Comprehensive Report

Brain Mapping

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Alpha Clinic
www.alphaica.com

Report Layout

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4. Broad-Based Probability Mapping
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6. Management Recommendations
7. Further Comments & Considerations

Essential Disclaimer and Warning

This EEG report is designed for clinical purposes as a supplementary tool in patient evaluation and diagnosis. It provides insights based on electroencephalogram data to assist healthcare professionals in identifying neurological and psychological patterns or potential abnormalities. The findings, however, are not intended as standalone diagnostics. Instead, they should be interpreted alongside the patient's clinical history, imaging results, and other diagnostic tests for a comprehensive understanding of the patient's condition.

Overall Patient Status

Patient / Session Details

Patient ID: **205-102-986**
Name: **Farhad Saadati**
Birth Year / Age: **40 years**
Gender: (Male/Female/Other): **Male**
Handedness: (Left/Right/Ambidextrous): **Right**
Referring Clinician (Specialty, Referring Facility): **Lida Shafaghi**
Recording Date: (DD-MM-YYYY): **28 / 12 / 2024**
Recording Conditions: **Eye Open**

Brief Clinical State

Current Diagnosis: **ADHD / Predominantly Inattentive**

Management Strategies
Pharmacotherapy: **Methylphenidate 20mg/day**
Psychotherapy: **CBT sessions twice a month**
Neurotherapy: **EEG neurofeedback twice a week**
Other: **Diet: High-protein meals**

✨ Key Findings

The qEEG analyses were deviant from normal and showed dysregulation in bilateral frontal lobes especially in the left frontal lobe, bilateral temporal lobes especially in the left temporal lobe and bilateral parietal lobes especially in the left parietal lobe.

LORETA showed dysregulation in the left medial frontal gyrus, right superior frontal gyrus, left anterior cingulate and right postcentral gyrus.

Signal Acquisition and Quality Check

This section focuses on evaluating a set of biomarkers relevant to the proposed primary state or diagnosis indicated by the physician. The biomarkers are compared against established normative ranges to assess deviations and identify patterns that may support or contradict the proposed diagnosis.

Hardware

The EEG data was acquired using ALPHA hardware. The system operated at a sampling rate of 250 Hz. Data collection adhered to the 10-20 electrode montage system. During the session, recordings were conducted under controlled conditions, including specific eye states (e.g., open, closed, or alternated as necessary).

Parameter

Metric	Value	Quality
Signal-to-Noise Ratio (SNR)	37.3792	Good
Channel Correlation	0.2369	Good
Power Line Interference Index	0.0000	Good
Amplitude Consistency Index	0.9508	Good
Baseline Drift Index	0.9977	Good
Spectral Flatness Measure (SFM)	0.0581	Good
Total Harmonic Distortion (THD)	0.0000	Good
Cross-channel Artifact Index	0.0024	Good
Signal Entropy	0.7010	Good

Collective Note

Split Half reliability shows an average value of 0.99, indicating excellent internal consistency. Test Retest reliability has an average value of 0.92, reflecting a high level of stability over time. These results highlight the robustness and consistency of the measurements.

Targeted Biomarker Profiling

This section focuses on evaluating a set of biomarkers relevant to the proposed primary state or diagnosis indicated by the physician. The biomarkers are compared against established normative ranges to assess deviations and identify patterns that may support or contradict the proposed diagnosis.

Related Table

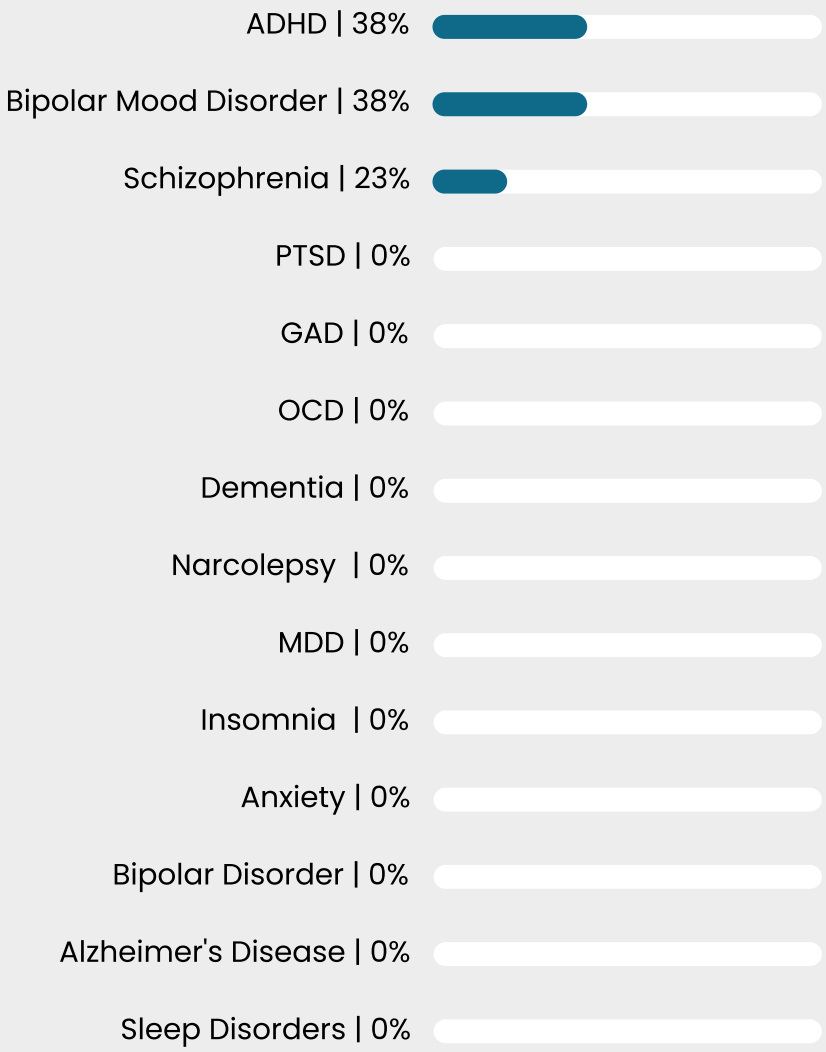
Parameter	Region	Hemisphere/Condition	Raw Value	Threshold (Z-score)	Confirm
Increased Theta Power	Frontal, Central	Bilateral (Eyes-closed/open)	21.85 Vμ Sq	> +2.0	
Decreased Beta Power	Frontal, Central	Bilateral (Eyes-closed/open)	8.99 Vμ Sq	< -1.5	
Increased Theta/ Beta Ratio	Frontal	Bilateral (Eyes-closed/open)	2.09	> +2.0	
Reduced Alpha Power	Frontal, Central, Parietal	Bilateral (Eyes-closed/open)	10.7 Vμ Sq	< -1.5	
Increased Delta Power	Frontal, Central	Bilateral (Eyes-closed/open)	51.03 Vμ Sq	> +2.0	
Abnormal High Beta Power	Frontal, Central	Bilateral (Eyes-open)	1.3 Vμ Sq	> +2.0 or < -2.0	
Frontal Alpha Asymmetry	Frontal	Right > Left (Eyes-closed/open)	6.83-11.23	> +1.5 (Right > Left)	
Reduced Coherence in Theta	Frontal-Posterior	Bilateral (Eyes-closed/open)	19.43	< -2.0	
Slowed Peak Alpha Frequency	Frontal, Central, Parietal	Eyes-closed	9.84 Hz	< -1.5	

ADHD Index: %33

Broad-Based Probability Mapping

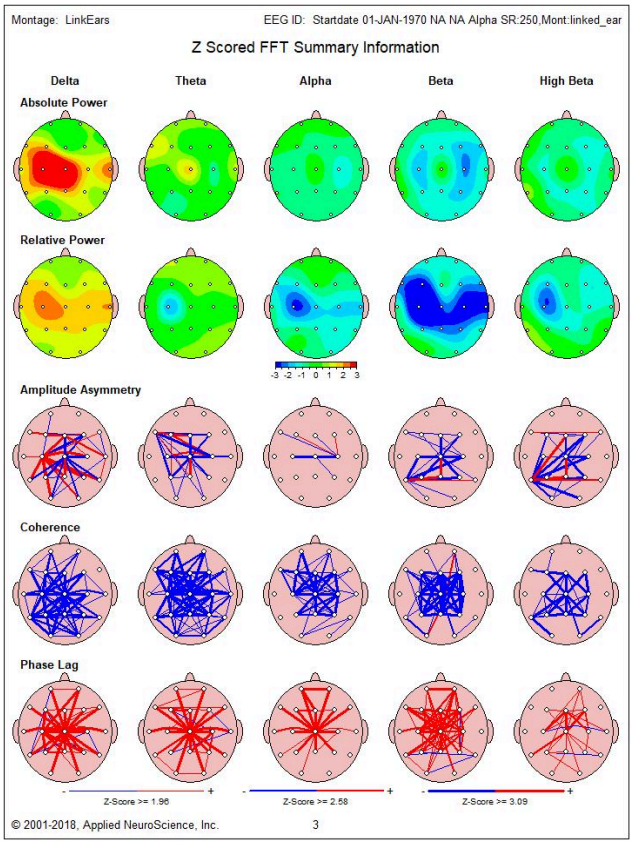
This section utilizes established biomarkers to evaluate the likelihood of various neuropsychiatric disorders, extending beyond the primarily-intended diagnosis. A radar chart is presented to illustrate these probabilities, with the skewness indicating a higher likelihood of a particular disorder, based on the collective biomarker set. This approach offers additional context to the patient's neuropsychiatric profile, helping to refine clinical understanding and alternative or comorbid diagnoses.

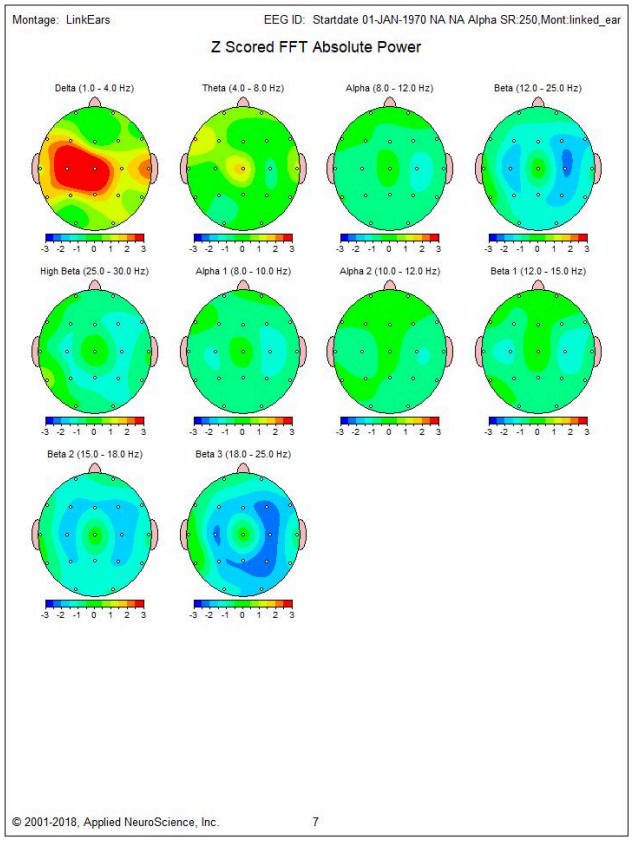
Disorder Analysis



Normalized Metrics and Patterns

This section presents a detailed summary of Z-scored metrics and topographical patterns, focusing on various EEG parameters. It includes Z-scored topographical maps (topomaps) for different frequency bands, absolute and relative power, phase lag, and coherence metrics.





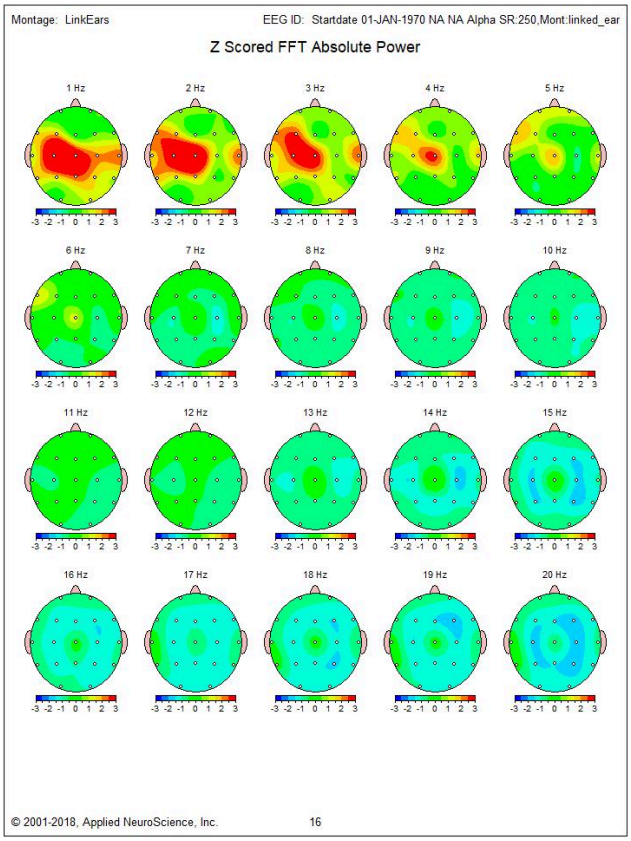
Collective Note

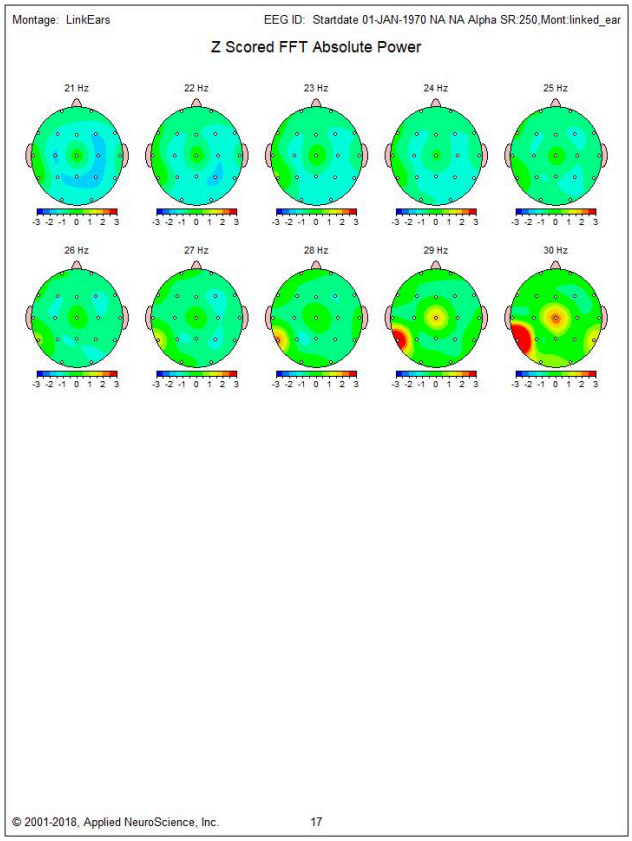
CONNECTIVITY ANALYSES: EEG amplitude asymmetry, coherence and EEG phase were deviant from normal, especially in frontal, temporal, parietal and occipital relations. Elevated coherence was present in frontal and occipital regions which indicates reduced functional differentiation. Reduced coherence was present in frontal, temporal, parietal and occipital regions which indicates reduced functional connectivity. Both conditions are often related to reduced speed and efficiency of information processing.

The qEEG analyses were deviant from normal and showed dysregulation in bilateral frontal lobes especially in the left frontal lobe, bilateral temporal lobes especially in the left temporal lobe, bilateral parietal lobes especially in the left parietal lobe and bilateral occipital lobes especially in the right occipital lobe.

Normalized Metrics and Patterns

This section presents a detailed summary of Z-scored metrics and topographical patterns, focusing on Z-scored topographical maps (topomaps) for absolute power (Linked Ears Montage)



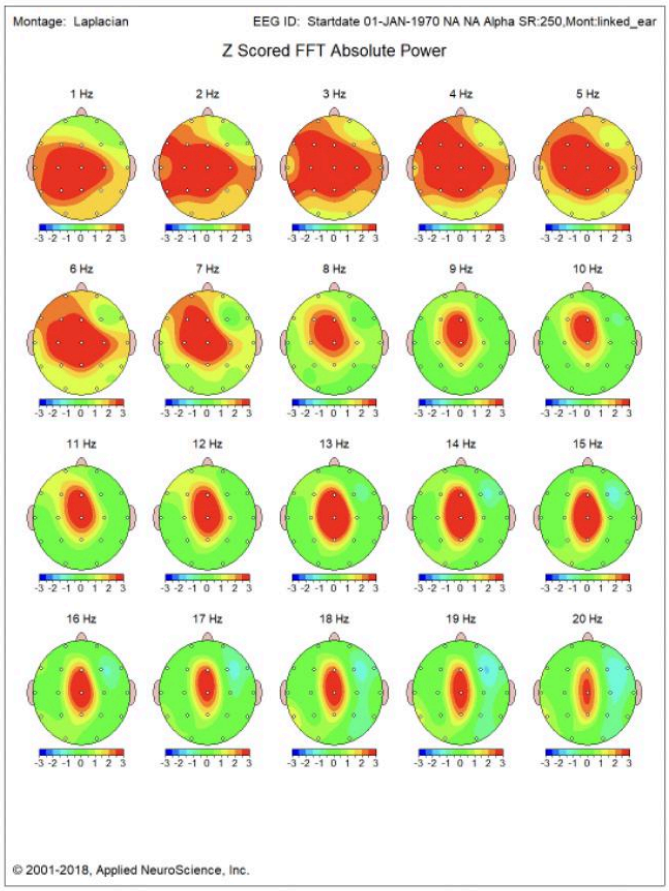


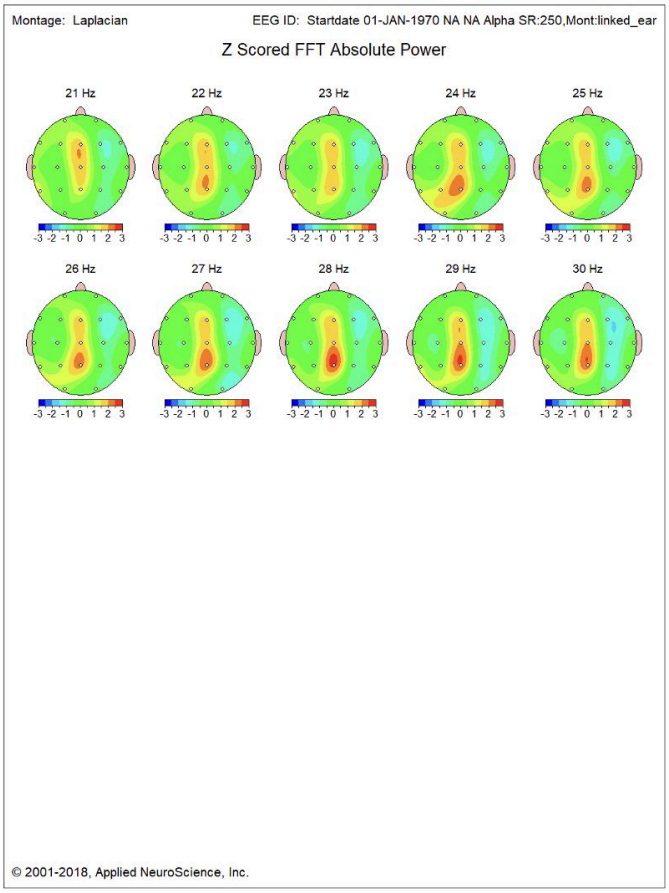
Collective Note

The Linked Ears power spectral analyses were deviant from normal with excessive power in left frontal regions and especially in the midline frontal region from 1 - 4 Hz and excessive power was also present in the right temporal region from 2 - 3 Hz.

Normalized Metrics and Patterns

This section presents a detailed summary of Z-scored metrics and topographical patterns, focusing on Z-scored topographical maps (topomaps) for absolute power (Surface Laplacian Montage)



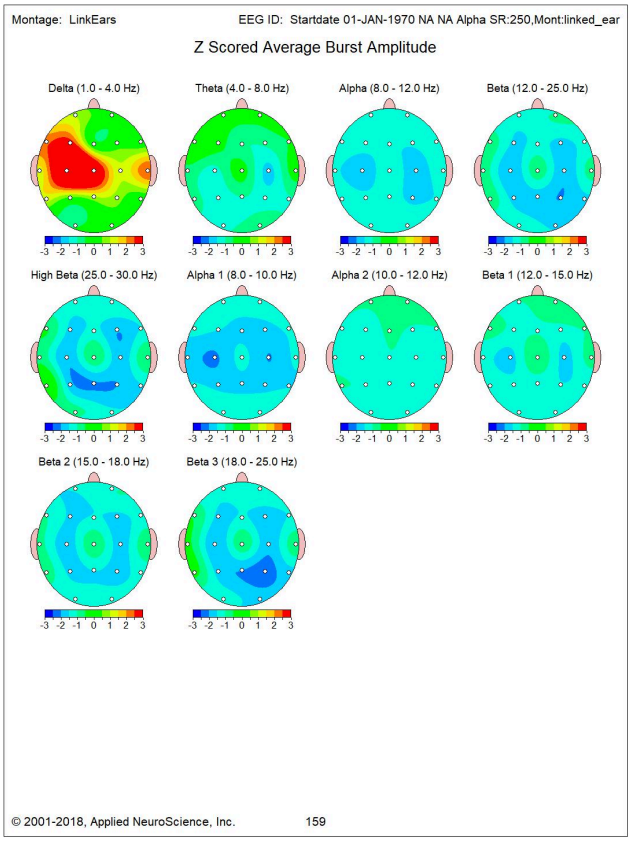


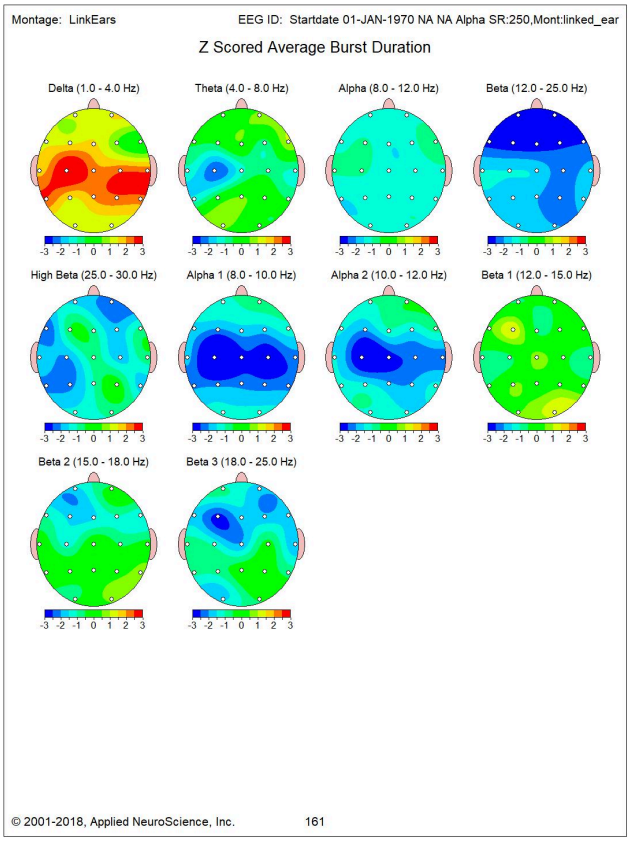
Collective Note

The Laplacian power spectral analyses were deviant from normal with excessive power in bilateral frontal regions especially in the midline frontal region over a wide frequency range, excessive power was present in bilateral temporal regions especially in the left temporal region from 1 - 4 Hz and excessive power was also present in bilateral parietal regions especially in the midline parietal region over a wide frequency range.

Normalized Metrics and Patterns

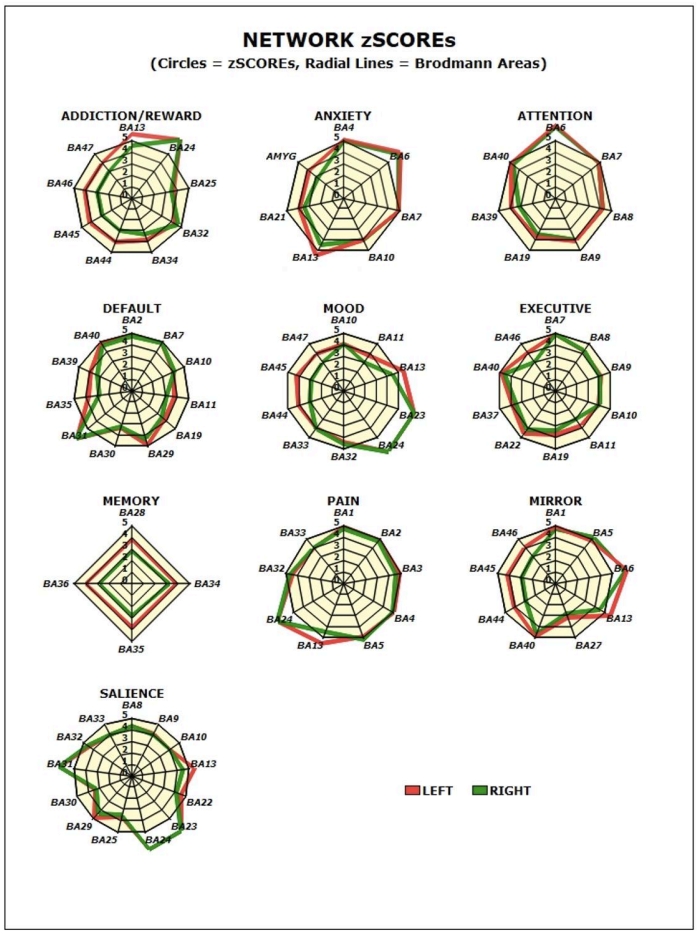
This section presents a detailed summary of Z-scored metrics and topographical patterns, focusing on the burst activity pattern. These burst-related metrics provide additional insights into transient neural dynamics, offering a more detailed understanding of both functional connectivity and pathological activity in conditions like epilepsy, ADHD, or anxiety disorders.

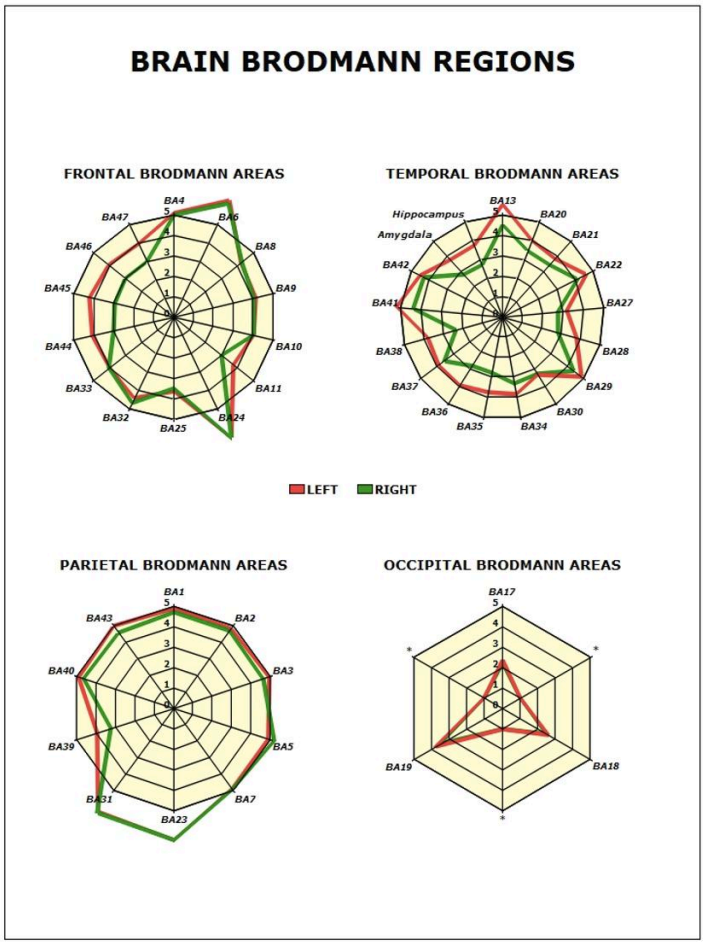




Normalized Metrics and Patterns

The second part focuses on network-based analysis that their pattern and obtained insights could supplement previous parts and comprises addiction/reward, anxiety, attention, executive, default, mood, memory, pain, mirror, and salience networks.

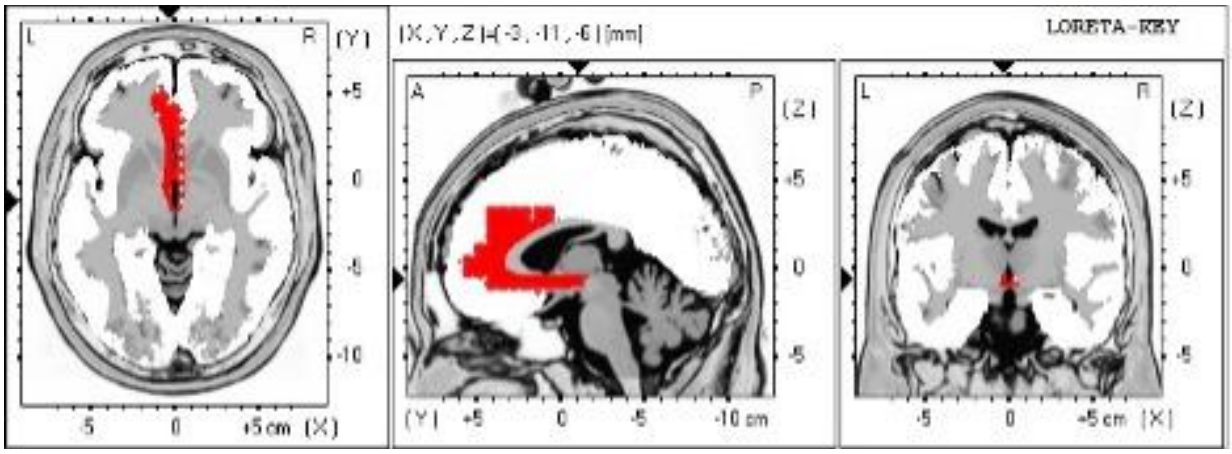




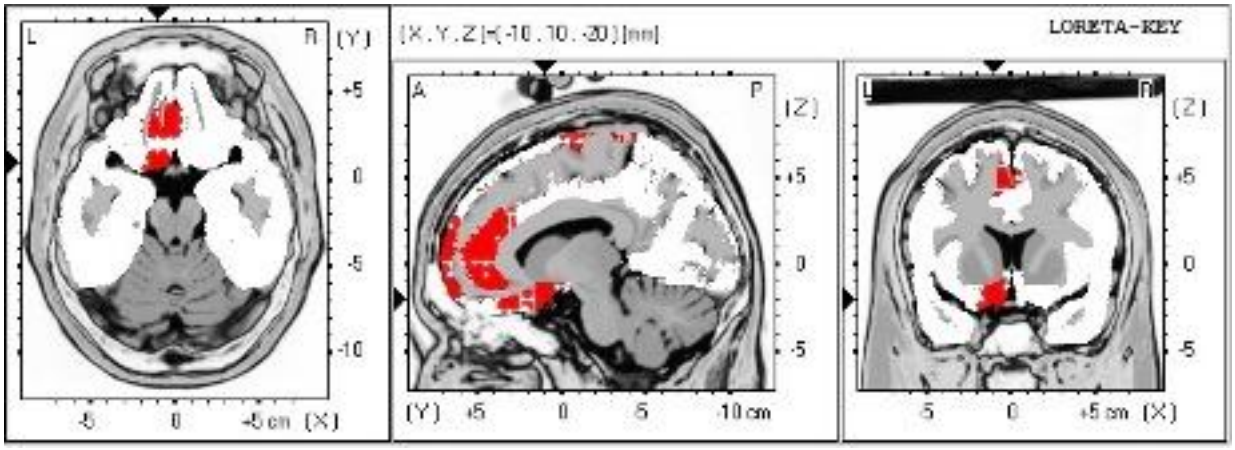
Normalized Metrics and Patterns: sLORETA Summary

The second part focuses on sLORETA mapping, providing detailed source-localized analyses for various EEG frequency bands. It includes information on the distribution and power of localized brain activity, offering insights into the source dynamics underlying different frequencies.

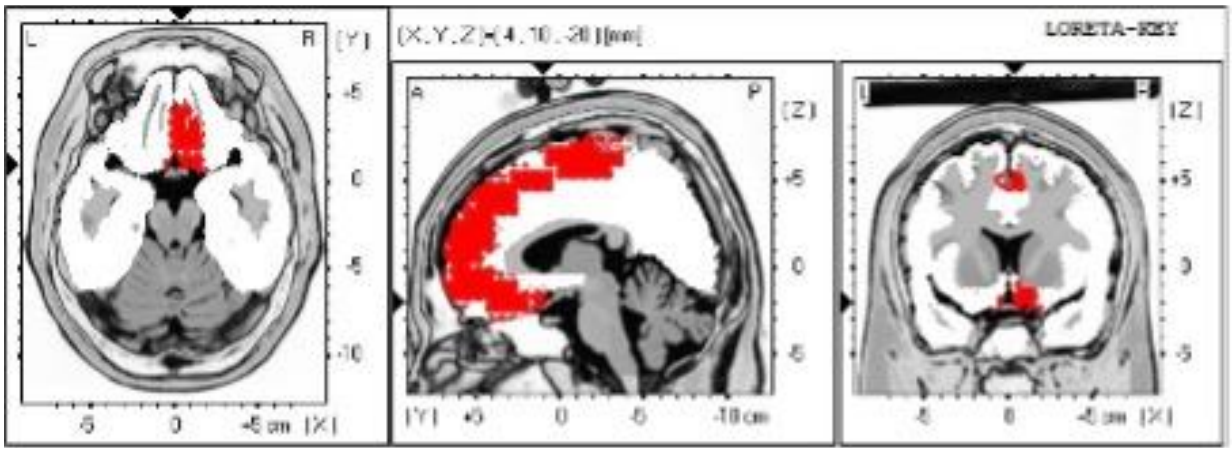
Delta (1-3 Hz), Z-score: Frequency: 2 Hz Brain Region: Cingulate Cortex, Function: emotional regulation, decision-making, and error detection and plays a critical role in attention allocation and conflict monitoring.



Theta (4-8 Hz), Z-score: Frequency: 5 Hz Brain Regions: Premotor Cortex and Supplementary Motor Area, Function: motor imagery, planning, action monitoring, and social cognition

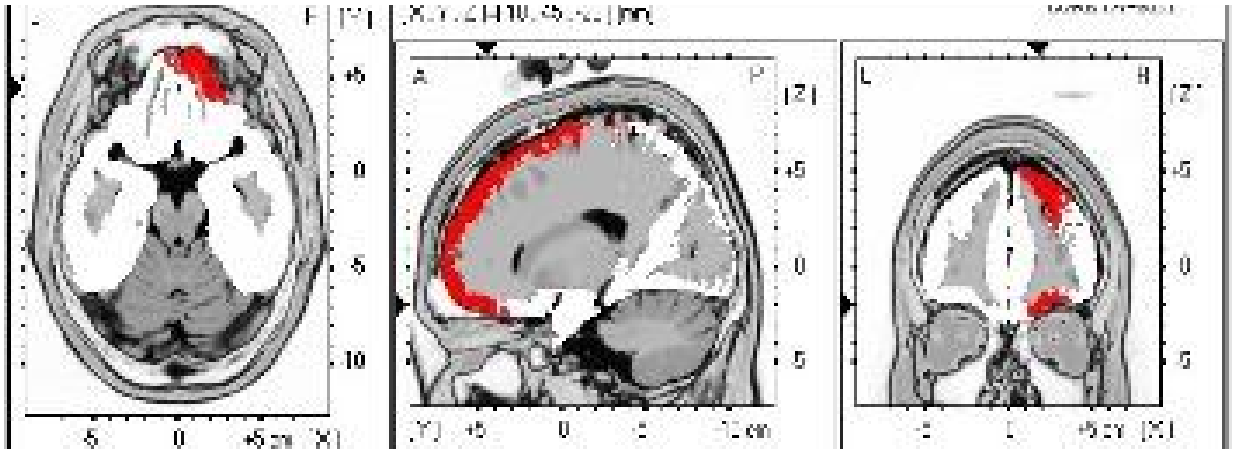


Alpha1 (8-12 Hz), , Z-score: Frequency: 11 Hz Brain Regions: Frontal Eye Fields, Dorsal Anterior Cingulate Cortex, Supplementary Motor Area, Function: decision-making, and working memory.

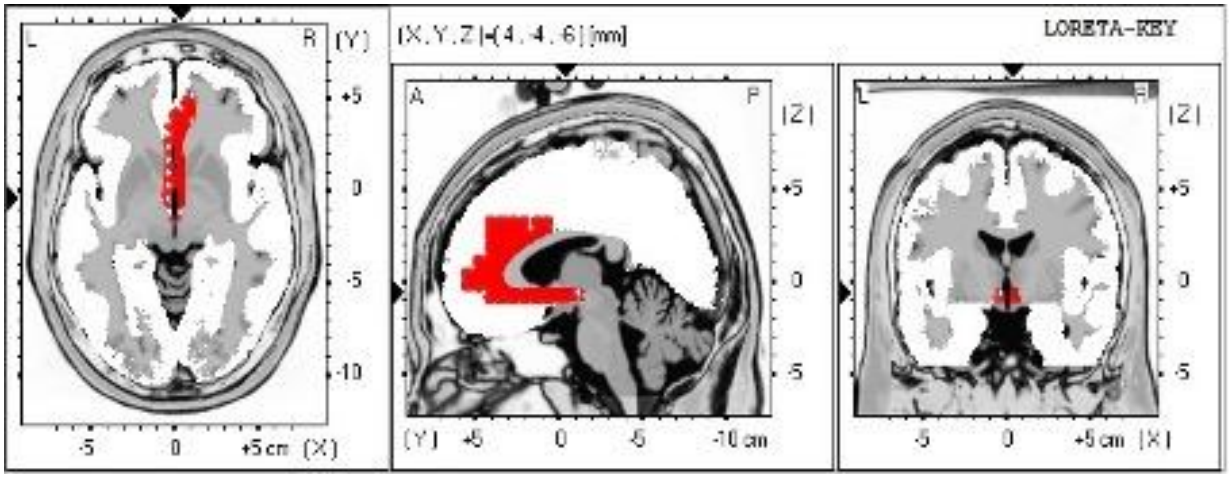


Normalized Metrics and Patterns: sLORETA Summary

Alpha 2 (8-12), Z-score: Frequency: 12, Brain Regions: Frontal Eye Field, Cingulate Cortex, Supplementary Motor Area, Function: decision-making, and working memory, conflict processing.



Low-Beta (13-18 Hz), Z-scores: Frequency: 14 Hz, Brain Regions: Cingulate Cortex and Premotor & Supplementary Motor Area. Functions: Emotional regulation, conflict monitoring, and decision-making.



Collective Note

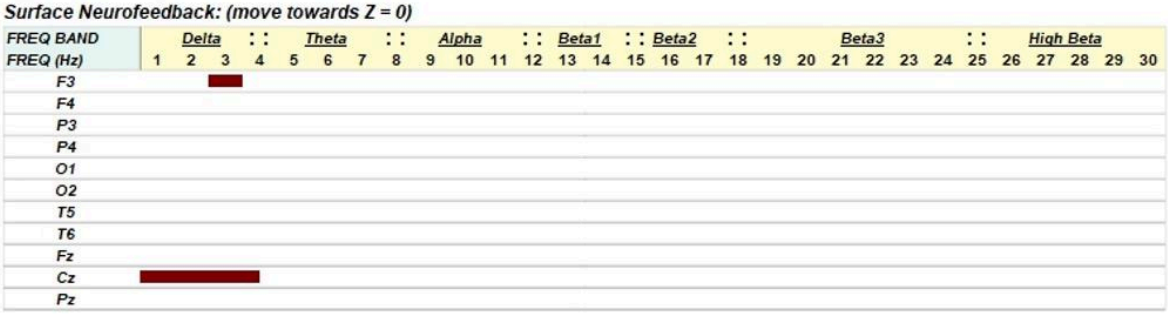
The LORETA 3-dimensional source analyses were consistent with surface EEG findings and revealed elevated current sources in specific brain regions across various frequencies. Elevated activity was identified in the left Anterior Cingulate (Brodmann areas 24, 23, and 31–33) at 2–4 Hz, and in the left Medial Frontal Gyrus (Brodmann areas 3, 4, and 6) at 5–6 Hz. The right Medial Frontal Gyrus showed elevated activity at 7, 11, 13, 15–16, and 18 Hz (Brodmann areas 4, 6, 8, 24, 31, and 32). Additionally, elevated activity was observed in the right Superior Frontal Gyrus (Brodmann areas 6, 8, and 32) at 12 and 17 Hz, and in the right Postcentral Gyrus (Brodmann areas 3, 5, and 7) at 19 Hz.

Management Recommendation

The Management Recommendations section outlines tailored treatment strategies based on the analysis of EEG biomarkers and neuropsychiatric probabilities. It includes proposals for therapeutic interventions. These recommendations aim to optimize treatment outcomes by addressing the underlying neurophysiological patterns identified through the EEG analysis

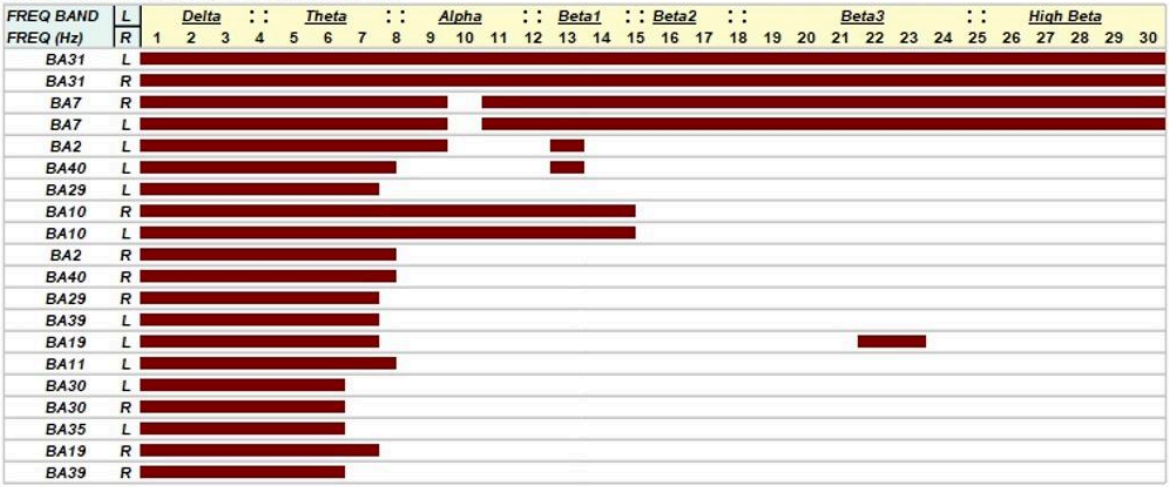
Default Mode Network:

Surface Neurofeedback: (move towards Z = 0)



Coherence Neurofeedback: (move towards Z = 0)

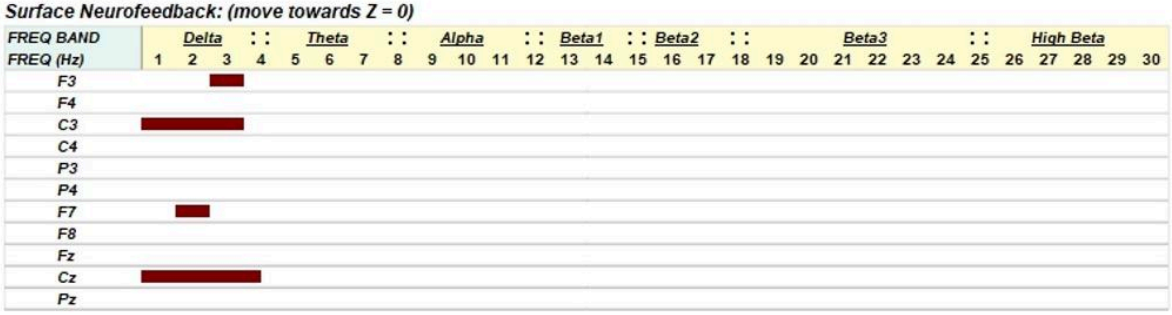
Loreta Neurofeedback: (move towards Z = 0)



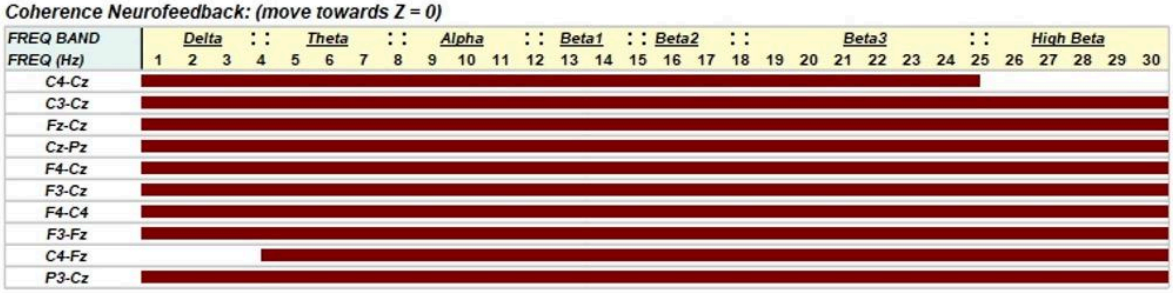
Management Recommendation

Executive Network:

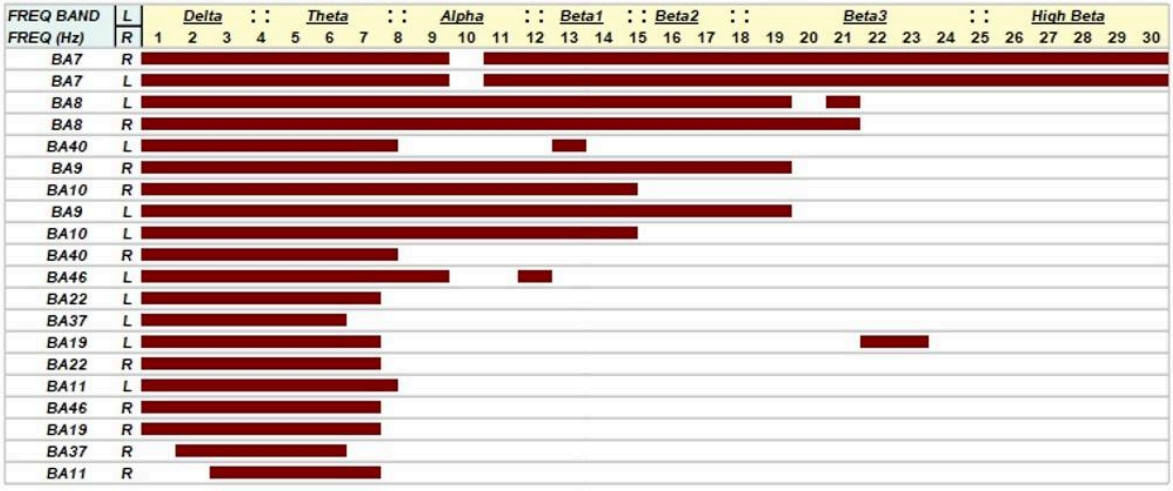
Surface Neurofeedback: (move towards Z = 0)



Coherence Neurofeedback: (move towards Z = 0)



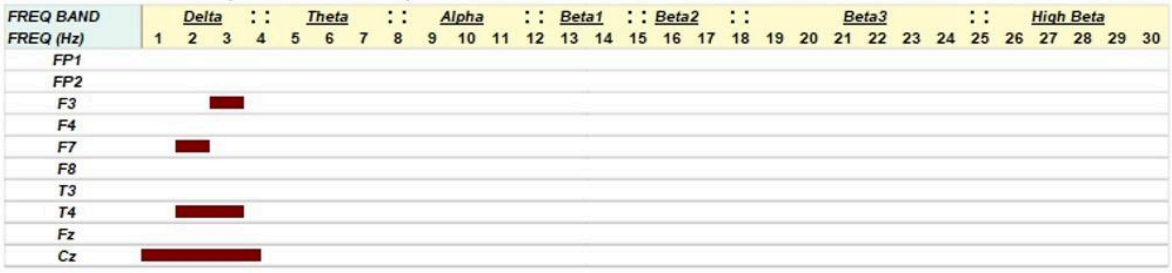
Loreta Neurofeedback: (move towards Z = 0)



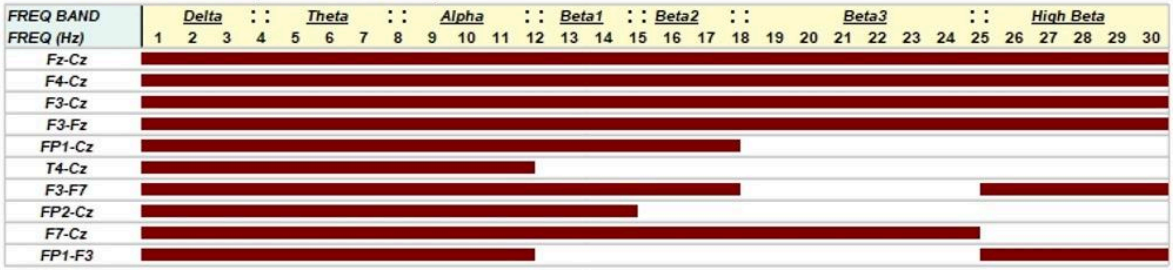
Management Recommendation

Mood Network:

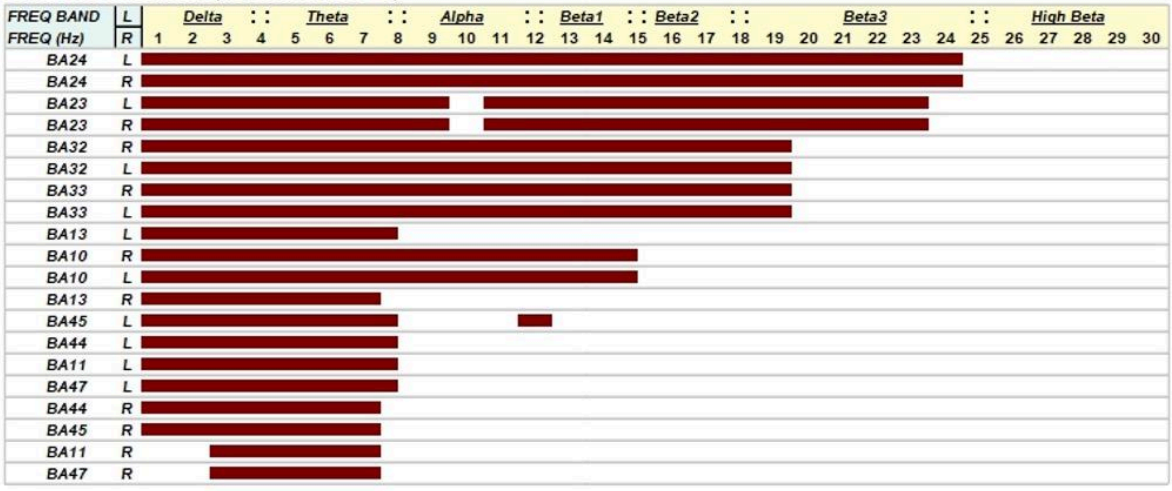
Surface Neurofeedback: (move towards Z = 0)

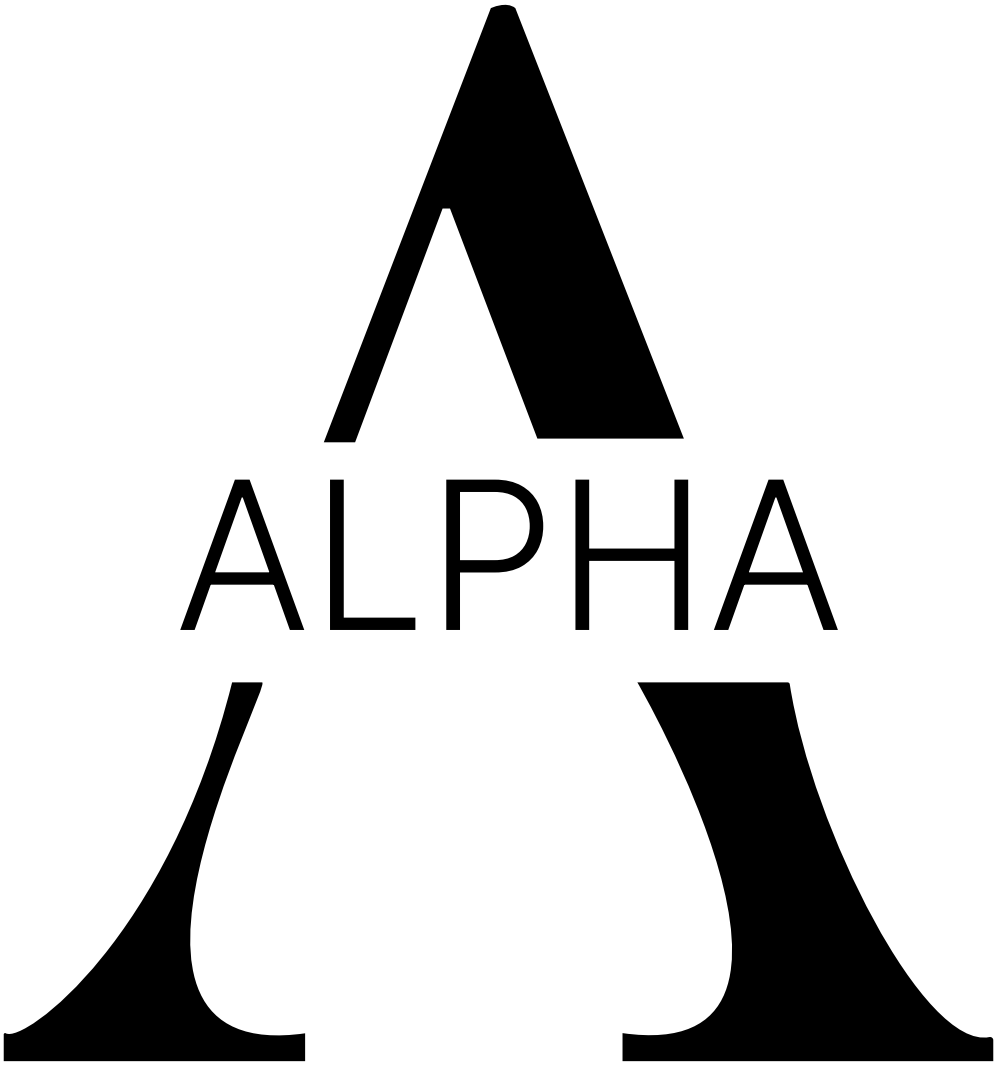


Coherence Neurofeedback: (move towards Z = 0)



Loreta Neurofeedback: (move towards Z = 0)




ALPHA