed by the body. The primary palpation protocol was found when dialoguing with the tissue. The body's inner physician showed the layer that was most primary as it was the one that allowed the BOL to permeate the most. Following Sutherland's second question, "How and/or where would you like to live?" the body showed its health in each of the three protocols. In Sutherland's third question, "What is impeding you from living there?" the body showed the barrier and what it needed from each palpation protocol to find its health. Inhibition was used to validate the appropriate palpation protocol and what level was needed to find health. A chakra lamp was

used to illuminate the room with the appropriate lighting, enhancing the correct EMF level for healing.

NOTE: Due to gall bladder surgery, R 2 missed treating on September 10, 17, 24 and only treated subjects 2, 3, 4, & 7 on October 1, 2017.

3.4. Material and Measuring Instruments

3.4.1. Autism Treatment Evaluation Checklist (ATEC)

The Autism Treatment Evaluation Checklist (ATEC), developed by Bernard Rimland and Stephen M. Edelson of the Autism Research Institute, is a one-page form designed to be completed by parents, teachers, or caretakers. It consists of 4 subtests: I. Speech/Language Communication (14 items); II. Sociability (20 items); III. Sensory/Cognitive Awareness (18 items); and IV. Health/Physical/Behavior (25 items) (ARI, 2016). It was used to measure severity of autism and has demonstrated high reliability and validity (Jarusiewicz, 2002; Lonsdale, Shamberger & Audhya, 2002; Klaveness & Bigam, 2015; Geier, Kern & Geier, 2013; ARI, 2016).

3.4.2. HeartQuest™

A well-accepted measurement in the medical literature, Heart Rate Variability (HRV) has numerous research articles written about it in relationship to the autonomic nervous system (ANS) (Casanova et al., 2014). Since the ANS controls HRV this gave significance to measuring HRV, as it is a reflection of the ANS function. The HeartQuest™ system measured HRV, "the beat-to-beat changes between one heart contraction to the next, using a simple [electrocardiogram] (ECG) recording". This technology was designed to evaluate how well the ANS, the neurohormonal system and the Chinese Meridians are able to regulate

the body. The HeartQuest™ system is specifically designed for research and education, and Drs. Karimov and Kessler and others continue to illustrate high validity and reliability (HRVHQ, 2016; Moldabek, 2011; Su et al., 2009; Tonhajzerova et al., 2012; McCraty, Atkinson, Tomasino, & Stuppy, 2001; Ahs, Sollers, Furmark, Fredrikson, & Thayer, 2009; Ellis & Thayer, 2010).

3.4.3. Bio-Well™

Bio-Well™, a relatively new and emerging technology, has been shown to measure the state of anxiety of tested subjects among other aspects related to their energy field. This device has been used in a few independent studies to date (Haydon, Nunley, & Scudiere, 2005), in addition to numerous research studies by the inventor (Banajan, Grachev, Korotkov, Korotkova, 2016; Yakovleva et al., 2014). The Bio-Well™ tool is non-invasive and did not pose any threats to the children in the study. Bio-Well™ was used in previous studies with children who have ASD and their families (Kostyuk et al., 2009; Kostyuk, Rajnarayanan, Isokpehi & Cohly, 2010).

Bio-Well™ illustrates a delicate reflection of the physical, emotional, and spiritual state of a person by turning bio-electricity into images. The four pillars of Bio-Well™ analysis are: the endocrine system, the gastrointestinal system, the ANS, and emotions, all of which are impacted in children with ASD. The screening was detected through the person's 10 fingers, each finger relating to different body systems and organs. Bio-Well™ is not a medical instrument but allows valid and reliable impression of the HEF as it transforms and changes on a day-to-day basis, with a high sensitivity to slight changes (Bio-Well, 2016). Bio-Well™ was specifically used to measure the children's EP (anxiety level) and Energy level to see if osteopathy had an effect on this emotional state.

3.5. Data Collection

The research assistant, Dr. Morrison, PhD, collected all the data involving both measurement devices and coordinated the collection of data from the parents who filled in the ATEC form on behalf of the children for the 14-week data collection period.

3.5.1. Autism Treatment Evaluation Checklist (ATEC)

The ATEC, an automated online computer form, was filled out by the parents at the office during each visit. The scores were calculated by ARI and emailed in a PDF to the researcher who gave them to the research assistant to log into a spreadsheet.

3.5.2. HeartQuest™

Children were physically connected to the HeartQuest™ system electrocardiogram (ECG) by placing ECG pads, using pigtail extensions, on the right and left sides of the oblique pole of the heart axis or by placing clamps on the wrists (red clamp on the right wrist, yellow clamp on the left wrist). The use of ECG pads improved conductivity and reduced noise on the smaller children who moved around a lot. See Appendix J for a picture of pigtails and clamps.

3.5.3. Bio-Well™

Bio-Well™ readings were obtained using a desktop camera and accompanying software and by having the children place each finger individually onto the device lens in a high-intensity electromagnetic field. An unperceivable electrical pulse was given for one millisecond to the finger tips. A deviation of an “electron cloud” composed of light energy photons was formed by the finger’s response to the electrical pulse and the optical charge-coupled device camera system captured the electron “glow”, which was invisible to the human eye, then

translated and transmitted it into a digital computer file (Bio-Well, 2016). This instrument was re-calibrated at least once a day and followed the operating manual's suggestions for mitigating possible trouble if calibration was not done. The recalibration occurred each day and respected the remarks in Appendix G, specifically the "Important Remarks" which insured optimal validity and reliability of the device.

3.6. Progress of Experimentation

The assessment and treatment protocol for addressing the appropriate osteopathic lesions in the 9 children recruited were conducted by the researcher Jennifer Williamson BSc PT, MSc PT (R1) and Andrea Mounce-Halasz, D.Sc.O. (R2), and followed: Dr. Frymann's sequencing used in conjunction with Andrea Mounce-Halasz, D.Sc.O.'s methodology, approved by the CEO in 2014, of working in the fascia, fluids and field; Dr. Sutherland's three questions; and the CEO methodology. A detailed description is found in Appendix I.

3.7. Bias

Any possible bias within the instrumentation was reduced by daily calibration and followed the manufacturer's important re-calibration steps.

The parents completed the ATEC on behalf of the children potentially skewing the results based on their belief in their child's improvement.

The researcher controlled the bias by having a trained independent person that is not an osteopath take the measurements and calibrate the devices according to the manufacturer's specifications.

The children's increased familiarity with the dependent variable tools may have threatened the internal validity.

3.8. Pre-Study

A pre-study was not required, as this pilot study actually served as a pre-study for future research on this topic.

3.9. Ethical Considerations

The 1964 Declaration of Helsinki regulations of ethical human studies was strictly adhered to (see Appendix K). This study followed complete confidentiality of patient identification, their records and information. Records were stored electronically in accordance with the Canadian SHIELD Ethics Review Board (CSERB) and the Personal Health Information Act (PHIA) of 2013. Protected Health Information (PHI) would be removed/redacted from any data used for research. Any research person involved in data collection was required to follow the policies and procedures dictated by the Canadian SHIELD Ethics Review Board (CSERB) and PHIA. No subject names or identifying information will be used in any further reports or publications. The researcher sought ethical approval from the Canadian SHIELD Ethics Review Board (CSERB).

The ethics process involved the researcher completing the application form that included Biographical Sketches, including CVs on the researcher, Andrea Mounce-Halasz, D.Sc.O., and Dr. Morrison, PhD. The timeline for the CSERB submission was during the month of May 2017, with approval by June 2017 to start recruitment once approval had occurred. All the research was conducted at Personal Care Physio and Osteopathy Inc., located at 3785 Highway #3 Chester, Nova Scotia. The principal investigator was the researcher, Jennifer

Williamson, BSc PT, MSc PT, who is a 5th year completed academic student osteopath in thesis writing. Jennifer Williamson was the researcher responsible for the study and for the CSERB process. As stated in Appendix B, and in Appendix C, the subjects and representative of subjects had the right to withdraw from the study at any time without penalty.

4. ANALYSIS AND INTERPRETATION OF RESULTS

4.1. Data Analysis

Eight children with ASD served as the convenience sample for this pilot study as one child withdrew from the study after his third treatment. Data was collected on the: severity of autism using the ATEC; ANS regulation measured using HeartQuest™; and Energy pressure and Energy levels measured using Bio-Well™. All three dependant variable (DV) measurements were conducted at three designated measurement times: 1, 2 and 3 weeks for baseline composite score, weekly for the eight weeks of treatment, and repeated again at 1, 2 and 3 weeks post treatment.

Using SPSS (23.0), the aggregate mean scores for participants were compared at baseline and post treatment measurement times using paired T-test. Levene's test for Equality of Variances were examined and data was reported appropriately. Data was analyzed to detect differences between pre-and post-mean scores on each of the study measures of ATEC, HeartQuest™ and Bio-Well™ findings. Visual analysis was used to present the trends over time from baseline, treatment phases and post treatment assessments for each participant. Please see Appendix L for the statistician's credentials.

4.2. Severity of Autism Hypothesis

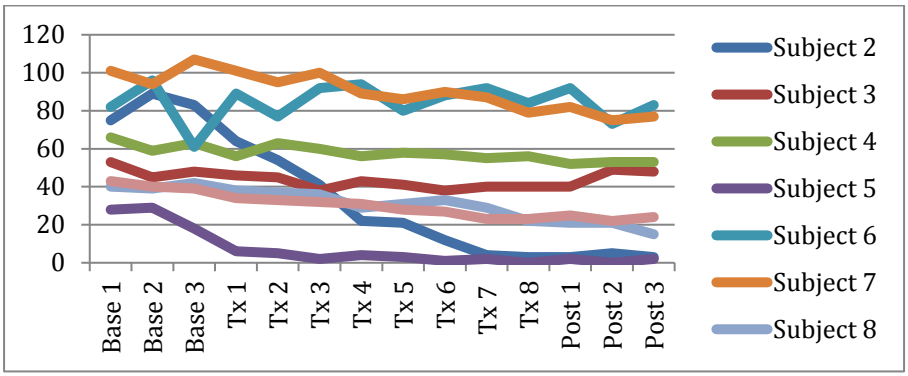
The ATEC mean baseline score was 60.0 and the post mean score was 38.68 giving a mean difference of 21.32 resulting in a p value of 0.05.

Table 2. ATEC Paired T-tests for Subscale.

ATEC	Mean	Standard Deviation	t	p
Base-Post	21.32	25.3	2.38	0.05*

The p value of 0.05 means the null hypothesis is rejected and the hypothesis is accepted as the ATEC scores decreased significantly over time. Graph 1 for the ATEC scores of each subject illustrates visually the changes in each of their ATEC scores over time.

Graph 1 : ATEC (Baseline-Treatment- Post)



4.3. Autonomic Nervous System (ANS) Regulation Hypothesis

The VF (vitality) baseline mean score was 142.54 and the post mean score was 89.66 giving a mean difference of 52.87 resulting in a p value of 0.02. The HRV, beat-to-beat (R-to-R) changes in the Q-R-S-T complex, mean was 626.91 at baseline and was 605.54 during post measurements which were all within normal limits for their ages.

Table 3. VF Paired T-tests for Subscale

HeartQuest™	Mean	Standard Deviation	t	p
VF Base-Post	52.87	52.25	2.86	0.02*
HRV RRNNms	21.37	38.87	1.55	0.16

The paired T-test results were unable to show significance in any of the other ANS dependent variables, measured as a whole. Therefore, the null hypothesis was accepted.

Please see the discussion for further insights and discoveries about children with ASD from the HeartQuest™ data.

4.4. Emotional Pressure (Anxiety) Hypothesis

As a group they had a mean baseline of 2.66 and post mean treatment value of 3.01. Please see Table 4 for the paired T-test for subscales. The paired T-test result was unable to show a significant change in the Emotional Pressure (dependent variable) measured. Therefore, the null hypothesis was accepted.

Table 4 Emotional Pressure Paired T-test for Subscales

Bio-Well™	Mean	Standard Deviation	t	p
EP Base-Post	-0.35	0.83	-1.18	0.27

4.5. Energy Level (Inflammation) Hypothesis

Energy scores, indicative of inflammation, significantly differed between pre and post mean scores with the mean baseline score of 84.76 and the mean post treatment scores of 77.54 giving a mean difference of 7.21 and resulting in a p value of 0.04. The p value of 0.04 means the null hypothesis is rejected and the hypothesis is accepted.

Table 5. Energy Level Paired T-test for Subscales

Bio-Well™	Mean	Standard Deviation	t	p
E Base-Post	7.21	8.25	2.47	0.04*

5. DISCUSSION OF RESULTS

5.1. Discussion of the Degree of Autism Severity Hypothesis

Children diagnosed with ASD had significant improvement in their: degree of autism severity (Speech, Sociability, Sensory/Cognitive Awareness, Health/Physical/Behavior) and total ATEC score when exposed to an osteopathic treatment that incorporates the use of palpation protocols to address all three dimensions of matter, fluid, and field work. Seven of the eight parents noticed significant changes at home in their children's behavior. They found their children to be more cooperative, listened better, were more independent in their activity of daily living, experienced improved sleep patterns and, some noticed speech improvements from making first words to speaking in full sentences. Six of the parents are continuing with treatments post study. One child who was non-verbal has started to say single words such as “mum”, “dada”, “help”, “iPad”, and is now playing interactively with other children for 10 minutes at a time. Overall, the parents expressed there was less SS behavior or stemming and less aggressive behavior of hitting and scratching. There were less fluctuations between the severe anger to calm states. One parent found it helpful to understand why their child was reacting so explosively. It was discovered that all of the children were hyper and hypo sensitive to many things but, specifically, to hurtful comments said to them by others which made them feel deep sadness (a lack of joy). Their response was extreme anger (a lack of love) to defend the lack of joy. Please see Appendix M for testimonies from each parent.

5.2. Discussion of ANS Regulation Hypothesis

Considering the HeartQuest™ data showed no significant improvement and, in fact, a significant DECREASE in the VF (vitality), this raised the question: Why did the ATEC show a significant improvement in the severity of ASD if the child's vitality decreased? It is, therefore, necessary to qualitatively and visually analyse the HeartQuest™ data when exposed to an osteopathic treatment that incorporated the use of all 3 palpation protocols. It is possible that, HeartQuest™ data as a group, is not able to be analysed using paired T-tests. However, the VF scores did, as a group, decrease over time possibly indicating that the children were able to use their energy to regulate their nervous system. Previously, as suggested by the data, they had a tremendous amount of energy but it was not being employed correctly in driving nervous system regulation.

The children in this study showed positive individual changes in their overall HeartQuest™ data. This can be easily visualized in each subject's readings below. Dr. Karimov explains that some researchers get controversial information from the data because they only use one or two of the parameters and then make a decision. Dr. Frymann advocated seeing the patient as a whole and so does Dr. Karimov with HeartQuest™ data. He advocates you must look at the whole picture not only a pie or a parameter (Karimov, email, 2017-10-04). It is possible that HeartQuest™ data as a group is not able to be analysed using paired T-tests. However, the VF scores did, as a group, decrease over time possibly indicating that the children were finally able to utilize their energy to regulate their nervous system rather than just having a tremendous amount of energy but not knowing how to employ it. Potency is a latent power; it has a vital capacity only in the presence of a fulcrum. The bioenergetic force manifests from the interaction of the Potency with the fulcrum. Thomas Schooley, D.O.,

states that the Potency acts from and across the fulcrum (P. Druelle, personal communication, January 29, 2018). This finding might suggest that the children could finally access their innate potency as the researchers restored its consciousness. Therefore, bringing back their consciousness the fulcrum is able to be present and the potency can become active using the fulcrum to restore health.

Globally the HeartQuest™ illustrated that all the children utilized their hormonal or SNS system the majority of the time to regulate their ANS and had difficulty accessing their PSNS. This supports the literature that children with ASD have been found to have decreased baseline parasympathetic and that the over-arousal SNS in children with ASD may be the effect of dis-inhibition from the compromised baseline PSNS tone (Ming et al., 2011; Casanova et al., 2014). This would fall in line with Porges' theory, that the healthy myelinated vagal system (PSNS) suppresses SNS activity and when the myelinated vagus is damaged it results in a heightened SNS response (Porges, 2011). A compromised or inhibited vagus nerve results in excessive production of cytokines and inflammation systemically. If the vagus nerve is functioning optimally its cholinergic anti-inflammatory pathway is activated and this reduces inflammation and lowers the serum pro-inflammatory cytokines levels, such as tumour necrosis factor-alpha. (Levine et al, 2014; Zhao et al., 2012). The damage to the vagus nerve may be due to significant inflammatory reactions from an over-active immune system. Over-active mast cells, the leaky GI, toxicities, lack of GSH and bidirectional vagal tone are possible culprits. It is natural that these children have severe emotional reactions as they have utilizing their hormones at full capacity to regulate their ANS and these emotional centers become inflamed. The ANS index balance, which indicates the self-healing potential, will start to improve prior to the improvements on the

ANS/Hormonal balance (pie chart). Dr. Karimov explained that the physiology will shift from hormones (VLF) to SNS (LF) first in the healing process and then start to increase the PSNS (HF) when regulating towards health (J. Karimov, personal communication, January 5, 2018). The normal ranges for HeartQuest™ data (J. Karimov, personal communication, December 9th, 2017) are outlined in Table 5.

Osteopathically, consciousness was restored and then the barriers were gradually removed in the different layers to bring back their autoregulation restoring the self-healing potential. The self-healing potential visually seen in HeartQuest™ is the ability of the body to self-regulate. Dr. Frymann states, "It is the recognition that there is a wise, all-knowing restorative force, an Intelligence, within every patient that will accomplish all that needs to be done if the obstacles to its performance are removed" (1998). Globally, this may improve the patient's ability to expresses its own self-regulatory medicine (auto-regulation) and Potency (Breath of Life) resulting in a better expression of their life force within their tissues. From here, we must ensure that we normalize the SNS and PSNS individually and then restore dynamic coherence between the two systems. This is followed by endocrine normalization and dynamic coherence with the ANS system. Please see Appendix I, number 45, for specific ways to do this. The ANS index balance is a representation of the balance between SNS and PSNS which correlates to coherence in osteopathy. Once the coherence has been established between the two systems illustrated as normal ANS Index number and an "optimal balance" in the self-healing potential then vagal nerve function can be improved. This can be achieved by liberating the vagus pathway and addressing systems that increase PSNS, i.e., active CV4. As well, we can reduce the hormonal input by restoring the weight bearing apparatus to remove weight from the vital centers. We decrease the stimulation of

hormonal system by ensuring all weight bearing structures are free to accept load. Hence, the importance of addressing the physical, i.e., OA, fascia, musculoskeletal system and postural body. To understand the fluctuating self-healing potential indicator, we need to consider that the body has undergone a change with respect to the vagus activation which causes a new relationship between the SNS and PSNS requiring an integration period for coherence to return to be reflected in the diagram. The period of integration will require more energy from the system translated to a visual drop in the VF. Overall, the osteopath offers a possibility of balance in each of the different mechanisms that are under disturbance and if accepted by the body it allows the patient to manifest through the structure of their living matter, therefore to auto-regulate (Forget, 2017).

Table 6. Normal Ranges for HeartQuest™ Dependent Variables (DV)

HeartQuest™ : DV	Range for Normal	Higher or Lower Meaning
Stress Index (SI) tells us how hard the ANS has to work to maintain balance	10-100	A number that increments greater then 100 means the system has to work harder and harder as the number gets larger.
Standard Deviation (SDNN) reflects the ability to respond quickly, dynamically, and effectively to a stressor and tells us how hard the ANS has to work to maintain balance (Adaptablity)	55-65	A low value can mean adrenal burn out and numbers around 12 means the person has a serious disease with poor prognosis.
Vital Force (VF)	55-500 50 will be enough energy to maintain a balanced ANS	This normally drops if the person is undergoing treatment as they are using their vitality to find health.
ANS Index Balance self-healing potential: balance between the SNS and PSNS nervous system	35-145	Greater than 145 the ANS becomes more disrupted and the physiology will use the CNS (hormones) more to try to regulate. A lower number within the normality range means less tension to support the balance between PSNS and SNS.
PSNS (HF)	30%	Optimally there should be a slightly greater percentage of PSNS (HF) than LF and VLF with a high Vital Force (VF).
SNS (LF)	30%	
Hormonal (VLF)	30%	
HRV RRNNms beat-to-beat (R-to-R) changes in the Q-R-S-T complex	3-5 years old = 500-750 ms 6-11 years old = 508-800ms	The adaptive capabilities of the autonomic nervous system. A higher number indicates greater adaptability.

Kessler and Karimov (2014) explained that oxidative stress and decreased blood flow to the brain causes neural degeneration. These two factors are related to:

1. Decreased neurotransmitter and neuronal interconnections.

2. Increase in CNS control (hormonal VLF) over autonomic regulation.

3. Vagus nerve dysfunction resulting in CNS control over ANS regulation.

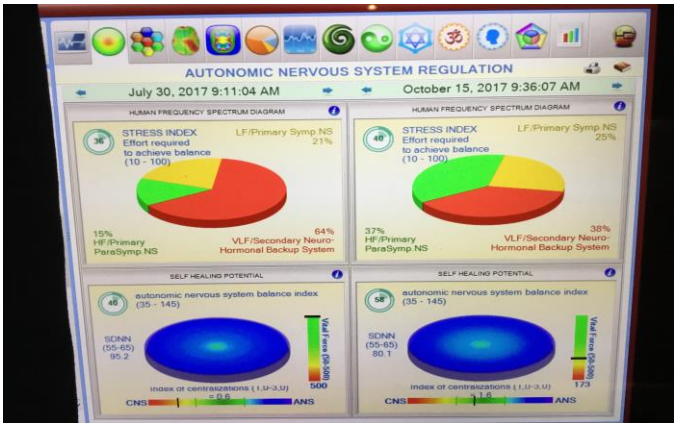
It is not normal for the CNS to be the predominant controller over the ANS system. In normality one utilizes the ANS (PSNS/SNS) 90 % of the time and the CNS (hormonal) 10% of the time to regulate the body's functions. Therefore, a higher percentage of VLF (hormonal) and diminished autonomic regulation (low HF/PSNS and LF/SNS) indicate an unbalanced nervous system and will impact health. People with a predominant VLF (hormonal) usually have an "overactive renin-angiotensin system due to decreased glomerular blood flow, as well as an overactive aldosterone system, both of which contribute to endothelial damage, sodium/potassium imbalances, and increased blood pressure. An increased cortisol/dehydroepiandrosterone (DHEA) ratio and insulin resistance are also common in these individuals" (Kessler & Karmiov, 2014, p. 4). Overall, if a person is in long term limbic/thalamus (CNS) regulation it increases psycho-emotional stress and increases catecholamine-regulation. If a person is in a chronic state of SNS (LF) they will have increased levels of epinephrine and adrenaline output resulting in a disrupted DHEA/cortisol ratio becoming catabolic (HRVHQ, 2016).

Children with ASD in this study were hormonal (VLF) or SNS predominant prior to the osteopathic treatments.

Overall, the findings from the HeartQuest™ post-study data demonstrated that as the PSNS (HF) level of activation became more balanced with respect to the SNS(LF) and hormonal (VLF) levels, it required energy expenditure on the part of the subject. This is illustrated by a reduction of their VF, as seen in the data. These findings, coupled with the improvement

in the ATEC scores, showed that the possible reason for the improvement was the newly balanced nervous system. This however came at a cost which was of VF expenditure and therefore showed a decrease in the vitality, statistically speaking. BioWell™ energy level (inflammation) results support these findings as it showed a significant decrease in energy levels, indicative of inflammation reduction and allowing the PSNS to return to normal function.

5.2.1. Individual Subjects' HeartQuest™ Changes and Interpretations



Subject 2			
DV	1st Baseline July 30, 2017	8th Treatment Day October 15, 2017	Normal
PSNS (HF)	15%	37%	30%
SNS (LF)	21%	25%	30%
Hormones (VLF)	64%	38%	30%
SI	36	40	10-100
SDNN	95	80.1	55-65
ANS Index	40	58	35-145
VF	500	137	55-500

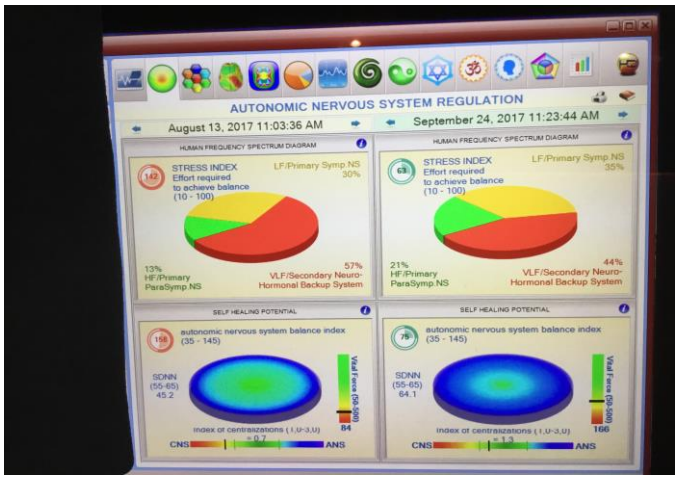
ATEC MEAN PRE = 81

ATEC MEAN POST = 3

Figure 7. Subject 2, 1st Baseline and 8th Treatment Day HeartQuest™ Readings

Subject 2 was a 13-year-old boy who, through Bio Well™ data collection, demonstrated excessive energy and high inflammatory markers. His HeartQuest™ demonstrated a high level of VF which would normally be indicative of someone who would have a high capacity to regulate his nervous system. However, from his parents and ATEC scores (moderate to severe autism) this was not the case. His vital force (VF) dropped from 500 to 173. It was felt that his VF had reduced because he was now able to expend his energy appropriately while utilizing his physiology more effectively, due to the consciousness of the tissue being restored. He had an "optimal balance" self-healing potential and normal ANS index which did not change as the treatments reduced the VF. The osteopathic treatments were requiring

the patient to use his vitality to find health, and auto regulate (self-healing potential). Hence his baseline had a high VF because he was not utilizing his VF appropriately to regulate his ANS physiology. Once the VF was accessed he was able to improve his ability to utilize his PSNS. This corresponded to what his parents expressed. He was now: acting his age; displayed no ASD behavioral issues; and was independent and compliant with all his ADL's.



Subject 3			
DV	1st Baseline August 13, 2017	5th Treatment Day September 24, 2017	Normal
PSNS (HF)	13%	21%	30%
SNS (LF)	30%	35%	30%
Hormones (VLF)	57%	44%	30%
SI	142	63	10-100
SDNN	45.2	64.1	55-65
ANS Index	158	75	35-145
VF	84	166	55-500

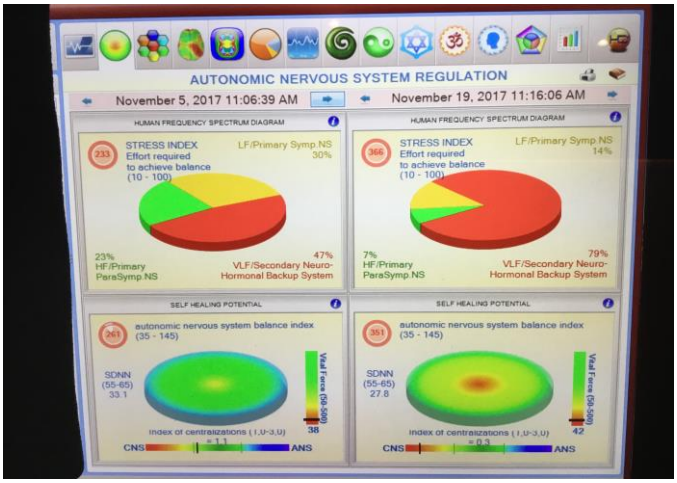
ATEC MEAN PRE = 47

ATEC MEAN POST = 49

Figure 8. Subject 3, 1st baseline and 5th Treatment Day HeartQuest™ Readings

Subject 3 was a 5-year-old boy who developed high fevers after his 8th treatment. Figure 8 illustrates he had improved prior to the 8th treatment. He improved in his: self-healing potential, VF, ANS index, SI, and ability to utilize his PSN. His improved self-healing potential changed from a "stable balanced" to "stable to optimal" suggesting he had improved ability to autoregulate, and the reduction in his ANS index to normal values suggested he had greater coherence to offer balance to the ANS. His reduced SI indicated that he required less effort to maintain a balanced ANS. All demonstrating an improved ability to autoregulate, followed by a balanced ANS coherence and then an improved ability to access the PSNS. However, after the first post measurement he was treated for two weeks in the hospital with a diagnosis change from Kawasaki to unknown. He had returned two weeks later for two more post measurements where he regressed from his

baseline scores. The parents felt his ASD signs and symptoms had gotten worse since the hospital visit. However, he had improved in all his physiology prior to hospitalization.



Subject 3			
DV	1st Post November 5, 2017	3rd Post November 19, 2017	Normal
PSNS (HF)	23%	7%	30%
SNS (LF)	30%	14%	30%
Hormones (VLF)	47%	79%	30%
SI	233	366	10-100
SDNN	33.1	27.8	55-65
ANS Index	261	361	35-145
VF	28	42	55-500

Figure 9. Subject 3, 1st Post and 3rd Post HeartQuest™ Readings

Figure 9 illustrates November 5th reading prior to being admitted to the IWK and November 19th reading after being discharged from the Hospital. He relapsed in all his physiology, demonstrating he regressed in his ability to: auto-regulate (self-healing potential); balance the ANS Index (coherence); and to access the PSNS. He had a self-healing potential of "balanced within normal limits to unstable balanced" and regressed to a "unstable balanced". He has continued treatments since the study and the parents have reported that he has improved with: less stemming, being more cooperative, and expanding his sentences and vocabulary.

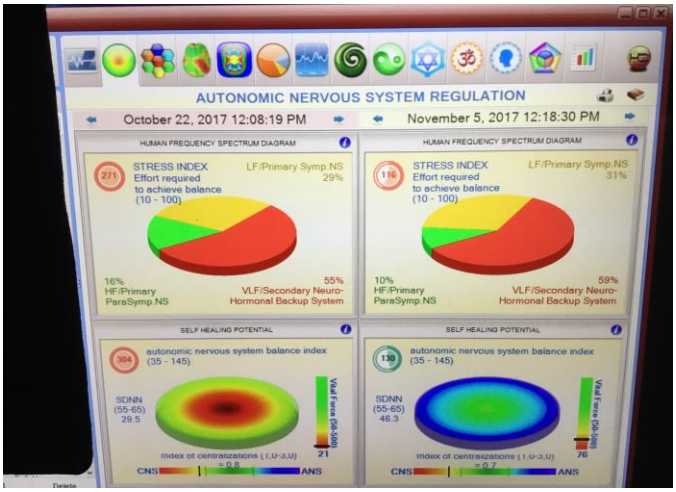
Subject 4			
DV	2nd Baseline August 20, 2017	2nd Treatment Day September 3, 2017	Normal
PSNS (HF)	2%	29%	30%
SNS (LF)	9%	39%	30%
Hormones (VLF)	89%	38%	30%
SI	529	166	10-100
SDNN	26	41.8	55-65
ANS Index	424	172	35-145
VF	72	144	55-500

ATEC MEAN PRE = 62

ATEC MEAN POST = 52

Figure 10. Subject 4, 2nd Baseline and 2nd Treatment Day HeartQuest™ Readings

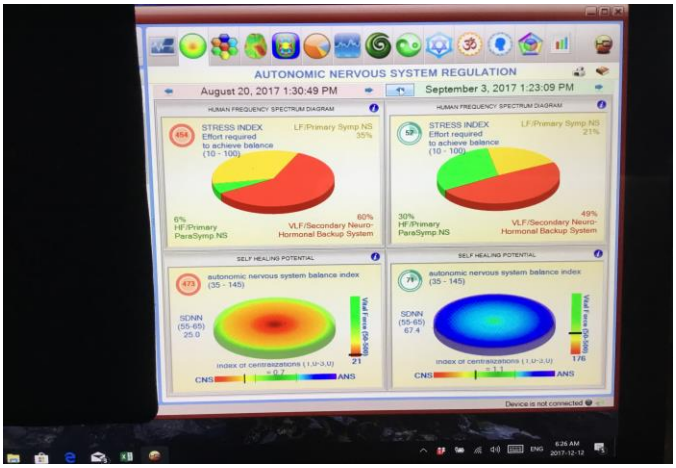
Subject 4 was a 4-year-old non-verbal boy who demonstrated aggression, scratching, biting and hitting on all of the baseline testing. We consistently played a song called “Puff the Magic Dragon” for all the baseline, treatment and post testing. The music allowed faster contact with his true nature keeping the test and treatment from being overly distressing; which would have excluded him from the study. It was felt ethically that this was the only way to test and treat. The variables were kept constant as the same music was used each time for all the baseline, treatment and post testing and was not used with any other child. Pigtail extensions on the ECG leads were used to attach the ECG pads with the HeartQuest™ device, as this improved conductivity and reduced noise with Subject 4 who would not allow the clamps on him. Figure 10 shows a comparative of a baseline score with the score obtained one week after his first treatment. Even though his SI, SDNN, and ANS index were still not within normal ranges they did improve, to the point where he had made a dramatic physiological change in his PSNS (HF) of 27% and VF increase with a “stable balance" self-healing potential. His parents subjectively noticed he was “ZEN-like” and connected to everyone and what was being said to him.



Subject 4			
DV	**1st Post** October 22, 2017	**3rd Post** November 5, 2017	**Normal**
PSNS (HF)	16%	10%	30%
SNS (LF)	29%	31%	30%
Hormones (VLF)	55%	59%	30%
SI	271	116	10-100
SDNN	29.5	46.3	55-65
ANS Index	304	130	35-145
VF	21	76	55-500

Figure 11. Subject 4, 1st Post and 3rd Post HeartQuest™ Readings

After the September 3rd reading his physiology regressed back to his baseline readings for several treatments with the exception of his ability to utilize his PSNS (HF). During treatments the data (not shown here) illustrated a gradual increase in his PSNS (HF) from 2% to an 8%. Visual analysis of Figure 11 shows that he continued to increase his PSNS utilization without treatments indicating a positive integration phase. Visually the hormonal usage was still excessive indicating he was working very hard resulting in a high SI and ANS index on his 1st post measurement. However, he had gone from an "unstable – disrupted balance" to "stable balance" self-healing potential, improved auto-regulation indicating he had integrated enough to balance his ANS Index, an improved coherence. His reduced SI indicated he was not working as hard to achieve a balanced ANS Index. Overall, the findings suggested that his physiology was fluctuating but trying to keep his improved self-healing potential, normalized ANS Index and increased PSNS utilization which reflected in his 10 point drop in his ATEC scores.



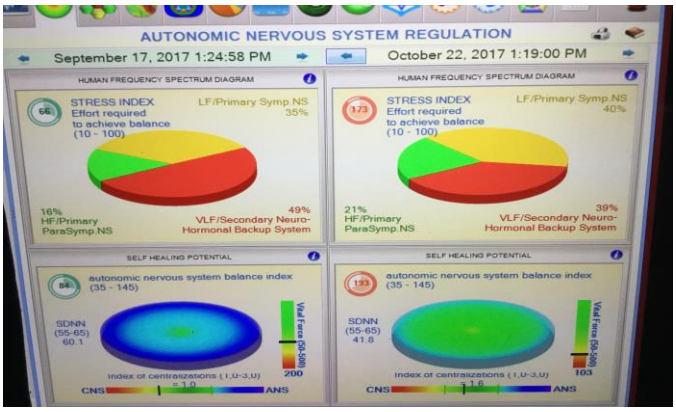
Subject 5			
DV	1st Baseline August 20, 2017	2nd Treatment Day September 3, 2017	Normal
PSNS (HF)	6%	30%	30%
SNS (LF)	35%	21%	30%
Hormones (VLF)	60%	49%	30%
SI	454	52	10-100
SDNN	25	67.4	55-65
ANS Index	473	71	35-145
VF	21	176	55-500

ATEC MEAN PRE = 25

ATEC MEAN POST = 1

Figure 12. Subject 5, 1st Baseline and 2nd Treatment Day HeartQuest™ Readings

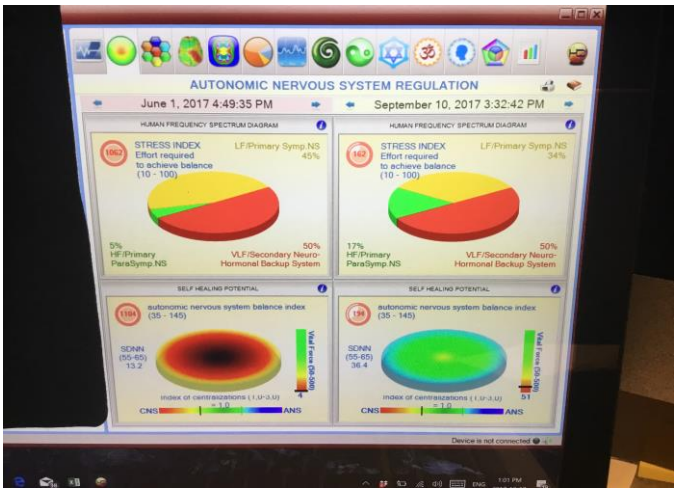
Subject 5 was a 10-year-old boy who during the treatment and post treatment periods accessed a more balanced self-healing potential and ANS Index with a greater percentage of PSNS. His three baseline readings for PSNS (HF) were: 10%, 6% and 10%. Figure 12 demonstrates a "disrupted balance" self-healing potential on August 20th. On September 3rd (2nd Treatment Day readings) his: PSNS (HF) increased to 30% and he had a "stable balance" self-healing potential with his SI, VF, ANS Index and SDNN all within normal limits. This illustrated that his physiology had improved dramatically, and his parents noticed a big improvement in his ASD behavior.



Subject 5			
DV	4th Treatment September 17, 2017	1st Post October 22, 2017	Normal
PSNS (HF)	16%	21%	30%
SNS (LF)	35%	40%	30%
Hormones (VLF)	49%	39%	30%
SI	66	173	10-100
SDNN	60.1	41.8	55-65
ANS Index	84	193	35-145
VF	200	103	55-500

Figure 13. Subject 5, 4th Treatment Day and 1st Post HeartQuest™ Readings

After September 3rd his physiology fluctuated towards using his SNS (LF) more before increasing his PSNS (HF) as he used less hormonal (VLF) for ANS regulation. Then he increased the PSNS (HF) with less SNS (LF) and hormones (VLF) for regulation. This demonstrated how the physiology should normally change as it progressed towards health. Figure 13 illustrates a comparison between a treatment and post measure where his PSNS increased but his self-healing potential reduced from a "stable balance" to a "balance within normal limits" with a drop in VF. This indicated he required his vitality to access a higher PSNS which reflected in his improved ATEC scores but challenged his entire physiology. At the end of the study the parents felt he had improved so much that he did not even seem to have ASD.



Subject 6			
DV	2nd Qualification June 1, 2017	3rd Treatment Day September 10, 2017	Normal
PSNS (HF)	5%	17%	30%
SNS (LF)	45%	34%	30%
Hormones (VLF)	50%	50%	30%
SI	1062	162	10-100
SDNN	13.2	36.4	55-65
ANS Index	1104	194	35-145
VF	4	51	55-500

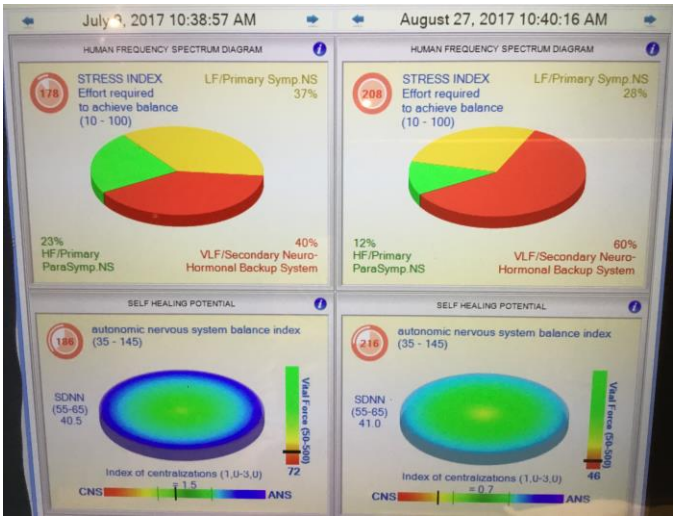
ATEC MEAN PRE = 84

ATEC MEAN POST = 82

Figure 14. Subject 6, 2nd Qualification and 3rd Treatment Day HeartQuest™ Readings

Subject 6 was a 9-year-old boy who predominantly, throughout the whole study, fluctuated from using a very high hormonal (VLF) or high SNS (LF) regulation and very little PSNS (HF) and a self-healing potential that was "disrupted balance" or "poor regulation" (see Figure 14, 2nd Qualification). He greeted everyone with a smile, ready to participate, but his physiology was severely imbalanced. At home he was non-compliant and abusive.

Throughout the study he demonstrated hormonal (VLF) levels between 50% to 76%, SNS (LF) levels between 18% to 57%, and PSNS (LF) levels between 5% to 18%. His mother felt the medication he was on made him much more suicidal, aggressive and emotional. Once the study finished, she discontinued this medication and he was sent for further psychiatric evaluation beyond an ASD diagnosis. Figure 14, on September 10th, shows an improved self-healing potential (auto-regulation ability) of a "balanced within normal limits" which was his best reading even though the rest of his findings were not within normal limits. The mom reported that he was really silly, playful and doing all his ADL's without help. He got ready for school by himself and took the bus which he never does. He had held his mom's arms tightly but never hurt her, instead he let go and used his breathing exercise to calm down.



Subject 7			
DV	1st Baseline July 9, 2017	1st Treatment Day August 27, 2017	Normal
PSNS (HF)	23%	12%	30%
SNS (LF)	37%	28%	30%
Hormones (VLF)	40%	60%	30%
SI	178	208	10-100
SDNN	40.5	41	55-65
ANS Index	186	216	35-145
VF	72	46	55-500

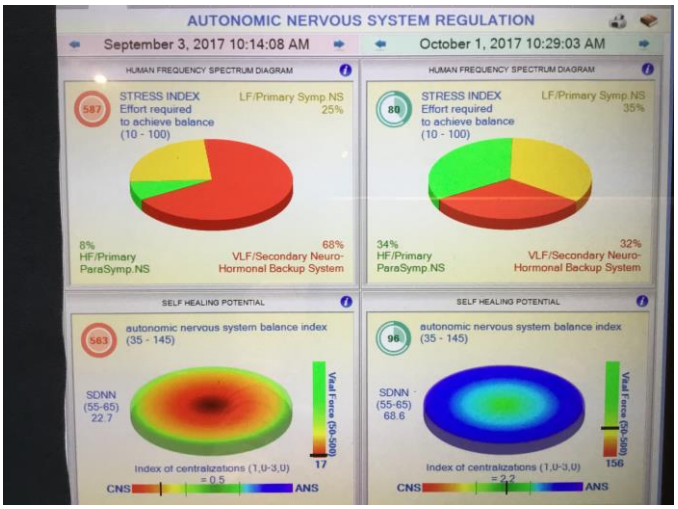
ATEC MEAN PRE = 104

ATEC MEAN POST = 78

Figure 15. Subject 7, 1st Baseline and 1st Treatment Day HeartQuest™ Readings

Subject 7 was a 3-year-old boy. His baseline PSNS (HF) and hormonal readings changed depending on when the readings were taken. If he was measured 30 minutes after waking up from a nap he demonstrated a very balanced ANS and SI with a normal percentage of

SNS, PSNS, and Hormone regulation. However, if he was measured 2 hours before his nap time he demonstrated higher levels of hormones, less PSNS and an imbalanced ANS with a higher SI. Figure 15 illustrates a baseline reading 2 hours before nap time on July 9th and a reading directly after his first osteopathic treatment on August 27th. His self-healing potential changed from a "stable balanced to a balanced within normal limits" and he utilized a greater percentage of hormones (VLF). Subject's 7 baseline hormones ranged from 40% to 49% over 4 weeks of testing demonstrating a dominant limbic/thalamus (CNS) regulation. On August 27th, the measurements for the first few treatments illustrated his physiology had increased in hormonal regulation and became more unstable. His mother felt he was more emotional. This increase in hormonal response could possibly be due to a release of his somato-emotional traumas.

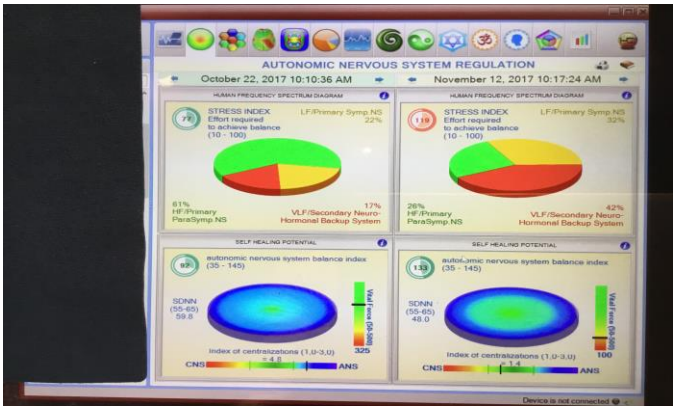


Subject 7			
DV	2nd Treatment Day September 3, 2017	4th Treatment Day October 1, 2017	Normal
PSNS (HF)	8%	34%	30%
SNS (LF)	25%	35%	30%
Hormones (VLF)	68%	32%	30%
SI	587	80	10-100
SDNN	22.7	68.6	55-65
ANS Index	563	96	35-145
VF	17	156	55-500

Figure 16. Subject 7, 2nd Treatment Day and 4th Treatment Day HeartQuest™ Readings

Overall Subject 7 was able to access his PSNS (HF) but due to high levels of inflammation it was hard for him to maintain PSNS activation for long periods without a rest. Figure 16, on September 3rd, illustrates a self healing potential of a "disrupted balance" and his physiology had increased in hormonal regulation and disrupted ANS and high SI. However,

by October 1st he had a "stable to optimal" self healing potential and a healthy regulated physiology and ANS system, all within normal limits. The mother noticed he was much more cooperative, less emotional and managed a usual stressful situations with very little expression of being overwhelmed.



Subject 7			
DV	1st Post October 22, 2017	3rd Post November 12, 2017	Normal
PSNS (HF)	61%	26%	30%
SNS (LF)	22%	32%	30%
Hormones (VLF)	17%	42%	30%
SI	77	119	10-100
SDNN	59.8	48	55-65
ANS Index	92	133	35-145
VF	325	100	55-500

Figure 17. Subject 7 1st Post and 3rd Post HeartQuest™ Readings

During the post treatment measurements, he demonstrated an ability to keep his post nap readings without it being after a nap and when in a typically upsetting situation he maintained the improved healthy regulated physiology and ANS system, which reflected his ATEC scores. Figure 17, on October 22nd, he demonstrated a normal ANS index and self-healing potential of "stable to optimal". His findings illustrated a well-regulated ANS. On November 12th, he illustrated a "stable balanced" self-healing potential but started to lose his gains indicated by a reduction in the PSNS scores and his hormonal and SNS utilization increased resulting in an increased SI, 19 points above the normal range. Although, he still maintained a normal ANS Index, his VF dropped as his system was working hard (indicated by the increased SI) to maintain the "stable balance" self-healing potential.

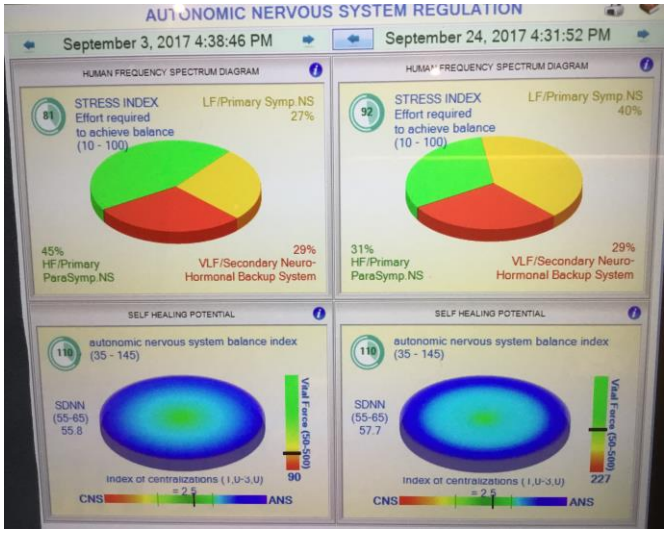
Subject 8			
DV	2nd Baseline August 20, 2017	3rd Baseline August 27, 2017	Normal
PSNS (HF)	13%	14%	30%
SNS (LF)	41%	31%	30%
Hormones (VLF)	46%	55%	30%
SI	162	142	10-100
SDNN	46.7	51.7	55-65
ANS Index	169	148	35-145
VF	178	204	55-500

ATEC MEAN PRE = 42

ATEC MEAN POST = 19

Figure 18. Subject 8, 2nd Baseline and 3rd Baseline HeartQuest™ Readings

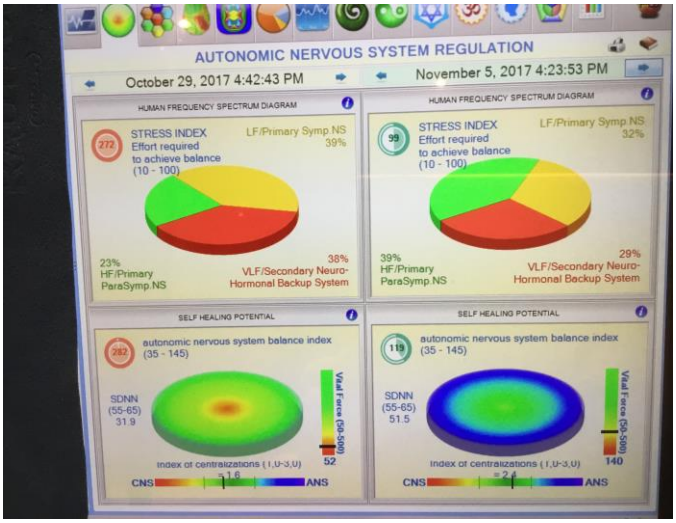
Subject 8's baseline measurements, in Figure 18, demonstrate that he utilized: lower percentages of PSNS (HF); higher percentages of hormones (VLF); and higher levels of SNS (LF) to regulate his ANS. All his measurements were taken at the end of the day before he was due for his next dose of medication in order to reduce the effect of the medication as much as possible. He had to work hard to regulate his ANS and find coherence between his PSNS and SNS which was indicated in his elevated SI score and an increased ANS index respectively. However, his VF and SNDD were within normal limits with a "stable balance" self-healing potential to auto-regulate.



Subject 8			
DV	2nd Treatment Day September 3, 2017	4th Treatment Day September 24, 2017	Normal
PSNS (HF)	45%	31%	30%
SNS (LF)	27%	40%	30%
Hormones (VLF)	29%	29%	30%
SI	81	92	10-100
SDNN	55.8	57.7	55-65
ANS Index	110	110	35-145
VF	90	227	55-500

Figure 19. Subject 8, 2nd Treatment Day and 4th Treatment Day HeartQuest™ Readings

Figure 19 illustrates measurements taken on September 3rd (2nd treatment day) and 24th (4th treatment day) demonstrating his ability to access his PSNS (HF) and reduced his need to use his hormones or SNS to regulate his ANS. He also illustrated a normal SI and a "stable to optimal balanced" self-healing potential.

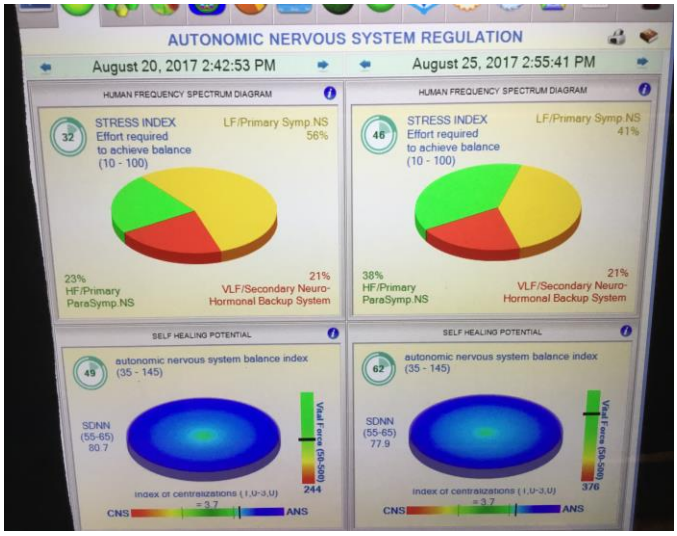


Subject 8			
DV	1st Post October 29, 2017	2nd Post November 5, 2017	Normal
PSNS (HF)	23%	39%	30%
SNS (LF)	39%	32%	30%
Hormones (VLF)	38%	29%	30%
SI	272	99	10-100
SDNN	31.9	51.5	55-65
ANS Index	282	119	35-145
VF	52	140	55-500

Figure 20. Subject 8, 1st Post and 2nd Post HeartQuest™ Readings

Figure 20, on October 29th, illustrates he had an "unstable balance" self-healing potential with a low VF combined with a high SI and ANS Index outside the normal range. Although, he was still fluctuating between the SNS and hormonals he held the improved PSNS (HF) at 25%. On November 5th he illustrated a "stable balance" self-healing potential, demonstrating similar measurements, he had during the treatment days 2 and 4 seen in Figure 18 where he accessed his PSNS at 39% with a "stable balanced" self-healing potential. This improvement from the first post to the second post maybe a result of a time period required for the body to integrate the treatments to finally express the improved physiology. His mother expressed: he goes to school with no arguments, getting out of the

car and walking into class; and he easily transitions from one thing to another without being overwhelmed or resistant to the change.



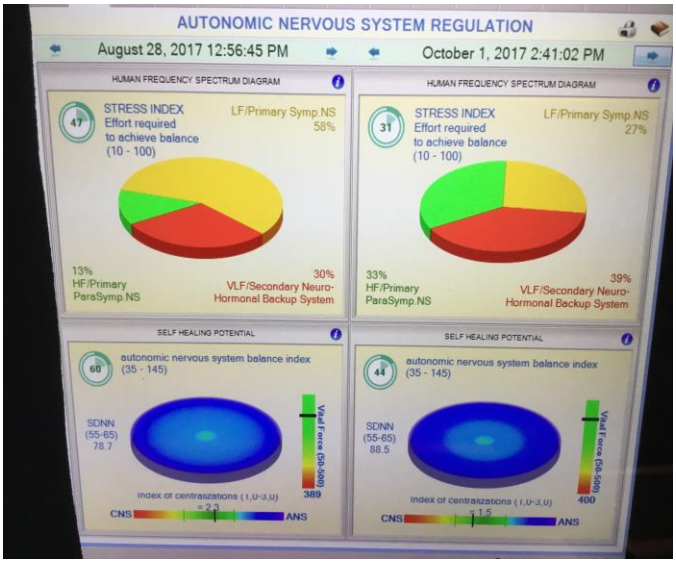
Subject 9			
DV	Qualification August 20, 2017	Sentiochewelery August 25, 2017	Normal
PSNS (HF)	23%	38%	30%
SNS (LF)	56%	41%	30%
Hormones (VLF)	21%	21%	30%
SI	32	46	10-100
SDNN	80.7	77.9	55-65
ANS Index	49	62	35-145
VF	244	376	55-500

ATEC MEAN PRE = 40

ATEC MEAN POST = 23

Figure 21. Subject 9, Qualification and Sentiochew Chewelry HeartQuest™ Readings

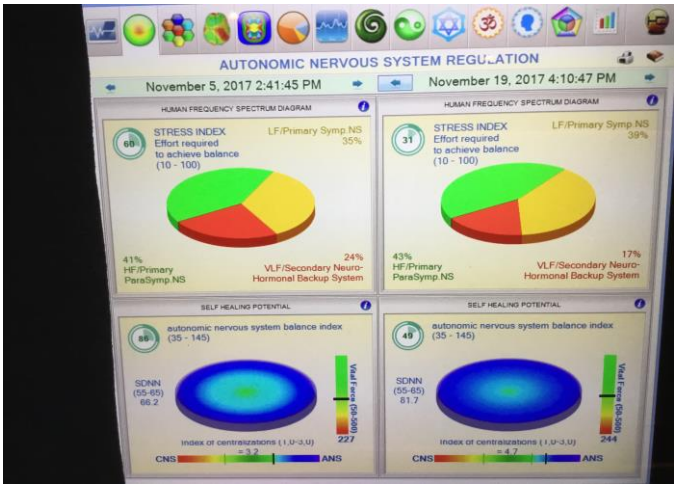
Subject 9, was a 12-year-old girl, illustrated during her baseline a dominance in the SNS (LF) but was not excessive in hormonal (VLF) levels for ANS regulation (see Figure 21, Qualification). She was not aggressive at all or expressed anger. HeartQuest™ illustrated and confirmed the parent's description of her responses being a flight/fright SNS reaction. She displayed a normal SI and ANS Index with an "optimal balanced" self healing potential throughout the entire study. Her primary change was in her ability to access her PSNS from 23% to between 37% to 46% without the requirement of her Sentiochew Chewelry (necklace). August 25th illustrated optimal physiology when chewing on her necklace, specifically her PSNS (HF) and VF with an "optimal balanced" self-healing potential. However, she had just fallen off her bike and her parents almost did not bring her because she was anxious and chewing on her necklace.



Subject 9			
DV	1st Baseline August 28, 2017	3rd Treatment Day October 1, 2017	Normal
PSNS (HF)	13%	33%	30%
SNS (LF)	58%	27%	30%
Hormones (VLF)	30%	39%	30%
SI	47	31	10-100
SDNN	78.7	88.5	55-65
ANS Index	60	44	35-145
VF	389	400	55-500

Figure 22. Subject 9, 1st Baseline and 3rd Treatment Day HeartQuest™ Readings

Figure 22, on August 28th, gives another example of her baseline where she was dominant in her SNS (LF) with lower PSNS (HF) activation to regulate her ANS. On October 1st she demonstrated a reading similar to her necklace reading on August 25th. This was significant as she was not relying on her necklace to self-regulate her ANS; she was able to autoregulate with normality without an external aid.



Subject 9			
DV	8th Treatment Day November 5, 2017	2nd Post November 24, 2017	Normal
PSNS (HF)	41%	43%	30%
SNS (LF)	35%	39%	30%
Hormones (VLF)	24%	17%	30%
SI	60	31	10-100
SDNN	66.2	81.7	55-65
ANS Index	86	49	35-145
VF	227	244	55-500

Figure 23. Subject 9, 8th Treatment Day and 2nd Post HeartQuest™ Readings

Figure 23 illustrates on November 5th and November 24th that Subject 9 utilized her PSNS (HF) 41% and 43% respectively. Her PSNS (HF) measurements from the 7th treatment day to the 3rd post were: 46%, 41%, 37%, 43%, and 34% all demonstrating a stable increase in activation of her PSNS. Her SNS (LF) measurements from the 7th treatment day to the 3rd post were: 32%, 35%, 46%, 39%, 46% demonstrating she was using an equal percentages of the SNS and PSNS to regulate her ANS. All indicating she was able to access her PSNS more regularly and at higher percentages mimicking her chewing result without chewing. As well subjectively, reported by her and her parents, she required less chewing even during events that used to be stressful and upsetting and in addition they were not as stressful anymore. All reflecting her ATEC scores.

5.3. Discussion of Emotional Pressure Hypothesis

Children diagnosed with ASD showed no significant change in Emotional Pressure (EP) when exposed to an osteopathic treatment that incorporates the use of palpation protocols to address all three dimensions of matter, fluid, and field work. The EP results were found mostly to be in a 0-2 state which can correlate with chronic cases of depression or inflammation, indicating a severe disease such as ASD or the very “calm” relaxed people. The post treatment scores increased to 2.5 to 3.0, an “Optimal” quiescent state in most of the children. Although the Bio-Well™ EP did not change, it gave valuable information as it correlated with the predominant heightened delta brain waves shown in the HeartQuest™ data and the heightened Energy Levels from the Bio-Well™ indicating inflammation. Brain delta waves indicate a state of deep meditative healing and regeneration. However, excessive amounts of delta brain waves can mean a deep state of depression or, in some cases, inflammation, indicating severe disease such as a brain injury. “Delta is the realm of your

unconscious mind, and the gateway to the universal mind and the collective unconscious, where information received is otherwise unavailable at the conscious level" (Mindvalley academy blog, 2017). People with abnormally large quantities of delta waves, while they are awake, have typically been found to have: brain injuries, learning problems, an inability to think, or have severe ADHD (Mental Health Daily, 2017). Although the delta waves were not part of the DV in this study, it was observed that the children in this study had large quantities of delta waves during the baseline. During the treatment phase it was observed that they started to access the other brainwaves.

5.4. Discussion of Energy Level Hypothesis

Children diagnosed with ASD showed significant reduction in Energy as measured by the Bio-Well technology, the use of the word Energy denotes a certain level of inflammation as analyzed by this machine. A reduction in Energy is indicative of a reduction in inflammation. The Baseline Energy levels in the Bio-Well™ data correlated with the increased Delta brain waves as the children demonstrated excessive energy levels indicating higher levels of inflammation. With the osteopathic treatments done in matter, fluid and fields their energy/inflammation significantly reduced and with less spiking of delta waves and an increase access to other brain waves. If the fascia endures trauma, as in the birthing process or toxicities, which can be experienced by children with ASD, the body responds with inflammation, which results in the fascia losing its fluid/serous quality and becoming more solid, resisting deformation or change in shape (Centers, 2011). If the fascia is held in the traumatic position for long periods of time the solid quality develops adhesions that will maintain the tone, shape and position of the trauma, holding the traumatic memory in the tissue (Centers, 2011). The fascia was found to be adherent, preventing the piezoelectric

activity from conducting information or consciousness from the field to the physical body. As well, these children presented with significant inflammation throughout the body, specifically at the level of C0/1/2 and the cranium.

5.5. Tissue Consciousness

It is possible that due to the severity of inflammation in the body, the fluid matrix of the fascia became motionless, or adhered, preventing its conductive piezoelectric quality to connect to the field reality. This may disrupt the consciousness' ability to communicate with the tissues. Due to the distortion of the fascial system the consciousness might no longer express itself in the physical realm. Therefore, it would need to find another place to reside, this place was found to be the Chaotic Field (CF). It is possible that these children are accessing the CF through the physical meditative delta brain waves. The consciousness of the tissue being treated was retrieved by going into the CF with the child's inner physician. The tissues' consciousness was invited to return to the physical realm. Once restored in the tissue a fulcrum could be established allowing Sutherland's questions to be utilized fully. We found this to be important as it seems that the consciousness must reside in the tissue for normalization to occur. It was found in the study that every child needed restoration of the fascial body with unwinding and then connecting the newly harmonized fascial matrix to the expression of the BOL. As the coherence increased between the BOL and each of the layers in the field, fluid and matter it was noticed that the tissue became more imbued with health. Normalization was achieved when the fascial system finished its unwinding.

5.6. History and Treatment Highlights of Each Subject

A full description of each subject's history from conception forward to present day with some of the relevant treatment highlights written as a journal can be found in Appendix N.

5.7. Commonalities

A weekly description of the treatment commonalties, and why the commonalities were important to treating the disrupted physiology of children with ASD, can be found in Appendix O.

5.8. Factors Influencing the Results

5.8.1. Statistical Influence

"There are two fundamental advantages of the within-subjects design: a) power and b) reduction in error variance associated with individual differences. A fundamental inferential statistics principle is that, as the number of subjects increases, statistical power increases, and the probability of beta error decreases (the probability of not finding an effect when one "truly" exists). This is why it is always better to have more subjects, and why, if you look at a significance table, such as the t-table, as the number of subjects increases the t value necessary for statistical significance decreases. The reason this is so relevant to the within-subjects design is that, by using a within-subjects design you have in effect increased the number of "subjects" relative to a between subjects design" (Hall, 1998). Due to the limited sample size available for this research a within-subjects design was employed in order to increase the power of the study and potentially detect a treatment effect.

"The reduction in error variance is due to the fact that much of the error variance in a between-subjects' design is due to the fact that, even though you randomly assign subjects

to groups, the two groups may differ with regard to important individual difference factors that affect the dependent variable. With a within-subjects design, the conditions are always exactly equivalent with respect to individual difference variables since the participants are the same in the different conditions" (Hall, 1998). With the large range in variables presented by children exhibiting symptoms of autism disorder it is almost impossible to create two homogenous groups, therefore a within-subjects design is preferred.

Cardon and Azuma (2011) state that using a control group and treatment group with children diagnosed with ASD is seldom used over a single-subject design, as attaining homogeneity between the groups of children with ASD rarely occurs. These authors explain that adverse ethical issues would be generated if the research design compared two separate groups for children with ASD (treatment and non-treatment). Children with ASD lack homogeneity and the difficulty in matching children with ASD generates a threat to the internal validity, therefore, using a signal subject design will provide strong internal validity. The fact that R1 and R2 could significantly reduce the severity of ASD and reduce their Energy levels/inflammation in 8 children so diverse when grouped in a paired T-test illustrates that even with this wide range of diversity there is one commonality, inflammation. To have significantly impacted 8 children that did not attain group homogeneity was remarkable to the statistician. The statistician had recommended a sample size of 30 children in order to show significance when based on a study of this nature and design.

The researcher used the ATEC, which is a gold standard tool, not only as a measuring tool but as an inclusion criteria tool to limit discrepancies in interpretation of the diagnosis of ASD.

5.8.2. Expected Outcomes Influencing the Results

A child treated by Drs. Centers and Frymann had experienced considerable trauma on the physical, mental, emotional, and spiritual levels. The researcher believed very strongly that the child's treatment incorporating aspects of the human energy field (HEF) was what made the improvement so profound. Please see Appendix P for a continuation of the child's story for the inspiration of this study.

Overall, the expected outcome consisted of: a more balanced ANS indicated by reduced sympathetic nervous system (SNS) and hormonal regulation, and an increase in PSNS activity; improved emotional pressure, and reduced energy levels (inflammation); and a reduction in the severity of ASD. The results indicated that treating osteopathically in matter, fluids and fields could have a significant and important impact on reducing the severity of autism in children suffering from ASD by restoring consciousness and reducing inflammation for the appropriate physiological systems to find dynamic coherence.

5.9. Repercussion and New Avenues of Research

The results of this study support continued research on ASD: as an autoimmune disease, particularly mast cells and the impact of excessive inflammation at the blood brain barrier; and brain stem function, specifically the RAS and the vagus bidirectional ability to carry inflammation. The results of this study leads us to ask: Is ASD a true anxiety and aggressive behavioral issue, or are they living in their hormones excessively from a lack of PSNS and RAS activation due to inflammation caused by an autoimmune reaction? This study's results suggest these children are responding to hormones that are already being utilized at full capacity to regulate an imbalanced ANS, excessive SNS and insufficient PSNS activation.

The findings from this study suggest that:

1. Children with ASD may not have anxiety, but have excessive SNS or hormonal CNS regulation due to a lack of PSNS resulting in an emotional imbalance.

2. ASD may be an autoimmune disease; and

3. Treating in the human energy field and restoring consciousness is essential to optimize recovery.

This study hopes to inspire researchers and therapists to investigate:

1. The phenomenon of tissues requiring their consciousness restored prior to normalization;

2. That the physical body is maintained in balance and total functioning by the bio-energetic field;

3. That high emotional content/trauma can be locked into the bio-energetic field, manifested in the physical body as a dysfunction.

Fulford, Frymann and Still all felt that if we do not appreciate this force our treatments would not be complete (Fulford, 2003; Frymann, 1998).

6. CONCLUSION

This Pilot study suggests from examining the entire picture of all the results, and looking at the whole child with ASD, that these children may have excessive inflammation in their body resulting from an autoimmune reaction. Rimland suggests that ASD is an autoimmune disease and the results of this study supports that view. Globally, from the HeartQuest™ data, it was seen that all of the children in this study either utilized their hormonal or SNS system the majority of the time to regulate their ANS and had difficulty accessing their PSNS. This supports the literature that children with ASD have been found to have decreased baseline parasympathetic tone (PSNS) and that the over-aroused SNS in children with ASD may be the effect of dis-inhibition from the compromised baseline PSNS tone (Ming et al., 2011; Casanova et al., 2014). This would fall in line with Porges' theory, that the healthy myelinated vagal system (PSNS) suppresses SNS activity and when the myelinated vagus is damaged it results in a heightened SNS response (Porges, 2011). This damage may be the result of the significant inflammatory reaction to the overactive immune system from mast cell activation in the brain, gut, and liver due to many things such as: the leaky gastrointestinal (GI) tract, toxicities, lack of glutathione (GSH), and stress. It is felt by R1 that the children in this study display severe emotional reactions because: they were already accessing their hormones at full capacity to regulate their ANS; their emotional centres were inflamed; and they were weight bearing on these vital centers rather than on their weight bearing structures and fascial network. This neurological inflammation and overactive mast cells may be the result of multiple layered sources such as: environmental toxins; prenatal stress; birth or in utero trauma; lack of antioxidants (GSH); and a disrupted

microbiome that supports the immune and inflammatory responses which are modulated by communications along the bidirectional vagal tone (Barsotti & Mills, 2011, p. 23). Osteopathically, we learn the artery is absolute and the CSF is supreme. Physiologically, it is well known that tissues die in a 24-hour period with a stagnant lymphatic system. Disease occurs when there is a failure of the passing of fluids (Still, 1892). Osteopathically, it was felt the improvements were largely due to: restoring the tissues' consciousness to the body allowing them to access their vital force (vitality) to auto regulate; and removing barriers for increase drainage of the inflammation prior to profusion. Therefore, with the consciousness restored in the tissues and the inflammation reduced, the children's physiology was able to access their ANS and CNS more harmoniously with dynamic coherence. Fulford, Frymann and Still all felt that if we do not appreciate the Human Energy Field, osteopathic treatments would not be complete (Fulford, 2003; Frymann, 1998). Hence, it is stated by Fulford and proclaimed by Still, Frymann and Druelle, that osteopathy is not seeing the patient as a disease process but requires the osteopath to assist with balancing the physical, emotional, mental, and spiritual dimensions/structures for optimal function (Fulford, 2003).

7. TIMELINE

February - June 2017	• Proposal corrections and revisions
May – June 2017	• Ethics application will be submitted CSERB • Confirmation of thesis completion in one year to CEO
July – August 2017	• Recruitment of participants
August – November 2017	• Experimental research and data collection
December 5th, 2018	• First Pre Reading • Analysis of data
February 5th, 2018	• Completion of writing • Thesis sent to reader
April 3rd, 2018	• Thesis sent to CEO
May 3rd, 2018	• Thesis presentation to Canadian Jury in Halifax

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APPENDIX A. New Patient Questionnaire

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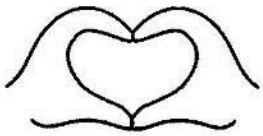


The Children's HOPE Center

HEALTH QUESTIONNAIRE

SHAWN K. CENTERS, DO, FACOP
3706 Ruffin Rd, San Diego, CA 92123
Phone/Fax: 619-583-7611

Please fill out to the best of your ability:

Patient Name:

Last	First	Middle Initial

Age: **Date of Birth:**

	Month	Day	Year

Guarantor's Name:

Last Name	First Name	Middle Initial

Address:

Street Address	
City	
State	Zip Code
E-mail	

Telephone Numbers:

Home	Mobile

Occupation (if child – parent's occupation):

Marital Status

Married	Single	Divorced

Child - (Number and Age of siblings):		Adult - (Number and Age of Children):	
Number of Siblings	Ages	Number of Children	Ages

Religion or Personal Philosophy:

Reason for Evaluation:

When did the health concern arise and how is it associated with the reason for your visit?

What makes the symptoms better or worse?

Better?

Worse?

Are the symptoms better or worse in the morning /afternoon/ or evening?

What other symptoms are associated with your illness?

What other treatments have been tried for your condition?

What is the type or name of your medical condition?

List the medications currently being used? (include vitamins, minerals, herbs and nutritional supplements)

Describe a typical meal for the patient.

Breakfast Time_____	Lunch Time_____
Dinner Time_____	Snacks Time(s)_____

List surgeries and/or hospitalizations

What problems are associated with your condition listed below:

	Problem/Condition:
Skin	
Head	
Eyes/Vision	
Ears	
Nose	
Throat	
Teeth	
Lungs/Breathing	
Heart	
Stomach	
Bladder	
Behavior/Depression	
Muscles/Joints/Bones	
Nervous System	

Circle all those that apply:

Weight gain/loss	Weakness	Fatigue	Fever	Night sweats
Cancer	IIIV	Rash	Change in Skin lesion	
Severe Acne	Too much hair/loss of hair		Headaches	History of head injury
Recurrent ear infection		Sense of smell		Sinus Infection
Nose bleeds	Sensitive to loud noise		Difficulty Hearing	
Speech Delay	Repeats Words	Hoarseness	Severe Visual Impairment	
Neck Lumps	Swollen glands	Cough	Asthma	BPD
Respiratory distress	Breathing problems	Congenital Heart Disease		Heart Murmur
H/O Rheumatic Fever	Palpations	Spitting up	Feeding Difficulty	
GERD	Diarrhea	Abdominal Pain		Abdominal Surgery
Gall Bladder Prob.	Infant Jaundice	Appendectomy		Blood in Urine
Foul Smelling Urine	Bed wetting	Kidney Infection		Frequent urination
Thirsty	Pain on Urination	Muscle pain?	Back Pain?	Arthritis
Joint swelling	Obesity	Sweating	Heat/Cold Intolerance	
Excessive sleeplessness	Increased/Decreased Appetite		Fainting	
Seizures	Tremor	Dizziness	Difficulty in Balance	Anemia
Easy bruising	Mouth sores	Depression	Anxiety	Auditory hallucinations
H/O suicide ideation (currently or not currently a problem)				Learning difficulty
Hyperactivity				

List Family health problems.

Mother
Father:
Sister(s):
Brother(s):

Are there any other concerns not listed in this health questionnaire?

Mother's age at time of pregnancy?

Any problems during pregnancy? If so, what are they?

What week was the baby delivered?

Baby's birth weight?

Length of the labor?

Vaginal or C-Section delivery?

Describe any complications?

What was the APGAR?

Circle all that apply:

Pitocin was used	Epidural was done	Forceps were used
The baby was spitting up	The baby had vacuum extraction	The baby's head was molded
The baby was first born	The baby was a twin	The baby was blue on Delivery
The baby required NICU	The baby had difficulty sucking	The baby had colic
The baby would arch his/her back	The baby preferred one side of the breast than the other	

DEVELOPMENT

ACTIVITY	AGE
The baby rolled over at	
The baby was able to sit unsupported at	
The baby creeped at	
The baby crawled at	
The baby began to walk at	
The baby began to talk at	

How does the child do with/in school?

Name:_____

Hosp. No.:_____ Date of Birth:_____

Directions: Record date only for all immunizations
Record value for need circumstances, height, weight, BP, and Hct.
Record N (normal) or ABN (abnormal) for all other items.

	NB	2 wk	2 mo	4 mo	6 mo	9 mo	12 mo	15 mo	18 mo	2 yr	3 yr	4 yr	5 yr	6 yr	8 yr	10 yr	12 yr	14 yr
Today's Date																		
Head Circumference																		
Height (cm)																		
Weight (kg)																		
BP																		
Dental Care Screen																		

APPENDIX B. Informed Consent Form to Participate in a Clinical Research Study

INFORMED CONSENT FORM TO PARTICIPATE IN A CLINICAL RESEARCH STUDY

TITLE OF STUDY/PROTOCOL:	The effect of osteopathic treatments on outcomes in children with ASD.
PRINCIPAL INVESTIGATOR:	Jennifer Jane Williamson, MSc. PT.

INTRODUCTION

We are inviting you and your child to volunteer to participate in this research study. Before you can decide whether or not to volunteer, you must understand the purpose of this study, how it may affect you and your child, any risks to you and your child, and what is expected of you and your child. This process is called informed consent.

Your participation in this study is entirely voluntary.

Your child may withdraw from the study at any time without affecting their present or future health care.

If the study is changed in any way, which could affect you or your child's willingness to stay in the study, you will be told about the changes and may be asked to sign a new informed consent

The principal investigator, Jennifer Jane Williamson MSc. Pt, has completed five years of post-graduate study with the Collège d'Études Ostéopathiques de Montréal. The completion of this thesis is the final requirement towards a Diploma of Osteopathic Manual Practice

PURPOSE OF STUDY

The purpose of this research study is to learn if osteopathic treatments adjunctive to standard medical care will improve the quality of life, autonomic nervous system, and anxiety levels of a child with ASD.

Your child has been identified as a potential participant in this research study as he/she has been diagnosed with ASD.

PROCEDURE

PRE DATA COLLECTION

The study starts with pre-data collection with Dr. Morrison, Ph.D. (certified in Bio-Well™) at Personal Care Physio and Osteopathy Inc. located at 3785 Highway #3 Chester, Nova Scotia. Dr. Morrison, PhD, is well versed in the use of both measuring tools being used in the study and is not an osteopath.

Your child will be scheduled once a week for 14 weeks, for 30 min to 90 min each week, with Dr. Morrison, PhD, and an assistant volunteer. Your child will come once a week on the days listed below.

The receptionist at Personal Care Physio and Osteopathy Inc. located at 3785 Highway #3 Chester, Nova Scotia will be booking your appointment times and the days you will come for data collection and treatments (902-275-5086).

START OF STUDY (PRE DATA COLLECTION): August 6, 2017

August 6 (for 30-45min)

August 13 (for 30-45 min)

August 20 (for 30-45 min)

START OF TREATMENTS:

Assessment and treatments with the researcher, Jennifer Williamson, MSc. PT, and Andrea Mounce-Halasz, DOMP, will be at at Personal Care Physio and Osteopathy Inc. located at 3785 Highway #3 Chester, Nova Scotia

START OF TREATMENTS WITH DATA COLLECTION: August 27, 2017

August 27 (one hour assessment with treatment booked 75 min plus another 30 min for data collection)

September 3 (for 60-90 min)

September 10 (for 60-90 min)

September 17 (for 60-90 min)

September 24 (treatment with re-assessment 75 min plus another data collection 30 min.)

October 1 (for 60-90 min)

October 8 (for 60-90 min)

October 15 (for 60-90 min)

October 22 (treatment with re-assessment 75 min plus another data collection 30 min)

POST DATA COLLECTION: your child will come on ONE of the 2 days each week

October 29 (post data collection 30-45 min)

November 5 (post data collection 30-45 min)

November 12 (post data collection 30-45 min)

You and your child will be required to attend eight osteopathic treatment sessions conducted by Jennifer Williamson, MSc. PT, and Andrea Mounce-Halasz, DOMP, over the course of two months. These treatments are free of charge to those participating in this study. You will not be financially compensated for participating in this study. You (parent/legal guardian) will be present at all times during the osteopathy sessions.

Any and all information collected throughout this study will only be used for the study. Please note, the results of the study may be published in medical literature, but your child will not be identified in any way.

Osteopathic manual therapy involves assessing specific areas of the body that may have tension or pain. Gentle mobilization of various areas of the body by the therapist's hands is

done to reduce the tension or pain. Your child may feel pressure or slight tension in various tissues from gentle manual techniques. Your child will be clothed at all times in shorts or light gym pants and a light tee shirt.

Data Collection Tools:

The Autism Treatment Evaluation Checklist (ATEC) is a simple questionnaire that is filled out by you (parent/guardian) during the data collection with Dr. Morrison, PhD.

HQ HRV: Your child will be physically connected to the HeartQuest™ system electrocardiogram (ECG) by placing ECG pads on the right and left sides of the oblique pole of the heart axis. A reading will be taken that takes only a few minutes, and your child will feel nothing.

Bio-Well™: Your child will place a minimum of one finger to a maximum of 10 fingers on a camera lens followed by a cloth over the finger to prevent light entering. A picture is taken for 5 seconds per finger. An imperceivable electrical pulse is given for one millisecond to the finger tips. A deviation of an "electron cloud" composed of light energy photons is formed by the finger's response to the electrical pulse, and the optical charge-coupled device camera system captures the electron "glow", which is invisible to the human eye, then translates and transmits it into a digital computer file. This will show us your child's anxiety levels and systems in their body that are specifically imbalanced/ having difficulty normalizing.

POTENTIAL RISKS/DISCOMFORTS

There are no significant physical risks associated with osteopathic treatments. No additional invasive treatments or tests will be involved in this study. Every effort will be made to be sensitive to your child's responses to treatment. If there are any questions or concerns, the primary researcher will be available for consultation.

POTENTIAL BENEFITS

Whether or not the osteopathic treatments help with ASD, there may be other benefits from the treatment such as: increased flexibility, range of motion, and improved posture. The information learned from your participation in this study may help to develop a better understanding of, and more effective treatment for, ASD.

ALTERNATIVES TO PARTICIPATION

You will continue to receive standard medical care during this study and your routine care will not be changed due to the study, unless your doctor deems it necessary. Therefore there are no alternative treatments that would be offered to you, if you choose not to participate.

QUESTIONS

If you have questions after you read this form, feel free to ask the principal investigator, Jennifer Williamson, MSc. PT. You should not sign this form until you are sure that you understand the study. You can contact the principal investigator Jennifer Williamson, MSc. PT by phone at 902-456-9914 or by email jenwillia@yahoo.ca

PRIVACY AND CONFIDENTIALITY

Protecting your child's privacy is an important part of this study. Your child's physician will be told at the beginning that your child is taking part in this study.

When you sign this consent form you give us permission to:

1. Collect information from your child.
2. Collect information from your child's health record (e.g., medications, reports from x-rays, MRI, CT scan, ultrasound, or previous surgeries).
3. Share information with the people conducting the study.
4. Share information with the people responsible for protecting your safety.

USE OF RECORD:

The research team will collect and use only the information they need to conduct the study.

This information will include your child's:
Date of birth
Sex
Medical Conditions
Medications
Results from tests and procedures your child had before and during the study
Information from study interviews and questionnaires.

Please note, the results of the study may be published in medical literature, but your child will not be identified.

Your child's name and contact information will be kept secure by the research team at the site where the study is being performed. It will not be shared with others without your permission. Your child's name will not appear in any report or article published as a result of this study. All data and personal information will be kept locked in a filing cabinet at the site of the study.

Information collected for this study will be kept as long as required by law which will be approximately 7 years.

If you decide to withdraw from the study, the information collected up to that point in time will continue to be used by the research team. It will not be removed.

By signing this consent form, you agree that your child's information, including personal health information, may be used as described above.

YOUR ACCESS TO RECORDS

You may ask the researcher to see the information that has been collected about your child.

RESEARCH RELATED INJURY

There are no anticipated risks associated with your child's participation in this study.

COMPENSATION

You will not be financially compensated for participating in this study

ADDITIONAL INFORMATION

If you wish your child to participate in this study, you will be asked to sign this Informed Consent Form, and your child will complete the Minor Assent Form. You will also complete the the health questionnaire.

You are encouraged to ask questions at any time during the study. In the event that you have further questions about the study, please call Jennifer Williamson, MSc. PT at 902-456-9914 or email jenwillia@yahoo.ca

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE OF PROTOCOL: The effect of osteopathic treatment on outcomes in children with ASD

PRINCIPAL INVESTIGATOR: Jennifer Jane Williamson, MSc. PT

PARENTS/GUARDIANS OF PARTICIPANTS' QUESTIONS:

Has this study been explained to your satisfaction?	Yes 0
Have you had an opportunity to ask questions and discuss this study?	Yes 0
Are you comfortable with the information that has been provided?	Yes 0
Do you understand that you are free to withdraw your child from this study?	Yes 0
Do you understand that you will receive a signed copy of this consent?	Yes 0

PARENT/GUARDIAN STATEMENT

I have read the above information and understand the purpose of the research as well as the potential benefits and risks of my child's participation in the study. I have had the opportunity to ask questions, and all my questions have been answered. I hereby give my informed consent for my child to be a participant in this study.

Printed Name of Participant (Child)		Date
Printed Name of Parent/Guardian	Signature of Parent/Guardian	Date
Printed Name of Person Conducting Informed Consent Discussion	Signature of Person Conducting Informed Consent Discussion	Date

INFORMED CONSENT FORM TO PARTICIPATE IN A CLINICAL RESEARCH STUDY

INVESTIGATOR'S/DELEGATE'S STATEMENT

I have explained to the above parent/guardian of the participant the nature, requirements, and the purpose of the study, potential benefits, and possible risks associated with participation in this study. I have answered any questions that have been raised. I believe that the parent/guardian of the participant understands the implications and the voluntary nature of the study.

Investigator/Delegate (Print)	Signature	Date

An amendment to the above Informed Consent Form to Participate in a Clinical Research Study was that there was a typo in the number of treatments going to be offered. The Method said eight treatments were given and the above form had a typo of nine treatments to be given. To reconcile, the researcher did the eight treatments and offered a free ninth treatment at the end of the post data collection. All participants wanted the ninth treatmetn as they found improvements from the treatments.

APPENDIX C. Minor Information Sheet and Assent Form

MINOR INFORMATION SHEET AND ASSENT FORM

TITLE OF STUDY: The effect of osteopathic treatment on outcomes in children with ASD

PRINCIPAL INVESTIGATOR: Jennifer Williamson, MSc. PT.

I would like to tell you about a research study I am doing. A research study is a way to learn more about something. I would like to find out if osteopathy treatments will help children like you that have autism by helping to balance your nervous system wich may reduce your anxiety and improve overall wellbeing.

Why am I being asked to participate in this study?

You are being asked to join the study because you have been told by your physician that you have a condition called ASD. This information sheet will help you understand what will happen during the study. If you want to take part in the study, you will write your name on the form at the end of this sheet. This is called your "Informed Assent" and means that you have been told all about the study, that you understand what will happen, and that you want to take part.

Both you and your parent/legal guardian must agree that you take part in this study too.

We will not do any study procedures unless both you and your parent/guardian agree to take part and sign the forms.

What will I have to do?

If you agree to join this study, you will be asked to come to Personal Care Physio and Osteopathy Inc. located at 3785 Highway #3 Chester, Nova Scotia, once a week for 14 weeks. During the first three weeks that you come to the clinic a research assistant, Dr. Morrison, PhD, will have your parent/guardian fill out the Autism Treatment Evaluation Checklist (ATEC) which will measure your quality of life. Dr. Morrison, PhD, will measure you with a device called HeartQuest™ Heart Rate Variability (HRV) which will measure your: ANS, Stress Index (SI) and Heart Rate Variability of the RR interval on the ECG. Dr. Morrison, PhD, will also use a device called Bio-Well™ to measure your Human Energy Field (HEF) and Stress Levels (anxiety).

For the next 8 weeks you will be receiving osteopathic treatments with the researcher and Andrea Mounce-Halasz, DOMP. We will both use our hands in a gentle way to help move different parts of your body around to help you be more flexible and to take away any tightness in your muscles and tissues that may be making your bones not move as well. The tightness that I will be working on can affect the systems that impact your nervous system and behavior. You will keep his/her clothes on at all times. You can wear shorts or light gym pants and a tee shirt. Your parent or legal guardian will be with you at all times.

MINOR INFORMATION SHEET AND ASSENT FORM

During the 8 weeks of osteopathic treatment, Dr. Morrison, PhD, will take your measurements again (like she did in the first three weeks) after each treatment. Dr. Morrison, PhD, will also continue these same three measurements for three weeks after the 8 weeks of osteopathic treatments.

The measuring with Dr. Morrison, PhD,will take anywhere from a half hour to 45 min each time for the 14 weeks. The 8 weeks of osteopathic treatment will take 60-90 min at the first and fourth treatments but all other treatments will take about 60 min. In total most appointments will take an hour to an hour and a half.

Overall, you will only have an appointment once a week for 14 weeks.

Measurements will be performed at Personal Care Physio and Osteopathy Inc. located at 3785 Highway #3 Chester, Nova Scotia.

Will it help?

This study will help us learn more about if osteopathy treatments help with ASD and may help other children with the same issue. Whether or not the osteopathic treatments help with ASD, it may help you in other ways such as: increased flexibility, range of motion, and improved posture.

We will always give you the best possible care.

Can I stop my participation in the study?

Your participation in the study is voluntary. You can say okay now and change your mind later if you want. All you have to do is tell us you want to stop. No one will be mad at you if you don't want to continue to be in the study, or if you join the study and then change your mind later and stop.

Who will know that I am participating in the study?

Your name and contact information will be kept confidential by the research team at Personal Care Physio and Osteopathy Inc. located at 3785 Highway #3 Chester, Nova Scotia. It will not be shared with anyone else other than your physician or research team.

Signature

Your parent/guardian will be asked to sign a consent form as well, agreeing for you to take part in the study.

Do you have more questions?

Before you say yes or no to participating in this study, we will answer any questions you have. Both you and your parent /guardian can ask questions at any time during this study. Just tell the researcher that you have a question. If you have any questions about this study please feel free to contact Jennifer Williamson at 902-456-9914.

MINOR INFORMATION SHEET AND ASSENT FORM

ASSENT STATEMENT

This assent form MUST be used in conjunction with the appropriate parent/guardian consent form. On its own, it does not provide informed consent for a minor to take part in the study.

Yes, I would like to enroll in this study ()

No, I do not want to enroll in this study ()

Subject's name: _____

Signature of assent: _____

Date: _____

Full name of person explaining the study: _____

Signature of person explaining the study: _____

Principal Investigator: Jennifer Williamson, MSc. PT.

APPENDIX D. Ethical Approval (CSERB)

Canadian SHIELD
Ethics Review Board
OHRP Registration IORG0003491
FDA Registration IRB00004157
Registered with CAREB, NCEHR

501 Deerhurst Drive,
Suite 102,
Burlington, ON L7L 5T1

Phone: (905) 681 8661
Fax: (905) 681 8668
www.cserb.com

June 20, 2017

Ms. Jennifer Williamson,
3785 Hwy #3,
Box 930,
Chester, NS
B0J 1J0

TITLE: The Influence of Osteopathy on Children with Autism Spectrum Disorders (ASD).

REB Tracking Number: 15-06-004

The following materials were submitted to Canadian SHIELD Ethics Review Board for review:

- *Protocol: "The Influence of Osteopathy on Children with Autism Spectrum Disorders (ASD)", Version 2, dated 19 June 2017, E-copy.*

Canadian SHIELD Ethics Review Board reviewed the above referenced material via our Expedited Review SOP (RR401). The REB found the study-related documentation to be **approvable** in terms of safety and protection of the rights of human research subjects. There are no changes required to the Informed Consent to Participate in a Clinical Research Study, or the Minor Information Sheet and Assent Form as a result of this amendment.

Approval for this material was granted on June 20, 2017.

The study-related documentation was **Approved with no restrictions**.

The approval period for this study is from **13 June 2017** to **12 June 2018.**

Approval for this study is conditional upon your compliance with the following requirements:

- Each subject prior to initiation of any protocol procedures must sign the current approved version of the Informed Consent to Participate in a Clinical Research Study, Version 1.1, dated 08 June 2017 (English), and the Minor Information Sheet and Assent Form, Version 1.1, dated 08 June 2017 (English).
- In addition, each subject must be given a copy of their signed consent form.
- All advertising materials or other recruitment aids must be approved by Canadian SHIELD Ethics Review Board, before they are to be used.
- All protocol amendments and changes to approved research must be submitted to Canadian SHIELD Ethics Review Board and not be implemented until approved except where necessary to eliminate apparent immediate hazards to the study subjects.

APPENDIX E. Autism Treatment Evaluation Checklist (ATEC)

ARI/Form
ATEC-1/11-99

Autism Treatment Evaluation Checklist (ATEC)

Bernard Rimland, Ph.D. and Stephen M. Edelson, Ph.D.
Autism Research Institute
4182 Adams Avenue, San Diego, CA 92116
fax: (619) 563-6840; www.autism.com/ari

Project/Purpose:				
Scores: I	II	III	IV	Total

This form is intended to measure the effects of treatment. Free scoring of this form is available on the Internet at: www.autism.com/atec

Name of Child _____ _____ ☐ Male Age _____
Last First ☐ Female Date of Birth _____
Form completed by: _____ Relationship: _____ Today's Date _____

Please circle the letters to indicate how true each phrase is:

I. Speech/Language/Communication: *[N] Not true [S] Somewhat true [V] Very true*

N S V 1. Knows own name
N S V 2. Responds to 'No' or 'Stop'
N S V 3. Can follow some commands
N S V 4. Can use one word at a time (No!, Eat, Water, etc.)
N S V 5. Can use 2 words at a time (Don't want, Go home)
N S V 6. Can use 3 words at a time (Want more milk)
N S V 7. Knows 10 or more words
N S V 8. Can use sentences with 4 or more words
N S V 9. Explains what he/she wants
N S V 10. Asks meaningful questions
N S V 11. Speech tends to be meaningful/ relevant
N S V 12. Often uses several successive sentences
N S V 13. Carries on fairly good conversation
N S V 14. Has normal ability to communicate for his/her age

II. Sociability: *[N] Not descriptive [S] Somewhat descriptive [V] Very descriptive*

N S V 1. Seems to be in a shell – you cannot reach him/her
N S V 2. Ignores other people
N S V 3. Pays little or no attention when addressed
N S V 4. Uncooperative and resistant
N S V 5. No eye contact
N S V 6. Prefers to be left alone
N S V 7. Shows no affection
N S V 8. Fails to greet parents
N S V 9. Avoids contact with others
N S V 10. Does not imitate
N S V 11. Dislikes being held/cuddled
N S V 12. Does not share or show
N S V 13. Does not wave 'bye bye'
N S V 14. Disagreeable/not compliant
N S V 15. Temper tantrums
N S V 16. Lacks friends/companions
N S V 17. Rarely smiles
N S V 18. Insensitive to other's feelings
N S V 19. Indifferent to being liked
N S V 20. Indifferent if parent(s) leave

III. Sensory/Cognitive Awareness: *[N] Not descriptive [S] Somewhat descriptive [V] Very descriptive*

N S V 1. Responds to own name
N S V 2. Responds to praise
N S V 3. Looks at people and animals
N S V 4. Looks at pictures (and T.V.)
N S V 5. Does drawing, coloring, art
N S V 6. Plays with toys appropriately
N S V 7. Appropriate facial expression
N S V 8. Understands stories on T.V.
N S V 9. Understands explanations
N S V 10. Aware of environment
N S V 11. Aware of danger
N S V 12. Shows imagination
N S V 13. Initiates activities
N S V 14. Dresses self
N S V 15. Curious, interested
N S V 16. Venturesome - explores
N S V 17. "Tuned in" — Not spacey
N S V 18. Looks where others are looking

IV. Health/Physical/Behavior: *Use this code: [N] Not a Problem [MI] Minor Problem [MO] Moderate Problem [S] Serious Problem*

N MI MO S 1. Bed-wetting
N MI MO S 2. Wets pants/diapers
N MI MO S 3. Soils pants/diapers
N MI MO S 4. Diarrhea
N MI MO S 5. Constipation
N MI MO S 6. Sleep problems
N MI MO S 7. Eats too much/too little
N MI MO S 8. Extremely limited diet
N MI MO S 9. Hyperactive
N MI MO S 10. Lethargic
N MI MO S 11. Hits or injures self
N MI MO S 12. Hits or injures others
N MI MO S 13. Destructive
N MI MO S 14. Sound-sensitive
N MI MO S 15. Anxious/fearful
N MI MO S 16. Unhappy/crying
N MI MO S 17. Seizures
N MI MO S 18. Obsessive speech
N MI MO S 19. Rigid routines
N MI MO S 20. Shouts or screams
N MI MO S 21. Demands sameness
N MI MO S 22. Often agitated
N MI MO S 23. Not sensitive to pain
N MI MO S 24. "Hooked" or fixated on certain objects/topics
N MI MO S 25. Repetitive movements (stimming, rocking, etc.)

APPENDIX F. HeartQuest™

TRAINING MANUAL FOR THE HEARTQUEST ™ HEART RATE VARIABILITY SYSTEM

Please Note: Remember that the HeartQuest is not designed to treat or diagnose. You are looking at patterns to see how your therapies affect the HQ readings and, by using the HQ, you are part of the research team.

INTRODUCTION

Heart Rate Variability (HRV) is a well accepted technology in the medical literature and there are numerous research articles written about it in relationship to the autonomic nervous system and the effects of various modalities and medications influencing autonomic nervous system function. Heart rate variability measures the beat to beat changes between one heart contraction to the next using a simple ECG recording. The time domain between each contraction of the heart to the next should vary. What was found is that the people who have very little variation are the ones who are at risk for heart attacks on Monday morning, returning to work after the weekend. What controls these beat to beat changes is the autonomic nervous system (ANS). The autonomic nervous system is the nervous system that controls all the body functions such as heartbeat, respiration, digestion, etc. and it does it automatically. The two branches that are in control of this are the sympathetic and the parasympathetic nervous systems (SNS and PNS respectively). They need to be able to shift back and forth as the body needs to make changes based on the body's needs and environmental changes. Heart rate variability gives the healthcare provider the information on the adaptive capabilities of the individual's autonomic nervous system. The patients or clients who have low adaptability of their autonomic nervous systems are the ones who have functional health issues and go from one healthcare provider to the next with no resolution.

Another very important component of classical heart rate variability is that the ECG signal can be analyzed by spectral analysis to demonstrate patterns of autonomic nervous system health or dysfunction using a technique called Fast Fourier Transform. This method allows the ECG to be broken down into individual bandwidths that correspond to specific physiology. The HeartQuest© (HQ) reveals even more information as Russian scientists were able to extract information about brain patterns, complex neurohormonal patterns and information about the Chinese meridians to make this a unique technology. Whatever your healing art or modality, you are able to use the HQ to see how your therapies are affecting the regulatory systems of the body.

QUICK AND EASY STEPS ONCE THE HQ IS INSTALLED

Wet the patient's inner wrist and forearm with a spray bottle and place the red clamp on the right wrist/lower forearm and the green clamp on the left wrist/lower forearm. Make sure the metal bar on each clamp is contacting the inner portion of the arm. **If there is a problem with getting a reading, make sure you have enough water on the wrists before attaching the clamps. We suggest you purchase a small spray bottle to use for wetting the wrists. You can also move the clamps up or down the arm to get a good connection. You can also put a little salt in the water you are using to spray on the wrists or use conductive gel. If you still have a problem, put the left clamp on the left leg**

and the right clamp on the right wrist as usual. Red clamp goes on right wrist.

If there is still a problem, use another USB port on your computer. Some ports may not have enough power and another may work better.

IMPORTANT: If there is no red clamp, the cord with the RED connector on the end is the one that goes on the right wrist and it doesn't matter which clamp color goes on that cord.

Please do not connect the HQ to a hub. Only connect it directly to the computer's USB port.

Some off-brand computers use inadequate USB ports to supply the energy necessary to power the HQ, which may be a hindrance to the program running smoothly.

PROCEDURE FOR OBTAINING ACCURATE MEASUREMENT AND ANALYSIS

General Suggestions

1. Please try to keep the time of day for repeat tests about the same since the HRV is known to have circadian rhythm fluctuations due to changes in ANS balance (morning/evening).

2. Avoid bright light or noise, maintain comfortable room temperature

BEFORE the measurement

1. Avoid caffeine and smoking at least 2 hours before measurement

2. Avoid the measurement right after a meal (1 hour after the meal is best)

3. Give the patient time to adjust to the environment and have some time to rest prior to testing

4. Refrain from exercise immediately prior to testing

DURING THE MEASUREMENT

1. Maintain a comfortable sitting position

2. Don't move or talk. Don't close the eyes or fall asleep

3. Breathe normally, don't control the breathing intentionally

RUNNING AND RECORDING A HEARTQUEST HRV READING

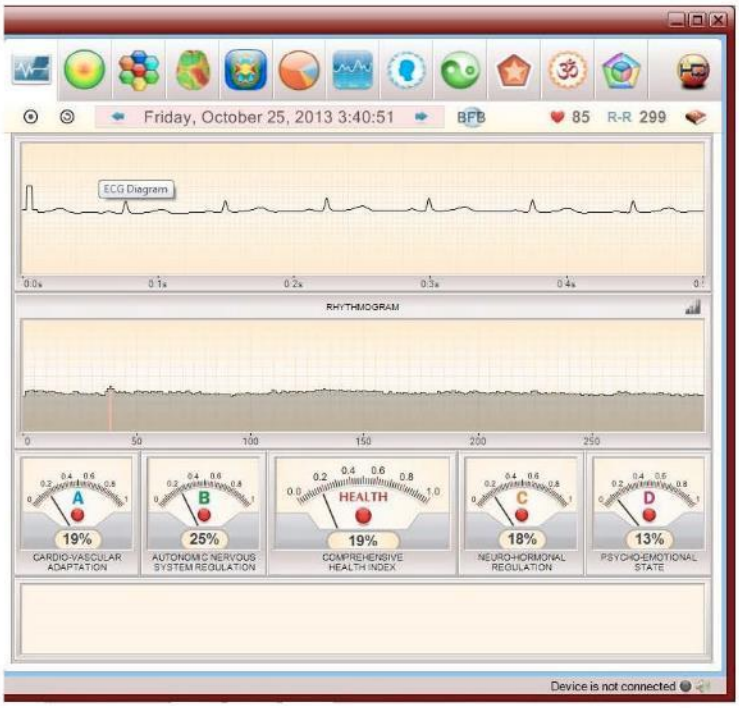
Before clicking on the red dot found underneath ECG written on the main page, make sure your patient does not move or talk. Once you click this button the ECG will begin. If you have a good reading it will say **Record** on the screen and it will record 300 beats to get the HRV information. If it is not a good reading you will see written on the screen "signal quality is not satisfactory". To stop this recording click on the red dot and move the leads to a lower or higher location on the wrist and click on the red dot again to activate. Sometimes you may need to wet the wrist again or move the leads again.

If the ECG is inverted (peaks going down instead of up), just click on the black half circular arrow located under the ECG tab at the top. The inverted ECG can happen if you put the leads on the wrong wrists. After you get 300 beats recorded, remove the clamps from the patient's wrist or other areas. You are now ready to evaluate the patient's reading by clicking on each icon at the top of the screen.

THE ECG SCREEN (1ST SCREEN)

On the top of the screen you will see the patient's heart rate and how many beats have elapsed during the evaluation period. The test will stop at 300 beats. The day of the week, month, day, year and time of test will show up on the top of the screen. If you left click on this, a window will show up that says delete or print report. If you left click on print report the print window will come up and if you click on print you will have a nice report for you or your patient. We will show you the exact details later to print reports.

If you click on **BFB** you will see a suggested breathing program for your patient to follow customized based on the results. This is not a diagnosis or treatment, only a suggestion! There is considerable research showing how effective this is on improving HRV. The research showed that this 5 minute program trained the breathing centers in the brain stem and activated HF activity. What this does is increase vegetative tone or parasympathetic nervous system activity. It is a good idea for health care professionals to use this on themselves. You can see this research article under articles on this web site (www.ghs-hq.com). The research showed that after performing this test for 7 days, it will generate an increase in healing power by increasing the HF and the benefits will still be present 3 days later.



RHYTHMOGRAM

This is the computer calculation of the RR interval. The R waves are the spikey peaks at the top of the page showing when the heart contracts during the depolarization phase. What's important is the shape of the rhythmogram. If the shape is a straight wave there is low heart rate variability and an indication that the autonomic nervous system is not able to adapt as well or as fast to internal and external stimuli. If you have nice, rhythmic wave this indicates a good HRV pattern and lots of variation in the autonomic nervous system. If you see a sharp up and down picket fence pattern this is abnormal and indicates that the patient is stressed and agitated. When we get to the ANS section window later on, we will be able to see where this pattern of a predominance of LF (Sympathetic nervous system), HF (Parasympathetic nervous system), and VLF (Neurohormonal system) will show up.

On the bottom of this screen you will see 5 individual meters with a % in each area. The best reading would be to have the needle go completely to the right with a percentage of 100%. The colored dots in the middle of the meter go from red being the worst to yellow as moderate and green being the best. Let's now explain the meaning of each of these parameters.

A: CARDIOVASCULAR ADAPTION

This has to do with the ability of the vessels of the body to contract and dilate as needed. A good example is when you go from lying down to standing up. The sympathetic nervous system releases epinephrine or norepinephrine to cause constriction of the vessels in the lower extremities so the blood doesn't pool in this region. The reason for this is so that more blood can get to the brain to maintain orthostatic blood pressure. If the Cardiovascular Adaption is low, there is a good possibility that the blood pressure will go up if the sympathetic nervous system is dominant and the blood pressure can also go low if the patient is in adrenal exhaustion. The point is that the blood pressure can be unstable if the Cardiovascular Adaption is low.

B: AUTONOMIC NERVOUS SYSTEM REGULATION

This is how well the autonomic nervous system is regulating the body's physiology. It tells us if there is a balance between the sympathetic nervous system (our gas pedal) and the parasympathetic nervous system (the brakes) or if one of these is more dominant. Between the two parts of the autonomic nervous system there has to be a smooth transition. An example would be adrenal exhaustion because there is not enough sympathetic nervous system stimulation and the parasympathetic nervous system is taking over and is dominant. If a person is locked in sympathetic dominant mode the body is in a state of hypervigilence or fight or flight. When this happens we know that the heart rate goes up, blood pressure goes up, and digestive functions are shut down as well as the body's ability to detoxify. In dominant sympathetic mode, powerful hormones such as cortisol are damaging neurons in the brain not to mention the immune system suffers as well. In this mode the body prioritizes and makes stress hormones instead of the other important sex hormones. This is also called the cortisol steal as the body shunts hormones from pregnenolone to cortisol instead of the other hormones.

C: NEUROHORMONAL REGULATION

This shows how all hormonal systems are coordinating together in perfect synchronization like a symphony orchestra. The hypothalamic/pituitary axis is just one of the systems in this category. Neurohormonal regulation is reflected in VLF or very low frequency and you will see this in the ANS screen. This would be a good time to explain some very important concepts. We will use the analogy that HF and LF is the state government and they can handle almost any situation without any interference from the federal government. In fact they are very efficient at dealing with their own local problems but all of a sudden there is a major earthquake or other disaster. They now are completely overwhelmed and have to call in the federal government for help. The "Feds" represent VLF and they start to mobilize equipment to help. The problem with the Feds is that there is too much paperwork and they are very slow in getting things done. LF and HF are like fast speed internet and can make adjustments very fast. For example they may need to constrict vessels and then dilate them. They can stop in the middle of an action and change direction as needed. This is a good example of how the autonomic nervous system made up of the LF and HF works.

On the other hand the VLF represents the Feds, which means central regulation. Its speed of action is like sending a letter via snail mail (postal mail) instead of email. In other words the VLF is slow compared to the autonomic nervous system and can inhibit its action. The message the VLF sends cannot be

changed quickly if at all, unlike the autonomic nervous system that can quickly degrade its neurotransmitters. The hormones released from the VLF system reach their target through the bloodstream which is why it is a slower system. The question you should be asking is,"What would be a good balance between LF, HF and VLF"? There is a formula called the Index of Centralization. This is the formula HF+LF (autonomic nervous system) divided by VLF (central regulatory system). Here is an example: if LF is 30%, HF is 20% and VLF is 50% and you apply the formula you get 1. This is the value that represents the dividing line central regulation, (VLF) and autonomic regulation (HF, LF). You want the Index of Centralization (IC) to be more than 1. Normal parameters for the IC are 1-3. For example, if LF is 35%, HF is 35%, and VLF is 30% (35+35)/30 = IC of 2.33 which would be an excellent score. When HF and LF combined is less than 50% and VLF is higher than 50% this decreases your Index of Centralization (less than 1). This will be less than 1 on the index and you will have more centralization vs. autonomic regulation. If we can help it we don't want the central nervous system stepping in.

As we age VLF increases. VLF also increases with prolonged mental/emotional stress and metabolic imbalances like glycemic dysregulation, lipid problems and other metabolic issues. The VLF will be elevated when the autonomic nervous system is maxed out. Then VLF takes over but ends up being less efficient. The Neurotransmitters released from the autonomic nervous system have a very short half life and are degraded very quickly. The VLF circulating hormones are longer acting and once released can be a problem. An example is where this system is producing too much renin and angiotensin increasing blood pressure. It's not possible to shut these hormones down very quickly outside help is needed. When you see elevated VLF in young people there is usually considerable mental/ emotional stress. When you are in this state you produce lots of adrenaline that can block the production of thyroid hormone. The biofeedback system gets disturbed because adrenaline is blocking receptor sites. The body at this point does not know if it needs more or less hormones when this happens.

COMPREHENSIVE HEALTH INDEX

This is a reflection of all the systems we just talked about and gives us a comprehensive view of the total health of the individual.

CONCLUSION of the ECG or first screen will give you a percentage in each category: Cardiovascular Adaption, Autonomic Nervous System Regulation, Neurohormonal Regulation, Psychoemotional State. You will see this at the bottom of the screen along with the combined Comprehensive Health Index as seen in the bottom middle of the screen were it says **HEALTH.** On this screen on the right of where it says Rhythmogram you will see some small crisscrossing lines, left click on this. Five wavy, different

colored lines will appear on the screen. These represent the functional states of A, B, C, and D during the ECG recording. If you see a huge gap between one of the lines and the others, this may indicate that the recording was not ideal or that the patient moved a lot, deliberately controlled their breathing or some other event happened during the recording. If you see this pattern, just record the ECG again.

ANS

Click on this symbol on the top of the screen to get to this page. Here you will see the spectral diagram.

SPECTRAL DIAGRAM

What you see on this screen is a circle with different colors. The yellow portion represents primarily the sympathetic nervous system and is labeled LF or low frequency. The green primarily represents the parasympathetic nervous system and is labeled HF for high frequency. Red is the neurohormonal back up system and is labeled VLF or very low frequency. The VLF also has some sympathetic nervous system regulation properties. You can see the percentage of each of these regulatory systems that will tell you the predominance of one system in relationship to the other. Don't forget to use your centralization index formula as we have discussed earlier.

STRESS INDEX

The stress index will show you how hard the body is working to maintain balance. The higher the number the more effort the body has to work to maintain equilibrium. The range on the screen is between 10-100. Dr. Karimov says that normal for someone living in a stressful city may be from 100-200. This is a STRESS INDICATOR. If it stays at a high level for long periods of time, the body will start to experience symptoms of exhaustion or burn out. Dr. Karimov relates this to the cooling system in the car. Not controlling the car temperature from going too high for too long a period of time will cause the engine to seize and break. If this number goes up to 500 this indicates increased probability of stroke or heart attack. If the stress index is lower than 10 the body can't react to stress. The actual stress index number is in the circle on the left of the screen. On the right of the screen is where you will be able to compare 2 separate tests next to each other to see if there is a change from one treatment to the next.

SELF HEALING POTENTIAL

Self healing potential shows how balanced the autonomic nervous system is and how well it is regulating. The normal range for the Autonomic Nervous System Balance Index is between 35 -145. It's better to be in the lower end which is more parasympathetic stimulation. This number is derived from many different parameters such as LF, HF, VLF, SI (Stress Index), and Vital Force. This indicator tells us how the body is handling stress and its ability to heal. If it is in the higher end of the range there is more sympathetic overstimulation. It is the parasympathetic nervous system that is involved in healing and regeneration. Let's look at this big colored circle. This circle represents your patient's Self Healing Potential. On the bottom of the screen you will see a color index. The right of the horizontal color index is the best outcome as is indicated in blue. As you move to the left, the results get progressively worse. If you left click on the *i* you will see 6 circular diagrams. Compare the patient's circle representing self healing potential to those diagrams to see where your patient fits in based on the categories given. For example "unstable balance of autonomic nervous system". With 2 separate tests you will be able to compare them.

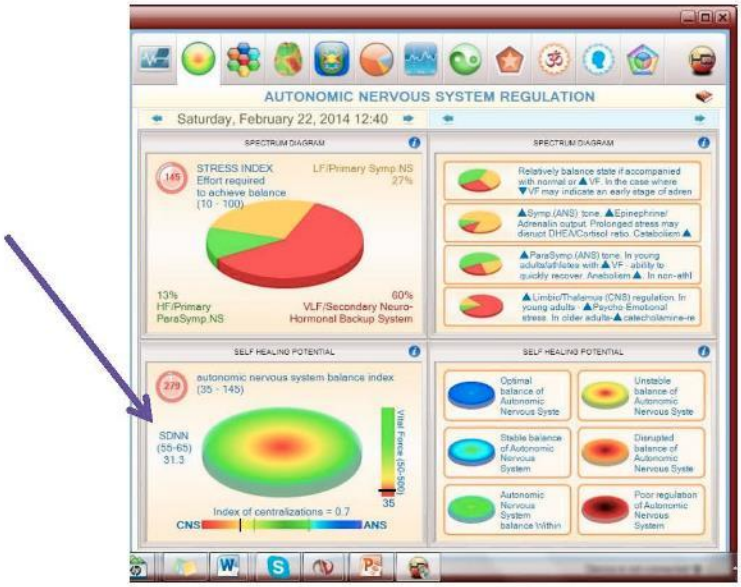
VITAL FORCE

This is the power of the electrical activity of the heart and equates to chi or prana. The range is between 50 -500. Normal is between 150-350 and is considered good. Athletes could be higher. This score is important because you need enough power to create change in the body. This is like checking your battery. If it is low this means the amperage is low. You can have good voltage in LF, HF, and VLF such as 1.5 volts but if the amperage is low you have a total power drain and the battery will run down much faster. The body can't perform work for long periods of time with low vital force. It's like having an old battery. When low you don't want to put your patient on a detox program until you can get the vital force up. It takes the body lots of energy to detox and if vital force is low they can crash. You can have a normal looking pie chart on the ANS screen because the voltage is normal but have a very low vital force. If you do a therapy that recharges the vital force you put more energy into the adrenal glands which will initially kick up the LF. Over time, with good therapy, the HF should come up and the LF should come down.

New to this screen is the SDNN number. This is the most common index of overall heart rate variability. SDNN stands for Standard Deviation of Normal to Normal beats. In the HQ we are calculating for 5 minutes which is derived from the differences in successive R-R intervals. This number is highly correlated to provide good estimates of autonomic nervous system activity. Most importantly this number reflects our ability to rapidly, dynamically and effectively respond to a crisis. Improving lifestyle factors such as exercise, healthy diet, decreasing toxins, increasing quality sleep, etc. may improve the SDNN. Here are the standard ranges for the HQ:

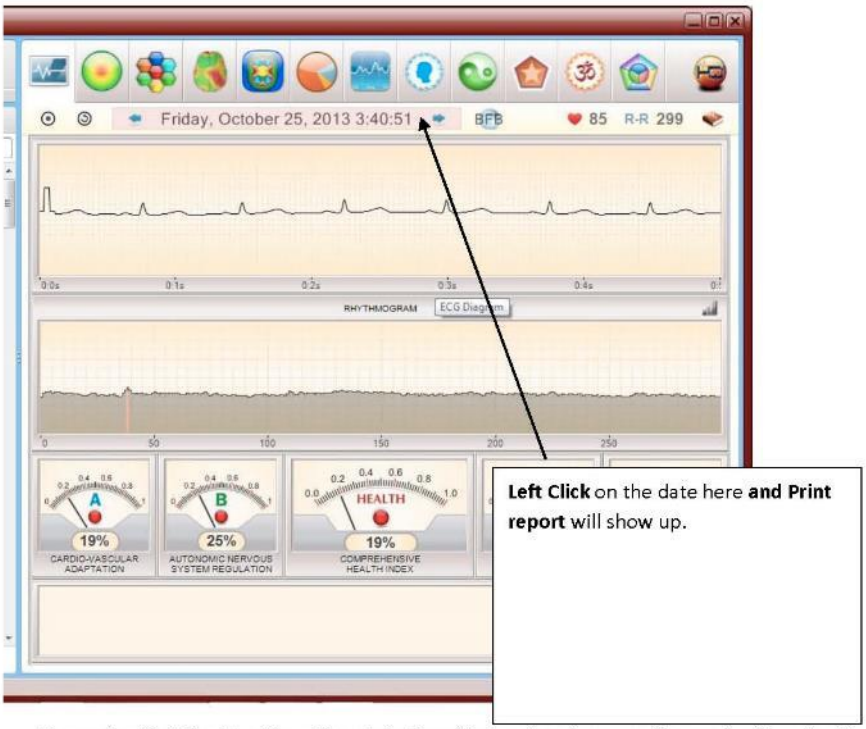
Median Range for Health People- **55 – 65**

Athletes can go much higher - **65+**



PRINTING REPORTS

Left click on the first ECG screen on the top of the screen where it shows the day of the week, month, day, year and time and date. A window will appear. Left click on **Print** then click OK. The report consists of 3 pages and will print all of the screens.



Remember that the HeartQuest is not designed to treat or diagnose. You are looking at patterns to see how your therapies affect the HQ readings and, by using the HQ, you are part of the research team.

APPENDIX G. Bio-Well™

Bio-Well Operation Manual

September 2015

Purpose

The Bio-Well device is intended to perform the following functions:

1. Analyze the complete energetic state of a person by scanning 10 fingers.
2. Produce a functional analysis of a person's Energy, Stress and Balance levels by scanning 2 fingers.
3. The dynamic recording of signals, during a period ranging from a few minutes to many hours, using a special sensor which detects variations of environmental energy parameters.
4. Record a person's Human Energy Field (HEF) response to environmental stimuli, including potential allergens, food, medicine, etc.

Initial Operation

Full Scan Mode

With the Bio-Well device connected to the computer, choose a Card and click **Full Scan** to enable the 10-finger interface.

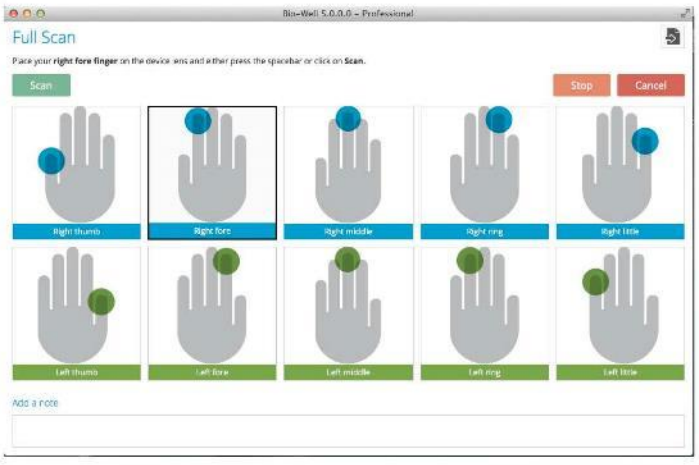


Fig.4

Click **Scan** (or press Spacebar) to initiate a capture of each finger, one-by-one, starting with the Right Thumb.

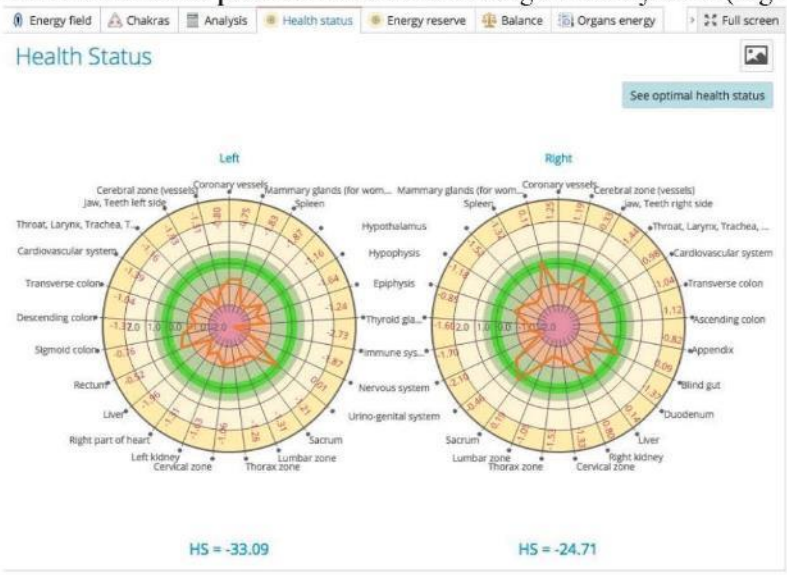
Analysis

The three main parameters – Stress, Energy and Balance – as numeric results (Fig.10).

Fig.10

Health Status

Shows distribution of Area parameters for different organs and systems (Fig.11).



Energy Reserve

Shows distribution of Energy parameters (Fig.12). Represents energy reserve of different cells of the body.

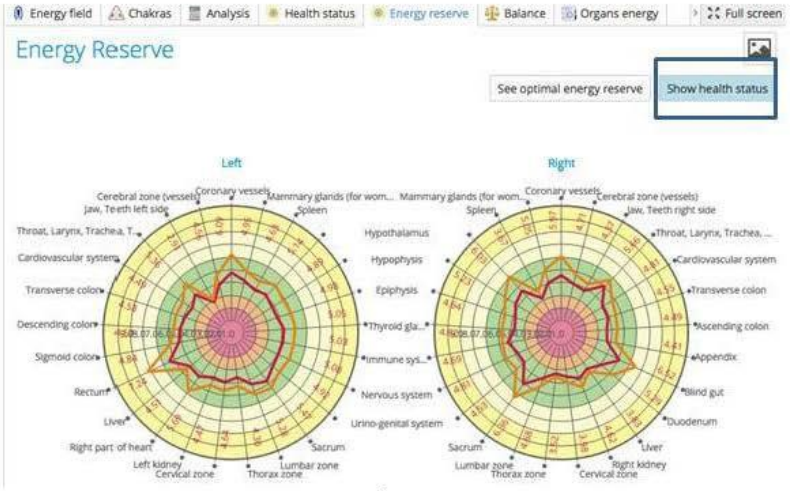


Fig.12

Show Health Status button (Fig.12) displays a comparison of the Health Status and Energy Reserve. It is beneficial when the Energy Reserve outline is wider/larger than the Health Status outline.

Balance

Shows the level of Energy for paired systems and organs. A significant mis-balance will be presented as highlighted bars (Fig.13).

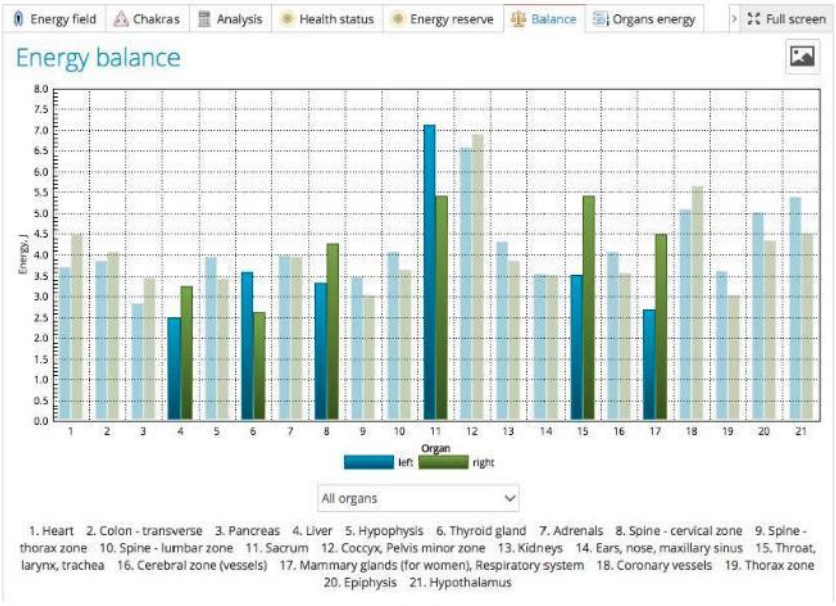


Fig.13

Organs Energy

Shows sectors corresponding to different systems and organs (Fig.14).

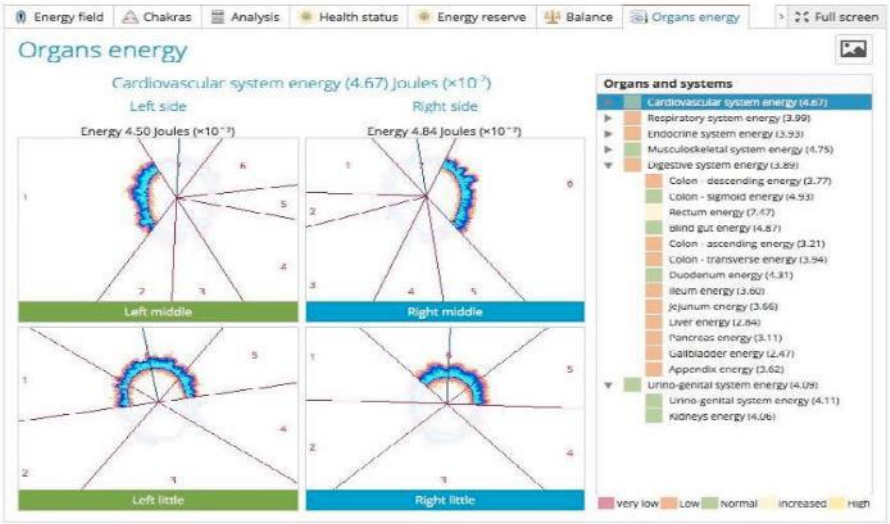


Fig.14

Fingers

Displays parameters for each finger in its own window (Fig.15). Clicking on a finger window opens a larger view of the image and parameters. (Fig.16)

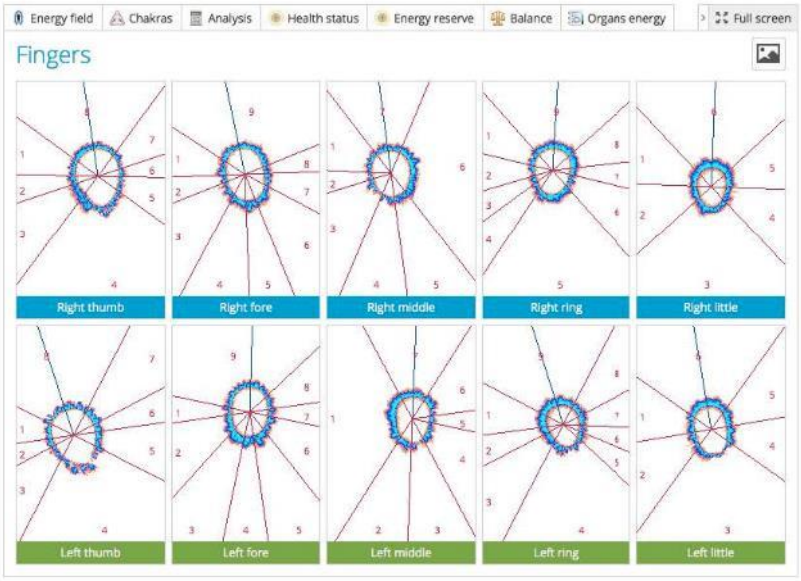


Fig.15

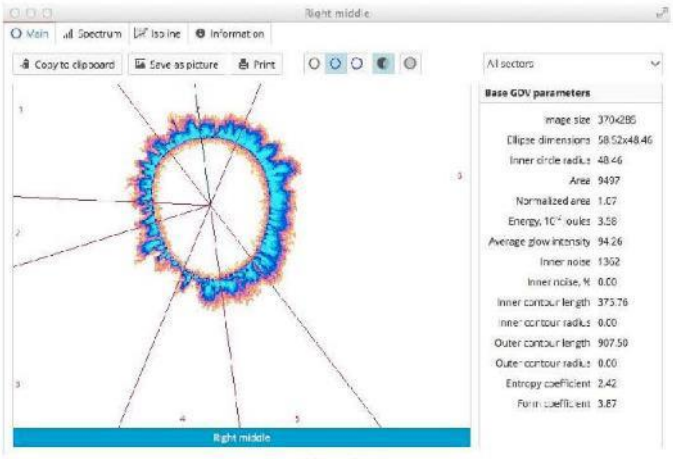


Fig.16

Report

Prepares a PDF file containing descriptions of the main parameters. Comments, recommendations and pictures may be added, and all included information is customizable for corrections and omissions.

Export to CSV

Allows for saving the main parameters in CSV format for further processing in Excel, Statistics and other similar programs. Fractional numbers are presented using the European style – with a comma separating the integer and decimal portions of the number. It may be necessary to enable European settings within the program to view the data correctly.

Back button takes you back to initial view.

After Scan Mode

This mode allows simple comparing of two HEF readings. Choose the first scan, then click the **After Scan** button. The capture screen will appear to enable a Full Scan. The Analysis button will present two sets of of Energy Field and Chakras for review (Fig.19). This mode is a simpler version of Compare mode.

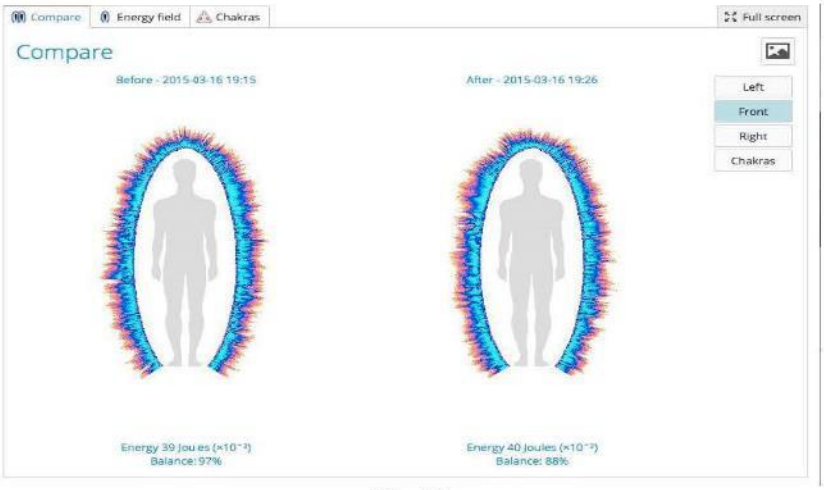
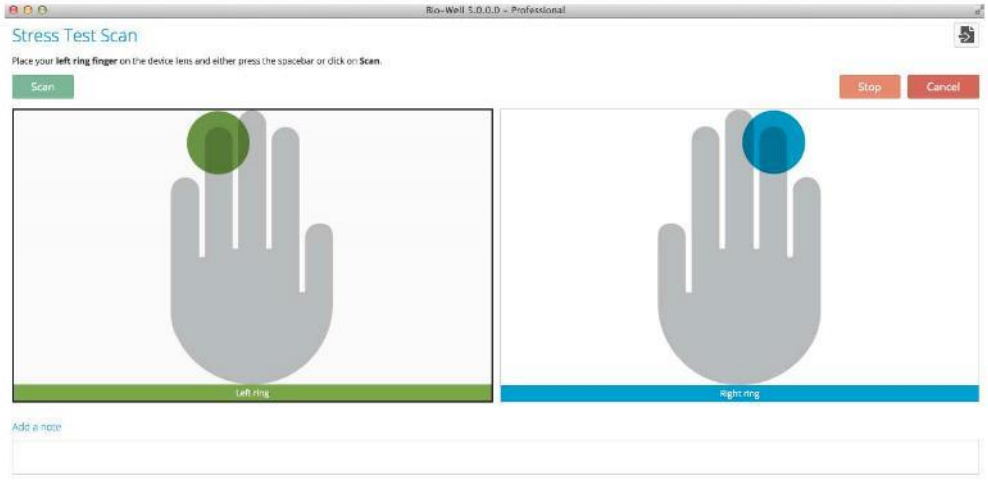


Fig.19

Stress Test Scan Mode

This mode enables readings from two fingers to produce an analysis of the 3 main parameters. Typically, the Ring fingers (4L and 4R) are used for this scan. However, the use of other fingers is optional.

As a result of this test the scales of Stress, Energy and Balance will be presented. Fig. 20



Environment Mode (Sputnik or Water Electrode required)

This mode enables the measurement of dynamic processes. During the first three minutes, a baseline signal is recorded; these data are excluded from analysis.

It is recommended that during the readings no other activity would be done at the computer and computer would not switch to sleep mode till the completion of the session.

Click **Start** to test the image of the metal cylinder. It should look like a circle with very little or no pixel noise inside (Fig.21).

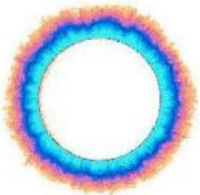


Fig.21

Labels may be added during readings.

Clicking **Stop** will save the data on the computer if offline, or to the server if online.

View offers the list of available parameters to be displayed (Fig.22).

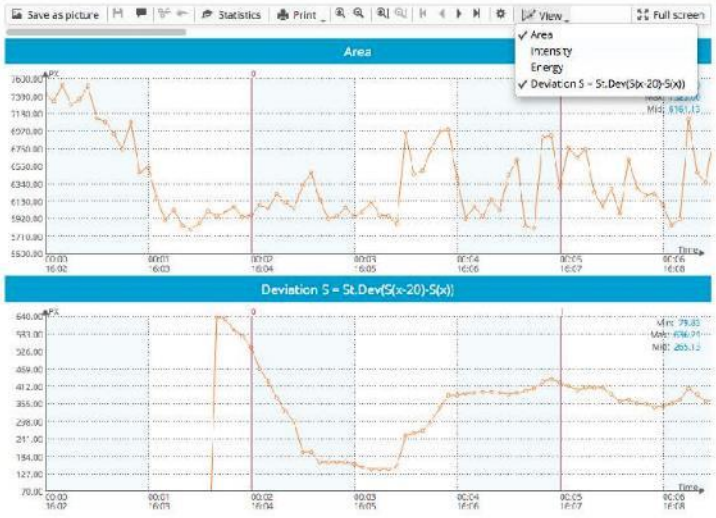


Fig.22

For every graph, the scale may be changed by a click on the vertical axis.

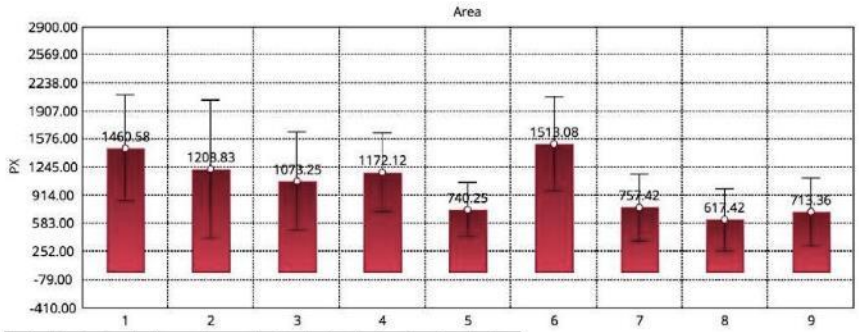
Edit labels allows for adding and editing labels.

Right-click enables selection of part of the graph to **Save Selected to the new file or Cut Selected** part.

Statistics button opens the Statistics window.

Right-click to edit and **add labels**. Labels may be added at equal time intervals from 60 seconds to 6000 seconds.

Click **Calculate**. The software calculates parameters for all labeled intervals and parametric / non-parametric statistics. Every interval is compared with the prior interval (Fig.23).



1	2	3	4	5	6	7	8	9
1 (01:30)	2 (01:50)	3 (03:00)	Meditation (01:05)	4 (02:30)	5 (02:00)	6 (02:05)	end (04:15)	7 (02:35)

	1/Start (12)	2/1 (12)	3/2 (16)	Meditation/3 (8)	4/Meditation (12)	5/4 (12)	6/5 (12)	end/6 (12)	7/end (11)
Student's t-test	0.7917	0.6746	0.5410	0.7012	0.3303	0.0469	0.0676	0.6577	0.5669
Mann-Whitney U-test	0.7987	0.5512	0.6834	0.6456	0.4776	0.0684	0.0519	0.7553	0.7970

Fig.23

Calibration

This mode is necessary to ensure stable device operation following changes of location and/or environmental conditions. It is recommended to calibrate when moving to various locations, or at least once per month of operation. To calibrate:

1. Remove the Finger Insert by holding the unit firmly while gently pressing downward and pulling outward.
2. Connect the grounding cable to the spring knob on the top of the Calibration Unit (doing this after inserting the unit may damage the glass inside).
3. Insert the Titanium Cylinder unit by raising and holding back the spring knob while carefully pushing the unit in until it clicks into place. Then, gently lower the spring knob until it rests on the glass. **NOTE**: **Do not let the spring lower quickly or abruptly, and be sure to not rotate the knob without first raising it. Failure to follow these procedures may result in scratching the glass, which is not covered by the warranty.**
4. Connect the other end of the grounding cable to the port located at the rear of the Bio-Well device.
5. Click **Start** and a test image will appear. It should display a full ring (Fig.21). If the image is having noise inside or distorted, clean the glass with a cloth and carefully check the position of the spring knob to be sure the Titanium Cylinder is resting evenly on the glass (raising before adjusting).

Calibration may take up to 30 minutes depending on the condition of the device, and/or environmental factors (i.e., high humidity).
Calibration data will be saved for all your scans and used for data processing.

It is recommended to calibrate at least once per week or more frequently in the following situations:

- Moving to a new location;
- Rapid change of weather conditions;
- Presence of many people in the room;
- New Moon phase.

In the Calibration window, the Information button (Fig.26) displays identification and usage data for the connected Bio-Well device.

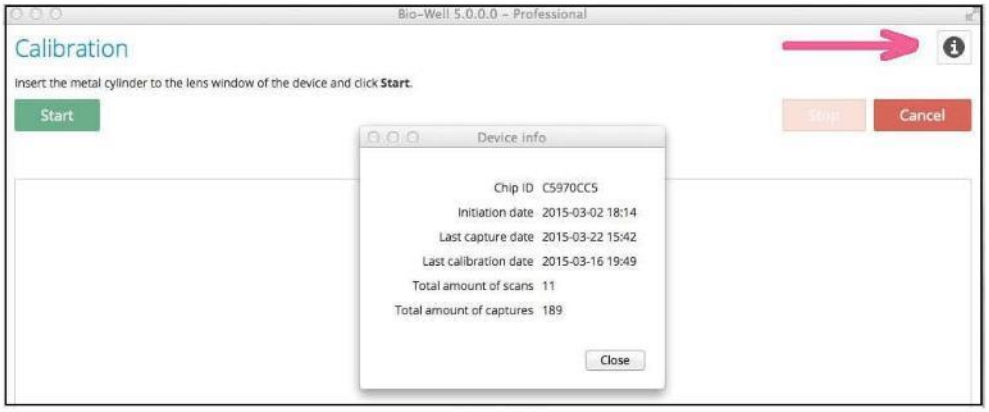


Fig.26

Previous GDV Readings

In **Full Scan** mode, a previously saved data file may be opened with the Import button (Fig.28). This allows users of other GDV instruments to use the Bio-Well software. A Card must first be created to be associated with the data to be imported.

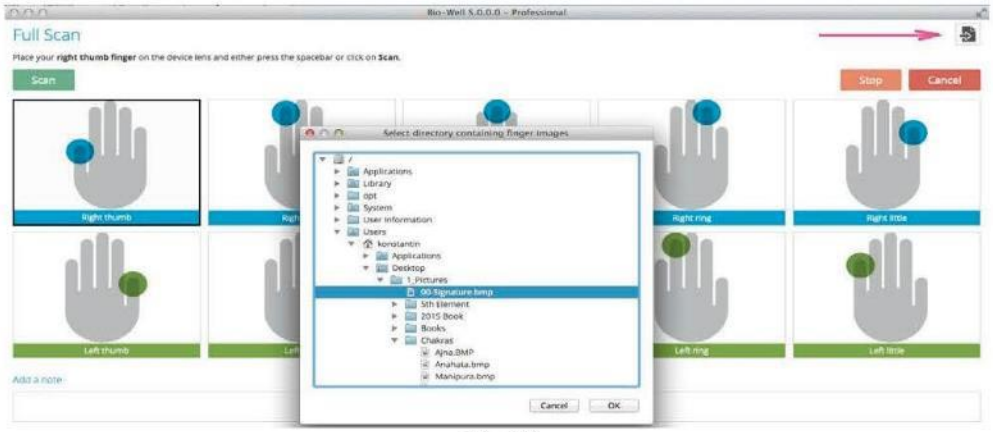


Fig.28

Important Remarks

User should track environmental conditions during experiments:

- Shifts in relative humidity should not exceed 5%.
- Shifts in air temperature should not exceed 10 °C.
- During experiments, do not turn on/off electrical devices within the room where the Bio-Well device is operating.
- Do not use cell phones near the Bio-Well device or Sputnik.
- Presence of different people in the room may affect the measurement results.
- Do not take measurements during strong atmospheric changes.
- Be aware of changes in geomagnetic background (e.g. Sun and Moon rise/recess).

For general finger scans:

- Clean the person's fingers with a soft cloth before taking the reading, especially to at least wipe any hand lotion off the fingers.
- Clean the optical glass using a soft cloth after every set of scans.
- Fingers should be positioned on the fingertip.
- If light is preventing clean scans, reposition the fingers lower within the Bio-Well device, especially the little finger (sometimes light comes in under the finger). You may clean the image before saving it (see Fig.5).
- For people with long nails you may erase the nail shadow before saving the image.

APPENDIX H. Palpation Protocol

Philippe Druelle, D.O., defines Protocol 1, and Protocol 2 palpation as the following:

Protocol 1 palpation is the palpation of the tissues of the body. It is described as a volumetric palpation where the osteopath directly contacts the center of the volume through the resilience of the tissue, which is proportional to the resistance of the tissue. This type of touch is more in relation with proprioception and function, it is the life in the matter. He explains it as a dialogue with life, its rhythm and its strength (Druelle, 2006; Druelle, 2014b).

Protocol 2 palpation is the palpation of the fluids of the body. It is described as a volumetric palpation where the osteopath contacts the superficial spring on both sides of the volume and compresses the superficial springs towards each other without crushing them. At a certain point, we feel a resistance that is equal to our pressure. Here we are at the level of the fluid in the living matter (Druelle, 2006; Druelle, 2014b).

Protocol 3 defined by Druelle and our prominent osteopaths from the past, Still, Frymann, and Fulford:

Like Still, Frymann, and Fulford, Druelle also saw beyond the musculoskeletal (MSK) and primary respiratory mechanism (PRM) systems, into the spiritual realm. During Druelle's work in the spiritual realm (he had a quest to understand if there was a central unifying structure that allowed the physiology (function) to constantly have a reference to work around), he discovered the concept of the Central Chain. It was during the third ventricle normalization that Druelle discovered a whole central chain continuum, a central organizing

potential. Then Druelle looked at transverse slices of anatomy to which this central coherence corresponded to become the central chain fulcra. The fulcra of the central chain and its central fulcrum of the body, called the heart fulcrum, have a connection which is at the same time structural (biomechanical), fluidic (biodynamic), and electromagnetic (bioenergetics). The way to come into connection with these different realities is through the use of different palpation protocols. Protocol 1 palpation accesses the biomechanical (material) reality, Protocol 2 the biodynamic (fluidic) reality and Protocol 3 accesses the bioenergetics (field) reality. Druelle speaks of three different energetic realities of the central chain: an electromagnetic, morphogenic and life field reality (Wood-Reucassel, 2006).

Druelle describes Protocol 3 palpation as a method of perceiving the state of the vibrational aspect of the human body, it is used to detect the energetic reality which encompasses 3 different layers of energy fields; the electromagnetic field, the morphogenic field and Life field realms. He expresses the importance of treating and diagnosing with the energetic field in complicated cases, therefore using protocol 3 palpation. Druelle states that the dialogue to access the different energy fields is with Pure Consciousness (spiritual realm). He illustrates that the "Breath of Life" (BOL) dialogues with all the cells and manifests as the person's PRM. In order to access the Pure Consciousness with ease we can enter into contact via spiritual doors located at the head, heart and T2 (Druelle, 2006; Druelle, 2016).

Forget explains that the fascial body is continuous with the vibrational body and is a conduit to move from the material aspect into the energetic realm. The fascial body provides biotensegrity with its fractalization and micro vacuoles that distribute forces and load throughout the network, and is constantly adaptable. It has piezoelectric properties that allows it to have a semi conductive fascial structure. Forget explains that we have

piezoelectric properties that are distributed through our network, which means that being under constant compressive and tensile forces we change our electric charge and modify our polarity and therefore the surrounding body field that it creates. This piezoelectric property of fascia therefore creates the link between our fascial matrix and the vibrational body realm. The energy distributed by the vibrational body and its field interacts with the semiconductor aspect of our collagen matrix/fascial network, giving rise to the piezoelectric property. Therefore, under stretch and compressive forces we emit fields and vice versa, the fields, through their vibrational aspect, create mechanical deformation at the fascial level causing stretch and compressive forces in turn creating the piezoelectric effect. The BOL has the ability to manifest as PRM in the body because of this property of piezoelectricity of the fascial network. The piezoelectric quality creates the necessary field for the BOL to be transmitted from the vibrational realm into the physical realm. The fascial network is directly connected to the craniosacral mechanism via the diaphragms and meninges thereby creating a functional unit, which allows the BOL to be expressed as PRM in the physical body. The PRM relates to the overall life force of a person. From the PRM standpoint we can see how the person expresses themselves throughout the body referred to as the overall systemic vitality state. We affect the expression of PRM by removing the barriers so the life force can propagate and have greater ease of expression. The life force is universal but its expression/manifestation within the body can vary depending on the energetic layer (physical, fluidic, field) affected. The type of barrier will also have a consequence on the expression of PRM in different areas. The different barriers could include aspects of structural blocks, fluidic blocks such as inertia, toxicity, emotional agitation, force vector/force of impact, and field blocks such as belief system, consciousness. The Breath of Life (BOL) is an underlying constant. If the life force emanating from the Universe was not

running itself across a gravitational field it would stay as a continuous presence or flow. The gravitational field is determined by the curvature of space-time and this geometry creates the force that creates gravity (Meyers, 2014, p.46). So, this concept can explain how the BOL is able to come down to Earth and its inhabitants. When the BOL permeates through all the different layers of energy fields from the cosmos down to Earth it is able to express itself as PRM at the physical level in the body. (Forget, Autoregulation, 2017). Forget illustrates the breakdown of the flow of the BOL from cosmos to the Earth through the different layers of energy manifestation as:

1. Quantum particles: Life force as consciousness (oscillatory waveform).

2. Cluster of particles: Morphogenic (fluffy clouds) where genetic and epigenetic issues exist (oscillatory waveform).

3. Oscillatory particles and light waves (undulatory waveform) is the EMF field: Chakras and colors

4. Fluids are waves of undulations and are no longer oscillations

5. Solid aspect of matter: undulations (PRM)

The BOL is pure streaming energy that progressively moves from the life force of quantum particles to eventually solid matter. It moves down through the different waveforms from oscillation (standing waves) to undulations (propagating waves). The perception of the cycle is faster as the particles become more solid. The presentation of the cycle is dependent on the frequency versus the lambda. Lambda is what changes the frequency and the cycles will change your perception of the BOL as it moves through the different layers. It is the same

life force (BOL) just you will see it differently depending on your reference point (assessment method, e.g. Life Field approach, Sutherland's questions, reciprocal inhibition, and Barral fascial pull test). When you have a perception of the structure (volume) along with a reference point combined with the conscious awareness of what you are palpating (local, regional, global) you are able to change the lambda and therefore change the frequency/number of cycles you perceive i.e. 6-12 cycles with PRM depending on the depth and level of volume you are perceiving. If you are palpating a local structure like the SBS it will feel like a rapid cycle compared to the PRM if your awareness is on the whole cranial sphere where the cycle will feel slower. Therefore, it is important to have your consciousness tune to the desired level, are you on the solids, fluids, EMF or Life fields and what is the size of the volume perceived? (Forget, Autoregulation, 2017).

Bio-energy, the energy of living things that feeds the cells and keeps them going, has been given many names such as: life force; vital body; etheric body. The energy in the cells in our body breaks down into atoms and smaller particles which become photons that results in a vibrational light called, bio-energy. Life energy must flow freely and completely; if it does not illness occurs (Fulfold, 2003). Hence, the fields are discussed as vibrational levels of frequency resonance, where the life field of each atom's electron is linked to the fluidic flow and electromagnetic force (Druelle, 2016). Fulford (2003), calls our vital force Love, and, Frymann (1998), speaks of the vital body as the emotional body providing the person with the capacity to feel and love. Vital force or vital energy is also described as Chi in traditional Chinese medicine and Prana in Ayurveda. These descriptions of life energy began from metaphysical reflections of the nature of consciousness with its connections with the mental, emotional and physical bodies (Rubic, Muehsam, Hammerschlag, & Jain, 2015).

Druelle teaches from Becker that the “Breath of Life”, or Chi, known as the invisible force, is needed to be brought back to the patient. He explains that in order to connect with the True Nature of the patient (love) there must be Presence at the heart chakra entry point, near the thymus, and this will boost the mind of the patient. He explains that the mind connects the body with the Consciousness. By combining the belief of oneself (consciousness) and the force that moves the blood (machine), the patient will return to their true sense of life. He also says that True Nature is in the heart, love, and friendship, and that once you have boosted the true sense of the patient you’ve allowed the patient to transcend in evolution. Osteopathy is “pathos”; the deep feeling of wanting to express yourself, expression of true nature is love (Druelle, 2015). Fulford notes Still as saying: “Osteopathy is a science that analyzes man and finds that he partakes of the Divine Intelligence”. “It is sacred because it is a healing power through all nature” (Fulford, 2003, p.3).

APPENDIX I. Osteopathic Assessment and Treatment Protocols with Consciousness (HEF)

Dr. Frymann stated, "The whole patient needs a whole physician" (1998, p. 330). She meant that in order to find the cause of the patient's trauma, the entire patient needed to be seen. In order for the deepest needs of the patient to be observed, required the physician to have full compassionate awareness. The assessment of the children in this study consisted of focusing on aspects that may affect their ability to cope efficiently. Five different assessment protocols were used:

1. Dr. Frymann's approach instructed by Dr. Centers but augmented and modified as used by R1 and R2.

2. Sutherland's 3 questions;

3. CEO approach to clinical methodology that included treatment in Philippe Druelle's different palpation protocols, i.e., matter (P1), liquids (P2), and fields (P3);

4. Human Energy Field (HEF) augmented with Mounce-Halasz, 2014 protocol;

5. Chaotic field (CF).

Dr. Centers (2012) states that treating children with ASD:

> Begins with a detailed history from birth to the present. It is also essential that the osteopathic physician establish a true and meaningful rapport with the child. Observing the child at play and in a position of comfort can provide valuable information regarding the child's level of wellness, developmental stage, and

> attitude. Osteopathy is also a touching profession, involving the use of hands to palpate the inherent motion of the child's body. Because many children on the autism spectrum are resistant to touch and may refuse to lie down on a treatment table (particularly if they have had negative experiences with other healthcare providers or significant trauma within their body), osteopathic physicians may need to proceed cautiously. Osteopathic evaluation and treatment should begin with a total and complete focus on establishing a meaningful contact with the tissue under our hands, alongside a focus on the highest aspect of the child (i.e., "What is beautiful about this child?" or "What are this child's gifts?"). Initially, we may start our palpation on the body from distant areas such as the feet or hands. As we gradually establish a "dialogue" with the tissue through palpatory skill, children eventually will perceive the touch as safe and allow us to manipulate and unwind the tense and tight areas within their bodies. From this point on, we divide our approach into the three different areas of motion, matter, and mind. (pp. 460-461)

Jennifer Williamson, MSc. PT, the osteopathic student researcher, and Andrea Mounce-Halasz, D.Sc.O., followed an augmented and modified framework of Dr. Frymann's assessments and treatments. An assessment of the child consisted of the following: body symmetry; standing flexion test; seated flexion test; hip drop test; crawl; creep (arm crawl); ROMs including EXT ocular; and jaw/teeth. Dr. Frymann's sphenobasilar synchondrosis (SBS) lesion diagnosis list was used and consisted of: Flexion; Extension; Side Bending Rotation (SBR); Torsion; Lateral Strain; Vertical Strain; and Compression. Additionally, R1 and R2 evaluated the following structures for dysfunction: temporal lesions (petrous); foramen magnum lesions; SNS drive from the central brain command center, spinal cord,

paravertebral ganglionic chain, and pre-aortic ganglions; PSNS including the vagus pathway, brain stem nucleus, and ganglions that have both SNS and PSNS; and the entire endocrine system/glands to ensure neuroendocrine function. R1 and R2 assessed if the systems were harmonious on their own and then if they were harmonious between each other resulting in dynamic coherence.

The treatment sequence and decision-making protocol was determined by: dialoguing with the child's True Nature; asking each subject's inner physician "show me your deepest needs"; and using the Barral fascial pull test, as referenced by Andrea Mounce-Halaz in her 2014 thesis (Mounce-Halasz, 2014). During the assessment phase, the Barral fascial test was used to perceive where the tension in the fascial system resided. This would pull R1 and R2 each to a primary tissue area of lesion. If there was no tissue attraction or fascial pull within the body, then R1 and R2 would ask Sutherland's modified question "Where are you living?" to assess if the consciousness was present in the body. If it was not, then using a similar Barral fascial attraction test R1 and R2 would feel the pull to an outside field layer position. If the consciousness was found to be in the body then the assessment proceeded using the CEO methodology to determine why there was a lack of PRM (i.e. compactions, adherences, non- physiological lesions with or without respect of axis). R1 and R2 used Sutherland's questions to determine its: current posture ("How are you living?"); optimal health ("Where would you like to live?"); and barrier ("What is impeding you from living there?") in all three protocols. The tissue either showed the lesion in the physical body or in the field as a fixity, imprint or shock in the field. If it was a field shock imprint, R1 and R1 raised the vibrational frequency of the shock imprint, using intention, which caused it to dissipate. Once completed, the tissue then returned to normal PRM or another lesion

presented itself in the physical realm. In the physical realm, the Barral fascial pull test determined which region was primary and what required further assessment. From the regional area, R1 and R2 assessed the local tissues and structures using the inhibition test to establish the tissue to be treated first. The tissue that expressed the least vitality and/or PRM was the primary lesion and was treated first using CEO methodology. The techniques used were:

1. Contacting the True Nature: Prior to even contacting the patient, Druelle explained that the therapist must first connect with the true nature of themselves and the true nature of the patient. Druelle explained that the mind connects the body with the consciousness and by combining the belief of oneself (consciousness) and the force that moves the blood (mechanism), the patient will return to their true sense of life allowing the patient to transcend in evolution (Druelle, 2016). Once the therapist has connected to the patient's true nature the osteopath needs to determine if the person is centered in the plane. Children with ASD may have no dialogue with their inner physician because it is too painful, hypersensitive or hyposensitive, to be in body. The osteopath needs to re-center and harmonize them around the central fulcrum in order to have a minimally centered state in order to dialogue with her deepest needs (Forget, Auto-regulation, 2017). This technique taught by the CEO is called Harmonization of the Organism around the Central Fulcrum by Philippe Druelle, D.O., and gives the patient a fulcrum to organize around.

2. Harmonization of the organism around the central fulcrum by Philippe Druelle, D.O. (CEO, Autoregulation).

3. Barral Test (modified): Fascial listening to determine the primary lesion. Patient supine with knees flexed. Therapist standing beside the subject with one hand placed on the sternum. Follow the fascia until the hand stops. If no movement, check to ensure patient's fulcrum in within their physical body by asking "Where are you living?" A pull to the subject's field indicates that their fulcrum is outside of the physical body (Mounce-Halasz, 2014).

4. Tissue Expression of Consciousness in the Field: Listen and assess the PRM of the structure. If none present, ask Sutherland's question: "Where are you living?" The tissue will draw you to where its consciousness is expressing itself in the human energy field. To test if you have the correct position in the field place one hand on the structure's consciousness expressing itself in the field while maintaining your other hand on the physical structure. Induce a movement: right or left rotation, for example. If you are on the correct position of the structure's consciousness in the HEF, you will feel a movement in the physical structure. Technique Procedure: Look for the passage that the structure's consciousness took to leave the physical body. Holding its consciousness in the field, retrace the passage it took in leaving the physical body to return it to the physical body. If it returns you will feel normal PRM return to the structure or another lesion will present itself to be treated. Comment: If this technique fails to return the tissue's consciousness to the physical body it may be because a foreign energy is occupying this space. In this case you need to perform the foreign energy release technique to clear that space for the tissue's consciousness to return" (Mounce-Halasz, 2014). .

5. "Foreign Energy Normalization: if the consciousness does not return to its physical location in the tissues after performing the Tissues Expression of Consciousness in the

Field Technique, it indicated to the researchers that a foreign energy was present in the physical body's tissue and was impeding the structure's consciousness from returning to its correct position. This foreign energy was dubbed as a "squatter". To release the squatter, the researcher raised the vibration of the tissue by connecting to it and, with intention, increased the vibrational frequency of the molecules in that tissue" (Mounce-Halasz, 2014). The vibration was raised by feeling and seeing the healthier higher vibration in the lesion and expanding it and rising the rest of the lower vibrations to the health vibration the body can give that day with unconditional love. "Once this vibration was raised, the foreign energy left and the healthy consciousness of the tissue returned to the physical body creating a feeling of balance within the tissue" (Mounce-Halasz, 2014).

6. Balance technique of the sacrum and the Angle of Louis (CEO).

7. Venous sinus drainage (CEO).

8. Shock imprints were found and treated. They were found as either a: local barrier like a second degree, kidney ptosis or SBS lesion; regional imprint, like a mono block; or global whole body barrier, that is impacted not just by the intensity of the impact but also becomes global because of severity of the state of the physiology during the time of impact. All three protocols were impacted or sometimes only one or two of the protocols were impacted. The shock imprints might be in: matter, due to a physical trauma; fluids such as a force vector in fluid that feels like Jell-O; or in some other realm from a different kind of shock like emotional, or past life. R1 and R2 used a modified Sutherland

question "What is preventing you from living in health?" to determine the impeding element preventing health.

9. A triangle shock imprint BRT technique was used by R1 and R2: the heart or thymus, spleen, and liver was frequently normalized by maintaining a BRT between these three structures by R1 and R2. All three were harmonized in all three protocols by releasing the trauma or barriers by removing the force vectors or by increasing the vibratory rate. This was followed by normalization of each individually in a still point, then normalization as a unit (triangle) with BRT into a still point while being held in a vibrational resonance until PRM was restored. The heart (center fulcrum of the being) was the first structure to be normalized, followed by the spleen (childhood trauma) and finally the liver (metabolic/inflammation).

10. 6^{th} Rib Shock Imprint Theory: According to Fulford, from Reich's writings, shock settles, regardless of the type of incident the body experiences, at the attachment of the 6^{th} rib on the left side of the xiphoid process and, in turn, pulls the diaphragm up and under the sternum limiting the diaphragm excursion, affecting the liver, spleen, lymphatic system and solar plexus functions.

Theory behind the Release: Once R1 released the link between the 6^{th} rib and the tissue holding the shock imprint, the shock imprint released which gave access to the tissue without the imprint.

Technique used: R1 used BRT between the 6^{th} rib on the left and the shock imprinted in tissue being treated to enable dissipation of the negative force (imprint) from its physical, fluidic and/or field location. The therapist holds onto the left 6^{th} rib which holds aspects of

the tissue's shock imprint and acts was an anchor to the tissue's shock imprint. Once that shock imprint releases from both the tissue and 6th rib and removed from the body the tissue was now accessible to be treated by conventional means.

11. Embryological lesions were found by the child's inner physician's tissue memory presenting the traumatic experience to the consciousness of R1 or R2. The tissue in lesion felt, in the hands and mind of the therapist, as an embryological form and development stage in memory. Sutherland's modified questions were used and the barrier was removed in P1, P2, and P3 allowing the PRM to be restored. The therapist was then pulled to normalize the tissue vibration in the morphogenic field restoring perfect morphology. This was shown to R1 from the patient's inner physician while hearing or mentally picturing the correct embryological motion and perfect morphogenic form from her own consciousness.

12. Coccyx, sacrum, pelvis, lumbar spine, abdomen listening with normalization (CEO and Sutherland's modified questions).

13. Sacrum evaluation and normalization (Magoun) (CEO, Pediatrics).

14. Visceral assessment and normalization (CEO).

15. Bilaterally unwinding of the adrenals from the iliacs (Philippe Druelle D.O., Advanced Pediatrics CEO).

16. Harmonisation of the solar plexus, by Viola Frymann D.O. (CEO, Autoregulation).

17. Linea alba technique by Fulford: using an anterior to posterior pressure and longitudinal (caudal to cranial) BRT with shock imprint release to the solar plexus. This also helps

re-center the child and release shock imprints from the round ligament which is a remnant of the umbilical cord (Dr. Centers).

18. Normalization of the central tendon and crus of the diaphragm techniques (CEO Intestines and Obstetrics respectively).

19. Thoracic spine, sternum and rib normalization (CEO with Sutherland's modified questions).

20. Dural rods/adhesion: normalized with BRT (Autoregulation, CEO).

21. Heart centering/normalization to ideal position of health, as it is the central fulcrum of the body.

22. Lung normalization (CEO and Sutherland's modified questions).

23. Cervical spine lesions: normalised with Still technique with specific attention to C2/C3 for its gateway to spiritual importance and inner physician to express spiritual insights.

24. Base expansion or decompression of the base by W. G. Sutherland (H. Magoun) technique to open the base (CEO).

25. Pneumatic decompression of the space C0/C1, sphenobasilar, and spheno-petrous and petro-basilar (CEO).

26. Foramen magnum technique (CEO).

27. Balancing of the asterions to affect the pineal gland by Philippe Druelle, D.O. (CEO, Autoregulation)

28. Normalization of spheno-petrous and petro-basilar from W.G. Sutherland (CEO).

29. De-rotation of the occiput squama technique (CEO).

30. Normalization of posterior fossa (EV4) with basilar artery variation by Philippe Druelle, D.O. (CEO, Autoregulation).

31. Specific cranial lesion patterns normalized (CEO and Sutherland's modified questions) followed by unwinding with BRT to the heart once the heart was centered (Druelle, Advanced Pediatrics).

32. Harmonization of the thalamic area by Philippe Druelle, D.O. (CEO, Autoregulation).

33. Harmonization of the pituitary area by W.G. Sutherland (CEO, Autoregulation).

34. Normalization of the endocranial membranes frontal-occipital technique (CEO).

35. Condyles/ alx cerebri normalization (Frymann) (CEO, Pediatrics).

36. Falx cerebelli/tentorium terebelli normalization (Magoun) (CEO, Pediatrics).

37. Upper and lower extremity fascial unwinding with heart as the reference point (Druelle, Advanced Pediatrics).

38. IntraOral technique I (CEO: suture de-compaction of premaxilla-maxilla, maxilla-palatine, palatine-pterygoid, intermaxillary, and vomer/ethmoid release).

39. IntraOral II jaw (TMJ) (CEO: the 4 TMJ suspensory ligaments reciprocal tension release).

40. Zygoma normalization, normalization of the sphenopalatine ganglion, frontal-sphenoid de-compaction, and sphenosquama suture releases.

41. Orbital Technique (CEO: normalization of orbit and posterior quadrant); and then re-evaluate.

42. Orbital Technique, as taught by Viola M. Frymann, D.O. Before considering local treatment, always evaluate the whole patient and the whole cranium.

    A. V-spread to fronto-nasal articulation. For the left fronto-nasal articulation, cradle the occiput in the right hand and direct cerebrospinal fluid from the margin of the foramen magnum just to the right of the mid-line with the index or middle finger to the V created by the left index finger on the nasal bone and the middle finger on the frontal in close approximation to the edges of the suture. Maintain slight separation of the nasal and frontal fingers while fluid is directed until a sudden “softening” and inherent motion are palpated between the nasal and the frontal. Repeat on the right side.

    B. Flexibility and the physiologic motion at the metopic suture should be assured. The falx is attached on its interior surface. Place the pads of the left fingers on the frontal bone just to the left of the mid-line. Direct fluid from the supraocciput with the right hand just to the right of the mid-line of the occiput. Maintain until “softening” and inherent motion is palpable. Repeat on the opposite side.

    C. Compression of the naso-maxillary suture is not uncommon. In my experience, it is much more common on the left side. Is this due to the right-handed adversary’s blow

on the left cheek? Release this with v-spread; index finger on the nasal, middle finger on the ascending process of the maxilla and fluid direction from the occipital squama just to the opposite side of the mid-line. The orbit is then treated as a unit, as a cone, the circumference of the base of the cone being accessible to the palpating fingers and the apex of the cone projected as a line of force to the opposite occiput. When treating the left orbit, cradle the right posterior quadrant of the head in the right hand while grouping the fingertips of the left hand on the borders of the circumference of the orbit, e.g. the thumb and index finger on the frontal, the middle finger on the maxilla and the 4th and 5th on the zygoma. Gently evaluate the clockwise or counter-clockwise rotation of the circumference of the orbit. Follow it in the direction it moves more freely and hold it there until it suddenly "softens" and assumes easy, gentle rhythmic inherent motion. Repeat on the other side. (H. King, personal communication, June 26, 2017).

43. A technique from Dr. Frymann, originating from Sutherland, was used as well. The therapist, at the head of the patient, placed one hand on the left occipital mastoid in a V spread and on the opposite side (right) a spread over the orbit. These oblique lines cross in the sella turcica and have an action on the pituitary gland. Repeated on the other side.

44. Normalization of petrous via the eye orbit for a child: As taught by Philippe Druelle, D.O. The head is positioned at a 45-degree angle to the right. Gently contact the right petrous with a modified temporal hold, index finger not in the external acoustic meatus. The 4th and the 5^{th} fingers are along the mastoid process to monitor the place of petrous portion. The left hand is placed on the opposite side on the frontal or orbit or globally and a soft gentle compression is used to get Still points and to remove strains and intra-

osseous lesion. It is very good for vascularisation of the brain and carotid. In the second part of the technique the middle finger is placed in the auditory tube for normalization. Then turn the head to the left at 45 degrees. The left hand that is on the left eye orbit moves to the left mastoid to send fluid from here to the right petrous carotid canal opening to liberate the internal carotid artery. Repeat on the other side.

45. Normalization of the ANS structures and endocrine system individually and then to promote dynamic coherence between the systems using indirect techniques by R1 and R2 such as:

    A. Normalization of the SNS with various techniques such as: foramen magnum technique for the SCG; rib raising to normalize the sympathetic ganglion, indirect normalization of the impar ganglion through coccyx normalization.

    B. Normalization of the PSNS with various techniques such as: liberating the vagus nerve pathway, CV4 passive, and posterior fossa with normalization the brain stem.

    C. Endocrine system normalization with autoregulation techniques (CEO, Autoregulation).

    D. Restoring dynamic coherence between the PSNS and SNS systems by indirect techniques. Indirect techniques such as: CV4; SPG normalization; and solar plexus normalization.

    E. Restoring dynamic coherence between the ANS and endocrine system by using indirect techniques that impact the pineal gland and hypothalamus. Indirect techniques such as: zygoma lift or asterion normalization to normalize the pineal

gland. autoregulation. HPA axis normalization was done using Sutherland's modified questions as a group and then restoring their consciousness first followed by holding them in a vibrational resonance until PRM returned in each and was synchronized. Hypothalamus normalization was done using Sutherland's modified questions and then offering a health fulcrum waiting for PRM to return.

46. Restored three fulcrums which make a triangle that controls the whole being. The three points of contact were: the physical ethmoid crista galli; the etheric field Sutherland axis on the straight sinus; and the light of divine mind that centers over the pineal gland (Fulford, 2003). R1 used Sutherland's modified questions with one hand on the ethmoid crista galli and the other on inion to connect to the straight sinus and light of the divine mind centered over the pineal gland. The position was felt, the barrier removed by increasing the vibratory rate and then they were all held in a vibrational resonance until PRM was restored.

47. Integrate with pharyngeal arches normalization, Philippe Druelle D.O. Therapist sat at the side of the patient’s head who was lying supine. There are 7 steps to normalize using a volumetric Hoover and R1 supplemented with Sutherland's modified questions. The bottom hand remains in a horizontal occiput volumetric hold for normalization of all 7 steps. The top hand is placed on one of the 7 following positions: step 1 is a preparation, engage with a frontal lift hold; step 2 is a preparation, engage both zygoma; step 3 which addresses arch 1, engage the maxilla bilaterally; step 4 which addresses arch 1, engage the mandible bilaterally; step 5 is arch 2, engage middle upper hyoid; step 6 is arch three, engage lower hyoid; and step 7 arch 4, engage the thyroid and cricoid. The top hand dialogues with the hand on the occiput volumetrically, normalizing with a Hoover on a

membranous level while at the same time on the contents of the liquid and brain. This will impact the vascular tree and touch the physical, mental and emotional levels (P. Druelle, personal communication, January 21, 2018). The arches are the support networks of the cranium. The central chain can be accessed through the arches to re-establish a central organization coherence for the body. This will also balance the membranes (tissue frame) versus fluids restoring the pressure mechanism. The endocrine system is impacted too, specifically, the pineal gland via the zygoma, and pituitary via the mandible. It will also work the emotional and social being adaptations restoring the True Nature of the child through the face (Forget, 2017).

48. Global body unwinding: to reconstitute the continuity of the facial body plus indirect somatoemotional release work. R1 spent time helping the children restore their biotensegrity of the body from the feet with fascial unwinding to the pancreas and T9, the resulting myofascial pivot point. The fascial body provides biotensegrity (described as living matter), distribution of load properties with factorization (because the fascial body continuously changes its position and is not stable or fixed, the fascia continues to modify), and microvacuoles (filled with fluid). The children were showing R1 a pattern to normalize their fascia model with biotensegrity, factorization and microvacuoles. The fascia has piezoelectric properties with big crystals that have a semi conductive facial structure. The piezoelectric property is distributed throughout the fascial network and this network is under constant compressive and separation forces changing our charges or modifying our polarity and this plays between the relationship of the fascial matrix and the vibrational body. The vibrational body with the field and energy distribution all play with this semiconductor of collagen matrix/fascial network which gives the

piezoelectric property. Therefore, under stretch and compression forces we emitted fields (Forget, Auto-regulation, 2017). R1's consciousness brought forth these thoughts from the words of a Forget lecture while treating this unwinding pattern watching the reconnecting levels from fascia to fields when she contacted their 2nd cuniform. This pattern unfolded starting at the feet while holding the second cuneiform with fascial unwinding to T9, though the pyramids of lines of gravity, 3 diaphragms, to the bands of the cranium (RTM and pharyngeal arches) back to T9 and the pancreas. The pattern was completed when the lemniscate retuned in all three protocols with no breaks in the pattern.

49. Open the gates and clear the path: was a meditation session with R1 and R2 receiving the messages of open the gates and then clear the path. This instructed R1 and R2 to normalize: OM; C0/2/3 with specific intention to C3 normalization. Then to increase the potency of the CSF with a CV4; posterior fossa; and lateral ventricles techniques. Followed by normalization of any Dural rods with BRT and then filling the neural grooves of the spinal cord with CSF, using number 48 technique, taught by the CEO. Frequently R1 and R2 followed with number 45.

50. Parenchymal normalization: CEO techniques and R1 and R2 focused on specific cellular level such as mitochondria and normalization. R1 and R2 normalized specific cellular levels by expanding a healthy cell and increasing the number of healthy cells to provide a fulcrum for other cells to find health. This will be followed by a cascade of healthy cells while increasing the vibratory rate at the brain and/or liver cellular level until the PRM is restored.

51. Central chain (CC) integration 4 sequencing normalization (CEO, Autoregulation): Example: heart unwind about fixed reference T4, unwind T4 about fixed reference the heart, then balance the volume T4 to heart, then balance volume around CC beam. This can be done at all slices of CC and was done on many of them with the children.

52. Harmonization of the longitudinal and transversal expression components of the PRM applied to cranial spheres (cord normalization) (CEO, Autoregulation).

53. Normalization of the lateral ventricles by Philippe Druelle, D.O. (CEO, Autoregulation).

54. Normalization of the cerebral hemispheres by Philippe Druelle, D.O. (CEO, Autoregulation).

55. Heart Centred Therapy was used which required R1 or R2 to dialogue with the inner physician or the consciousness of the patients verbally, out loud, to expand places that had the lack of: joy (spleen, sadness to joy); love (liver, anger to love); bravery (kidney, fear to bravery); celebration (lung, grief to celebrate); compassion (heart, insensitive to compassion). The health was always focused on and expanded. For example, if the subject had anger, R1 would expand where the subject had a lack of love (anger). As well, verbal dialoguing questions were used like: “what makes you joyful?”; “what make you feel happy?”; “what have you done in life that you loved?”; “ what have you done in life that you have celebrated?’; “what have you done in life that has made you happy and sad at the same time, to increase compassion?” Using the mental memory answer to these questions, the subjects would focus on that memory and R1 and R2 would expanded that memory to expand that feeling to help improve the health in the tissue being treated. Open ended questions were used for the subjects to find their own meaning

and health without R1 leading them to a word or providing the answer. The subjects found the temporary fulcrum provided to them by R1 and R2, and were more readily able to restore their own. This allowed the subjects to empower themselves with their own sense of self towards health. The question “What If” was used to invoke a necessary change towards health; however, it was used as a last resort skill. This approach was used when the subjects’ inner physician and higher consciousness of the subject and or higher consciousness of R1/R2 provide the insight.

56. Heart- Spirit technique (CEO).

57. Dr. Sutherland’s three questions: "Perceive how these tissues are living? How would they like to live? What is preventing them from doing so?" were modified and used continuously throughout the assessment and treatment to determine the posture, the impeding element preventing health, and the position of health of each lesion (Druelle, 2006).

The assessment will have included the CEO methodology of assessment along with the additional methods stated in order to fully evaluate the state of the child. Therefore, the assessed lesions/restrictions will be treated in order of priority for that child’s needs and listed according to the CEO methodology:

Vitality

Compactions/Inter and intra osseous lesions

Scars

Non-physiological lesions without respect to axis

Non-physiological lesions with respect to axis

Physiological lesions

Restriction

An osteopathic assessment was conducted and recorded in the first session, and reassessed during the last session. A complete description of the researcher's and Andrea Mounce-Halasz, D.Sc.O., ways of working in the HEF can be found below.

Researcher's Approach

Working in the HEF for me is first connecting to my own sense of self and belief, in order to stay neutral and open. Then allowing my true sense of self to enter the limitlessness of the horizon found in Buddhist mediation called the Garuda. This for me opens the gates of the mind, body and spirit while staying as a whole connected. Connecting my mind with my heart at the thymus region (heart chakra entry point), feeling grounded but connected to the higher self, GOD's wisdom, spiritual consciousness.

Then it is to connect to the patient's true belief and sense of self in their thymus region, which is the heart chakra entry point. Now we are both in awareness and connected with our true sense, inner wisdom and higher wisdoms.

Now I listen with my hands, heart, ears, mind and eyes. I ask the patient's body to show me the dance of what they need to help them find their heath. Where do they need me to go? I go to where the fascia or fluids take me depending on the layer the body showed me (Barral Fascial pull). Then I ask my modified Sutherland questions: "Where are you living? Where would you like to live for health? What is impeding you from living there?" I listen to feel

the body float into its posture, then I'm waiting for it to show me energetically its position of health, but I do not take it there. I allow the body to show me what is impeding it from getting to health on a physical/structural/anatomical level, on a fluidic anatomical level, and then on an energetic level. The energetic level is found by proposing a field level, and then whatever level in the field that allows the physical structure to accept the new fulcrum of health is the level of field chosen. This new fulcrum accepted by the body becomes an active fulcrum. The active fulcrum is created (by your proposal) and then the life force or Long Tide can move across this fulcrum and from the fulcrum to correct the osteopathic lesion. The fulcrum takes on a life of its own, as evidenced by its ability to automatically shift, called automatic shifting fulcrum, when it needs to, in order to complete the restoration of health to the tissues and the elimination of the forces holding the osteopathic lesion in place. I'm supporting the body so its own internal auto regulation of cerebrospinal fluid (CSF) and external HEF force (life force) is able to overcome the force of the lesion to correct the physical structure, fluidic lesion, and energetic trauma back to health for that patient. It is the physical response of the Still Point or Long Tide that tells me I'm in the correct layer of human energy field. I continue this dance while the patient's body fascia, fluids, and/or energetic field pushes or pulls me to new places to find the health of the structure within the lesions the patient wants treated that day.

Andrea Mounce-Halasz D.Sc.O. and Jennifer Williamson BSc PT & MSc PT Approach

Working in the fields, they addressed:

1) Examination of the Whole HEF

    a. electromagnetic fluid movement and light of each field layer

b. Sutherland's modified question "where are you living?" may take you to the HEF where the researchers use inhibition testing to determine the correct field level. Example: once you have found a physical structure (diaphragm under extreme tension with anxiety) in an osteopathic lesion that needs more health in your hands, you then ask that structure "where are you living?" If it is consciousness presented in the HEF, your mind will be pulled to the HEF and the physical structure will increase in the physical PRM within your hands. You then can access with intention the different layers of the HEF and, through inhibition, access the correct layer. Inhibition testing in the field was done by having the hands on the physical structure in lesion while testing with intention of the mind the different field layers. The correct field layer will give the best PRM in the physical structure that resides in your hands. The consciousness of the tissue had to be restored first in the physical. Then, typically, the health shown in P1 and P3 was used to optimize the healthiest posture, but occasionally the practitioner had to focus on one protocol layer longer for the health to present while the other two had already found health, fine tuning of parameters occurred in all three protocols as the structure fluctuated its health reference in each of the different protocols. This was the balance point dialoging, until the Still point arrived, following that the long tide was observed and normalization occurred. During inhibition, the osteopath received feedback from the tissues in the form of an increase or more harmonious PRM within their hands. Inhibition was performed by entering into the chosen palpation protocol with the mind and the hands. The improved response in the tissues was confirmation that the body had accepted the osteopath's proposal of this new fulcrum offered. Once the body picked the

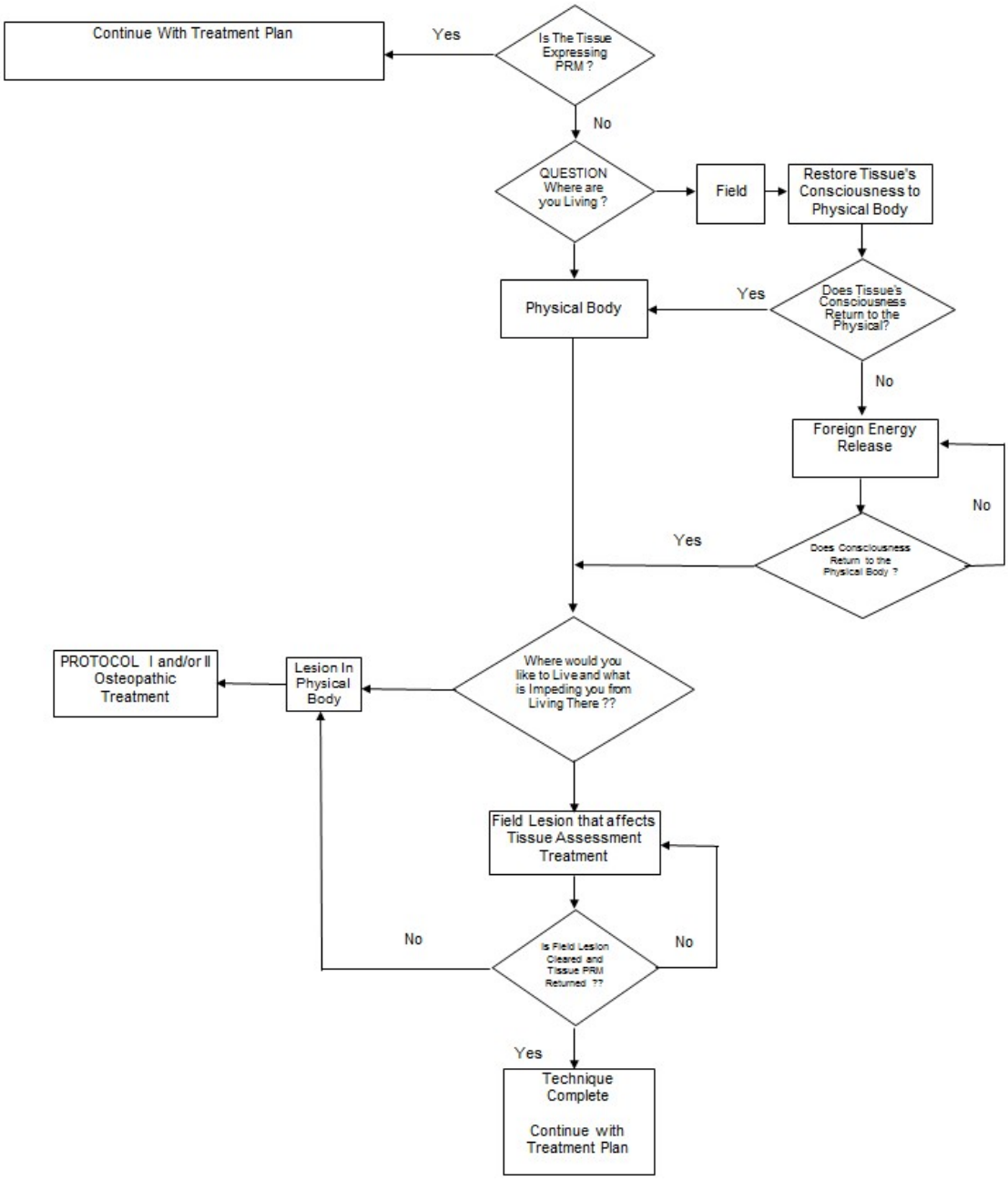
proposed fulcrum it was perceived as the deepest balance point possible. The structure organized around the new fulcrum to find the Still point, building the largest swell or long tide which is the life force normalizing the structure.

2) Specific manifestations in dysfunction within the Chakra system.
    a. beginning at the root to crown
    b. Alta Major Chakra (Karmic lessons and past life)
    c. Higher self
3) Specific blockages (that may be physical, psychological or spiritual) by dialogue with the unconscious mind to release emotions and restrictions from the time line (past life, between lives, pre-life, and present life).
    a. This may be done with dialogue, verbal or non-verbal, with child and in some instances, may involve treatment of family genealogy, past life, etc., and involve family, constellation work or Ho'opono.
4) Morphogenic: where genetic and epigenetic issues exist (oscillatory waveform)
5) Life Field: as consciousness
6) Breath of Life: life force expression in many different forms from quantum particles, waves, fluidic to PRM.
7) Chaotic Field (CF): is another dimension that the children's Life Field was connected to and their consciousness resided in. Utilizing Sutherland's question "where are you

living?", the researchers followed the imprinted lesion of the consciousness in a spiral motion, like the eye orbit and petrous bone technique, taking them to the chaotic field to restore the consciousness. The practitioners used Sutherland's questions and functional approach to allow the consciousness lesion pattern to reveal itself removing the lesion imprint of the consciousness. The consciousness of lesion's pattern and frequency follows the energetic pattern till it retrieves all of its lost consciousness in the CF and this removed the imprint of the lesion from the consciousness. It then returns to the physical; presenting a physical lesion to be treated in all three protocols. This is similar to the Sutherland concept of going into the ease to remove the imprint.

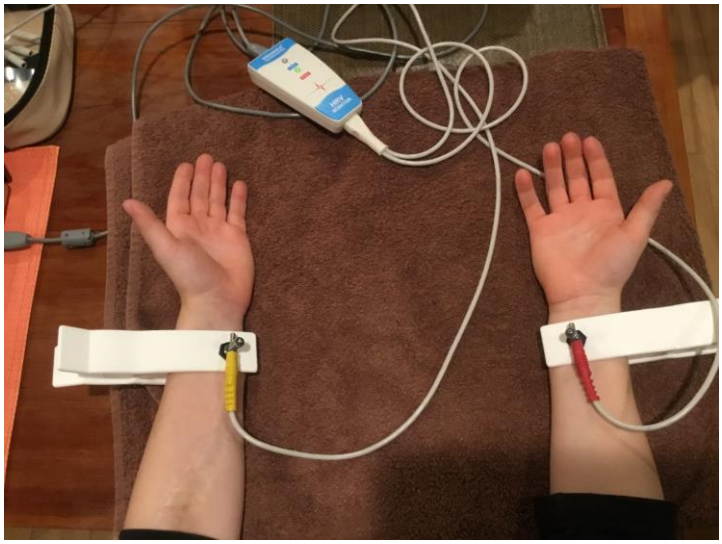
8) A chakra lamp was used to illuminate the room with the appropriate lighting, enhancing the correct EMF level for healing.

ASSESSMENT AND TREATMENT PLAN

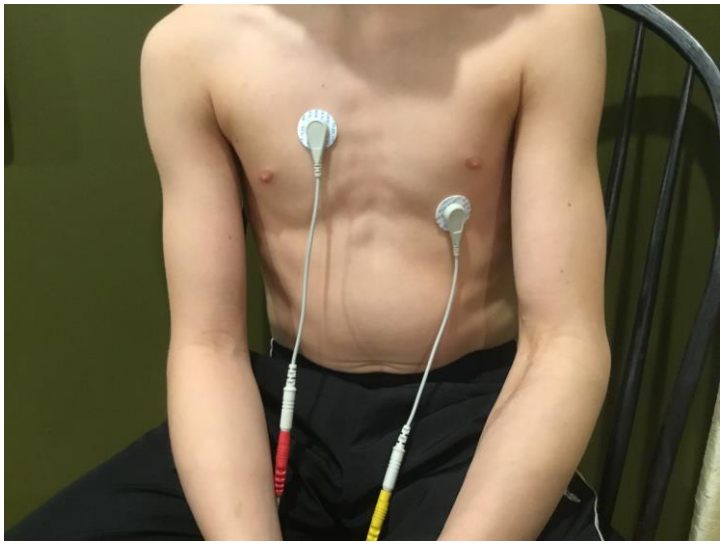


APPENDIX J. Clamps & Pigtails

Clamps



Pigtails



APPENDIX K. WMA Declaration of Helsinki

WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects

Adopted by the 18th WMA General Assembly, Helsinki, Finland, June 1964
and amended by the:
29th WMA General Assembly, Tokyo, Japan, October 1975
35th WMA General Assembly, Venice, Italy, October 1983
41st WMA General Assembly, Hong Kong, September 1989
48th WMA General Assembly, Somerset West, Republic of South Africa, October 1996
52nd WMA General Assembly, Edinburgh, Scotland, October 2000
53rd WMA General Assembly, Washington DC, USA, October 2002 (Note of Clarification added)
55th WMA General Assembly, Tokyo, Japan, October 2004 (Note of Clarification added)
59th WMA General Assembly, Seoul, Republic of Korea, October 2008
64th WMA General Assembly, Fortaleza, Brazil, October 2013

Preamble

1. The World Medical Association (WMA) has developed the Declaration of Helsinki as a statement of ethical principles for medical research involving human subjects, including research on identifiable human material and data.

The Declaration is intended to be read as a whole and each of its constituent paragraphs should be applied with consideration of all other relevant paragraphs.

2. Consistent with the mandate of the WMA, the Declaration is addressed primarily to physicians. The WMA encourages others who are involved in medical research involving human subjects to adopt these principles.

General Principles

3. The Declaration of Geneva of the WMA binds the physician with the words,

"The health of my patient will be my first consideration," and the International Code of Medical Ethics declares that, "A physician shall act in the patient's best interest when providing medical care."

4. It is the duty of the physician to promote and safeguard the health, well-being and rights of patients, including those who are involved in medical research. The physician's knowledge and conscience are dedicated to the fulfilment of this duty.

5. Medical progress is based on research that ultimately must include studies involving human subjects.

6. The primary purpose of medical research involving human subjects is to understand the causes, development and effects of diseases and improve preventive, diagnostic and therapeutic interventions (methods, procedures and treatments). Even the best proven interventions must be evaluated continually through research for their safety, effectiveness, efficiency, accessibility and quality.

7. Medical research is subject to ethical standards that promote and ensure respect for all human subjects and protect their health and rights.

8. While the primary purpose of medical research is to generate new knowledge, this goal can never take precedence over the rights and interests of individual research subjects.

9. It is the duty of physicians who are involved in medical research to protect the life, health, dignity, integrity, right to self-determination, privacy, and confidentiality of personal information of research subjects. The responsibility for the protection of research subjects must always rest with the physician or other health care professionals and never with the research subjects, even though they have given consent.

10. Physicians must consider the ethical, legal and regulatory norms and standards for research involving human subjects in their own countries as well as applicable international norms and standards. No national or international ethical, legal or regulatory requirement should reduce or eliminate any of the protections for research subjects set forth in this Declaration.

11. Medical research should be conducted in a manner that minimises possible harm to the environment.

12. Medical research involving human subjects must be conducted only by

individuals with the appropriate ethics and scientific education, training and qualifications. Research on patients or healthy volunteers requires the supervision of a competent and appropriately qualified physician or other health care professional.

13. Groups that are underrepresented in medical research should be provided appropriate access to participation in research.

14. Physicians who combine medical research with medical care should involve their patients in research only to the extent that this is justified by its potential preventive, diagnostic or therapeutic value and if the physician has good reason to believe that participation in the research study will not adversely affect the health of the patients who serve as research subjects.

15. Appropriate compensation and treatment for subjects who are harmed as a result of participating in research must be ensured.

Risks, Burdens and Benefits

16. In medical practice and in medical research, most interventions involve risks and burdens.

Medical research involving human subjects may only be conducted if the importance of the objective outweighs the risks and burdens to the research subjects.

17. All medical research involving human subjects must be preceded by careful assessment of predictable risks and burdens to the individuals and groups involved in the research in comparison with foreseeable benefits to them and to other individuals or groups affected by the condition under investigation.

Measures to minimise the risks must be implemented. The risks must be continuously monitored, assessed and documented by the researcher.

18. Physicians may not be involved in a research study involving human subjects unless they are confident that the risks have been adequately assessed and can be satisfactorily managed.

When the risks are found to outweigh the potential benefits or when there is conclusive proof of definitive outcomes, physicians must assess whether to continue, modify or immediately stop the study.

Vulnerable Groups and Individuals

19. Some groups and individuals are particularly vulnerable and may have an increased likelihood of being wronged or of incurring additional harm.

All vulnerable groups and individuals should receive specifically considered protection.

20. Medical research with a vulnerable group is only justified if the research is responsive to the health needs or priorities of this group and the research cannot be carried out in a non-vulnerable group. In addition, this group should stand to benefit from the knowledge, practices or interventions that result from the research.

Scientific Requirements and Research Protocols

21. Medical research involving human subjects must conform to generally accepted scientific principles, be based on a thorough knowledge of the scientific literature, other relevant sources of information, and adequate laboratory and, as appropriate, animal experimentation. The welfare of animals used for research must be respected.

22. The design and performance of each research study involving human subjects must be clearly described and justified in a research protocol.

The protocol should contain a statement of the ethical considerations involved and should indicate how the principles in this Declaration have been addressed. The protocol should include information regarding funding, sponsors, institutional affiliations, potential conflicts of interest, incentives for subjects and information regarding provisions for treating and/or compensating subjects who are harmed as a consequence of participation in the research study.

In clinical trials, the protocol must also describe appropriate arrangements for post-trial provisions.

Research Ethics Committees

23. The research protocol must be submitted for consideration, comment, guidance and approval to the concerned research ethics committee before the study begins. This committee must be transparent in its functioning, must be independent of the researcher, the sponsor and any other undue influence and must be duly qualified. It must take into consideration the laws and regulations of the country or countries in which the research is to be performed as well as applicable international norms and

standards but these must not be allowed to reduce or eliminate any of the protections for research subjects set forth in this Declaration.

The committee must have the right to monitor ongoing studies. The researcher must provide monitoring information to the committee, especially information about any serious adverse events. No amendment to the protocol may be made without consideration and approval by the committee. After the end of the study, the researchers must submit a final report to the committee containing a summary of the study's findings and conclusions.

Privacy and Confidentiality

24. Every precaution must be taken to protect the privacy of research subjects and the confidentiality of their personal information.

Informed Consent

25. Participation by individuals capable of giving informed consent as subjects in medical research must be voluntary. Although it may be appropriate to consult family members or community leaders, no individual capable of giving informed consent may be enrolled in a research study unless he or she freely agrees.

26. In medical research involving human subjects capable of giving informed consent, each potential subject must be adequately informed of the aims, methods, sources of funding, any possible conflicts of interest, institutional affiliations of the researcher, the anticipated benefits and potential risks of the study and the discomfort it may entail, post-study provisions and any other relevant aspects of the study. The potential subject must be informed of the right to refuse to participate in the study or to withdraw consent to participate at any time without reprisal. Special attention should be given to the specific information needs of individual potential subjects as well as to the methods used to deliver the information.

After ensuring that the potential subject has understood the information, the physician or another appropriately qualified individual must then seek the potential subject's freely-given informed consent, preferably in writing. If the consent cannot be expressed in writing, the non-written consent must be formally documented and witnessed.

All medical research subjects should be given the option of being informed about the general outcome and results of the study.

27. When seeking informed consent for participation in a research study the physician must be particularly cautious if the potential subject is in a dependent relationship with the physician or may consent under duress. In such situations the informed consent must be sought by an appropriately qualified individual who is completely independent of this relationship.

28. For a potential research subject who is incapable of giving informed consent, the physician must seek informed consent from the legally authorised representative. These individuals must not be included in a research study that has no likelihood of benefit for them unless it is intended to promote the health of the group represented by the potential subject, the research cannot instead be performed with persons capable of providing informed consent, and the research entails only minimal risk and minimal burden.

29. When a potential research subject who is deemed incapable of giving informed consent is able to give assent to decisions about participation in research, the physician must seek that assent in addition to the consent of the legally authorised representative. The potential subject's dissent should be respected.

30. Research involving subjects who are physically or mentally incapable of giving consent, for example, unconscious patients, may be done only if the physical or mental condition that prevents giving informed consent is a necessary characteristic of the research group. In such circumstances the physician must seek informed consent from the legally authorised representative. If no such representative is available and if the research cannot be delayed, the study may proceed without informed consent provided that the specific reasons for involving subjects with a condition that renders them unable to give informed consent have been stated in the research protocol and the study has been approved by a research ethics committee. Consent to remain in the research must be obtained as soon as possible from the subject or a legally authorised representative.

31. The physician must fully inform the patient which aspects of their care are related to the research. The refusal of a patient to participate in a study or the patient's decision to withdraw from the study must never adversely affect the patient-physician relationship.

32. For medical research using identifiable human material or data, such as research on material or data contained in biobanks or similar repositories, physicians must seek informed consent for its collection, storage and/or reuse. There may be exceptional situations where consent would be impossible or impracticable to obtain

for such research. In such situations the research may be done only after consideration and approval of a research ethics committee.

Use of Placebo

33. The benefits, risks, burdens and effectiveness of a new intervention must be tested against those of the best proven intervention(s), except in the following circumstances:

Where no proven intervention exists, the use of placebo, or no intervention, is acceptable; or

Where for compelling and scientifically sound methodological reasons the use of any intervention less effective than the best proven one, the use of placebo, or no intervention is necessary to determine the efficacy or safety of an intervention

and the patients who receive any intervention less effective than the best proven one, placebo, or no intervention will not be subject to additional risks of serious or irreversible harm as a result of not receiving the best proven intervention.

Extreme care must be taken to avoid abuse of this option.

Post-Trial Provisions

34. In advance of a clinical trial, sponsors, researchers and host country governments should make provisions for post-trial access for all participants who still need an intervention identified as beneficial in the trial. This information must also be disclosed to participants during the informed consent process.

Research Registration and Publication and Dissemination of Results

35. Every research study involving human subjects must be registered in a publicly accessible database before recruitment of the first subject.

36. Researchers, authors, sponsors, editors and publishers all have ethical obligations with regard to the publication and dissemination of the results of research. Researchers have a duty to make publicly available the results of their research on human subjects and are accountable for the completeness and accuracy of their reports. All parties should adhere to accepted guidelines for ethical reporting. Negative and inconclusive as well as positive results must be published or otherwise made

publicly available. Sources of funding, institutional affiliations and conflicts of interest must be declared in the publication. Reports of research not in accordance with the principles of this Declaration should not be accepted for publication.

Unproven Interventions in Clinical Practice

37. In the treatment of an individual patient, where proven interventions do not exist or other known interventions have been ineffective, the physician, after seeking expert advice, with informed consent from the patient or a legally authorised representative, may use an unproven intervention if in the physician's judgement it offers hope of saving life, re-establishing health or alleviating suffering. This intervention should subsequently be made the object of research, designed to evaluate its safety and efficacy. In all cases, new information must be recorded and, where appropriate, made publicly available.

APPENDIX L. Statistician's Credentials

Dr. Beth Bruce
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December 13, 2016

RE: Data Analyses

To whom it may concern,

I am pleased to provide approval of the statistical analyses plan of this thesis. I can confirm that I will be completing the data analyses for this study conducted by Jennifer Williamson and that she is permitted to use the analyses. If I may provide any further details, I would be pleased to do so.

Sincerely,

Beth Bruce

Beth Bruce, BScN, MN, PhD

APPENDIX M. Testimonials

Subject 2's father: Our son had a succession of treatments at the Chester Physio clinic. The positive results were not readily noticed but after 2 or so osteopath treatments my wife and myself both noticed a positive result from these treatments. Our son had more energy. Less aggression. And an overall "levelling out" of his overall persona. He had less body pain and was able to stay attentive and connected more so than we previously observed. He had much better progress at school as well. When the treatments ended we noticed an almost immediate negative change in him. He was not as attentive and more combative. We have resumed his treatments and he is responding favorably. If there any questions or such, please don't hesitate to contact us. Sincerely, Shawn and Tanya Henderson

Subject 3's mother: During our initial 8 treatments, our son had noticeable behavior improvements, he was less agitated and more agreeable. He also showed improvement in his toileting skills, notably fewer accidents. Most recently, with continued treatments, his conversational skills have sky-rocketed!! Much more spontaneous speech. We are thrilled!

Subject 4's mother: My son has been receiving treatments from Jennifer since July of this year. Since starting treatments, the improvements that myself, family and my son's professional team have notice in him are quite amazing. My son is now: more engaged; his eye contact has improved tremendously; his immune system has improved; his sleep habits have improved; he is starting to be able to be around his peers and being able to play with peers; he is better at regulating himself when it comes to his emotions and behaviors; he also has decreased the

amount of sensory seeking he does in a day; and presently he is non-verbal, but since starting treatments, we have heard him say words and his receptive language is improving. Thank you, Jennifer.

Subject 5's mother: we have noticed that our son started to have bowel movements a lot more regularly after a few treatments and a noticeable improvement with his attitude in general. He started to be a lot more compliant with requests and was more willing to go outside and play instead of being on the computer for hours at the time. We are very pleased with all those improvements.

Subject 6's mother wanted me to write how she felt after she verbally told me. She felt even though he did not make much change with the data from the 3 different measuring tools, figuring out that he is so hyper-sensitive to bullying that it is resulting in his extreme anger (for his defence), was very helpful to her. Understanding that he regulates his body with hormones excessively the majority of the time was very helpful. She felt she had a better understanding of the whole picture to helped her understand her child more. She got more help finally from the school and other medical professional because of understanding her son and Jennifer Williamson explaining it to the school's ASD team. She felt he made some gains as: he misses Jennifer Williamson and wants to come back for treatments; respects the clinic and won't destroy it; and, during treatments, he finally let Jennifer Williamson treat him as he wanted to improve himself where before he did not want to change. He also was able to communicate with Jennifer Williamson how he truly felt inside which no one was able to do yet, not even his mom.

Subject 7's mother: My child has been going to see Jennifer for several weeks for treatment, it has helped him in many ways. The biggest difference I have noticed would be emotionally. By him being treated his emotions are more balance he is doing much better with being able to regulate his emotions himself along with recognizing that crying isn't the only emotion he has. My child had also taken a huge leap with his communication skills, he is able to communicate with us (his parents) more with what his wants and needs are as opposed to just crying and screaming or throwing himself on the floor when he needs something. My child has also been diagnosed with a sensory processing disorder, which means he is very sensitive to touch and textures. He did not like being touched and was not affectionate. With several treatments, I have seen a difference with this he lets Jennifer touch his head, neck, back and stomach to do the treatments and had become more affectionate with his parents and close family members along with Jennifer. I feel that the treatments helped my child in such a positive way that we have continued to see Jennifer on our own.

Subject 8's mother: My 13-year-old son was diagnosed with ADHD shortly after his fifth birthday and with ASD when he was 11. He has struggled with emotional regulation, sensory sensitivities, boundaries, hyperactivity, making transitions and impulsivity his whole life. After having received a series of osteopathic treatments with Jennifer Williamson, MSc, BSc PT, and Andrea Mounce-Halasz, D.Sc.O., I have noticed he is calmer, and better in control of his emotions. Others have commented that he seems more "mature". He also seems to be having an easier time with transitions. Getting out of the house to school in the mornings is less of an ordeal than it used to be and unlike the previous year we are almost never late. I plan to continue with more Osteopathy treatments with these two great therapists in the future.

Subject 9’s mother: Since starting treatment we saw improvements in regard to her mood with less tantrums, more agreeable, less confrontational. Reports from school also indicated that her attention and focus have been better this term. She relied less on her chewlery (at least at home) and we did not have to constantly speak to her about having things (objects, toys etc.) in her mouth.

APPENDIX N. History and Treatment Highlights of Each Subject

Subject 1 was an 11-year-old boy born April 13, 2006 at 39 weeks. He was diagnosed with ASD at age three. His history and treatment highlights are not included as he chose not to complete the study after the third treatment.

Subject 2 was a 13-year-old boy born January 2, 2004 at 41 weeks. He received no therapies other than medication. He was diagnosed with ASD and Attention Deficit Hyperactivity Disorder (ADHD) by a Bridgewater South Shore Mental Health psychiatrist and psychologist at age five, and was diagnosed with Tourette's syndrome at age 5-6 by Dr. Dooley at the IWK (Neurologist). His mother noticed issues beginning at age 4 when he started hitting after seeing another boy at daycare (diagnosed with ASD) hitting, and after his great-grandmother's death. His mother had no miscarriages and no fertility issues. At age 25, his mother was pregnant for 6-8 weeks before she realized she was pregnant. She got married during this timeframe and consumed alcohol on her wedding night as she did not realize she was pregnant. She had an uneventful pregnancy and experienced no overall illness or morning sickness. The labour was 12 hours and delivered naturally; no medication was used to reduce pain. She hemorrhaged after delivery, as the placenta would not deliver because the cord was short. Subject 2's APGAR was 10 out of 10. She experienced postpartum depression, which was not treated. She nursed for 3 weeks but then stopped due to mastitis. Subject 2 had a difficult time suckling during nursing and had colic. Commencing at 2 months, he experienced recurring otitis requiring antibiotics; at age 5-6 tympanostomy tubes were inserted in both ears. Once the tubes were in place he did not have

further episodes of otitis. The tympanostomy tubes fell out by age 8. Subject 2 was very easy to teach proper control of his bladder and bowel but had trouble with constipation once he started to toilet train from 18 months to 2 years old. He was circumcised at age 3 as he had ballooning of the foreskin due to him having a small orifice for urination. He fell out of his crib at 8-9 months and hit his head. He lacked coordination and balance as a child, especially hand and eye coordination. He experienced emotional trauma at age three when he lost his great-grandfather, uncle and great-grandmother in an eight-month period. The mother became very depressed and had to go on antidepressants. At this time, Subject 2 began hitting himself, others, and objects which he continued to do up to these osteopathic treatments. He had a serious fall at age 9-10 years old where he stepped backwards into a hole falling four feet onto his coccyx. At age 12, he slipped on a round piece of wood and had a strain/sprain of the tissue surrounding the left 5^{th} metatarsal. The 5th metatarsal is associated with the bladder meridian and male fear according to traditional Chinese medicine. He experienced no delays in his developmental milestones.

Subject 2 started medication at age five, and was on Risperdal or Risperidone, but had problems with fluctuating weight on this medication. At age 6, he started on Abilify 30 mg at night, and then at age 8-9 he started to take Vyvanse am pill 50 mg for CNS control in the morning. Age 11, he started to take Clonadine 0.1 mg am and 0.2 mg at night for his ADHD. He also started Zoloft 50mg, at age 11, for OCD and anxiety at night. In his family history, his father had ADHD as a child and was hyperactive. Subject 2 had signs and symptoms consisting of: weight gain, fatigue, hyperactivity, increase and decrease of appetite, depression, anxiety, learning difficulties, muscle pain, back pain, repeated words, recurrent otitis, tremor in the past, and difficulty with balance. He experienced “meltdowns” when he

was overly hungry. His surgeries consisted of circumcision and tympanostomy tubes. Schedules and planning improved his symptoms, and became worse when he was asked to do chores or was disciplined. Symptoms were better in the mornings and became worse by evening. He exhibited aggression and disrespect for others. At school, he had a full-time assistant but only attended three hours per day. He was unable to do school work due to a lack of concentration. The family's goals for him were: decreased depression and improved happiness; decreased aggression; improved ability be more settled/focused to learn; and improved balance (he still can't ride a bike).

Subject 2 was the first child to be tested in the morning without his medication. On his testing and treatment day his medication was consistently taken the same time the night before and then taken after he was tested and treated in the mornings. This was designed to have him with the minimal amount of medication in his system, and to try to be consistent with the level of medication in his system. He was tested the same time of day every week so that we had consistency of his biorhythms for his physiology.

August 27/17: R2 cleaned his energy field by removing foreign energies. R1, through Barral fascial pull, released shock imprints in the thoracic vertebrae (T1-T2-T3) that were compacted with each other and had underlying translation lesions as well. The balanced membranous tension (BMT) approach was used to normalize the area using the left 6^{th} rib as a fulcrum. However, the consciousness of the T1-T2-T3 vertebrae had to be retrieved from the chaotic field (CF) first so it could be accessible to physical treatment. Physically, he presented with severe non-physiological lesions, i.e., a bilateral lesion of lateral translation of the right and left lung, as well as T3/T4 in translation left lesion. The heart's consciousness was in the CF and, on the physical level, it presented as a heart embryological

ptosed lesion. This was normalized and then integrated locally. The heart was then integrated regionally via a left upper extremity unwinding with T4, and then globally with T4 and the central chain (CC). The right kidney's consciousness was in the astral plane and on the physical level it had an external rotation (ER) lesion. The bladder on the physical level was rotated and side bent (RS) right and the testes' consciousness was in the CF. The right adrenal's consciousness was in the CF and physically translated superiorly. The left kidney's consciousness was in the CF and physically SB (side bent) left. The left adrenal's consciousness was in the CF with a physical lesion that was superior and separated from the kidney. The pancreas' consciousness was in the CF and everted on the physical level. The lumbar (L) 3 consciousness was in the CF and it had a physical lesion of side bending right and rotation left (SR left). The mesentery's consciousness was in the astral field. The coccyx's consciousness was in the CF and physically was flexed and had several intraosseous lesions. The sacral short arm on the right was compacted and then presented with a right torsion on a right oblique axis physical lesion. L1/L2 were compacted physically. The foramen magnum (FM) consciousness was in the astral plane and had an inspiration lesion. The posterior fossa, and its content's consciousness, were in the CF and physically had a right posterior shear that was internally rotated. The brain stem had a shear to the left physically. All these structure's consciousness was brought back together from the CF, normalized with the posterior fossa technique, and then using BRT posterior fossa normalization with a connection to the thymus by both R1 and R2 to integrate. The SBS had a right lateral membranous strain which was normalized, and then integrated, using a BRT to the newly centered heart. The treatments ended with global integration of harmonization of the longitudinal and transversal expression components of the PRM applied to cranial sphere (harmonisation of the cord) and core link.

September 3, 2017 treatment day: Subject 2 had a 4-wheeler accident since his last treatment, and was complaining of right hip pain. One of the significant lesions on this date was the heart had a past life lesion. It presented as a lesion of a heart broken so severely he never wanted to feel this sensitive emotional pain again (a karmic lesson). R2 showed the subject how sensitivity is a gift. He had to be shown this karmic lesson for resolution of the RS lesion of the heart on the physical. Thoracic 5 presented with a post flexed (P)RS right which was normalized and integrated with the heart and CC. The pericardial ligaments were tight and compacted to the left lung. The left lung's consciousness was in CF with the lower lobe in external rotation (ER) and top lobe in internal rotation (IR). The frontal bone consciousness was in the etheric field and then the frontal, parietal, and temporal lobes' consciousness were all in the CF. De-compaction of the vomer, ethmoid, frontal and sphenoid was required with underlying lesions to normalize followed by vomer rocking. He presented with a left maxillary shear which was normalized. The pharyngeal arch second step hold was used for a regional integration. This was followed by: pharyngeal arch steps 1, 3, 4, and 5; lateral ventricles; harmonization of the longitudinal and transverse expression components of the PRM applied to cranial sphere from an SBS hold (balancing cord); and core link.

September 10/17 treatment day his mother reported he was much better. He got himself dressed this week and put himself to bed twice. Parents noticed he was calmer and was taking responsibility for his own personal hygiene, with less parental assistance. His diaphragm was in expiration with a high central tendon. T6/T7 consciousness was in the CF and physically had a second-degree lesion which was normalized. The vagus nerve was liberated on the left with BRT. His prostate's consciousness was in the Astral plane and R2

helped him retrieve his sense of self and what he loves about himself which was his ability to tell jokes. The FM was physically rotated left and the consciousness was in the etheric field in Alta major. The consciousness was restored and FM was normalized with BRT. The post fossa had a posterior shear with an IR on the left and its consciousness was in the etheric field treated though Alta major. The brainstem's consciousness was in the etheric field treated though Alta major and was physically compressed. He was asked what his gift in life was and he felt it was as a computer programmer for games. Integration followed with BRT of the entire cranial RTM volume, lateral ventricles, balancing cord and cross chain exercise.

September 17/17 Subject 2 did not want a treatment today and, this past week, exhibited the most stemming (face touching) his parents had seen in a while.

September 24/17 Subject 2's parents felt he was much better this week. He independently and cooperatively took responsibility for his own hygiene. His mother felt he was acting more his age and was very pleased with his behavior this week.

October 15/17 Subject 2's parents were very pleased, as there were no behavioural issues this past week. He went to work with his mother and was excellent. He completed all his activities of daily living without assistance and no arguing. His mother helped him keep his mind connected to his heart all week using the Heart- Spirit technique she saw us perform in the last treatment. His mother felt it was one of the most helpful tools she has used at home. Today, Subject 2 was a 4 on the ATEC; he started at a 77.

October 22/17 was the first day for post treatment data collection. Subject 2 was doing excellent. He presented behaviorally with kindness, and hugged everyone. He was very calm and cooperative. The parents could not believe the change in him.

October 29/17 Subject 2's parents noticed that some of the ASD behaviour returned and looked forward to another treatment after the post-testing. The parents felt his behavior was worse today, and noted that he had a sleep over with another child with ASD. The parents expressed that, during the sleep over, Subject 2 started to mimic the child with ASD who has not had treatments.

Nov 5/17 Subject 2's mother commented that he was doing very well with only a few old behavioral patterns returning. The parents continued with treatments to carry on his improvements with focusing at school.

Subject 3 was a 5-year-old boy born December 04, 2011 at 40 weeks. He was diagnosed with ASD, by Bridgewater South Shore Mental Health psychologists (Steven Hendrixson and Jeannie Chisholm), at age 4. However, his mother noticed issues beginning at 18 months when he started lining up toys, and at 20 months when, at daycare, he did not play with other children. When his speech developed it was and still is repetitive. He did not point at things at the correct time during his milestone development and was delayed with bladder and bowel training. He has undergone Speech Therapy, which started in 2015 for 9 months to a year. He started Behavioral Therapy in December 2016, which ended in August 2017. During this time-frame the Behavioral Therapist role played and created a booklet on the study to help him with the appointments and osteopathic treatments.

Subject 3's mother became pregnant at age 35, with no previous issues with miscarriages or fertility. This was her first pregnancy and she had no issues until labour. She took Paxil for depression during the pregnancy. They lived in a 30-year-old home with no central air-conditioning and they renovated a bathroom at the time of pregnancy. The mother's labour

was 36 hours and she pushed for hours and hours (“forever”). Extensive scar tissue, due to a surgery 5 years prior to remove pre-cancerous cells, prevented her from dilating. She had morphine for the intense back pain as the baby turned around so he was a face presentation. The hospital tried turning him when she was in labour but was not successful; he was born with a face presentation. She had an epidural. The hospital used suction (vacuum extraction) for delivery. Subject 3’s APGAR was 10. His head was molded in an abnormal shape from excessive pressure during birthing. The mother hemorrhaged as the placenta would not deliver because the cord was short. The baby was fed formula and was not breastfed. He had a fall at age 2 down a few steps onto his face which left a contusion on the left eye. He tripped and fell at age 2 1/2 hitting his left eye again on some rocks. He had pneumonia twice, the first time at age 18 months and the second time at 3 years old. He had one case of otitis with one of the pneumonias. He took antibiotics both times. The mother noticed after 18 months of age that he had repetitive speech, socially he stayed by himself and he made no eye contact with others. He had just started to bowel and bladder train in the last month (age 5) and still had some issue with bowel training. He had no trouble with constipation. He met all his developmental milestones. His vaccinations were all up to date with no apparent reactions. He has not taken any medication for behaviour modification. The family history consisted of his mother having anxiety-depression and ulcerative colitis. Subject 3’s signs and symptoms included: stemming (repetitive words); anxiety; and hyper-sensitive and hypo-sensitive sensory processing. He had a rigid repetitive behavior. Routine and knowledge of events made things better for him. If he was sick or lacked sleep his symptoms got worse. He craved pressure and loved to be tickled. He has had no surgeries. Their goals were to: improve repetitive speech, improve coordination so as to improve his ability to

peddle a bike; improve bladder and bowel training. The osteopathic treatments started August 27, 2017.

On September 10/17 his mother reported he did very well this week. He took the bus on his own and he just started primary school. However, he had been working with his behavioral therapist prior to school starting. This day he ran into the clinic and gave R1 a big hug almost running her over with so much joy.

September 17/17 his mother reported he was more emotional this week.

October 1/17 the spleen was retracted with an intra-parenchymal lesion of the spleen. The mother's spleen was also retracted with an intra-parenchymal lesion. Both the mother and Subject 3 were treated together. He cried and then the mother cried. R1 worked on them both seeing the joy on their own first, then together. The mother explained that they have had a lot of joy running and jumping in the waves. So, R1 had them both visualize this happening. The spleen went into deeper still points and when it released Subject 3 laughed and so did his mother; there was tons of laughter in the room.

October 22/17 Subject 3 got very sick with high fevers and was admitted to the IWK. He was diagnosed with potentially having Kawasaki disease and was treated with intravenous immunoglobulin therapy on October 27th. On October 29th, he was still at the IWK with no diagnosis as the physicians felt he would have responded better to the IVIG if it was Kawasaki. He was discharged as the fevers were not as high and were further apart. He would return to the study the next week for the last three post data collections.

Nov5/17 Subject 3 was very emotional in the hall outside the office today, and would not come into the office at first. R1 stepped out in the hall and squatted lower than him, about 4 feet away. R1 contacted his true nature first, then talked to him about all the things he just went thought at the IWK. Letting him know she understood that he has been through a lot and that she was so relieved to see him. She expressed and emitted from her heart that she was so happy to see he was doing much better. She told him she was sorry for all the doctors who might not have seemed to understand his sensitivities. She invited him in today to be tested if he wouldn't mind. He hugged his dad in the hall then came into the clinic and hugged his mother. Then he hugged R1 and said, "OK". After he was measured, he played with toys and R1 asked if he wold come back two more times to be tested and he could get treated again if he wanted. He said "yes, I'll do that".

On completion of the research, R1 has done weekly treatments and Subject 3 has reduced his repetitive speech and is now saying full sentences. His school teacher has been amazed and so have his parents. He has become more cooperative, especially with doing things he totally resisted before, like clipping his nails. The parents have been delighted and have continued with the treatments.

Subject 4 was a 3-year-old boy born August 01, 2013, at 40 weeks. He was diagnosed with ASD by psychologists Dr. Erica Baker and Dr. Lindsay Bates at age 2 ½. Since he was diagnosed, he has received conventional therapies, which have included: Early Intervention (started September 2016), Occupational Therapy (started October 2016), Speech Therapy (public and private started April 2016) and Music Therapy (started June 2016). His mother noticed, at age 18 months, that he was not up to his word count and, at 2 years, he was

assessed to have a speech delay. The mother obtained a second opinion at age 2 1/2 as she noticed he did not play with his toys either, and he was diagnosed at that time with ASD.

This was the mother's first pregnancy, at age 27; she had no previous miscarriages or fertility issues. She did not have any depression or anxiety with the pregnancy except at the 6-7-week period when she experienced tremendous stress. From 6-7 week of gestation, to the end of the first trimester, she had extreme pain all over her lower back and abdomen. In the first trimester only, she took Tylenol when required due to the severity of the pain. Initially, the physicians felt it was an ectopic pregnancy and anticipated miscarriage. The physicians determined that the cause of her pain was the musculoskeletal system changing due to pregnancy changes. She was very stressed during this period due to the possibility of a miscarriage or ectopic pregnancy. During the pregnancy, she had morning sickness that occurred usually only at night and lasted 12 weeks. The placenta was anterior so she could not feel Subject 4 move well during the pregnancy. She experienced hypertension. At 40 weeks she was admitted and induced with Pitocin due to the hypertension. Labour lasted six hours; she received an epidural and had to have the placenta removed as it did not deliver naturally.

Subject 4 had low oxygen levels at birth but did not get O2. The mother did not know about the low O2 levels until her second pregnancy when the physician discussed her first delivery with her. Subject 4 weighed 6lbs 15 oz and nursed for 2 years, and had a very strong appetite nursing. He was not jaundiced at birth. He had not been bladder or bowel trained yet. Subject 4 experienced trouble with constipation since starting solid foods at 6 months until one year of age. At age one Subject 4 started polyethylene glycol (PEG) which resolved his constipation over time. As of the last 6 months Subject 4 has stopped PEG and still has a

bowel movement once a day. Subject 4 was diagnosed multiple times with otitis since birth: three cases before the age of one; from age 1 to 3 years every 2-3 months; and, from age 3-4, every month. He was prescribed many rounds of antibiotics until the physicians inserted tympanostomy tubes in both ears, in October of 2016. He had his adenoids removed in October of 2016. He has experienced issues with eczema. He wet the bed at night occasionally, soaking his diaper (but this is not defined as enuresis until the age of 5 or older). He had emotional trauma: in-utero from week 6-7 to week 12 as his mother was not sure if she would miscarry; and then 4 days after his birth when his grandmother died from cancer. His speech was delayed from normal developmental milestones; he also exhibited a lack of coordination and balance. Speech normally begins at 18-24 months and Subject 4 was still non-verbal at the commencement of the study. The mother noticed he cried a tremendous amount as an infant, and felt he might have had colic. The only thing that stop him from crying was the nursing. He demonstrated a high pain threshold to external trauma; however, he demonstrated excessive crying with internal pain such as when he had constipation and streptococcus infections. His vaccinations were up to date, with no apparent issues or reactions. He took no medication for behavioural modification. The family lived in an apartment building on the 8th floor during the pregnancy. The family history consisted of the mother having a speech delay (she did not talk until age 5-6) with speech therapy from age 5 to 12 years old. Subject 4's symptoms became worse with lack of sleep and his symptoms were improved with routine and deep pressure. Subject 4's signs and symptoms included: speech delay, recurrent otitis, hyperactivity, and constipation. He did very well in daycare/preschool but progress was hard to measure because he was still non-verbal. He rarely engaged with other children, and demonstrated difficultly with focusing for more than a minute. About 75% of the time, Subject 4 slept through the night; 25% of the time, he

woke up screaming and inconsolable. This lasted 1-2 hours before he went back to sleep and, sometimes, he did not not go back to sleep. These episodes happened between 2:30-3:00 am every night, which, in Chinese Medicine, represents liver or lung imbalance. Subject 4 experienced fluctuations in his appetite. He demonstrated two repetitive behaviors: exerting pressure throughout his hands, taking his two fingers and trying to tickle or massage a surface, e.g., his leg, while rocking his upper body. He underwent surgery to have his adenoids removed in October of 2016, and had tympanostomy tubes inserted at the same time. He had no physical traumas since being home from the hospital at birth.

During the measuring and treatments, the same song had to be played ("Puff the Magic Dragon") as it helped R1 contact the subject's true nature, as Subject 4 was very resistant and non-compliant without the music. He had a streptococcus infection that started the day before and was treated with antibiotics. The researchers treated him while the mother and father took turns holding him. Each parent, while holding him, had emotional releases with their son. R2 found Subject 4 to have an expanded field. R2 had to reduce Subject 4's field and remove foreign energies. The R2 work was done entirely by distance, today, for Subject 4 as he would not let R2 place her hands directly on his body. R2 worked on him as if she had his tissues in her hands from about 2-4 feet away. All R1's treatment today was done with her hands on the physical body of Subject 4. R1 started at the coccyx, which was compacted and flexed into the impar ganglion with its consciousness in the CF. During the treatment, Subject 4 tried to bite his mother several times so the father stepped towards the dance of treatment to help the mother. R1 encouraged the parents to switch who was holding Subject 4. R1 felt his father needed to be part of the treatment too and bond with his son. R1 explained to the parents that biting was sometimes used by children with ASD, to calm their

nervous system down, because biting could activate the PSNS. Subject 4 went into his fathers arms willingly and snuggled in; it was beautiful to watch. Subject 4 wrapped his arms around his father's neck and calmed down for more treatment. The mother had tears of joy and sadness. She expressed to R1 that they felt blessed and grateful for R1 and R2 entering their lives. R1 explained how what just happened was healing for everyone.

Subject 4's liver was retracted and its consciousness was in the CF. When the consciousness was restored, the inner physician of subject 4 pulled R1's awareness to a lack of GSH or lack of antioxidants in his system. R1 asked for the best health of the liver and mitochondria with healthy GSH production to show itself finding a balance point, still point and then expanding this like a CV4 with a swing effect. The stomach was SB left with an intraosseous lesion at T6, which was normalized. The brainstem was sheared to the left, and the foramen magnum had an inspiration lesion with a tissue memory of reduce oxygen at birth. His inner physician pulled R1 into the tissue region of the reticular formation (RF) which felt like a very, very dark place to R1. R1's consciousness asked her to say the ho'oponopono prayer to help Subject 4 find his tissue's consciousness and best health at this time. R1 was shown the RF's consciousness in the CF and together Subject 4 and R1's consciousness brought it back. R1 then normalized the physical aspect with a post fossa technique in sitting once the brainstem and its parts where expressing their consciousness in the physical realm.

Sept 3/17 the family said they had been to PEI this past week. The mother noticed Subject 4 was very angry at times but more connected to everyone and calmer. The mother said he was Zen-like in the morning when he is normally running around really fast. He was treated today in the astral plane connecting the spiritual to the physical. He went into the birthing spiral and then went onto R2's lap and sat on her lap allowing her to treat him on the physical

level. R1 treated his supinated feet and medial calcaneus with reciprocal tension using the pancreas and CC as a fulcrum. This was followed by the Frymann interosseous membrane technique normalization with balance reciprocal tension (BRT) bilateral. The heart's consciousness was in the CF and then went to the ketheric field to a past life of a broken heart so severe in that past life that he decided he did not want to feel again. R2 talked to the inner physician and showed that in this life it is a gift to be sensitive and feel. The consciousness returned and the physical heart presented to R2 a RS right lesion which was normalized. The frontal lobe's consciousness was in the CF and retracted. The frontal bone and occiput required decompression and removal of the force vectors induced during labour. This released and he rocked into flexion globally. The thymus' consciousness was in the CF and expressed a lack of joy; it was restored and then a BRT from the thymus to the frontal/occiput normalization was done to reconnect the frontal lobe with the thymus at the heart chakra entry point. There was a second degree at T5 and its consciousness was in the CF. Subject 4 had a somato-emotional release with R2 having the mother say, "she was never going to leave him, Mommy and Daddy will never leave you". There was crying by the mother and the Researchers, and the Researchers held an axis while expanding areas that lacked love and joy with more love and joy in both the mother and Subject 4. The brainstem still had moderate shearing to the left with an anchor to L1/2/3 compactions that were normalized with BRT and Subject 4 rocked in the fetal position to help correct. Subject 4 laughed and made direct eye contact with R2 and laughed more. He went from one still point to another still point continuing with more and more eye contact and laughing in between each still point. The consciousness of the superior mesenteric artery and straight sinus where in the CF. This was restored back into the body, and then presented with a shear in the physical realm to the right and left respectively. They were normalized as in the heart and

S2 technique taught in autoregulation, bringing the pilot into the plane thereby normalizing the central fulcrum. The hemispheres were balanced by R2. The left hemisphere's consciousness was in the CF. It was first brought back and then balanced by R2, while R1 did a fascial unwinding with the IOM of the upper extremities to the heart and then to the balanced hemispheres palpated by R2. R1 continued the upper extremity unwinding with R2 on the corpus callosum. R2 finished with a core link.

September 10/17 the mother reported Subject 4 has been doing much better, except for waking up at 4:00 am (lung) in a lot of stress/anxiety. He had started with a new female daycare provider and the mother felt this increased his anxiety. Today he tried to say his sister's name, Ariel, Momma and Dadda. The mother could make it out even though it was not clear and it was like hearing an infant trying to say their first words.

September 17/17 Subject 4's mother reported that he was biting and scratching less and displayed a much better behavior. His sleep continued to improve with less episodes of waking up and less emotion when he did wake up. He was able to lie on the treatment table without his parents. He did get very aggressive during the treatment but then got very good at the end of the treatment. He would get very angry and then would go into some still points and then very angry again. He fluctuated frequently between severe anger and calmness. The tympanostomy tube in his left ear had fallen out but the right tube was still in place. His mother reported that if he continues with streptococcus infections he will have surgery to remove his tonsils.

September 24/17 the mother reported that Subject 4 was much better with behavior and interaction with others. He was sleeping for the first time through the night all week, 7 days

in a row. Only one night he had a nightmare that was easy to settle down. His mother reported he was much happier and content playing. R1 performed fascial unwinding of the upper extremities to the heart and into the SBS/tentorium tensions down to the diaphragm to T9. Subject 4 danced with R1 as R1 held his arms while doing fascial unwinding. He stood and R1 was on her knees to do this while the mother watched with joy. R1 then held the iliacs and did a pelvic fascial unwinding to T9 and the tension around the adrenals, normalizing the adrenals from the iliacs. The father then came into the treatment, and Subject 4 embraced his father. R1 tried to treat the base of the cranium, however, Subject 4 was not co-operative. R1 moved away from the head to the heart. Here, R1 centered Subject 4's heart with his father's heart together in fluids, through the Alta Major Chakra while normalizing the fluids and the physical structure with BRT. Then Subject 4 let R1 face him and unwind the base of the cranium and then his SBS from the newly centered heart as a reference point.

October 1/17 Subject 4 was very worked up before the measurements but, during the measurements, he was very calm and relaxed with no issues during the measurements. His mother reported he was sleeping throughout the night and much better at home, behaviorally, with less grabbing and biting. The parents were very pleased with his improvement and in his improved disposition. However, he was still in a diaper. R2 found him energetically to be a lost boy in many lifetimes; she helped him find the passages to come back. R2 found him to have many parts of his tissue's consciousness not in the body. He had shock imprints of the following: heart; T2 embryological, with the mother at 4th embryo week during her possible ectopic pregnancy diagnosis; liver; spleen; and mesentery. R2 spent time finding his consciousness, and bringing the consciousness back, his essence in different lifetimes, while R1 removed the shock imprints of those lifetimes held on the left at rib 6. They

integrated with pharyngeal arches during the treatment. He sat on the bed and on R1's lap and let the researchers treat and touch his head the greatest amount in all the treatments to date. Then Subject 4 danced his arms with his father's arms. R1 took this as an opportunity to engage the connection between the father and son with her eyes to induce a distance fascial unwinding, to help the trauma of any lifetimes with his father unwinding together restoring dynamic coherence between them.

October 2/17 R1 was pulled during a meditation walk to treat Subject 4 by distance. Prior to meditation, R1 asked her son clairvoyantly what she needed to treat in subject 4 to help him heal himself. He said clairvoyantly "it is his heart mommy". R1 was pulled in distance work to normalize the coccyx and spleen with BRT in Alta Major Chakra, then the Astral Plane to Solar Plexus. The spleen was used as the tuning fork for the coccyx and impar ganglion. R1 then treated through Major Alta Chakra to the Astral plan to the Solar plexus while normalizing the heart with a BRT to its shock imprint on the 6th rib, on both subject 4 and the father. This was for a healing between the father-son-relationship. R1 repeated the ho'oponopono prayer: "I'm sorry, please forgive, thank you, I love you" until normalization was felt. R1 was pulled to the RF which was a dark place again. R1 prayed and prayed for spiritual guidance for its health to show; the RF showed its consciousness in the CF which Subject 4 brought back to the physical and normalized with post fossa by distance. R1 again said the ho'oponopono prayer: "I'm sorry, please forgive, thank you, I love you". Re-connecting the Alta Major karmic lesson to the Astral plan to the Solar plexus. R1 called R2 for assistance to the mediation distant treatment. Both researchers together did distance work on Subject 4's Life force and the SA to help with his speech. The SA to them meant the divine within him and then his true nature connected to this divine. R2 found it was not

connected in him; his divine within him and his true nature were split, shattered, and not connected. The seed of the soul was broken in a past life and needed to repair with his father. Then, the thymus had three aspects and the three forces were apart and were not connected. The thymus had three forces the formative (blue print/bio-energetic), creative (potential energy), and functional (function/immunity). In order to unite these three, Subject 4 had to see his karmic lesion. Then the three aspects of the thymus united and normalized in the morphological field.

Both researchers learned that all these children in the study needed universal love (heart) restored. They each needed to learn from a past life their karmic lesions and unite the seed. Then they had to show the morphogenic field the three forces of the thymus to let it combine in perfect morphology. Then both researchers in meditation saw white light coming from the cranium to normalize the mitochondria.

R1 and R2 did the same meditation treatment with all the other subjects.

October 8/17 Subject 4 had otitis. The HeartQuest™ was measured, but the Bio-Well™ reading could not be done today, as the otitis was too irritating. Subject 4 cried, got very angry and screamed. The mother and R1 took Subject 4 over to the bouncy ball. R1 got the mother to sit on the ball and hold him tight. R1 wrapped a blanket around him and the mother tightly using compression over his body. The blanket was heavy and gave a weighted sensation. The mother and R1 sent him love while she bounced very slow and rhythmically until he calmed down and smiled. They had contacted his true nature so then they moved to the treatment room. He let both researchers treat him on the table and he went into many Still points. Today, he took the hand of the person doing the measuring, which he had never

done prior to today. During the treatment, R2 had to help him bring his consciousness back to himself and she energetically treated the fracture of RF and sense of self through Alta major.

R1 treated the mesentery with the lumbar spine BRT and the heart with BRT at the shock imprint of the 6th rib on the left, while connecting and verbally dialoging out loud to his tiger of anger and expanded his humble confidence of love and awareness, allowing Subject 4 to know the researchers understood his frustration and irritation. They understood him and that he makes beautiful sounds. They explained to him that the tiger in him is wise, cautious, loving and gentle. They knew he had an infection and it hurt, but let them in to help his body heal the infection. This allowed the researchers to really connect with him resulting in several Still points, with R2 treating and R1 dialoging verbally on the conscious level. R1 was letting him know they understood him. He had very little angry moments with many Still points normalizing with laughter. The mother laid down on the treatment table too for some of the treatment and cuddled with him. He connected with the researchers and at times would snuggle into R1 feeling the love for him, while R1 was trying with an open heart to help him.

October 15/17 they could only do HeartQuest™ and he was very calm for this reading. The mother did the ATEC. During the Bio-Well™ measurement he was very aggressive with R1. R1 said to him that he was aggressive when he wanted to get his way, even if the situation was not hurting him, and that he has the ability to be calm. He got very mad at R1, and R1 asked for forgiveness. He hugged R1 and took her hand walking to the treatment room. R1 decompressed the thoracic spine from the cranium (SBS hold), unwinding birth trauma. R1 did this in sitting with full eye contact with Subject 4 and many Still points. Then

the CC beam came into the vertex through the celestial field. Subject 4 hugged R1 at the end and snuggled her. For the first time ever, Subject 4 let R1 touch his head for long enough periods to get a physical BRT feel in the hands. He finally let the researchers in on the physical realm of his cranium once R1 knew the path. R1 learned the path from Subject 2 earlier that day, and the path permeated into this treatment like a morphogenic resonance. The key for the passage was from a past life as an infant through the celestial field where R1 found the consciousness in the CF of that lifetime of the RF and occiput structure. Subject 4 returned his consciousness and health in this lifetime of the RF, brain stem and occiput. Finally, Subject 4 allowed R1 to treat the occiput and RF with a BRT physical touch. R1 normalized with a post fossa hold while facing him in sitting with full eye contact dialoguing into many Still points until the story was completed. R1 had the mother visualize the four of them in a bubble of love while the post fossa normalization completed. R1 held the second cuneiforms of the feet, connecting to the piezoelectric quality of the fascia, and engaged up the legs to: lumbar L3; the pancreas; the pyramids of the lines of gravity; the bands of cranium RTM and pharyngeal arches, unwinding the tensions until a Still point that allowed the central chain beam to appear down through the top of his head. R2 found there was a CC block in flow at the prostate level which was rotated to the left with the father's prostate. R2 treated the father and Subject 4, normalizing their prostate and then integrating it to their CC. R2 was then pulled to have their spleens act as a tuning fork to harmonies each of their CC beam.

Subject 4 became cuddly during the treatment. His parents were not needed. He laid on the bed to be treated and smiled expressing gentle love with many Still points. He then moved to sitting on the table with R1 in a SBS hold and then a post fossa hold while facing him. He

went into eye contact and made many Still points. At the end of the dance, he slide off the table onto R1's lap and gave R1 a hug with a giggle. He high fived R2 when she ask him too. He knew what high five meant and did it. He got off the table and walked right out to find his Father to snuggle him. He looked his father in the eyes and got up into his arms hugging him.

October 22/17 was the first post-data-collection day. Subject 4 was amazing and had hugs for everyone and made eye contact. He made no fuss with the data collection. His PSNS increased from a baseline of 2-6 percent consistently to treatments scores of 23, 6, 6, 6, 8, 8, 8, and 19 percent. Today he was at 19 percent in PSNS. His mother said he had been very gentle all week and had slept exceptional well.

October 29/17 Subject 4's mother reported he was doing really well. He started to say "Dada" and looked at his father three times this week while saying "Dada". He tried to say "Ariel" today with R1 and the mother. He was very calm and happy to snuggle with R1 during the data collection. After the measurements, the mother and R1 were talking and Subject 4 left the measuring area. The mother and R1 went to check on where he went; he had gone into the treatment room, and had crawled up on the bed waiting for another treatment. He was lying down all snuggled on his left side in the fetal position. R1 explained to him how wonderful that was and how grateful she was for him to come into the treatment area. R1 explained she would treat him next week after the last measurement. R1 connected to his body and asked his true nature; what needs to release to allow for more speech. His inner physician pulled R1 to Broca's area and his partial bone horns with narrowed pterions. R1 explained to him that next week they would treat in the order his body spoke to help

remove more of the barriers that were impeding his speech. His PSNS was at 13 % with a higher VF which was improved from his baseline of 2- 6 % with lower VF.

Nov 5/17 Subject 4 was more upset today because he had been at the hospital on Friday getting an EEG to rule out silent seizures. The physician felt he might be having silent seizures as he was staring off occasionally. The mother had noticed that since he was 2 years old, but noticed them less often since these treatments started. Overall, Subject 4 was still improving. He was trying to say more actually letter sounds rather than just noise and to say single words like "Dada, Mom, yellow, Ipad". He was a little more irritated with the testing today compared to last day, but he was easily brought back to calmness when his true nature was contacted.

Subject 5 was a 10-year-old boy, born September 12, 2006, at 41 weeks. Just before his 4th birthday, he was he was diagnosed with ASD by Hilary Cartwright, a psychologist in Fredericton. He underwent ABA therapy from 2010 to 2012 at the Autism Intervention Services in Fredericton, New Brunswick. However, his mother noticed issues beginning between 1 and 3 months, as he never made eye contact and, when he started solid food at 6 months, she noticed constipation issues. He did not show any other ASD behaviors until speech, which was delayed, and he made up his own language. He was not compliant as a child and was very difficult to toilet train. He did not like getting dirty. He had a repetitive behavior of watching the same movie over and over. He did not feel heat, and had an episode of heat stroke at 8 years of age. He was hypo sensitive to heat and hated the cold. He loved to dress warmly. His therapies included ABA therapy, from age 2010 to 2012 (age 4 to 6), and magnesium supplements.

Subject 5's mother had no miscarriages or fertility issues. Subject 5 was her first pregnancy. During the pregnancy, she experienced the following: nausea for 4 months; a cold, but took nothing for it; and, a yeast infection that she treated locally with a cream. They lived in Montréal during the pregnancy and she work in a dental lab with mercury. She gave birth in a Montréal hospital and her labour lasted 5 hours. She was induced with Pitocin at 41 weeks. The nurse had to break her water and then she pushed for several hours. She was administered an epidural. She had pushed too early in phase 1 and 2, so when she entered into phase 3/4 she could not push any more. She was getting a fever and Subject 5's heartbeat dropped. The physician required forceps as they were in a hurry to deliver. The physician was also worried that the umbilical cord would get pinched. The forceps cut the skin in front of Subject 5's ears. His APGAR was 9 and 9, but he did have jaundice at birth. The placenta was delivered normally. The mother nursed Subject 5 for 8 months, but at 1 month supplemented with formula. She had osteopathic treatments to improve her lactation, and took supplements, but nothing helped her produce more milk. As an infant, Subject 5 would wake up in middle of night constantly crying and would not stop. He had osteopathic treatments at two months old and the DO treated his cranium and intestines. He was difficult to toilet train and had trouble with constipation. Subject 5 lacked coordination with catching and, to this day, he could not ride a bike or understand the mechanics of a bike to ride. He had no emotional trauma and has never hit. He had no delay in his milestones for development. His vaccination were all up to date with no obvious reactions. He had never been on medications for behaviour modification. He took vitamins and, for the past 6 months, probiotics. His family history consisted of his mother having eczema and experienced depression and anxiety in 2013, when she was treated successfully with therapy,

as the father was away a lot on training. The mother has had anxiety since she was a child. The father has had allergies but no family history of learning difficulties or ASD.

Sign and symptoms of Subject 5 included speech delay, sensitivity to noise, jaundice at birth, repeated words, rashes in the creases of joints, and history of head injures. He had no surgeries. Traumas consisted of falling on his face just before he was 4, where he lost his three front baby teeth and, one year later, falling and cutting his forehead on the amplifier. Associated problems consisted of: acne; redness in the eyes (he had pink eye three times); teeth malocclusion with a few cavities; and urinary retention. The mother worked as a dental hygienist and was in touch with mercury fillings during her 7 months of pregnancy. She operated the dental X-ray machine but did wear the apron. Subject 5's signs and symptoms have been worse with artificial colors and flavors in foods, preservatives, and bagels which have caused constipation. He demonstrated improvements with probiotics, fruits, and vegetables. He had extremely high levels of cadmium in his hair when he had toxins measured by a naturopath. Cadmium is found in fossil fuels, fungicides, dyes, pigment, batteries, rubber tires, carpet backing, and plastic food wraps. In his hair, he showed higher levels of toxins such as aluminum, antimony, arsenic, lead, and thorium. Goals for the parents were: to improve his digestive tract; to improve his ability to explain his thought process; and to improve his understanding of social cues.

Aug27/17 R2 cleared his energy field of foreign bodies and R1 de-compacted T1/2/3 compactions and intraosseous with shock imprint removal at rib 6 (Fulford) with BRT. T2 was translated to the left with its consciousness in the CF. Each lung was in a lesion of lateral translation and both lungs' consciousness was in the ketheric field. The C5/6 were compacted and then the lungs showed an embryological lesion from bud development at C6,

followed by a morphogenic field normalization. The pancreas consciousness was in the CF with an eversion lesion in the physical realm. The left kidney was translated superior and its consciousness was in the etheric field. The left adrenal was in the CF and it was physically externally rotated. The coccyx and impar ganglion's consciousness were in CF and then, physically, the coccyx was flexed, and sidebent left with a compressed impar ganglion. The right kidney was ptosed and right adrenal was superior with its consciousness in the CF. The testes' consciousness was in the CF and compressed in the physical realm. In the physical realm, the mesentery was compacted to the ascending, transverse, and descending colons with their consciousness all in the CF. The sigmoid consciousness was in the CF and then physically externally rotated. The C3/4/5 were compacted and hyoid shear right on the physical. All the following parts had their consciousness in the CF and on the physical realm presented with these lesions: the FM had an inspiration lesion; the right occipital mastoid was compacted; post fossa posterior shear on the right and in IR; and the brain stem was sheared left. The mesentery with superior mesentery artery (SMA) presented a shock imprint with the straight sinus and occiput. This presented as a toxic issue and the liver was pulled as the anchor. R2 normalized the liver, the consciousness of which was in the CF, and additionally required a foreign body to be removed first. The liver was physically in a post flexion lesion, which was normalized. The PRM normalized in the liver, then the SMA and straight sinus were normalized and harmonized. The thymus gland was found to have: its consciousness in the CF, which was restored; a foreign energy, which was removed; and physically retracted which was normalized. The SBS had an inferior shear which was normalized directly and then followed with a BRT unwinding to the centered heart for integration. Pituitary consciousness was in the CF and had severe inertia. The pituitary was normalized, with harmonization of the pituitary area by W.G. Sutherland's technique with a

global normalization without thumbs followed with thumbs against the bregma to send the CSF drive. The asterion were both ER with the axis sheared inferior on the right with the consciousness in the CF. R2 had to balanced the optic ganglion whose consciousness was in the CF first before normalization of asterions in ease bilaterally and then in P2 a direct correction of the axis. The pineal gland consciousness was in the CF and physically compressed from the asterion axis shear. Zygoma and occiput were globally in a torsion with consciousness in the CF. This was normalized using the pharyngeal normalization hold for zygoma and occiput and expanded the pineal gland which indirectly normalized the pineal gland. This was followed by R1 implementing normalization of the cord technique, and R2 on occiput and sacrum energetically to balance with core link.

September 3/17 the consciousness of the heart was in the CF and had a RS right lesion in the physical. This was normalized. Then the heart pulled R2 to its consciousness as a teenager in the ketheric field and then to a fetal position in the Astral plan. R2 was shown a karmic lesion of Subject 5 encountering so much pain from loss that he never wanted to feel pain again. R2 dialogued with his inner physician to show him his karmic lesson, that it is a gift to feel and he has a second chance without that great loss. R1 was at the feet, which presented as: a globe supination lesion with a high second cuneiform and consciousness in the CF. The rest of the tarsals' consciousness presented in the etheric field with the naviculars bilaterally compacted physically to the cuneiforms and talus. Once de-compacted, both talus presented anterior lesions. The calcaneus was sheared medial bilaterally with consciousness in the etheric field. The 2nd metatarsal consciousness was in the etheric field and was embedded on the physical. Once the consciousness was restored, and lesions were normalized, R1 integrated with unwinding the feet and legs to T9 and

pancreas through the fascial chains. R1's intention with all the children here was to help their body restore the bio tensegrity from the feet through the lines of gravity to the T9 and pancreas. The T5 had a physical second degree lesion with the above heart lesion which was normalized. The left lung consciousness was in the CF with a physical lesion of the left lower lobe in ER and the upper in IR with the fissures adhered. The right lung consciousness was in the CF with the physical lesion of the superior lob in ER, lower in IR, and the middle retracted with both fissures adhered. Both kidneys' consciousness was in the celestial field and had a physical presentation of the right in ER and the left in IR. The kidneys were balanced with the bladder with BRT for integration. The sacral iliac joints consciousness was in the etheric field, and were derailed on the physical. They were normalized and balanced with iliacs. The C0/1/2 consciousness were in the CF and compacted with a C1 translation to the left under the compaction. The brain stem was sheared to the left in the physical. Physically the stomach was side bent left with a right torsion in the esophagus with C6 in a SR right. The frontal left lobe consciousness was in the CF with a physical IR lesion. The right parietal lobe consciousness was in the CF and physically compressed. The left temporal lobe consciousness was in the CF and could not come back until R2 treated the tentorium. The tentorium was physically in expiration. There was a force vector in the tentorium from the forceps delivery. The force vector was taken out and tentorium was normalized so the left temporal lobe consciousness could return. Physically the right occipital mastoid was compacted, and right mastoid had an intraosseous, with their consciousness in the CF. Physically, the facial bones were all de-compacted and each eye orbit movement was restored. The following lesions were found: vomer was compacted; the pre-maxilla was compacted; the intramaxilla suture had a shear on the left superior; the pterygoids were high with compression on the SPG bilaterally; left frontal had an

intraosseous; and metopic suture was compacted. The left and right sacral iliac were derailed again and their consciousness in the CF because they needed the bladder for normalization. The bladder consciousness was in the CF and physically was ptosed with a SR right. This was integrated with kidneys and then with the solar plexus to increase the lack of bravery to let go of fear. The left tibia had a physical shear medially. R1 ended the treatment with some of the pharyngeal arches techniques for integration such as: frontal/occiput; zygoma and occiput; and then mandible with occiput. R2 ended with Core link.

September 10/17 Subject 5 experienced new things this week with school starting, such as opening his own home on his own with his own key after school. This increased his stress this week. He loved the treatments and mother noticed a big difference in his behavior.

Oct 8/17 Subject 5's mother reported that he was doing really well with very little bowel or bladder issues.

October 22/17 Subject 5's mother reported during the first post treatment data measuring that he was doing excellent. According to the mother, he did not even seem that he had ASD anymore.

October 29/17 Subject 5's mother reported that he had some return of mild bladder issues but, overall, was really good.

Nov 5/17 Subject 5's mother reported that he was doing excellent and that she was very happy with the outcome. They would be returning in the New Year for treatments.

Subject 6 was an 8-year-old boy born October 1st, 2008, at 40 weeks. At age 17 months, he was diagnosed with ASD by neurologist, Wendy Stewart, in New Brunswick. However, his

mother noticed issues from birth with GI problems and, beginning at 2 months, he did not make eye contact and did not engage with his toys. He received several therapies that included: Early Intervention from ages 2 to 5; Speech Therapy from ages 2 to 5; Early Intensive Behavioral Intervention (EIBI) at age 4 for 2 years; an autism day hospital program for behavior from August to December during grade 1; and Cool Kids, an anxiety program beginning June 2017, and continuing with it into the fall of 2017.

Prior to this pregnancy, Subject 6's mother had two miscarriages. During this pregnancy, she had migraines and had tremendous stress with anxiety due to previous miscarriages, and a poor relationship with her boyfriend. She cried constantly and felt like she was on an emotional roller coaster. She was too thin during pregnancy so she ate: fish and chips once a week; and tuna (mercury) daily, at early pregnancy and, in general, she always ate tuna. She had RH negative blood so she had to have immunoglobulin three times, once for each miscarriage and then with Subject 6. She lived in Saint John, NB in her own apartment. The apartment was old and she and her boyfriend smoked during her pregnancy. She did not take any medication during the pregnancy. She was diagnosed with postpartum depression. At birth Subject 6's APGAR was 10/10 and the placenta delivered fine. Subject 6's mother's labour was 16 hours long. She had laughing gas and then an epidural because she was so distressed. Once the epidural was administered, the baby's heart rate dropped, the physicians had to use suction cups, and she required an episiotomy.

At Subject 6's birth, the mother remembers the physicians saying his phenylketonuria (PKU) was low but, after 2-3 days, it returned to normal so no medical attention was required. PKU is a condition where the body can't break down an amino acid called phenylalanine made in

the liver which needs to be broken down for normal growth and development, especially for the brain. If the phenylalanine gets too high infants can developed brain damage.

Subject 6's mother nursed him for 17 months with no issues; however, she was not informed to give him vitamin D. He nursed continuously, and she was told that had resulted in tooth decay to his baby teeth. At 4 months, she gave him Pablum but the physician said to stop and to give him whole milk instead. Subject 6 received no medical attention from 4 to 17 monthsof age. At 17 months, Subject 6 was diagnosed with low hemoglobin. The parents later found out that whole milk could contribute to low hemoglobin. Subject 6 was treated with ferrous sulfate butwhen he discontinued the ferrous sulfate his hemoglobin returned to being too low. He took ferrous sulfate for 3 years and, when he stopped cow dairy, his iron stabilized. The mother found he behaved better when his iron levels were in the 20s; lately they have been 17. Subject 6's APGAR was 10, and he was not jaundiced at birth. He was very hard to bladder and bowel train, which included nocturnal enuresis until age 6. He lacked coordination and balance as an infant and still does as a youth. Normal fontanelle closure occurs at 18 month and his did not close until age two. He had emotional trauma with his parents separating, and his father was verbally and emotionally abusive towards him. Subject 6 was hit on the side of the head by his father at age two for talking at the table, and then hit in the stomach for accidentally hitting his father in the groin. Subject 6 started hitting himself and others by the age of 2. He had delayed milestones in development. As a baby, he rolled over at 8 months, and began to sit unsupported at 12 months. He did not creep or crawl, and started walking at 17 month. Subject 6 did not start talking until age 2. His mother noticed from birth that he always wanted to be held or nursed, and he cried constantly when he was awake. He had daily pain in the stomach with GI tract problems

that included constipation and diarrhea as a newborn. His vaccination were all up to date, with no obvious reactions. Subject 6 had multiple bouts of pneumonia since birth. Every fall to winter, until grade primary he had pneumonia and was prescribed antibiotics. His medication for the last 2 years has been Abilify 2 mg in the morning; he started Clonidine 0.3 mg July 4th, 2017. His mother felt the Clonidine was making him worse. His father had a history that consisted of: a learning disability; depression; abuse; and being diagnosed with manic depression. Subject 6's father was abused as a child physically, mentally and emotionally. The mother's history was: abused as a child physically, emotionally, sexually and mentally; depression; anxiety; and a speech stutter as a child with an auditory processing delay. Subject 6's sign and symptoms included: weight gain; speech delay; foul smelling urine; excessive sleeplessness; hyperactivity; weakness; breathing problems; diarrhea; pain on urination; tremor; fatigue; fevers with pneumonia; rash (keratosis, due to GI imbalance); abdominal pain; sensitive to noise; thirsty; hyperactive; increase and decrease of appetite; depression; anxiety; learning difficulties; sweating; difficulty with balance; bed wetting; repeated words; anemia; difficulty with balance; sensitive to smell; heat/cold intolerance; sinus infections; and night sweats. At age 4, he had one surgery that included: tonsillectomy; septoplasty; and circumcision. He experienced one physical trauma before the age of 2, that the mother remembers, where he fell out of the bed and hit his head. The mother reported that, since infancy, a repetitive stemming behavior exhibited is hitting his head against the wall. Subject 6's associated conditions were: keratosis skin condition since an infant on his arms and legs, typically with stressful or exciting situations like school, Christmas, and Easter; depression; and aggressive behavior. Subject 6 has always experienced right thigh pain in the quadriceps. Triggers that made his symptoms worse included: change; the word "NO"; not having control; being told what to do; and foods that contain dyes, gluten and

sugar. Situations that have improved or helped his symptoms included: when his has choices; consistency; schedules; breathing exercises; a weighted blanket with deep pressure; and electronics. The mother's goals were to see improvement in his GI function, his autism signs and symptoms and, especially, his anger. He has been abusive to his mother and said he "will kill her" while in an impulse state. He has punched and hurt her numerous times. Subject 6's mother also had a goal to discontinue the antidepressant medication, Abilify, 2 mg. Abilify is for bipolar and aggressive behavior but it is used in this case for autistic behaviors.

August 27/17 the mother reported that yesterday Subject 6 wanted to kill himself, and asked his mother why she brought him into this world. He has not wanted to live with ASD.

September 3/17 Subject 6 was worse. His father was present for data collection and treatment. Subject 6 did not want to be treated. He was nervous since after the last treatment he felt great until bedtime, then he had the feeling of not being able to breathe which scared him. Subject 6 took frequent breaks from the treatment running around the treatment area, getting on and off the table. He was very hyperactive and stressed.

September 10/17 the mother reported that Subject 6 was much better this week. He was very silly, went to school, and took the bus. He was able to do his own ADLs by himself. Normally, he would not take the bus or do his ADL's on his own. He held his mother's arm this past week very strongly, and was going to hurt her but did not; he let go and worked on breathing exercises to calm himself.

September 17/17 the mother reported Subject 6 had a horrible week. He tried to commit suicide and was in the hospital. The physician looked at his chart and felt they had exhausted all avenues.

September 24/1 Subject 6's mother called to say he had hand, foot and mouth disease, so they would not be coming in today. R1 felt this might be a sign of his reduced immunity and his emotional state playing on his unconscious mind, as hand, foot and mouth disease is a young child's syndrome of age 2-4. Subject 6 may not want to grow older; the mother confirmed in conversions that he frequently regressed to a young little boy not wanting to get older.

However, during treatments, the researchers did make some breakthroughs with Subject 6. In one treatment, he refused treatment and locked himself in the bathroom. R1 gave him a choice, he could stay how he is in life with his ASD or "What IF" he came out and got on the table to see if R1 could improve his life and ASD. The researcher used a "What IF" technique. R1 explained she cared a lot about him and only wanted to try to help him. He came out and got on the table that day with no issues. The researcher did lot of Heart Center therapy with Subject 6 while doing OMT. During a session, Subject 6 explained he was very angry with bullies at school teasing him so he said he was going to kill these people or kill himself. Previously that day, he destroyed the resource room at school in anger. He said he hated the principal because he lied and did not follow through with what he said he was going to do. Subject 6 said he wanted to get a gun and kill all who have hurt him and then himself. Today, in therapy, we got to the core of his anger and he yelled and cursed at people who hurt him. He then cried. He said it hurts his feelings so deep, which makes him very angry and hurt inside leaving him very sad. R1 talked about what one can and cannot control.

People cannot control others, or what they say or do, but they can control their own words and actions. R1 explained that there are always going to be people in the world that are not nice even when he is older, but one cannot give into them becoming them. One should focus on the kind people like his mother, grandmother, and R1, and become like them, rather than let other people's actions and words control him. R1 explained he was allowing others to control his emotions rather than him controlling himself. R1 worked with Subject 6 on ways he can control himself. R1 worked on expanding what is kind, compassionate and wonderful about him. R1 and Subject 6 found his joy and love inside him and expanded it while working on his heart, spleen, liver and thymus restoring the consciousness and PRM. Shock imprints were released in the heart, spleen, solar plexus, mesentery and liver in the astral plan while R1 did heart centered therapy with Subject 6. R1 inquired with Subject's 6 mother about going to a smaller school that was local, less kids, fresh start with no teasing. R1 worked with Subject 6 on who he is and on controlling himself, not letting others and their actions control him. He is in charge of himself. He cried and hugged R1. He softened and listened. He knows he has wisdom inside; he is gifted with electronics. R1 focused on his gifts, and why he needed to go to school, so he can do things with his gift of working with electronics.

R1 gained wisdom from this session. R1 felt these children with ASD who have a lot of aggressive reactions, was because they are in pain inside. The pain was so deep the only way to respond was with their back bone of self-defences, the liver of anger. The pain of teasing was so intense because of their hypersensitivity that it was like a knife going through the heart creating extreme sadness and then a strong defences system of anger. All illustrated to R1 as lack of joy and love in the tissues.

In another session, Subject 6, after the treatment was finished, wanted a private conversation with R1 and his Mother. He wanted more time on the Xbox and did not want that hour of time to count, if he was just talking on the X box with friends, as his hour of playtime with the X box. He started telling his mother and R1 to "f#%* off" and demanded what he wanted. R1 explained to him he was not going to have the headset if he used it with bad language and incorrectly. It was explained to Subject 6, that R1 and R2 were there to help and love him, but he was not going to threaten. He cursed more and said he was going to torch the place down, destroy things, kill the f#%* people that tease him, kill his mother and kill himself. He punched R1 who called the police. He went to the bathroom to drink water and pour it into his lungs to kill himself. His mother stopped him. Subject 6 punched his mother and would not leave the office. The police came and took over. R1 told him his was welcomed back if he used proper language and behaved with kindness. R1 said she loved him and was here to help if he wanted help. He returned for more treatment and testing the following weeks, and was very kind and loving again towards the R1, opening his heart again.

Subject 7 was a 3 year old boy born March 13, 2014 at 38 weeks. In April 2017, he was diagnosed with ASD by Valerie Corkum, psychologist at Corkum & Associates Psychology, Nova Scotia. His mother noticed at 2 years of age that he had delayed speech, was fixated on objects, and lacked social skills with peers. He underwent Speech Therapy for one year that started at the beginning of June 2016.

Subject 7's mother did not have any miscarriages but was told she would have fertility issues, due to having cysts on her ovaries since she was 14 years old. She was put on birth control at age 14 because of having significant pain during her periods from the cysts. The

mother was 25 years old at the time of this pregnancy, and was not aware she was pregnant until 5 months into the pregnancy. She was still talking birth control, anxiety medications, acid reflex and ADHD medication during the initial 5 months of her pregnancy. She had been vomiting every morning and saw the specialist for an adjustment to her acid reflex medication. However, the specialist felt it was her anxiety medication casing the vomiting. She then saw her physician for her anxiety medication and they sent her for a pregnancy test. Once the physician found out she was pregnant he/she immediately took her off her all medication. This caused her to go into extreme withdrawal from the medications and she was vomiting continuously. The mother said she had extreme tremors with vomiting; she described it as a drug detox with severe withdrawal symptoms. She was prescribed a different anxiety medication, as she could not handle the change, but was not given any ADHD medication until after she gave birth. The mother felt that the dramatic reaction of her going off the medication completely without reducing the dosage slowly caused serious distress to her fetus. She had to get IV therapy every month to stay hydrated. She was hypoglycemic during the pregnancy. She was high risk with low embryological fluid, which can cause chronic hypoxia. She had to discontinue working. Her labour was 32 hours and she would not dilate. The doctor broke her water at 17 hours into the labour. She was administered Pitocin and an epidural. The placenta would not deliver well, and took at least an hour or more to deliver. Subject 7's APGAR was 8 and 9 and he was jaundiced at birth. Subject 7's mother was not comfortable emotionally to nurse at all, so Subject 7 was fed formula. Subject 7 and his mother had to stay at the hospital for 6 days after he was born because he would not cry, not even coming out the birth canal during labour. Subject 7 only started to cry when his mother's aunt comes to visit on the 5th day. During the 6 days, the nurses bathed him, took his blood work, and pinched his toes but nothing made him cry.

Subject 7 has never showed a reaction to pain but has been very emotional to non-painful events, demonstrating hypersensitivity. An example was his toe touching the door causing him to cry in pain for hours, but if he ran hard into something there would be no reaction. Subject 7 started hitting at 15 months old. He had colic as an infant and acid reflex. He was very easy to bladder and bowel train, but had trouble with constipation since he was born. He has gone10 days without a bowl movement. The parents administered Restoralax and he has required a prescription to make him go immediately. Since 9 months of age, Subject 7 has had 72 cases of otitis with high fevers, resulting in him having tympanostomy tubes inserted. Subject 7's mother felt he had significant emotional trauma in uteruo from her "coming off of" the medications at 5-6 months. Subject 7 made all of his milestones within normal development. All vaccinations were up to date with no apparent reactions. He has taken an acid reflex medication since he was 3 months old. The family lived in an old cottage that was newly renovated by her father-in-law before Subject 7 was conceived. The family history included: the mother had ADHD, acid reflex, and anxiety; the maternal grandfather had acid reflex; the maternal grandmother had anxiety; both maternal grandparents were emotional and physically abusive to the mother; the maternal grandmother was diagnosis with bi-polar disorder; and on the divorced of the maternal grandparents the grandfather become an alcoholic. Subject 7's signs and symptoms included: a speech delay; high fevers with otitis; a sensitive sense of smell; sensitive to noise; hyperactive; an increase and decrease of appetite; hypo-sensitivity to pain; and anxiety. He had the following surgeries: a scope in 2016 for his acid reflex; and tympanostomy tubes in his ears on June 25, 2017. He had a physical trauma when he was 10 months old, where he fell out of his baby swing and had a seizure. The family took Subject 7 to the hospital where he was assessed by a pediatrician who released him as medically sound. The mother's goals were to improve his

sleep pattern, reduce his anxiety, reduce his emotional responses, improve his hyperactivity, and improve his impulsive behavior.

When data collection started, it was observed that when he was tested at 3:30 p.m. in the afternoon, immediately after his nap, he showed normal results. However, at 10:00 a.m. and 10:30 am, which was 2 hours before his noon naptime, he consistency had lower PSNS and higher hormonal regulation. The mother confirmed that he consistently displayed his ASD signs and symptoms the worst between 10:00 a.m. and 12:00 p.m. Subject 7's measurements were consistently taken in the 10:00 a.m. -10:30 a.m. timeframe. The mother felt he was extra-emotional after the first few treatments but, by the end of the study, she felt he had improved his ability to regulate his emotions.

One interesting example during a treatment was when the mother was treated with Subject 7. The consciousness of the left and right adrenals of Subject 7 and mother were in the astral plan which was restored with the right adrenal presenting a shock imprint from drug withdrawal. Then the right adrenal presented another shock imprint at the time of diagnosis of autism with its consciousness in the etheric field. Subject 7 was connected to the mother from the shock of the withdrawal and the diagnosis of autism. Each shock imprint consciousness was in a different field. The ho'oponopono prayer was used verbally out loud. The mother's adrenals were treated at the same time as Subject 7's. The mother said the prayer out loud for the vibration to resonate into their bodies.

Subject 8 was a 12 year-old boy born November 4th, 2004 at 40 weeks plus 3 days. He had one osteopathic treatment at birth and no other therapies. He was diagnosed with ADHD, by Dr. Kiren Pure at age 5, and then with ASD at age 11 by psychologist, Dr. Valerie Corkum.

In Grade 5, Subject 8 attended a program called “red door” for understanding your emotions, and how to deal with your emotions. In grade 6, Subject 8 had social skills training at lunchtime. His mother noticed issues beginning at age 4-5. She noticed he would only walk with you if he held your hand, he would dart into traffic, he would not respect the word “NO”, he lacked social boundaries and he could not make friends. Subject 8 spent every school day with behavior intervention in the learning center. The school assigned him full time helped with his own APA within one month of him starting grade primary.

The mother experienced no problems with fertility or miscarriages. She had two children and two terminations, because of having depression and bad relationships, prior to having Subject 8. She was 34 when she was pregnant with him. Her pregnancy was stressful, emotional, and she had constant heartburn with acid reflex. She took Zantac for her acid reflex during the entire pregnancy. She had no colds or flues during the pregnancy. The house she lived in had mold in the basement. Subject 8 weighed 8 pounds 14 ounces at birth. During the pregnancy, he consistently pushed up into his mother’s diaphragm. She was induced by an acupuncturist, as she was 3 days over her due date. The labour was 6 hours and she had an epidural at 5-6 cm dilation. She pushed for less than half an hour. Subject 8’s head was moulded at birth. His mother hemorrhaged with her second baby, so the hospital gave her Pitocin to deliver the placenta and kneaded the abdomen earlier to prevent hemorrhage. She nursed Subject 8 for 4 1/2 months. He nursed well and slept well at night, but he did not sleep during the day. Subject 8’s mother stopped nursing him at 4 1/2 months when she went back to work and he was interested in food. He had a respiratory sickness at 4-5 months old and received antibiotics. Subject 8’s mother used formula and microwaved it with the liner that had plastic Playtex lines with the BPA. At that time, the research was

not out on the dangers of microwave and plastic. Her first child only has ADD. Her middle child and her youngest child (Subject 8) both have ADHD and ADD. The formula she bought had reduced amounts of calcium so Subject 8 would not get constipated. Subject 8's APGAR was 7, but the physician was not concerned. Subject 8 was not jaundiced at birth, and did not need O2. He was easy to toilet train for a boy and had no constipation issues. He had no episodes of otitis until he turned 9; he has had otitis once a year for the last three years where he had received antibiotics and then probiotics. Subject 8 had great coordination and good balance as a child and loved basketball. He had emotional trauma with his father as a child. As a child, Subject 8 hand flapped (stemming) and stood meek, but never hit. He has had tics movements but did not have this until he started medication. He reached all of his milestones in normal development. He received all of his vaccination until this year. Subject 8 only had one out of three vaccinations done with no apparent reactions. His medications included: Concerta 36 mg, a slow acting methylphenidate, for ADHD, at 8:00 a.m. on weekdays and 10:00 a.m. on weekends. Subject 8 took biphetin for his ADHD from age 5, but at age 8 switched to Concerta. He also took Intuniv for the last 2 years, at 2 mg, as an adjunct to the ADHD medication taken between 7:00 p.m. - 8:00 pm.

Subject 8's mother's health history included: ADHD; postpartum depression; and anxiety during this pregnancy. The father and paternal grandparents' health history included: a non-rehabilitated borderline personality disorder where they show no empathy. They changed the facts of a story to meet what they believed. The father was physically and mentally abusive towards the mother that started when Subject 8 was 3 months old. The mother separated from the father when Subject 7 was 9 years of age.

Subject 8's signs and symptoms included: recurrent episode of otitis for the last three years; nose bleeds since he was 3-4 years old; repeating words (stemming); sensitive to loud noises; high pain threshold; recurrent breathing problems and diagnosed with Asthma at age 5; decreased appetite from medication; hyperactivity; abdominal pain; anxiety; learning difficulties; ADHD; minor head injuries as a toddler; visual impairment (wears glasses); anaphylactic allergies to shellfish and lobster juice; headaches in the frontal cortex; anxiety; and depression. Subject 8 was born with bilateral strabismus and had left eye surgery at the age of 4. His ASD symptoms appeared worse: when he could not predict events; with change or transition, such as going from class to class or subject to subject; without medication; under social pressures; disrupted or irregular sleep patterns; and if he was home alone his anxiety increased. His symptoms improved with: consistent sleep patterns; medication; discussing the expectations and possible outcomes/direction prior to the events; and having a parent present. Traumas in the past included emotional trauma and head injuries, because of no depth perception, but did not require medical attention. For example, Subject 8 had three head injuries in three weeks between the age 12-13 months. His skin was covered in cuts because he did not feel pain. He had caps on his baby teeth and his adult teeth have had multiple cavities; by the age of 8 he had eight cavities. Subject 8's mother felt this was from a GBA microbiome disruption. Goals were: to reduce medications; improve behavior of listening and being cooperative; and able to adapt to change easier.

Subject 9 was a 9-year-old girl born September 20th, 2007. She has not taken any medications for behavioural modification. She was diagnosed with ASD a year ago, just before she was 9 years old, by Dr. Lindsay Bates who works with girls on the Autism spectrum. Subject 9 was high functioning and the family have managed her ASD in their

own home with their own strategies. She has not undergone any other therapies. Subject 9 was the first born in her family and has 3 younger siblings (brothers). The mother was 25 years old at the time of her pregnancy with Subject 9. Her labour was 6 hours, however, she had pushed incorrectly for 2 hours because she felt embarrassed if she were to have a bowel movement during labour. Once she changed her pushing method the baby was delivered normally. The mother's face and eyes were bloodshot for days from pushing incorrectly. When Subject 9 was born she was visually shaking with tears that created puddles around her. Subject 9 was sensitive to sounds since birth. Her parents called her eagle ears because she was sensitive to noises; for example, toilets flushing, vacuums, hair dryers, and water running from the shower. Subject 9 was sensory sensitive constantly and cried 18 hours a day for 18 months. At 18 months, they figured out how to avoid these noises and sounds so she was not crying constantly. She chewed chairs and objects to sooth herself when she was annoyed. She had a soother until age 2 ½ and cried for days when they took it from her saying "you don't understand mommy". As a youth, she had a sentiochew chewelry necklace, which is a durable small circular or star shaped piece made of generic silicon on a string to go around her neck for her to chew on when she got upset or stressed. At 16 months, Subject 9 started to have reoccurring episodes of otitis. She had a minimum of seven bouts, which were all treated with antibiotics. She had pneumonia with high fevers at the age of 3. She experienced stomach pain and shoulder pain with the pneumonia. She was nursed for 8 months, but the mother's supply was low and cereal was started at 5 months. She slept well and was supplemented with formula at 5 months. Subject 9 had a head trauma that was not a concussion at age 2 or 3 which required 4-5 stitches. She had all of her vacations with no apparent reactions. She did not have any delay in her milestones for development. The family history consists of GERD and anxiety on the father's side. The signs and symptoms

of Subject 9 were: recurrent otitis; sensitivity to noise; hyperactive; depression; anxiety; and difficulty with balance. She had no surgeries. While pregnant the mother and father lived in a newer building, an apartment in Clayton Park, and then in a house Sackville, NS. Symptoms improved with: routine; sleep; chewing; picking her clothes out the night before, especially socks and trying the socks on for feel that night; waking up from her alarm. Her symptoms have been worse with: lack of sleep; loud noises; or if her parents wake her up in the morning. Her parents try to be very aware of her likes and dislikes as they change fast and they adjust to that very quickly.

September 3/17 pigtails were used with the HeartQuest™. Subject 9 had been swimming and the clamps were unable to take a reading.

September 17/17 Subject 9 had a long bath before coming to treatment and, again, the HeartQuest™ had a hard taking a reading using the clamps; eventually a reading was taken with the clamps. R1 was thinking that her skin was so saturated in water it was making it difficult to get a reading. R1 asked if she would consider not being in water on the day of testing and she was very agreeable to this idea. It took 6-7 trials to get a reading pre-and post-treatment today. Subject 9 was excellent considering the technical difficulty.

The treatment started at the pelvis, coccyx and then work progressively up to the cranium. Findings started with: the coccyx having an intraosseous and compaction to the sacrum; the coccyx was flexed compressing the impar ganglion while the consciousness of both resided in the CF; the sacrum consciousness was in the CF and the short arms were compressed bilaterally; the pelvis had a global pseudo rotation right; the right kidney was ptosed physically with its consciousness in the etheric field; and the right kidney was separated

from the right superior adrenal with the adrenals consciousness in the CF. These structures consciousness were returned to the physical and then normalized with BRT. The L3 was a SR right and compacted to L2 with their consciousness in the astral plan. The left kidney was medially translated with its consciousness in the etheric filed and the left adrenal was superior with its consciousness in the CF. The central tendon of the diaphragm consciousness was in the astral plan and physically in expiration. This was normalized and integrated with solar plexus Frymann normalization. T6/7 had an ARS right with consciousness in the CF and then the liver was in a PRS right and stomach in RS right with consciousness in Astral plan. Everything was normalized with BRT and the organs harmonized with the T6/7. The T8/9 had a translated T9 to the left and consciousness in the CF. The pancreas was inverted but was descended as it was compacted to D2. This was normalized with BRT and balanced with T8/9 with central chain (CC) intergration 4 sequencing normalization (CEO, Autoregulation). T4 had an ARS right with consciousness in the CF. The heart had an embryological ptosis with its consciousness in the CF. R1 used the cross-chain heart technique after RI normalized the phenopericardium ligaments and removed the shock imprint to the heart with 6th rib on the left with BRT. Once the heart normalized, T4 was normalized, with the heart using unwinding and balancing, ending with thec. The left side of the thoracic had a cylinder fold at the 6th rib with a shock imprint compressing the vagus nerve with consciousness in the astral plan. This was normalized using BRT. T1/2/3 were compacted with translations underneath the compactions and their consciousness was in the CF. The lungs consciousness was in etheric field and lateral translated in the physical (off axis). The axis of each lung was restored with BRT and integrated with T3 with BRT for immunity and vasomotion. The base of the cranium consciousness was in the Alta major and compacted. This was normalized with opening the

base using BRT in Alta major. The SBS was compacted and sphenoid consciousness was in the CF. The Facial bones consciousness was in the etheric field and when brought back to the physical it expressed PRM. FM and post fossa were normalization with BRT in P1 with BRT, P2 the quite spot and P3 through Alta major. Lateral ventricles' consciousness was in the ketheric field, and they were normalized in the physical. The treatment ended with a core link.

APPENDIX O. Commonalities

It was interesting to note that the histories of each of these eight subjects included at least one of the following which have been identified as potential precursors to children developing ASD: stresses or complications during pregnancy and/or birth trauma. R1 and R2 had seen similarities during the treatments from one child to the next. Several of the subjects showed the same lesions which informed R1 and R2 of what they needed to assess and treat possibly in the next child.

Treatments started August 27/2017 with lesion similarities that consisted of: many interosseous and compactions of the coccyx, sacrum, L3, T6, C0/1/2, occiput, OM, base, and petrous bones with torsions; scars in P1 and P3; breaks in field; consciousness not in the body; and non-physiological without respect to axis in the physica, e.g., an SBS inferior shear. In all the subjects, their consciousness of the tissues or body parts were living in the CF and inside that was calmness. Crawling was typically weaker on the left, with a global and local left rotational pattern such as the occiput indicating to R1 the left rotational disease pattern. This pattern was found in Beauregard's thesis and, from a consultation with Denyse Dufresne, that after vaccinations she confirmed an axis of disease in left rotation. This axis of rotation found in babies increased their risk of having reducecd immunity (Bourgeois (revised), 2016). All the subjects in this study presented with a left disease rotation axis. R2 found: foreign energies; the pancreas, coccyx and empire consciousness were in the CF and in a physical lesion; their prostate consciousness was in the CF; kidneys and adrenals were physically separated with a superior adrenal and ptosis of the kidney with both their

consciousness in the CF. The kidneys were ptosed from a hyper-pressive thoracic spine and the adrenals where bilaterally superior from the central tendon of the diaphragm in expiration. The liver consciousness was in the CF and then retracted in the physical with minimal PRM. The facial bones' consciousness was in etheric field over the face. The occipital mastoids and sphenoid-petrous were compacted. Posterior fossa presented with shears. The otic pit and ganglion consciousness were in the CF and were compressed in the physical. Each pharyngeal arch required normalization in the field and in the physical. All of the RTM and pharyngeal arch bands had breaks in the fields with physical lesions. The bands are fascia with a piezoelectric quality emitting to the fields. The bands are necessary to prevent weight bearing on the vital centres like the thalamus and limbic centers. R1 found repetitively: the thoracic spine T1/2/3 compaction and multiple layers of shock imprints to 6th rib on the left. Thoracic 2, which is at the level of the connecting stalk embryological that migrated to become the umbilical cord, had shock imprints from embryological development and T1/2/3 were compacted with translation under the compactions of T2 or T3 impacting the immunity for lungs and SNS for vasomotion to the cranium. The SNS from T1/2/3 follows the internal carotid artery into the temporal petrous passage to the SPG, middle cerebral artery and into the eye orbits. The SPG were compressed, which can result in the nasal vasomotion becoming stagnant, introducing the potential for infection and autoimmunity. Many of the subjects presented with a global compressed lesion from the cranium to thoracic spine, from birth trauma. The diaphragm was in expiration and, bilaterally, the lungs were translated laterally or external rotated. Many of the subjetcs had a ptosis of the heart, an embryological lesion with its consciousness in the Astral plane, CF or Alta major. The heart is the central fulcrum of the body and was not centered; T4 had a non-physiological, without respect, lesion. These two combined prevented the pyramids

from maintaining a healthy pressure mechanism, the fluids from being centered, and the lines of gravity from aligning. Therefore, the subjects were unable to weight bear on their weight bearing structures resulting on them weight bearing on central chain, the heart and endocrine system. They all presented with a hyper-pressive thoracic spine, potentially contributing to emotional (cranium) and gut dysregulation. All subjects had T6 intraosseous lesions and translations, or a single SR lesion with the central tendon of the diaphragm in expiration. The stomach was typically in rotation and side bending left with the liver retracted, translated left and compacted to the heart ptosis. The foramen magnum had a distorted shape, compressed in a vertical (expiration) or horizontal (inspiration) lesion, and was rotated left. The brain stem and its nuclei's (vagus and RAS) consciousness were typically in the CF and physically appeared dark with no life force. The brain stem was compressed with a shear to the left, or a torsion to the left, on the physical. C0/1/2 were compacted with a compression to the SCG. The SBS either had an inferior shear or a lateral membrane with anchor to the heart. The eye orbits had compactions with lesions under the compactions.

Each subject seemed unable to activate the vagus and the RF to balance their ANS. Overall, they used their SNS or exhibited a heightened use of their endocrine system and hormones to try to balance their ANS. Therefore, it was felt by R1 that these children used their emotional centers to try to control their ANS because they do not have health expressing in the PSNS (vagus nuclei) and RAS systems to activate and regulate their ANS. Hence, emotional reactions and a hyper-sensitive sensory system was displayed. Additionally, the subjects did not have their weight bearing systems in a place of health, nor their fascial

continuity, for structural support resulting in them leaning on the endocrine system for support.

On September 3/2017, most of the mothers reported that their child was initially calmer and present, but then expressed more explosive anger that was short live. R2 was shown another layer to the heart. The heart was in an RS right with its consciousness in the CF, and then in the ketheric field with a past life where the subjects had such a tremendous loss that created so much heart pain they decided they never wanted to feel again. R2 had to spend time with each subject's inner physician showing them that their increased sensitivity in this lifetime was a gift. R1 spent time helping the children restore their biotensegrity of the body from the feet using global body unwinding to the pancreas and T9, the resulting myofascial pivot point.

R1 normalised the supination lesioned pattern in their feet in all three protocols. All subjects had a high 2nd cuneiform with consciousness in the CF. The navicular was compacted to the talus and cuneiforms with an embedded second metatarsal and medial calcaneus. The tarsals' consciousness was in the CF and then in the etheric field. Physically, both of the interosseous membranes in the legs were very tight with the fibula heads physically anterior. Once normalization of the tarsals and lower extremities occurred, they were integrated with BRT to the pancreas and T9, with a resulting leminescate local, regional, and global to T9/pancreas. R1 found L2/3/4 and the mesentery consciousness in the CF and, physically, the spine at L2/3/4 compacted with the mesentery translated left or right. R2 found common lesions in the lungs, liver, and cranium. The left lung consciousness was in CF with a physical lesion of the fissure adhered with the upper lobe in IR and lower lobe in ER. The right lung consciousness was in the CF with a physical lesion of the lower lobe in ER, the

upper in IR, and the middle lobe expanded with all three fissures adhered. The craniums presented with the: left frontal lobe consciousness was in the CF and physically in IR; the left parietal lobe's consciousness was in the CF and physically in IR; the occipital lobe consciousness was in the CF and physically retracted; the left temporal lobe consciousness was in the CF; and the left OM was compacted. Physically, the RF was sheared to the left and consciousness in the ketheric field. R2 found it to be a past life lesion. The left and right kidneys were in ER physically and in the ketheric field. The liver consciousness was in the CF, with the right lobe in postflexion (P) and the left lobe in anteflexion (A) on the physical. Once the liver consciousness was returned, it showed the most health (PRM expression) by treating it in the morphogenic field with a global CC beam approach for integration. The falciform ligament tension was severe in each subject. This was normalized with the Linea alba technique by Fulford. R1 and R2 found the short arm (SA) of the sacrum derailed bilaterally that would not hold the correction unless the the bladder lesion was treated and integrated with the ureter and kidney all as a functional unit with BRT. R1 and R2 danced with the subject's inner physician, with a lesion that presented in each subject physically as: the stomach in an RS left; the esophagus in a torsion; C6 in an SR; and C0/1/2 in a compaction, with a C1 translation lesion. Before addressing the physical, the consciousness was found in the CF, or a break was found in the astral plane, which was normalized. The physical was normalized between the two therapists with BRT normalization. Posterior fossa was done with all three still points to help normalize: the brainstem, the vegetative centers of the floor of the 4th ventricle, the cerebellum tissue, the 4th ventricle expansion for structural integrity, ANS harmonization, and the basilar artery step for cerebral blood flow (Forget, 2017). Frequently, the eye orbit and facial bones were normalized and then integrated with the second pharyngeal step which indirectly normalizes the pineal gland.

The body restored this pharyngeal band first in the morphological field to restore the biotensegrity of the cranium, reducing stress on the pineal gland. Sometimes, R1 and R2 had to treat the asterions at the same time to allow for the embryological unfolding of the brain around the asterion axis. This indirectly treats the pineal gland and allows for the C0/1/2 lesion to correct and potentially maintain the correction. The consciousness was treated in the morphogenic field and Alta major for a karmic lesson and then on the physical with a Hoover technique.

On September 10/17, each child had a new variable of starting school and/or a new teacher, which increased their stress. However, each child came into the treatment area full of joy and silliness. Embryological lesions presented primarily in this week's sessions, specifically, with the embryological T2 connecting stalk at 4 fetal months and the vagus nuclei and vagus pathway of myelination at 4^{th} fetal month to the heart. R1 normalized with BRT and restored PRM. As well, R1 treated the shock imprints of the embryological lesions with the 6^{th} rib on the left using BRT. Another goal of the treatment was liberating the vagus pathway and inhibiting SNS. The deep and superficial heart plexus and solar plexus consciousness were residing in the CF which was restored to the physical and then normalized. This was to harmonize the PSNS and SNS, making sure both systems were harmonized together once they were in harmonization on their own, to provide dynamic coherence.

Alta major chakra was entered, for the subjects' karmic lesson in the etheric EMF field, frequently when working on the brain stem, posterior fossa and base of the cranium. Treatments were also done constantly in the Astral plane, which was connecting their spiritual to the physical world.

Lateral ventricles was used almost every session with each subject to: improve CSF flow and help with balancing the fluids and reduce the global cranial inflammation, to help calm the hypersensitivity of the limbic system, and to increase production of the CSF.

The coccyx and impar ganglion were other common structures in lesion. The coccyx is significant for the pelvic floor fluid exchange and the impar ganglion is important for balance in the SNS, illustrating the structure governs function principle. Energetically, Hunt felt that the etheric field is where insult occurs first and the root chakra is with the coccyx and is where the etheric field enters.

The diaphragm, T6 and L3 were all in non-physiological lesions, without respect or higher, in all the subjects. The diaphragm attaches from T6 to L2/3 and, specifically, if the diaphragm is under tension from a T6 lesion, it will pull on the ligament of Treitz increasing the acuity of the duodenum jejunum (DJ) junction angle of the small intestine. Therefore, a T6 lesion can result in a reduced absorption of nutrients by the small intestine (Murray, 2013). One example would be vitamin B12 and B9 (folate) which are absorbed on either side of the DJ junction respectively, and are required for normal functioning of the brain, nervous system, and for the formation of blood (Murray, 2013; Stedman, 1990). In Dr. Still's first principle structure governs function, MTHFR gene variants alters the structure and cascade of events required for the processing of folate (vitamin B9) into a usable form for its proper function (Centers, 2015; Edward, 2014). Folate's function is for cellular growth and regeneration (Edward, 2014). The enzyme made by MTHRF is used to convert folate to a usable form, and is also used to convert homocysteine into methionine needed for the body's growth and metabolism (Edward, 2014). Folate metabolism irregularities can disturb methylation, resulting in genomic instability for children with ASD (Frye & James, 2014).

Methylation is another process that requires the gene MTHFR, enabling the body to detoxify metals, toxins and other wastes more efficiently (Edward, 2014). ASD has been linked with several causes that affect folate metabolism and impair folate passage across the blood–brain barrier and into neurons (Frye, & James, 2014). Recent research has illustrated that children with ASD are cerebral folate deficient (CFD) and have folate receptor (FR) autoantibodies preventing folate to cross the blood brain barrier (Frye, & Rossignol, 2012). Folate deficiency can result in mood disorders, impaired cognitive function, and fatigue mirroring symptoms of children with ASD (Edward, 2014; Frye, & Rossignol 2012).

Additonally, the L2/3 lesions were anchored by the cura of the diaphragm. L3 is also the vasomotion to the pelvis and L2/3, anatomically, are at the inferior pole of the left and right kidneys respectively. L2 is anatomically where: the head of the pancreas is; and the D2 and D3 of the duodenum are, with the sphincter of oddi and DJ angle respectively. All of these structures are important for digestion and absorption of nutrients.

The subjects presented with chronic lesions of T6/7, which invariably affect the liver and stomach (Clark, 1906). Emotionally, the liver represents anger or a lack of love (Druelle, 2017) which was seen in these children with ASD. Lesions at T6 may also affect the pleura, peritoneum, diaphragm, pancreas, gall-bladder and small intestines (Clark, 1906). The liver is responsible for the oxidation and conjugation phase to remove toxins safety from the body which has been illustrated in the literature that most autistic children are impacted due to the lack of production of GSH, glutathione (Fry & James, 2014). Metabolic pathways of children on the autistic spectrum have also shown imbalance in glutathione-dependent redox metabolism, which are connected to the abnormalities found with folate and methylation

metabolism (Frye, & James, 2014). GSH is an antioxidant required to export free radicals that are highly toxic out of the body (Frye, & James, 2014).

Irritation or disease of the stomach can occur due to a T6 discocorperal lesion (Clark, 1906). In a non-irritant disease, the abdominal muscles can become relaxed, resulting in descent of the abdominal viscera from lack of support (Clark, 1906). Indigestion occurs from the obstruction of the venous drainage of the small intestine and from the amount and quality of bile, as bile has a significant role in intestinal digestion (Clark, 1906). Bowel disorders will follow as bile changes, and marked odor to the stool usually follows, as one of the functions of bile is to prevent putrefaction (Clark, 1906). The literature illustrates that some children with ASD have altered microbiome resulting in an inflammatory GBA.

The majority of the subjects presented with a thoracic vertebra disco-corporeal, such as an SR at T6/T7, which can cause long term abnormal conditions resulting in disease that impedes health and survival (Chila, 2011). Disturbance in the thoracic region can result in life threatening problems, therefore, understanding, from an osteopathic view, its function, diagnosis, and treatment is vital (Chila, 2011). Our most vital function is breathing. Because T6 is the highest point of insertion of the diaphragm, with L3 being the lowest point, lesions affecting T6 can result in diaphragm turgor (Murray, 2013). The vagus and phrenic nerves can be disrupted since their pathways run anterior to T6/7 on either side of the heart, between the pericardium pleura and the mediastinal part of the parietal pleura, and pierce the diaphragm (Netter, 1997). The phrenic nerve innervates the central tendon, diaphragm, mediastinal pleura, pericardium, and lungs, and has a slip to the liver (Murray, 2013). It is apparent from the literature and this research that the vagus nuclei and nerve pathway is impacted significantly in children with ASD.

The vagus pathway on the left frequently presented as compressed in the subjects. This was normalized with a BRT, followed by an integration of the thoracic cylinders with heart. Normalizing the solar plexus, superficial and deep Cardia plexus was frequently done with the intent to provide dynamic coherence between the PSNS and SNS.

The C5/6 and C2/3 consciousness were found in the CF and the lesions were none physiological without respect which possibly contributed to a phrenic nerve irritation from C3/4/5 and disrupted the lines of gravity reducing the ability of the weight bearing structures to weight bear. C5 and L3 are important pivot points and are the resulting fulcrum for the top and bottom of the pyramid respectively in our lines of gravity maintaining pressure conditions and myofascial tensions for the biotensegrity frame work so the vital centers are not weight bearing. C5/6 is the vasomotor to the thyroid gland part of the endocrine system which these children were weight bearing on and L3 is vasomotor to the pelvic viscera. C2 is the main axis of the head around the neck and resultant fulcrum for the head and neck around the body for the lines of gravity. These segments are significant and need to be free from lesions to support our MSK system and postural balance and allow weight bearing to occur through this system and not on the vital centers. Foramen magnum normalization was frequently used which helped normalizes the SNS via the SCG.

On an energetic realm, R1 kept the following in mind with all of the subjects. The importance of head, heart, T2 and C3 are outlined by many practitioners. Druelle, D.O., has outlined, in charts, that the dialogue to access the energy fields and all its levels of the body is with pure consciousness (spiritual realm) (Druelle, 2016). He illustrated that the “Breath of Life” dialogues with all the cells as PRM, with spiritual doors at head, heart and T2 (Druelle, 2016). Specifically, in Fulford’s book “Are you on the Path” he discusses the

electromagnetic field in depth, and Fulford wrote from Hilarion book "Body Signs" that third cervical vertebra was the direct gateway to the spiritual truth of the patient. Fulford states that Sutherland said, "stay close to your maker" when doing CV4 as the hands are in contact with the third cervical vertebra. The third cervical vertebra is also the center for the primary control that involves the oculo-motor-vestibular apparatus and sub-occipital triangle where the primitive reflexes of an infant is found, explained by Alexander (1904) (Fulford, 2003). It is further discussed, by Fulford and Frymann, the importance of the base of the skull, atlas, axis, and third cervical vertebra in birth and the significant consequences if trauma occur to this area in a child's neurodevelopment (Fulford, 2003; Frymann, 1998). We know from the literature that children with ASD may have suffered birth trauma, impacting the C0/C1/C2/C3 region (Centers, 2011). Biomechanically, Fulford states that Fryette and Still interest was between C2/3 and they felt this was the key to the body's problems (Fulford, 2003). It is also well known that the diaphragmatic branches are C3, C4, C5 and, according to Still, we live and die by this muscle (Still, 1902). Lastly, "The cranial–sacral mechanism consists of the skull, atlas, axis, and third cervical vertebra above and below the 3,4,5 lumbar vertebra, sacrum and pelvis bones". "The third cervical is a companion of the third lumbar". "Third cervical receives the spiritual truth while the third lumbar is the center of gravity and expresses the physical reality" (Fulford, 2003, p. 26). Frymann says that the physical is only a quarter of what we need to walk on earth that people are "equipped with a vital body that energies evemy stream and every cell in the physical body" (Frymann, 1998, p. 284). The chakra Alta Major, which is about karmic lessons it is in connection with the pineal gland, illustrated as a triangle projection that encompasses the pineal, pituitary, and C0/1/2/3 outwards off the body (towardsoneworld.eu). It connects to

the carotid body, which monitors oxygen content in the blood and controls respiration (towardsoneworld.eu).

The venous sinus drainage steps were used frequently with all of the subjects. Still quotes, "the brain flushes the nerves of the lymphatics first, and more than any other system of the body. No part is so small or remote that it is not in direct connection with some part or chain of the lymphatics" (Still, 1899, p. 109) Osteopaths have techniques for the lymphatic system and venous drainage of the cranium and body. Inflammation is treated in osteopathy through treating the fluidic level, called P2. The heart is the main pump and is the liquid central fulcrum that coordinates all divisions, called the central fulcrum of the body (Thomas, 2014). The liver, defined as the venous sinus of the body, has a large relationship to immune system shunting toxins into the lymph resulting in weakening the immune system and leading to a potential initial basis for auto-immune disorders (Glover & Goodman, 2016). Osteopaths normalize the main filters of the body such as the liver, bowel, kidney, lung, lymphatics of the body and cranium, heart, venous sinuses and ventricles of the cranium improving the body's ability to deal with inflammation and toxicity (Glover & Goodman, 2016). Applying the osteopathic principles of Still, we must not forget that the body is a unity and needs to be assessed as a whole not the symptomatic area. The fluidic balance is primary and the role of artery is supreme (Still, 1902; Druelle, 2016)

September 24/2017 many of the subject's inner physician started their treatment with the Frymann Solar Plexus technique or the Mesentery with inhibition to the lumber spine ganglion to get a starting point. Additionally, this helped normalize the plexus for SNS and PSNS harmonization. Liver normalization on all levels was frequently needed after these two techniques, followed by centering the heart and its fluids before going to the cranium

so the body had the heart with fluids balanced as a health reference point for the cranium, giving a solid base for the cranium. The treatment typically continued with normalization of the FM and the opening of the base of the cranium for SCG normalization, and then brain stem normalization with posterior fossa. Once the eye orbits were de-compacted, and the facial bones normalized, R1 performed normalization of petrous via the eye orbit. Then, to bring back the structural integrity of the cranial bands, R1 normalized the pharyngeal arches for integration to relieve stress off of the vital centers. This session ended with harmonization of the longitudinal and transversal expression components of the PRM applied to cranial spheres (cord normalization) and lateral verticals for auto regulation effect and calming the inflammation down in the cranium.

September 30/17 was a mediation session with R1 and R2 receiving the messages of open the gates and then clear the path. Oct 1/17 treatment consisted of this message on all the children.

October 8/2017 main themes for this treatment week were: facial bones, especially the left eye orbit and left sphenoid-palatine ganglion; and breaks in the etheric field through Major alta chakra in the RF and /or RAS. It was reconnected by the divine light, through the pineal gland, and, using their sense of self, from the prostate or uterus for enough potency to normalize the RF. All of the subjects had mesntery breaks in the mental field (Solar Plexus). Each subjects's body presented the HPA axis as a whole, and required normalization. Harmonization occurred with R2 on the cranium in an SBS hold, connecting to the pituitary and hypothalamus, while R1 was connecting to the adrenals. Together, R1 and R2 used BRT to normalize the HPA axis. Many of the subjects presented with a physical torsion in the

pancreas. A triangle shock imprint BRT technique was used by R1 and R2 between the heart, spleen, thymus.

Most of the subjects required normalization of the subtalar, tibia and IOM. Many required restoring the whole EMF field by harmonizing with BRT these three points of contact: the physical ethmoid crystal gala; the etheric field Sutherland axis on the straight sinus; and the physical aspect of the pineal gland. Once this was normalized, R1 used a posterior fossa hold while channelling the divine light in to the normalize the fracture/tear in the etheric field through Alta major chakra in the FR/RAS, while R2 helped the body expand their sense of self of each subject from the pelvis to increase potency.

On October 9/2017, the main issue seen in these subjects was their hypersensitive and hypo-sensitive. Hence, their afferent system was not received at the RAS, due to the RAS dysfunction from potentially to much inflammation from trauma, autoimmunity and vagal inflammatory dysfunction. R1 felt that these children do not have anxiety or stress, hence the Bio-Well™ instrument was not picking up an emotional pressure issue. However, the Bio-Well™ instrument did pick up the high energy in the subjects, indicating excessive inflammation. It is possible that a lack of desensitization/sensitization of dynamic coherence at the RF/RAS and/or vagus from the environmental toxins creates an emotional response from the Limbic/thalamic system. This has been labelled as anxiety in the subjects, but evidence from this study suggests that this may be a result of an over-taxed hormonal system, due to a lack of PSNS, from inflammation accumulating in the brain stem causing a dysregulation to RF/RAS and vagus nuclei. Potentially, the lack of RF/RAS system functioning resulted in the hyper and hypo sensitivity dysregulation and the lack of vagal nerve regulation.

October 15/2017 For the last treatment, the common themes were: venous sinus; posterior fossa with specific intent to the RF and vagus nuclei harmonizing each, and then having the RF and vagus harmonize together; and Central Chain (CC). R1 treated consistently from the second cuneiforms, with global body unwinding.

R2 predominantly normalized different fascial slices of CC such as: sense of self, uterus/prostate with S2; heart with T4; pancreas with T9; falciform ligament with T7; mesentery root, which had tears in the field, increasing its permeability with L3. All of the csubjects required balancing of the hemispheres in the celestial field. The venous sinus sequence was performed, especially at the FM and at the straight sinus. Frequently, the heart consciousness bounced back to the CF and had to be retrieved. The thalamus autoregulation technique was used after the SBS was normalized and unwound to the heart. Lateral ventricle normalization was used on all of the subjects which then pulled R1 into the third ventricle for CC continuity and beam. CC consciousness was found in the celestial field in a past life, which returned the CC beam to the body connected. Posterior fossa was consistently done on all of the subjects. The base of the occiput was narrow and its consciousness found in the celestial field in a past life trauma. This was restored and normalized. The RF consciousness was in the CF of that past life. Once the consciousness of these two structures was restored, the physical was normalized using posterior fossa normalization. Central chain (CC) intergration 4 sequencing normalization (CEO, Autoregulation) was required for this step to normalize the entire posterior fossa around their CC for global integration.

APPENDIX P. Motivations for Research Based on Personally Experienced Evidence

A child treated by Drs. Centers and Frymann had experienced considerable trauma on the physical, mental, emotional, and spiritual levels. The researcher felt very strongly that the child's treatment incorporating aspects of the human energy field (HEF) was what made the improvement so profound…

Dr. Centers consulted Dr. Frymann and they determined a traditional medical diagnosis of hyperactivity, Post Traumatic Stress Disorder (PTSD), and significant trauma to the child's ANS and fascia. Dr. Frymann felt these multiple traumas caused disruption to the cephalic pole, as the child attempted to resolve deep seated issues within the etheric and energetic bodies (traditional medicine calls this a hyperactive child), and it was her opinion that these injuries are, in fact, a reflection of a deeper imbalance at the etheric or astral body level.

Dr. Frymann (V. Frymann, personal correspondence, 2013), said "A fracture to the bone is not a simple break but also causes a fracture to the energetic body and cause significant disruption to the etheric and electromagnetic field. Rudolf Steiner taught that a break of this nature is the body's attempt to resolve deep trauma that occurs from birth or pre-birth. A break of this nature can cause disruption to the ego and organization for the child and have an effect on the spiritual and emotional bodies on a deep level. Improper techniques can result in a fracture to the etheric field and disorganization of the ego causing disconnect to the nervous system".

Frymann (1998) writes that it is "Not just functions like circulation, respiration, digestion and so forth but also includes activities as thought, feelings, creative expression, meditation

and spiritual aspirations" (pp. 280-281). Frymann states the structure to which our attention must be directed is the etheric field, which has been distorted by the energy from the impact. Resolution of this energy field will restore the patient very quickly to being herself even though the structural aspect still has not yet been dealt with.

From watching Dr. Centers' treatments, which resulted in optimal improvements, and the readings on the works of Drs. Frymann, Sutherland, Fulford, and Still, it was obvious that there were amazing benefits to treating in the structural, fluidic, and energetic realms. It was due to this experience that this research is being undertaken in order to further investigate this phenomenon.

Specifically, Dr. Centers used HeartMath and HeartQuest™ to measure HRV analysis on dozens of autistic children and found a predominant hypersympathetic discharge. However, once Dr. Centers performed 4-5 osteopathic treatments, the autistic children's HRV monitor showed noticeable change in the hypersympathetic state. In a single case, Dr. Centers treated a 4-year-old child with a diagnosis of autism who "exhibited marked hypersympathetic variability 94% of the time at baseline and after the fifth osteopathic treatment, the child displayed low HRV (autonomic dysfunction) just 28% of the time (with moderate to high parasympathetic output, or balanced autonomic function, rising from a low of 6% to a combined 72%)" (Centers, 2011, p. 107). This child's subjective symptoms improved which coupled with his extraordinary HRV improvement (Centers, 2012).