COMPREHENSIVE BRAIN ASSESSMENT

The activity in your brain affects pretty much everything you think, feel, and do. As a result, when brain function is impaired and imbalanced, *you* are impaired and imbalanced. Problems with attention, memory, emotional regulation, learning, relationships, pain, sleep, and a myriad of other ailments all have underlying roots in your brain and nervous system. The good news is, we now have a way to observe these imbalances in your brain and help it balance itself out! At Lucent Chiropractic Neurology we utilize three types of neuroimaging to assess where your brain is functioning well and where it could use some improvement: raw electroencephalography (EEG), quantitative EEG (QEEG), and standardized weighted low resolution electromagnetic tomography analysis (swLORETA).

WHAT IS QEEG?

Quantitative electroencephalography (QEEG) is an analysis of recorded EEG that transforms raw EEG line graphs into “brain map” images, thus allowing us to better observe overall brain activity patterns. EEG is known for its ability to observe neural activity in milliseconds which surpasses other imaging methods such as functional MRI (fMRI; 2-6 seconds) and positron emission tomography (PET Scan; 30-40 seconds). This is important considering that neural changes occur within the millisecond time domain.

Another benefit of qEEG is that it is non-invasive, requiring no intake or injection of radioactive chemicals. As such, it can be used frequently and for longer periods of time with no risk to your health. Furthermore, brain activity can be read from the comfort of a chair with a simple cap on the head as opposed to laying in a large, noisy machine or being put into other uncomfortable positions. Consequently, this method tends to provoke less anxiety

and claustrophobia than many other methods. It is also more cost effective.

A cap with EEG sensors is simply placed on your head to measure the electrical signals being produced by your brain. These sensors only read the activity–they do *not* send any electrical signals into your brain, so it is completely safe and non-invasive. The brain activity picked up by these sensors can then compared against a database of "healthy brains" and converted into a brain "map" to more easily identify specific activity patterns that are likely giving rise to your symptoms. Once we have determined the specific areas/patterns of concern, we can create an individualized program to help your brain become the best it can be.

WHAT IS SWLORETA?

swLORETA (standardized weighted low resolution electromagnetic tomography analysis) is a 3D functional imaging technology that measures multiple metrics throughout the human brain. It utilizes a 19-sensor EEG cap and mathematical algorithms to determine the specific sources of brain activity. swLORETA is able to localize activity much deeper within the brain than traditional qEEG. With swLORETA we can evaluate the following components of brain activity:

Absolute Power: ***How much brainpower is available?***
Absolute Power aids in determining whether enough brainpower within a particular frequency range is present at each recording site. This can be too much or too little.

Relative Power: ***Who's in charge here?***
The Relative Power measurement aids in determining whether a particular frequency is overpowering other vital brain frequencies or if the power is low.

Amplitude Asymmetry: ***The brain's balancing act***.

Asymmetry scores reveal to us whether the brain waves between the various parts of the brain are balanced. Excessive activity may indicate an over-firing of brain cells. Insufficient activity may suggest brain cells are not firing sufficiently to maintain proper brain function. Both will lead to inefficient brain function.

Coherence: ***How efficient is my brain's ability to communicate with itself?***

In order for us to understand the complexity of the world and to make and execute decisions the different parts of the brain must share information. Coherence is one of the measurements on how well the brain is able to perform this inner self-talk. This measure gives us an indication of how efficiently our brain is working to connect and disconnect different parts of it to accomplish a particular task.

Excessive coherence tends to indicate two or more areas of the brain are "overly connected or locked together". That is, the brain has become overly dependent on those centers and is not efficiently processing and executing information. This tends to result in poor day-to-day performance. Deficient coherence signifies a brain is not able to efficiently connect cortical areas to perform specific tasks.

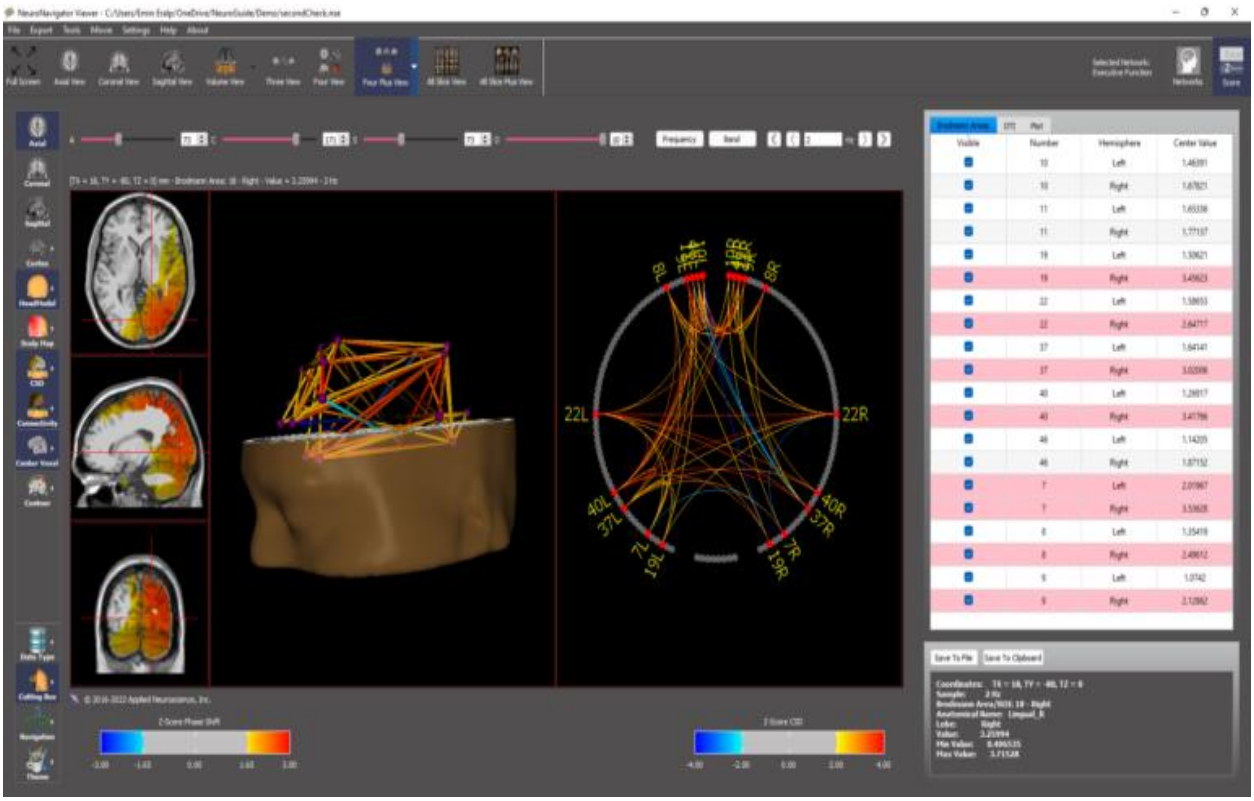
If coherence is extremely high there is limited regional communication, division of labor, connectivity, and regional cooperation. If coherence is extremely low there is limited to no communication occurring between regions.

Phase Lag: ***Is the brain's electrical energy moving at optimal speed for optimal performance?***

Many of the brain's functions are timed events, the energy from one part of the brain arriving at another area at just the right moment to perform a specific task. This QEEG measurement is called phase. Excessive phase mean the signals arrive too early; deficient phase means too late. In either case, the brain is not able to do its job with peak efficiency.

The proper function of these metrics influences all of our physical and emotional expression and so dysfunction in these communication systems will result in physical and emotional difficulties.

As a part of qEEG analysis, these swLORETA metrics are compared to a database of age-matched, “neurotypical brains” (i.e. with no reported neurological or psychological impairment) and mapped out for examination. This provides a useful tool to link reported challenges/symptoms with neurofunctional abnormalities, producing a more accurate assessment and guide for treatment.



A TYPICAL SESSION

For the brain assessment, you will wear a cap with 19 built-in EEG sensors and sit in a comfortable chair. We will gently prepare each sensor with conductive gel until we have a good connection with your brain activity. Then, we will ask you to sit fairly still as we record up to 10 minutes of brain activity with your eyes open and 10 minutes with your eyes closed. We can divide these times into smaller increments to make it more tolerable, especially for children. And that's it! We will take it from there to analyze the data and review the results with you in our next session!
In some cases we use neurocognitive/neuropsychological testing with a computerized assessment software called Montreal Cognitive Assessment Test (MOCA). This can be completed in the office or from the comfort of your home, whichever you prefer! This comprehensive testing will assess various factors, including simple and complex attention, working memory, cognitive flexibility, processing speed, and psychological/emotional wellness.

The QEEG brain map is then utilized to develop a treatment program for ***your*** specific brain imbalance. After a number of training sessions we often do another assessment to see how your brain has improved and what remains to be targeted in our treatment!

IS IT SAFE?

Yes! Both qEEG and swLORETA are derived from EEG technology, which has been found to have no risk to health whatsoever and no side effects.
EEG has been utilized as a safe, reliable technology for measuring the electrical and functional activity of the brain since the 1930s (although it has come a long way since then!). First and foremost, it is important to understand that EEG does not involve putting anything into the brain – or even into the body. Unlike many other forms of neuroimaging, EEG does not require the use of any radioactive fluids, anesthesia, or other substances, making it safe to

be repeated regularly without any adverse effects to health. It has even been proven safe for young children and infants.