

Why does Chiropractic need to look at . . .

Brain Activity

As we have continued to state over the last 114 years, Chiropractic's primary focus is the nervous system. Insofar as the brain is the central organizing authority, it behooves us to have some objective method of knowing that something is amiss in the CNS and even more compelling, that our care has improved neurological function. The best researched and simplest method today is via electroencephalograph or EEG^{1, 2} studies. B.J. Palmer told us that the subluxation (or less light) is found in the nervous impulse so what better area to examine than the seat of neural activity. Brain waves are created by cortical activity and are a very accurate method of revealing normal or abnormal brain activity.

Moving from the cortical function, we next need to look at the oldest part of the brain – the limbic system. Within this region we find all the life sustaining activities of the nervous system. The limbic system is the center of the Autonomic Nervous system and it is divided into two parts: the sympathetic (responsible for getting our other systems up and running) and our para-sympathetic system which is responsible for slowing everything down. The activity between these two systems allows us to respond to tasks or threats (sympathetic activity) and then to recover (para-sympathetic) from the efforts of these high energy demanding situations. Research shows that Chiropractic adjustments alter Autonomic Nervous system function³.

While we think (consciously) that we are in control, 84% of our brain activity is subconscious which is why the majority of time we have no idea that our systems are out of balance. We only become aware of a problem once the relationship between the two become so badly out of balance that symptoms appear.

In order to determine real neurological function we must look at the systems under duress and then recovery to see if they can adapt to a stressor and then recover to normal once the stressor is removed. This is the reason that we do dynamic testing over time and events. Static testing is out of date and does not present an accurate picture of neurological function.

The Limbic system controls other body systems including: heart rate, hand temperature, skin moisture, respiration rate, general muscle tone, and heart rate variability as well as others.

So, now as a truly Neurologically Based Chiropractor we can see the importance between cortical activity and limbic system response but how does that relate to practice?

Autonomic Neurological function

Heart rate - Ideal 56 to 66 BPM

So why is heart rate important? As Cardiac events are the number one killer, knowing what is going on with heart function is self evident. The NeuroInfiniti provides a great deal of cardiac information including simple heart rate and heart rate variability. With the stress/recovery measurements we can objectively see what the heart activity is during emotional stress⁴ and physical activity. We can see if the patient has any conscious control on his/her heart rate.

Heart Rate Variability - high bars in the low frequency range

This is a relatively new form of heart function testing and with research^{5, 6} now in place, it is important that we use measurement as an evaluation for the effectiveness of Chiropractic care in a clinical setting. There are several instruments available in the market today; however, the NeuroInfiniti is unique in its application and combination. The fact that we use HRV findings in conjunction with measured Respiration rates and during stress events and recovery, a great deal more information on all three of these procedures is provided.

Respiration Rate - Ideal 6 to 12 BPM

There are several vital sign measurements used in the health field. Brain activity, heart rate, blood pressure, and respiration rate are some of the most common. There is more to respiration than just the rate. Upper respiratory breathing is a sympathetic response to a stressor and involves elevating the upper rib cage rather than using the diaphragm to breathe. Diaphragmatic breathing involves the Vagus and Phrenic nerves and the parasympathetic nervous system. This system helps the body stop the stress response. Rapid breathing is very detrimental to the body and can create an imbalance in the body chemistry. Damage to the Phrenic nerve (C3,4,5) can cause abnormal breathing patterns.

Note: there are many systems in the market for HRV reading, but to gain a complete understanding of what is really happening, you need to have a report on Heart Rate, Respiration Rate and Heart Rate variability.

Skin Conductivity - ideal .8 to 1.5Su

The study of Skin Conductivity (SC) or Galvanic Skin Response (GSR) has been ongoing over the last 100 years. While SC measures the conductivity of electrical current, GSR measures the resistance. Both reflect the electro-dermal activity of the skin as affected by the sweat glands. There have been many studies^{7,8,9,10,11} over the years which establish the power of the subconscious emotions within the Central Nervous System to control sweat gland activity. With this knowledge and data, we have the opportunity to record the emotional responses to stressors and the ability to neutralize the responses.

Hand Temperature - Ideal 94°F to 96°F - 34°C to 35°C

While typical medical practice tends to look at core temperature as a vital sign, there is another area which tells an important story about health response much earlier than at the core. The extremities¹² are very important in reporting on the neurological state of the patient. Given any stress of threat, the typical neurological response is to close down the blood flow to the hands and feet and pool the blood into the central core. This is a typical fight/flight response as blood will be required in the heart and lungs to provide oxygen and nutrition to the major muscles. Long term stress patterns keep the patient in this state and cold hands and feet will be a constant.

Muscle tone (sEMG) – ideal .5 to 2.5

Over the years Chiropractic has been associated with musculoskeletal function. In the last 15 years we have seen the development of instrumentation which recorded static para-spinal muscle activity. There are challenges with this procedure. The fact that it is static is one of the major challenges as it represents a moment in time and does not provide any information about the dynamics of the neurological response. The static sEMG has been challenged more than once with regard to its ability to reproduce the results and has been found to be inconsistent. Any claims regarding the use of the static sEMG to locate vertebral subluxation will bring the FDA down on the equipment very quickly.

What is important here is to look for the way stressors affect muscle tone. The three areas most reactive are the trapezius, the masseter and the temporalis muscles. These muscles provide a window into the effects of stressors on general muscle tone.

While static sEMG readings provide some level of information¹⁵ they are limiting in value due to the lack of reproducibility and overall activity. A much better method of examining muscle activity is by dynamic sEMG, which provides a great deal more information, plus through repetition we can see not only the right to left comparison but also any fatigue factors that come into play. All abnormal spinal curves (outside of genetic malformation or trauma) involve abnormal muscle coordination. This is where the value of dynamic sEMG comes into play.

1. *Biofeedback – a Practitioner’s Guide – Third Edition Edited by Mark S. Schwartz, Ph.D, the Mayo Clinic Frank Andrasik, Ph.D, University of West Florida.*
2. *The Neurofeedback Book by Michael Thompson and Lynda Thompson*
3. *Chiropractic adjustments have an effect on the Autonomic Nervous System. A recent study published In the September 2000 issue of the Journal of Manipulative and Physiologic Therapeutics*
4. *Emotional Stress, Positive Emotions, and Psychophysiological Coherence. Rollin McCraty and Dana Tomasino. Chapter published in: Stress in Health and Disease, edited by B. B. Arnetz and R. Ekman. Weinheim, Germany, Wiley-VCH, 2006: 342-365.*
5. *Effect of Chiropractic Care ON HEART RATE VARIABILITY AND PAIN IN A MULTISITE CLINICAL STUDY John Zhang, MD, PhD,^a Douglas Dean, PhD,^b Dennis Nosco, PhD,^c Dennis Strathopoulos, DC,^d and Minas Floros, DCE*
6. *The Effects of Thoracic Manipulation on Heart Rate Variability: A Controlled Crossover Trial - Brian Budgell DC, PhD_a, and Barbara Polus PhD_b,*
7. *Guest, Hazel (1990) Sequential Analysis: monitoring counseling sessions via skin resistance counseling Psychology Quarterly, Vol.3, No.1, 1990, pp. 85-91*
8. *Toomin, M.K. & Toomin, H. (1975) GSR biofeedback in psychotherapy: some clinical observation*
9. *Psychotherapy: Theory, Research and Practice, 12(1), pp.33-38 Thayer, R.E. (1989)*
10. *The Biopsychology of Mood and Arousal New York, Oxford University Press Gale, A. (1989)*
11. *The Polygraph test London, Sage*
12. *Sympathetic nervous system activity in stress and biofeedback relaxation - Shusterman, V. Barnea, O. Cardiac Electrophysiology Labs., Pittsburgh Univ., PA, USA;*
13. *Role of arterial smooth muscle tone and geometry in the regulation of peripheral conduit artery mechanics by shear stress. Joannides R, Costentin A, Iacob M, Bakkali el-H, Richard MO, Thuillez C*
14. *Mental stress and trapezius muscle activation under psychomotor challenge: A focus on EMG gaps during computer work - Authors: Schleifer, Lawrence M.1; Spalding, Thomas W.2; Kerick, Scott E. 1; Cram, Jeffrey R.3; Ley, Ronald4; Hatfield, Bradley D.1 Source: Psychophysiology, Volume 45, Number 3, May 2008 , pp. 356-365(10) Publisher: Blackwell Publishing*
15. *SEMG Evaluations: An Overview Applied Psychophysiology and Biofeedback Stuart Donaldson^{1, 2} , Mary Donaldson² and Leslie Snelling² Department of Applied Psychology, University of Calgary, Calgary, Alberta, Canada, Myosymmetries Calgary, Calgary, Alberta, Canada*