Case Study

Improvement in Meniere's Disease, Balance, Coordination & Quality of Life Following Network Spinal Analysis Care

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Abstract

Objective: To report on multisystem health changes of a patient diagnosed with Meniere's disease while under a long term chiropractic care program utilizing Network Spinal Analysis (NSA).

Clinical Features: A 56 year old white male presented to a chiropractic clinic with a complaint of bilateral carpal tunnel symptoms, numbness in both feet after sitting, and pain and fullness in the left ear. The left ear pain and fullness was also accompanied by dizziness and progressive hearing loss experienced over the past twenty years. Physical examination revealed significant structural and neurological imbalances. Spinal subluxations were identified at multiple levels of the spine. The patient had been managing his symptoms with ten different medications prescribed for various complaints including: blood pressure, anxiety, muscle spasms and fluid retention. Auditory evaluations had shown progressive degeneration of hearing in his left ear, along the whole range of frequencies tested.

Intervention and Outcomes: The patient received NSA care, basic workshop style education about stress, simple range of motion exercises, and beginning Somato-Respiratory Integration exercises. The first re-evaluation showed positive changes in symptomatology and lifestyle. His auditory exam four months from the start of care showed improvements especially with lower frequencies. These changes in hearing continued to improve, and then were maintained over the course of treatment.

Conclusions: In this case, an individual diagnosed with Meniere's disease had improved hearing as well as reduction of other symptoms while enrolled in an NSA care program.

Key Words: *chiropractic, vertebral subluxation, Meniere's disease (syndrome), hearing improvements, Network Spinal Analysis (NSA)*

Introduction

Meniere's disease affects the inner ear and is characterized by intermittent episodes of vertigo, low frequency sensorineural hearing loss, tinnitus, and aural pressure. Normally endolymph, (responsible for maintaining a sense of balance) is produced and then absorbed through active transport into the endolymphatic duct and sac within the inner ear. However, development of an increased volume of endolymph and expansion of the sac within the membranous inner ear, a phenomenon called endolymphatic hydrops, can result in bouts of vertigo.[1, 2]

Several mechanisms have been proposed to explain how endolymphatic hydrops produces the intermittent spells of vertigo associated with Meniere's disease. The most prominent theory describes increased distention of the endolymphatic duct leading to rupture of its membrane allowing for the potassium-rich endolymph to flow into the perilymphatic space and irritate the hair cells and cranial nerve eight, which are responsible for sensing movement and balance. This irritation, in turn, causes direction-changing nystagmus (perceived as episodic vertigo) and hearing loss.[3]

Another explanation proposes that an obstruction within the endolymphatic duct leads to hormonal production of additional endolymph as well as glycoproteins in an attempt to overcome the obstruction. When the obstruction is overcome, the sudden outflow across the sac causes deflection of structures in the otoliths and semicircular canals thus depolarizing the hair cells and could result in vertigo.[1,3] Another proposed mechanism states a narrow bony endolymphatic duct limits the flow of the endolymph causing a buildup in the endolymphatic sinus. Eventually the buildup of fluid forces open the valve of Bast and the fluid overflows into the utricle causing distortion of the hair cells thus causing vertigo. With repeated incidence cellular damage decreases the functionality of the sac, increasing amounts of endolymph remain in the cochlear duct, and hearing deteriorates.[2]

Sajjadi and Paparella reported significant anterior and medial displacement of the sigmoid sinus in those with Meniere's disease as compared to healthy controls. This forward location can cause compression of the endolymphatic sac creating abnormal vascular flow that leads to the development of obstruction and hydrops. They report that prevalence studies suggest the disease more commonly affects adults in the fourth and fifth decades, has a familial tendency, affects more Caucasians of northern European decent, and has a slight female predominance.[1]

Although no definitive cure and no one effective treatment is available for patients with Meniere's disease, most find relief with a combination of medical therapy, psychological counseling and reassurance, along with lifestyle and dietary changes. Patients with Meniere's are advised to restrict intake of salt, caffeine, alcohol, and tobacco products. Diuretics such as Dyazide and Triamterene are commonly prescribed to reduce salt and retain potassium levels. If more invasive intervention such as a Meniett device (a pressure pulse treatment), and endolymphatic sac enhancement surgery are unsuccessful, Gentamicin injections into the middle ear hair cells to destroy the cells, vestibular neurectomy, or even labyrinthectomy are other possible surgical options.[1,4]

Endolymphatic sac enhancement (ESE) surgery has been reported to be effective with varying results, with studies showing a conservative 59%[4] and greater than 76%[1] effectiveness in alleviating intractable vertigo. However, pathological findings have been associated with ESE surgery including perisaccular fibrosis and production of granulation tissue that fills the mastoid air cells and the perisaccular space creating saccular compression and obstruction.[1]

Several chiropractic studies report improvement in patients with symptoms of vertigo as it relates to Meniere's disease as well as cervicogenic vertigo.[4-10] The purpose of this paper is to report on a case of a male diagnosed with Meniere's disease as he progressed through chiropractic care utilizing Network Spinal Analysis (NSA).

Case Report

History & Examination

A 56 year old male presented to a private chiropractic clinic with reported complaints of bilateral carpal tunnel symptoms, bilateral paresthesia of the feet, and pain and fullness in the left ear. The left ear pain and fullness followed a twenty-year history of vertigo and progressive hearing loss. This symptomatology had led to a previous diagnosis of Meniere's disease by a medical doctor.

When asked to reflect on areas of his current lifestyle and rate them as "poor", "good", or "excellent", he rated his diet and exercise as "poor" and his sleep and general health as "good". He also evaluated his stress levels using a visual analog scale where "1" represents no stress and "10" represents extreme stress, rating his stress level as a "2" for both occupational and personal life stress. In response to the initial consultation paperwork, the patient reported ten different pharmaceutical medications he was taking as prescribed for various diagnoses.

A postural examination revealed: right head tilt and rotation, a right high shoulder and a right high ilium. Bilateral weight scales showed that he carried an extra 33 pounds on the left side as compared to the right. Thermography and surface electromyography (sEMG) were performed on the initial visit and on average every 15 visits to illustrate changes in vascular sympathetic tone and somatic signals to the muscles in response to chiropractic care (Appendix A). It has been shown that sEMG is a reliable, valid and objective method of evaluating paraspinal muscle activity.[11] Additionally, thermography is a reliable method of observing the sympathetic nervous system response to vertebral subluxations and chiropractic adjustments.[12]

Initial visit thermal scan exhibited multiple areas of temperature difference measured in degrees Fahrenheit with "severe" differences up to 1.4 degrees at C4 and T1, "moderate" differences up to 1.3 degrees at C2, C3, C7, T4, and L4, and "mild" differences up to 1.0 at T2, T3, T6, T7, T8, L5, and S1. The initial sEMG scan illustrated multiple areas of muscular asymmetry with "extreme" asymmetry at T1, T4, T6 and S1, "severe" asymmetry at C7, T2, and L5, "moderate" asymmetry at T12, and "mild" asymmetry at C1, C3, T8, and L1. Normative values have been established, and the Insight software translates the results into these labeled categories.

The Network "Phasing System", which is further explained in the discussion, was used to identify areas of spinal cord tension at specific segments. The patient was evaluated with this method on each visit.

Interventions

The patient was examined and cared for with NSA protocol. After an assessment via the "Phasing System", low force contacts were applied at "Spinal Gateways" to increase the patient's awareness of spinal tension patterns, posture, and to initiate spinal waves and promote reorganizational strategies. A total of 118 NSA adjustments, also called entrainments, were administered over a period of 34 months. The care was administered through progressive levels of care with unique physiological markers, assessments, and outcomes (Table 1).

He began to show resolution of the dominant spinal patterns six weeks into his care program, and level two NSA

entrainments were introduced. Only the first two levels of NSA entrainments were used for the duration of his care. This concept will be further explained within the components of NSA protocol. NSA protocol is a non-linear approach in which the contacts made could be at different segments within each of the five phases, depending on the rapport detected by the practitioner. Contacts were made along varying aspects of the sacral tubercles, the occiput, and at any of the cervical vertebra depending on the phase (Table 2). Throughout the duration of care, the patient was found to exhibit all of these phases at some point. His care plan consisted of an average of three visits per week for the first three months. He was seen an average of three times per month over the period of a year and an average of 2.5 times per month for the following year, through the end of reported care.

In addition to the NSA adjustments, the patient also participated in basic workshops about stress and how it can affect the nervous system, spine, and health, and performed simple range of motion exercises such as knee to chest and piriformis stretches. As a complement to NSA care he also attended an introductory somato respiratory integration workshop, and self-awareness exercises were performed at home. These exercises are designed to enhance somatic awareness through the use of self-directed focus of movement, breathing and verbalization of statements about one's internal state.[13]

Re-evaluations

An audiologist examined the patient each year during the treatment period and had documentation supporting left sided hearing loss. The audiogram prior to beginning care indicated hearing deficiency throughout all frequencies in the left ear. After approximately four months of care, the patient's audiogram showed global improvements with greater improvements noted in the lower frequencies and the greatest overall improvement at 1000 Hz frequency. The audiogram performed during the second year of care showed similar global improvements with greater improvements noted in the higher frequencies, especially at 8000 Hz. During the third year of care the patient had minor regressions in hearing loss at the 250, 500, 2000 and 4000 Hz ranges; however, he still showed net improvement when compared to the audiogram performed prior to beginning care. (Figure 1)

Re-exams were done approximately every 15 visits using the Insight Millennium Subluxation Station to obtain and analyze sEMG and thermographic qualities of the patient's spine as he progressed through NSA care. These scans were completed on visits 13, 25, 52, 64, 81, 89, 100, and 115 to show the progression of the patient's autonomic regulation and changes in muscular symmetry. Overall, rolling thermal scans showed improvement in regulation of autonomic function through smaller and less frequent differences in paraspinal temperature. Surface EMG scans also showed relative improvements over the reported span of treatment with fewer areas of muscular asymmetry as well as a decrease in overall severity. (Appendix A)

A re-evaluation questionnaire was completed on the 89th adjustive visit which was approximately a year and nine months into care. The patient was asked to rate his overall health and well-being as the function of his nervous system improved by writing a "1" if improvement was noticed in the functional area and a "2" if significant improvement was noticed in the functional area. He reported that he felt more relaxed, more rested, more alert, had more energy, and could think more clearly. He also noticed improvements in his moods, sleep, vision, and overall comfort. A decrease in frequency and severity of headaches and colds or flu was reported as well as a noticeably improved ability to bend, walk, sit, and stand compared with the time prior to beginning care. His improvements in hearing, balance, and coordination were noted to be of significant improvement, with particular acknowledgement that his hearing improvement was also noticed by his family. Other noted lifestyle changes included increased water consumption and exercise.

A second re-evaluation questionnaire was completed a year after the first. Functional improvements included an increase in his ability to cope with or handle stress, a greater sense of well-being, and a heightened perception of his health as well as others' perception of his health. He indicated noticeable positive changes in the following: overall comfort (including joint, back, and neck comfort), and increased flexibility. He also reported greater ease with sitting, standing, lifting, bending, and driving. Decreases were reported in both frequency and severity of headaches and sinus congestion, as well as carpal tunnel symptoms.

He also indicated noticeable positive improvements with the following: memory, cognition (his ability to think more clearly), mood, sleep, coordination, allergies, and immunity. He again noted significantly fewer incidences of sickness with a cold or the flu and significant improvements in his breathing. Other positive indicators were noted with respect to: strength, relaxed demeanor, alertness, energy levels, and balance. An additional special notation was made that he had observed an improvement in his hearing since beginning care. Additionally, the patient reported a reduction in the amount of prescribed medications taken daily, from ten to two.

Discussion

Network Spinal Analysis (NSA) care is an evidence-based approach to wellness and body awareness developed by Dr. Donald M. Epstein and used exclusively by doctors of chiropractic. According to Dr. Epstein, NSA care encompasses certain aspects of multiple longstanding chiropractic methods, principles of quantum mechanics, neuroanatomy, neurophysiology, and psychoneuroimmunology as well as changing perspectives in health care to explain its approach.[14]

Based on Alf Breig's research on Adverse Mechanical Cord Tension (AMCT), NSA care developed and utilizes a "Phasing System" to correlate spinal cord tension with specific osseous segments. This "Phasing System" is administered through advancing levels (Tables 1 and 2) that have unique physiological markers, assessments, and outcomes which, according to Irastorza, are tracked via spinal and neural integrity subsystems as well as assessments by both practitioner and patient as they progress through the levels of care.[14, 15]

NSA seeks to perfect the technique through evidence based practice measures. It has evolved over the years and, more specifically, in 2004 was updated from a system of health care delivery seeking to reduce two specific types of vertebral subluxation: structural and facilitated, to a multi-component system of patient-centered health care delivery.[16] Originally viewed as a system of classifying, prioritizing, and adjusting vertebral subluxations, NSA has evolved into a system designed to enhance one's cognitive and precognitive awareness of spinal structure, body tension patterns, and specific spinal waves comprised of a "Respiratory Wave" and a "Somatopsychic Wave" to reorganize the nervous system.[17,18]

The Respiratory and Somatopsychic waves are unique to NSA care and are waves of muscular activity professed to encourage reorganization of the body's neural circuitry, spinal oscillation, and changes in the function of the autonomic nervous system contributing to a more relaxed state.[15, 18]

The four components of the updated NSA system include 1) gentle precise contact, 2) the process of spinal waves assisting in creation of adaptive strategies, 3) a psychosocial component that suggests an ability to facilitate positive self-modification of behavior by affecting the person's perception of their state of wellness and thereby influence the adoption of a health promoting lifestyle, and 4) a wellness education paradigm that creates an awareness of multiple concepts including the differences in allopathic and non-allopathic practices as well as differences in approaches, goals, and objectives of each. Patients are also educated on the differences in actions consistent with illness and wellness as well as the physiological effects of making healthy lifestyle choices and the importance of self-reports of health and quality of life when working towards wellness.[16]

Prior to making a contact, the clinician makes clinical notations about the passive (bones and ligaments), active (muscles and tendons), and neural (phase indicators) tensions in the body. When gentle and precise contacts are made in areas of specific spinal-dural attachments, called "Spinal Gateways", the brain is cued to create new wellness promoting and reorganizational strategies for living and healing. This is accomplished through the development of spinal waves.[15] The Spinal Gateway is described as "an interface between the dimensions of energy, consciousness, and physical tissue. [It is] a nexus or hub for interactions between the spinal stability subsystems".[19]

The Spinal Gateways are found in the vicinity of the tissues that overlie the spinal-dural attachments which are reported to be at occiput, C2, C5, S2, S3, S4, and coccyx.[19, 20] After the contact is made, clinical notations are made about changes in the tension parameters and regions of the spine that stretch or spontaneously move with the adjustment of other segments.

This may appear as muscular or bony movement as the spinal cord tension is released after receipt of the self-directed corrective force (the contact) at the subluxated segments. The "Respiratory Wave" is described as smooth, rhythmic muscular movements that are often synchronized with deep respirations and when fully developed produce movement from the sacrum to the cranium, segment by segment, and exhibit muscular expansion in both the axial and anterior/posterior planes simultaneously.[14]

In his article which outlined the transition of NSA care, Dr. Epstein described that it was the clinical findings related to the "Somatopsychic Wave Phenomenon" that provoked the shift in the system's approach. He reported that Bohacek and Jockheere's research evaluating unfiltered surface electromyography signals revealed a wave with "dynamical non-linear character distinct from voluntary muscle contraction" suggesting that the "Somatopsychic Wave" cannot be consciously generated but can be consciously halted. Patients who were aware of deeper respiration patterns and/or the "Somatopsychic Wave Phenomenon" reported greater wellness and quality of life as compared to those who were also under NSA care but not perceptive of the phenomena.[16] Also, research study of the nature of the "Somatopsychic Wave Phenomenon" reveals increasing levels of complexity as the patient progresses through a series of levels of care.[15]

Irastorza explained that NSA care operates from a model of "Reorganizational Healing" and "involves the dynamic relationship and outcomes of structural, behavioral and perceptual shifts in enhanced energetic (thermodynamic) efficiency, as well as the promotion of enhanced spinal-neural coherence," and as such "is an integrally informed structural approach to the developing field of integral health and medicine in which internal subjective and external objective developmental stages and states can be monitored and evolve."[15]

Although NSA does not claim to be a cure for medical conditions, it is estimated that more than 12,000 patients currently receive NSA care and there are many reports of improvements in symptoms of medical conditions.[18, 21, 22] To our knowledge there have been no reports of NSA care and Meniere's disease; however, there have been reports of NSA care and positive effects with multiple non-musculoskeletal issues including: reduction of psoriasis[21], improvement in vision[15], improvement in attention[18], and overall wellness and quality of life[23].

Surface Electromyography

Electromyography, also known as EMG, is a technique used to gather information about muscular activity. There are two approaches to gathering the information, needle electromyography and surface electromyography (sEMG). In his article comparing needle electromyography and surface electromyography, Kent described how sEMG study is more appropriate for evaluation of the global function of groups of muscles.

He described how sEMG can help to determine the severity of a condition as well as: areas of asymmetrical muscle contraction, areas of muscle splinting, abnormal recruitment patterns within muscles, dysponesis, and responses to dysafferentation as they are associated with vertebral subluxation. He also showed a physiological response to the chiropractic adjustment.[11] Additionally, Kelly reported that sEMG test-retest studies show very good to excellent reliability with correlation coefficients of 0.73 to 0.97 and

reports test-re-test reliability for the two approaches is in favor of sEMG with coefficients of 0.88 for sEMG and 0.62 for needle EMG.[24] Surface electromyography utilizes hand-held electrodes to measure and record electrical muscular activity as generated through the action potential. Data, including the amplitude, or muscle signal measured in microvolts, paraspinal muscular symmetry, and frequency shift is collected from fifteen paired sites along the spine, analyzed by a computer, and compared to a normative data base.[11]

Thermography

Infrared technology allows for the indirect evaluation of the sympathetic nervous system through the use of thermal scans which have been reported as a valid and reliable method for evaluation of sympathetic nervous system response as it relates to vertebral subluxation.[12] An infrared thermal scanning device measures peripheral skin heat emission created by paraspinal tissue vasoconstriction and vasodilation which is controlled by the sympathetic nervous system, a subcategory of the autonomic nervous system.[25] Thus paraspinal thermal differences indicate abnormal autonomic regulation. McCoy et al. report very high intra-examiner and inter-examiner reliability of paraspinal thermal scans with the Insight Millennium Infrared Thermal Scanner. [12]

Audiology tests

The primary hearing evaluation in this case was audiometry. Audiometric evaluation assesses bone conduction versus air conduction in a coherent patient. While wearing headphones, the patient is instructed to indicate when he or she can hear the sound. The audible sounds are produced at different decibels to determine any hearing deficiencies and the frequencies affected. With normal hearing defined as the ability to hear sounds at 15 db, a reduction in as little as 10db represents a deficiency.[26]

Di Duro reports that cases with vertigo also have sensorineural hearing loss. A possible explanation of this could be damage to the hair cells and vestibular portion of cranial nerve eight interferes with vestibulo-cochlear system function, causing a possible decrease in activation of the auditory cortex and primary association areas, leading to hearing loss. This deprivation of the normal peripheral input to the higher cortical regions has been shown to cause reorganization of brain activity.[27]

He explains that excitotoxic damage to the hair cells in the cochlea is shown to be reversible through neural plasticity and hearing could be restored. Di Duro also reports following reversible cochlear damage, plastic changes in the peripheral auditory system take longer.[27] It seems possible to extrapolate that the repeated exposure of potassium (toxic to the hair cells in the perilymphatic space) occurring with endolymphatic hydrops causes repetitive damage to the hair cells and thus plastic changes would not occur as expected.

However, Di Duro concludes that because of cortical integration of somatic, vestibular and visual information, it is possible that the afferent somatic information following chiropractic adjustment can create changes in the vestibulo-cochlear system and thereby influence changes in hearing. Perhaps this is the mechanism at work in this case study. The cortical integration could result in regulation of hormonal balance and reduce the fluid volume that occurs with endolymphatic hydrops allowing for restoration in hearing in this case.

Possible limitations of the study include limited patient history and limited documentation of examination findings including daily visit analysis of active, passive, and neural tensions as they relate to Network Analysis. Although the re-examination assessment questionnaires contained similar information as the questionnaires developed through NSA, they were developed by the private office and therefore were not peer-reviewed or analyzed for validity or reliability.

Conclusion

Over the course of the recorded care period, the patient reported improvements in multiple areas of his life, most notably with his symptoms of Meniere's disease. As a result of these improvements, his medicinal dependence decreased and his hearing significantly improved verified with objective testing through audiometry. He also experienced improved ability to communicate with his family. This case study adds evidence to support the research data-base of improvements made with patients under NSA care, with results expanding beyond the normal palliative care measures associated with many chiropractic techniques.

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Table 1

Level of Care	Description
1	Objectives: • To reduce facilitated subluxations, which are described as having a primary component of nerve root pressure related to adverse mechanical cord tension and a secondary component of osseous misalignment. • Entrainment of respiratory motion with spinal motion (respiratory wave) • Release of tension from spinal stability subsystems • Reduction of parameters of spinal cord tension
2	Objectives: • To reduce facilitated and structural subluxations. Structural subluxations have a primary component of vertebral misalignment and a secondary component of nerve interference and are thought to be initiated by mechanical or physical stress. These are not addressed until Level Two under the concept that in the absence of underlying chronic facilitation, the body is more accepting of structural adjustments. • Resolution of dominant spinal defense patterns • Development and refinement of the Somatopsychic wave (entrainment of two vertebral oscillators
3	Objectives: • Promote enhancement of overall health in individuals who have developed consistently flexible spines free of facilitated and structural subluxations and have coordinated the Somatopsychic Wave from sacral to cranial ends of the spine. • Absence of defense posture • Development of the third (thoracic) oscillator

Adapted from Epstein D. Network Spinal Analysis: a system of health care delivery within the subluxation-based chiropractic model. J Vert Sublux Res. 1996 Aug; 1(1):1-9.

Table 2

Phase	Correlating osseous segments	Possible direct "Spinal Gateways"
1	Sacrum or Occiput	medial to lateral aspects of the sacrum
2	C1 or C5	C1/CO or C1/C2
3	Ilium at Posterior Superior Iliac Spine or Sacral apex	Posterior Superior Iliac Spine or Sacrotuberous Ligament
4	C2 and or C3	C2/C1, C2/C3, C3/C2, or C3/C4
5	C2 and Sacral apex or C5 and coccyx	C2/C1, C2/C3, C3/C2, or C3/C4 C4/C3, C4/C5, C5/C4, C5/C6, C6/C5, or C6/C7

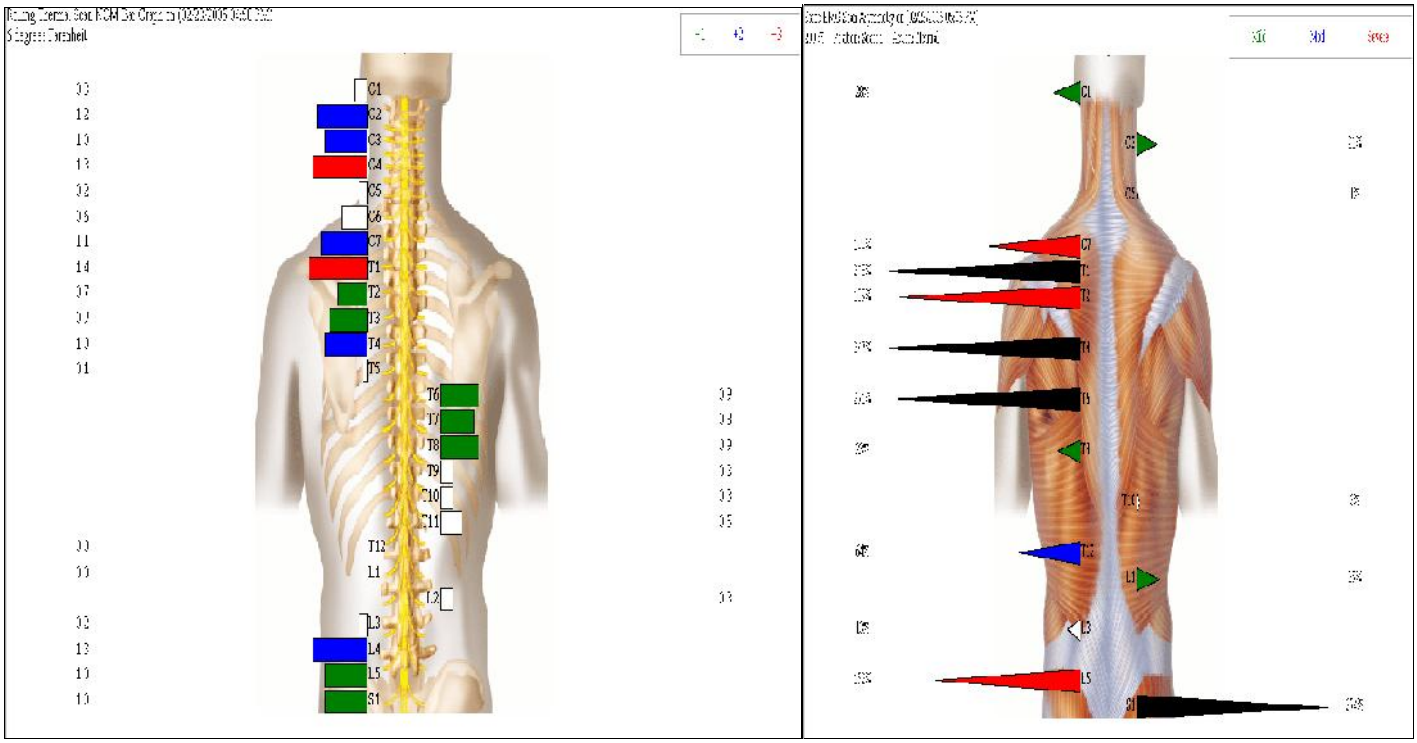
Adapted from Pauli Y. Improvement in attention in patients undergoing Network Spinal Analysis: a case series using objective measures of attention. J Vert Sublux Res. 2007 August: 1-9.

Figure 1

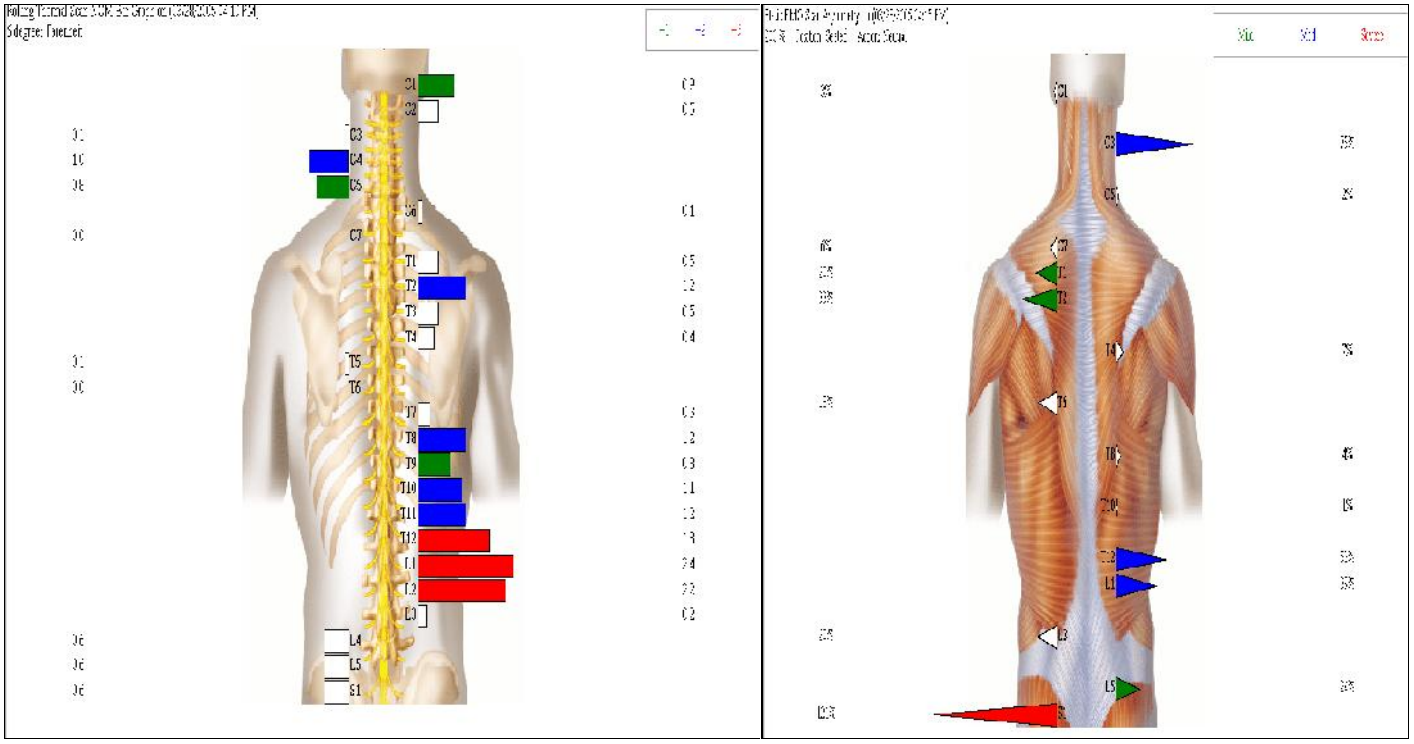
Test number	Frequency in Hertz	250	500	1000	1500	2000	3000	4000	6000	8000
1	right ear	10	8	10		7		10		15
	left ear	42	40	43		30		40		50
2	right ear	10	10	10		7		10		15
	left ear	25	20	20		15		35		55
Left ear difference of dB from test 1 to test 2		17	20	23		15		5		5
3	right ear	10	10	10		7		10		10
	left ear	30	18	10		8		25		35
Left ear difference of dB from test 2 to test 3		-5	2	10		7		10		20
Left ear difference of dB from test 1 to test 3		12	22	33		22		15		15
4	right ear	10	10	7		10		10		15
	left ear	35	20	10		12		30		30
Left ear difference of dB from test 3 to test 4		-5	-2	0		-5		-5		5
Left ear difference of dB from test 1 to test 4		7	20	33		18		10		20

Appendix A

Initial visit:



Visit 13:



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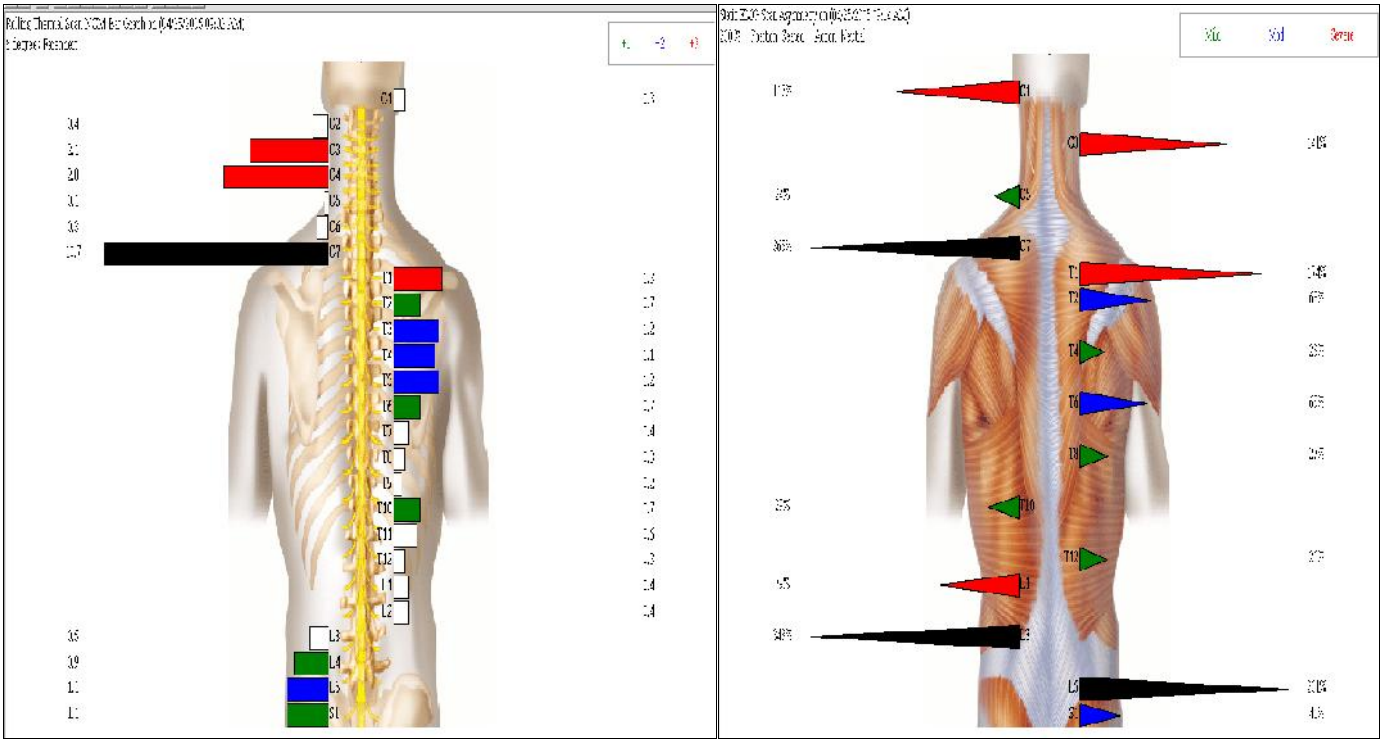
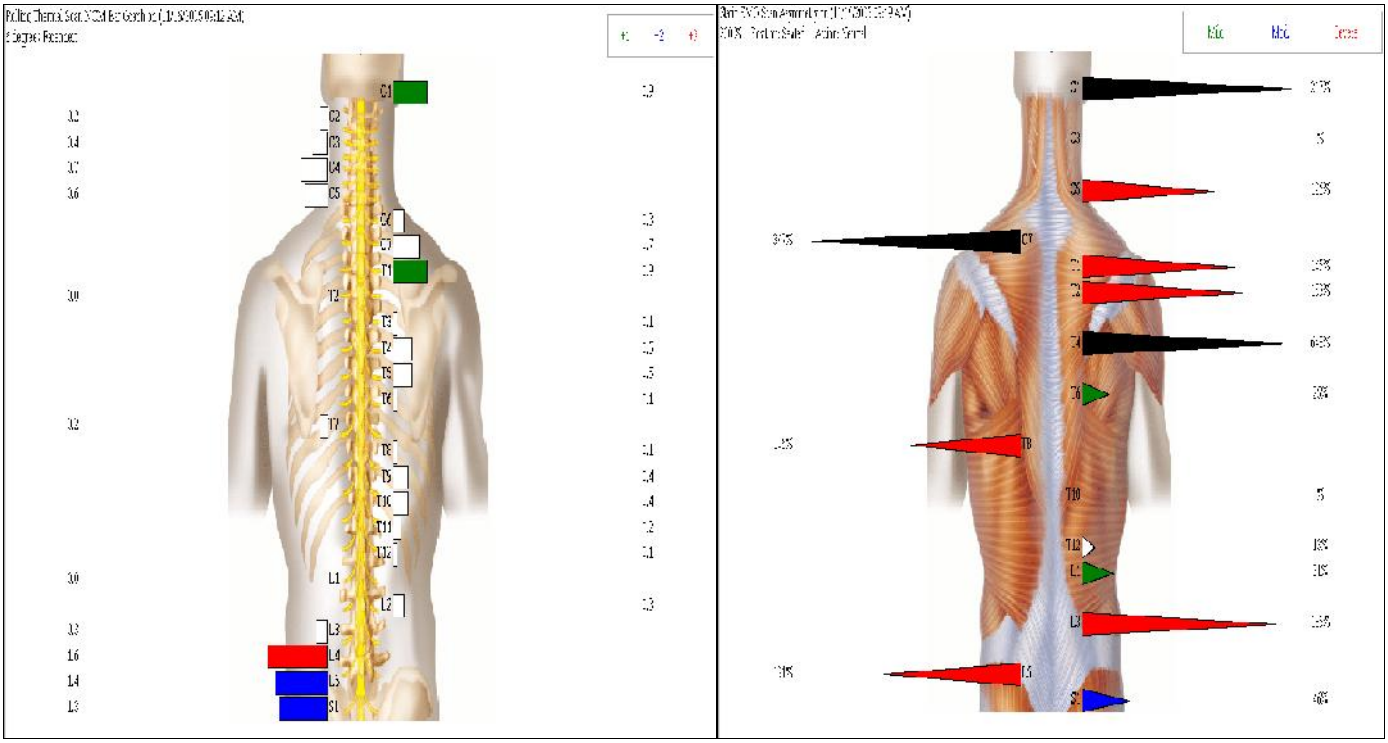
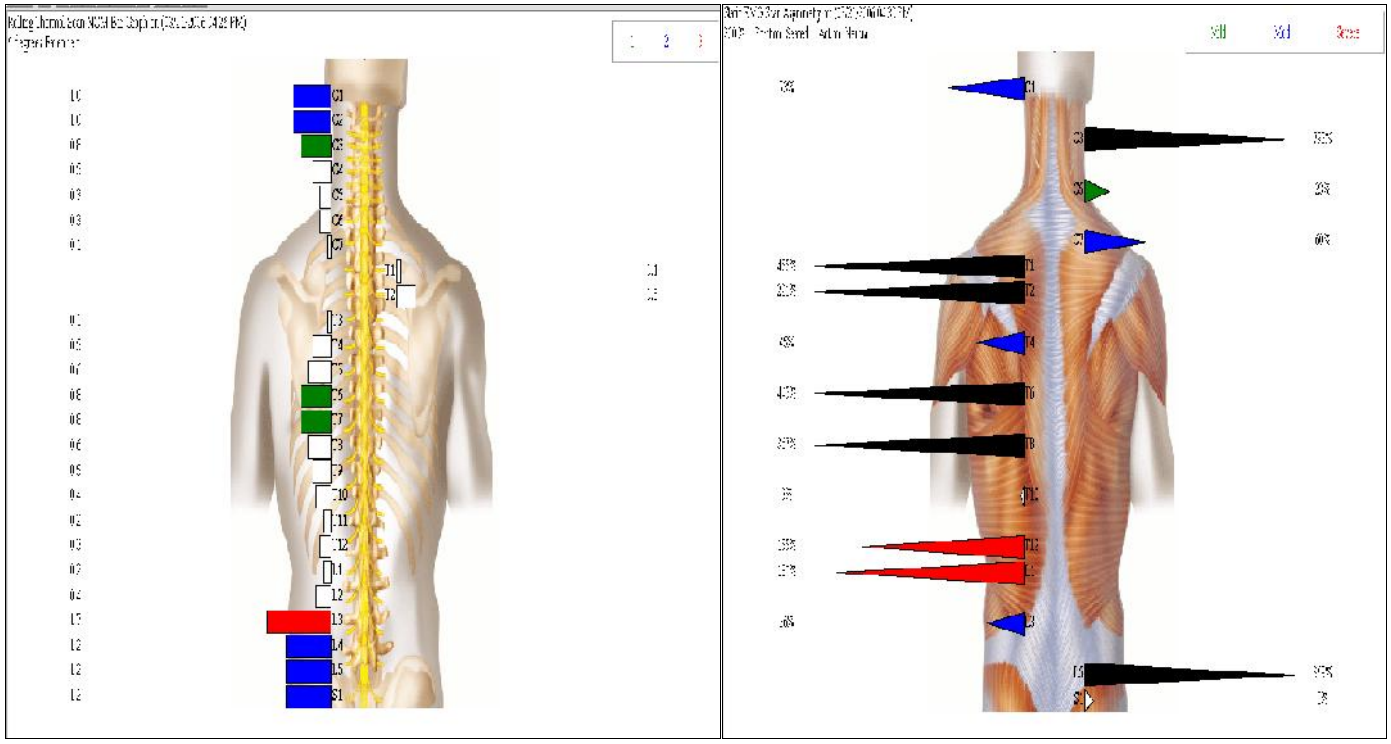


Visit 52:



Visit 64:



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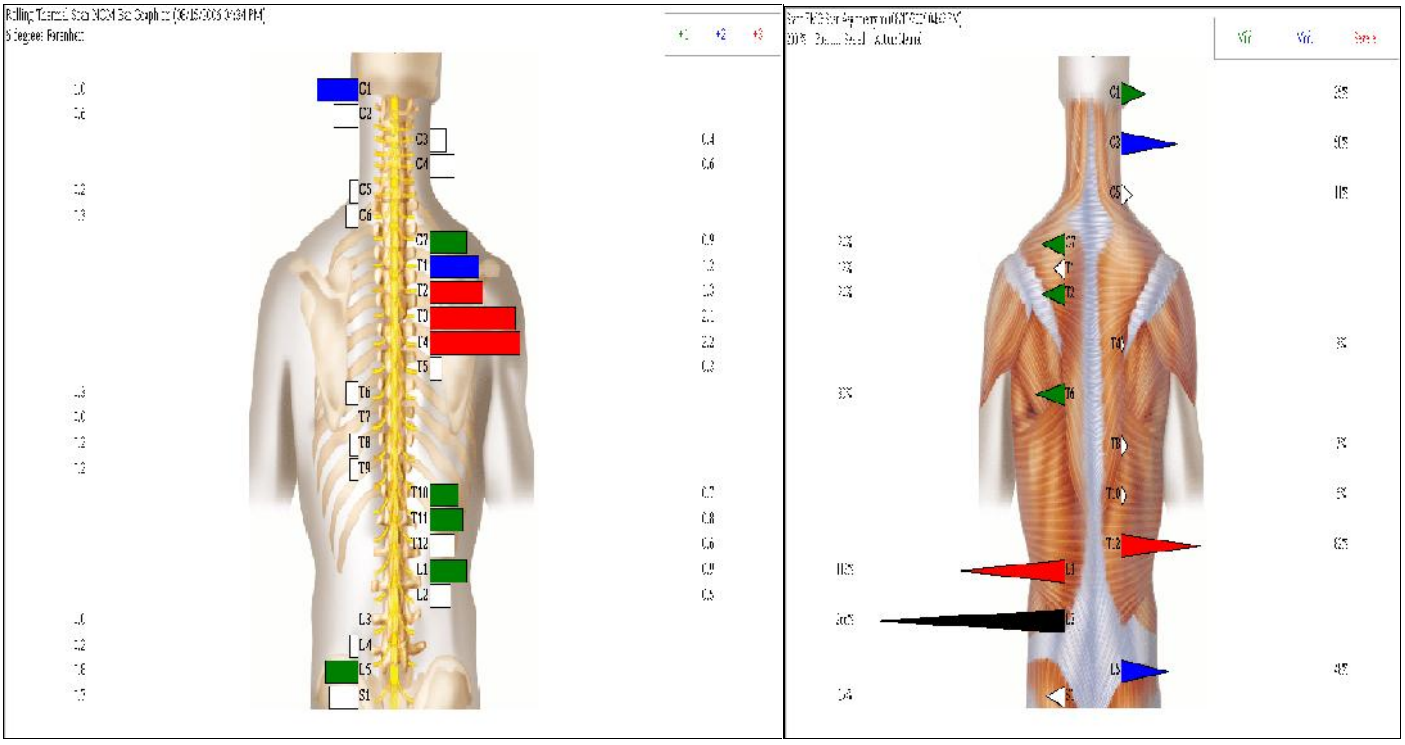

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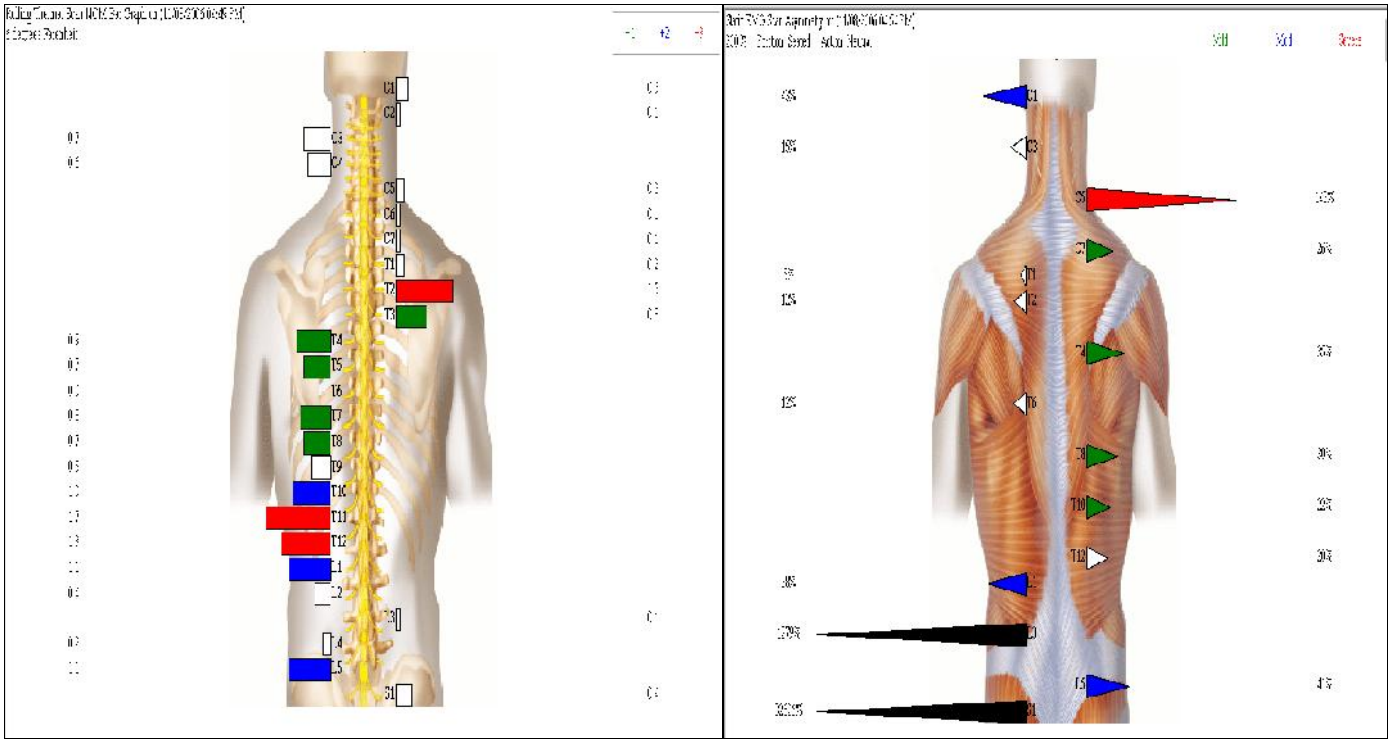

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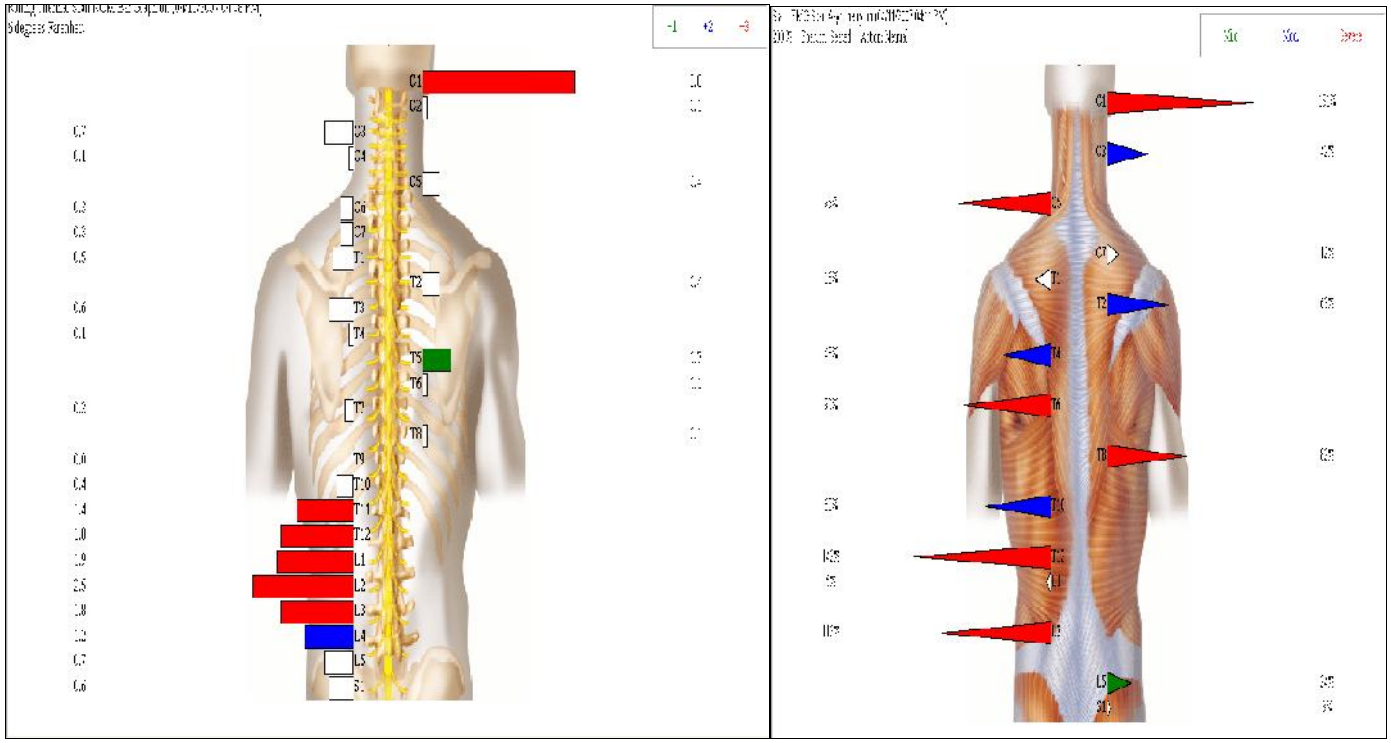

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