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Report of QEEG findings

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Recording and Analysis Procedures:
The electroencephalograph (EEG) was digitaly recorded (256 samples/sec) utilizing 19 electrodes with the International 10/20 System of electrode placement. Electrode impedances were reduced to below 5Kohms. The EEG was recorded continuously in the awake state with eyes closed and eyes open and may have included additional tasks. The raw EEG has been visually inspected and ocular and muscle artifacts rejected before generating the Neurometric analysis report.

This QEEG assessment reveals locations of dysfunction in the brain and quantifies the degree of deviation (Z-scores) from a normalized database. This data is helpful for the detection and localization of brain pathologies and/or dysfunctions (dysregulations). This information may assist in the differential diagnosis and in guiding the selection of treatment protocols and appropriate medications.

There are 2 reports (each a separate file), generated with Neuroguide software (www.appliedneuroscience.com), labeled:

LH120EC3……. eyes closed condition
LH120EO…….eyes open condition

Pages 1- 2 are subject and technical information.

Page 3 is Z-scored FFT summary information. This is overall results for EC or EO file. Labels at the top of each column show the EEG frequency bands: Delta, Theta, Alpha, Beta and high Beta. The frequency values for each band and their subdivisions are shown in pages 7-8. Single Hz bins (1 Hz resolution) brainmaps are shown in pages 14-17.

From page 3:
The two top rows show colored brain topographic maps (topos, the dots indicate the 10-20 scalp electrode placements) for Absolute and Relative Power. Power is computed as the signal amplitude squared. Absolute power is the total power computed for each frequency band in uV2.

Relative power is obtained by dividing the power in each band by the total power across all the bands (the sum of the power in each of the bands listed). Relative Power is therefore a % power value.

The color scale below the Alpha topo (Relative Power row), indicates the Z-scores derived from a comparison to the Normative database (RW Thatcher). This database compares the client's EEG values to an age and gender matched cohort and assigns a Z-score to indicate the degree of deviation from normal. Medium green is Z=0, normal values; positive Z-scores are light green, yellow, orange and red, indicating +1, +2, +3 values. Negative Z-scores are dark green, light blue to dark blue, indicating -1, -2, -3 values. Z-scores +- greater than 2.6 are statistically significant and **+- 3.0 or greater are considered highly statistically significant (red and blue respectively at each end of the scale).**

The 15 remaining topos, labeled: Amplitude asymmetry, Coherence and Phase are also known as **connectivity maps,** because they describe QEEG metrics related to brain functional connectivity. Note the Z-score is now indicated by the thickness of blue (negative values) and red (positive values) lines of varying thickness that connect pairs of dots (i.e recording sites). The software calculates these metrics for all paired combination of cortical sites. Medium and thick lines are Z-scores >= (greater than or equal to) 2.58 and >= 3.09, respectively.

Definitions

Coherence - The percentage of brain wave activity that is time-related between two locations. A measure of the coupling between two signals with a constant phase relationship at different locations. The normal coherence between all regions is around 60%.

Hypercoherence indicates hyper synchrony between two locations or regions and a loss of local, differentiated activity.

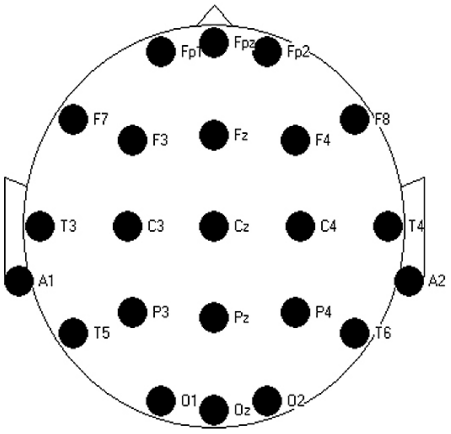
Hypocoherence indicate poor synchrony, reflecting impairment in the connection between two locations or regions.

For example, we measure coherence by comparing the stability of phase differences of the brainwaves at two different locations (e.g.FP1 and FP2). If, according to normative databases, there is too much similarity between two locations, there is hyper-coherence. The opposite of this is hypocoherence, where there is excess dissimilarity. Coherence is a measure of the extent to which two brain locations share activity or work together. In hyper-coherence there is too much sharing of information, meaning that the two brain areas are not sufficiently differentiated for optimal performance of whatever task they are sharing. Hypocoherence on the other hand, means that the two brain areas are too independent of each other. They do not cooperate to the extent required by the task at hand.

Abnormal coherence patterns are seen commonly in cases of Traumatic Brain Injury an Post Concussion Syndrome.

Phase Lag . Based on the calculated phase angle, converted to ms (milliseconds), between all connected pairs of scalp locations. An excess (Z+2,3 or higher) phase lag translates to slowing of neural signal transmission (reduced conduction speed) between connected sites

Below is the International 10-20 system of scalp electrodes placements.
F frontal, C central, T temporal, P parietal, O occipital



10-20 System

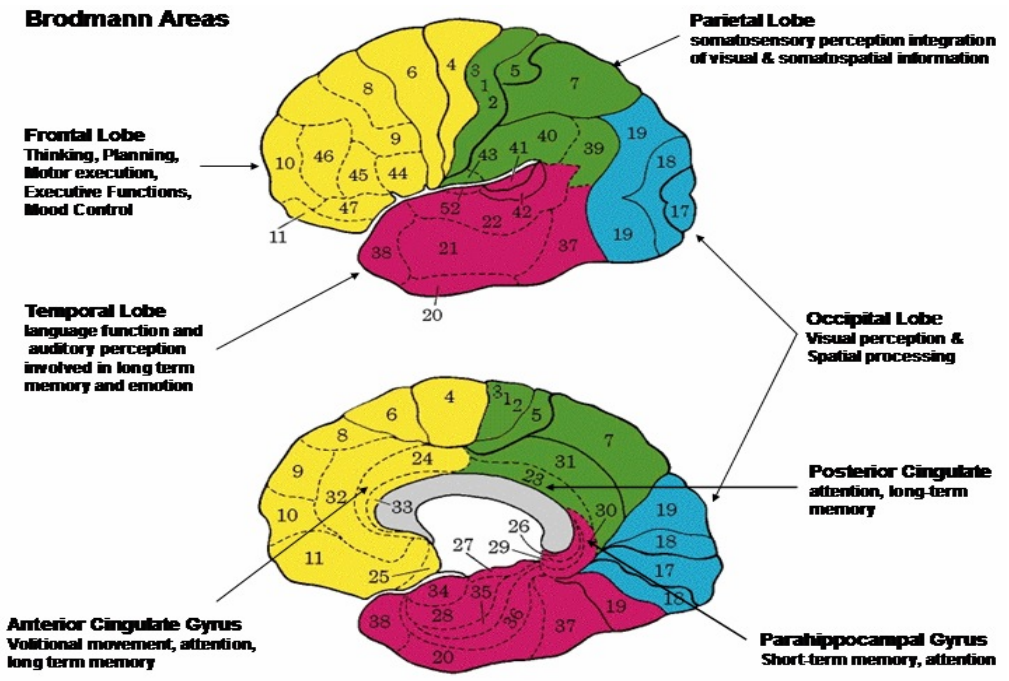


Illustration of Brodmann areas (Brodmann, 1909) linked to particular functions. Brodmann areas operate at the macroscopic level as measured by the qEEG with spatial areas of common functional cytoarchitecture that range in size from about 1 cm^3 to 6 cm^3. The goal is to link a patient's symptoms and complaints to deregulation or deviation from normal in brain regions known to be related to specific functions. QEEG also provides high temporal resolution so that measures of dynamic connectivity and phase reset can also be evaluated with respect to an age match normative database. Treatment then follows.