

BELLABEE

PROTOCOLS FOR USE WITH NEUROFEEDBACK THERAPY

Preamble

The world is progressing at a rapid pace and state-of-the-art cutting-edge technologies are dramatically changing the way how we live and even get treated. We are going to reveal such a technological breakthrough that will bring a paradigm shift in your perception regarding the therapies for brain disorders. In next slides, we will take you through a journey and show some common practical examples of this break-through therapy; and the list of disorders that can benefit from it is growing with each passing day. Scientific references to back up what we are talking about are also included.

So, lets begin our journey of this exciting, wearable neuro-medtech device that is the future of neurotherapies. You can be one of the trail-blazers by adopting this technology at this critical juncture. It will not only enhance your patient base and practice many-fold, but will do that with minimal investment.

Anxiety

BRAIN WAVE ABNORMALITY

DEFICIENCY OF

Alpha (8-12 Hz)

Theta (4-8 Hz)



EXCESS OF

Beta (12-30 Hz)

Gamma (30 Hz & above)



THERAPY

Enhance Alpha & Theta



BELLABEE PROTOCOL

12 Hz x 10 min

10 Hz x 10 min

8 Hz x 10 min

6 Hz x 10 min

5 Hz x 10 min

4 Hz x 10 min

RESULT

Increase in Alpha & Theta

Decrease in Beta & Gamma



Insomnia

BRAIN WAVE ABNORMALITY

DEFICIENCY OF

Theta (4-8 Hz)
Delta (0.5-4 Hz)
Alpha (8-12 HZ)



EXCESS OF

Beta (12-30 HZ)
Gamma (30 Hz & above)



THERAPY

Enhance Theta & Delta



BELLABEE PROTOCOL

8 Hz x 10 min
6 Hz x 10 min
5 Hz x 10 min
4 Hz x 10 min
3 Hz x 10 min
2 Hz x 10 min

RESULT

Increase in Theta & Delta
Decrease in Beta & Gamma



Concentration/ Focus

BRAIN WAVE ABNORMALITY

DEFICIENCY OF

Alpha (8-12 Hz)
Lo-Beta (12-21 Hz)



EXCESS OF

Delta (0.5-4 Hz)
Hi-Beta (21-30 Hz)
Gamma (30 Hz & above)



THERAPY

Enhance Alpha, Lo-Beta

Decrease Theta : Beta to < 3:1 (ADHD)



BELLABEE PROTOCOL

10 Hz x 5 min

12Hz x 5 Min

15Hz x 10 Min

18Hz x 10 Min

15 Hz x 10 Min

12 Hz x 10 min

RESULT

Increase in Alpha, Lo-Beta

Decrease in Delta, Theta, Hi-Beta & Gamma



Stress

BRAIN WAVE ABNORMALITY

DEFICIENCY OF

Alpha (8-12 Hz)
Lo-Beta (12-21 Hz)



EXCESS OF

Hi-Beta (21-30 Hz)
Gamma (30 Hz & above)



THERAPY

Enhance Alpha, Lo-Beta



BELLABEE PROTOCOL

9 Hz x 05 min
11 Hz x 05 min
13 Hz x 10 min
15 Hz x 10 min
13 Hz x 10 min
11 Hz x 10 min
9 Hz x 10 min

RESULT

Increase in Alpha, Lo-Beta
Decrease in Hi-Beta & Gamma



Depression

BRAIN WAVE ABNORMALITY

DEFICIENCY OF

Lo-Beta (12-21 Hz)
Alpha (8-12 Hz) asymmetry
(more on right side)



EXCESS OF

Hi-Beta (21-30 Hz)
Theta (4-8 Hz)
Delta (0.5-4 Hz)



THERAPY

Enhance Lo-Beta, Alpha
Enhance Alpha Symmetry



BELLABEE PROTOCOL

10 Hz x 10 min

12 Hz x 10 min

14 Hz x 10 min

16 Hz x 10 min

18 Hz x 10 min

20 Hz x 10 min

RESULT

Increase in Lo-Beta & Alpha
(+ Alpha asymmetry reduced)

Decrease in Theta & Hi-Beta



References:

Brainwave Abnormalities

1. [EEG Frequency Bands in Psychiatric Disorders: A Review of Resting State Studies](#)

Shows differences in **frequency bands** across a spectrum of psychiatric disorders including **Depression, ADHD, Autism, Addiction, Bipolar disorder, Anxiety, Panic disorder, PTSD, OCD, Schizophrenia.**

2. [Changes of the brain's bioelectrical activity in cognition, consciousness, and some mental disorders](#)

Shows that **slow brain waves** are seen in conditions such as **sleep, coma, brain death, depression, autism, brain tumors, OCD, ADHD, encephalitis** AND **fast waves** are seen in **epilepsy, anxiety, PTSD, drug abuse.**

3. [Role of Electroencephalography in the Diagnosis and Treatment of Neuropsychiatric Border Zone Syndromes](#)

Analyzed some of the imitators such as **epilepsy, dementia, some forms of encephalitis, and pure psychiatric diseases** which produce problems in decision making due to soft neurological features and the **utility of electroencephalography (EEG)** as a simple diagnostic tool in differentiating some of these conditions from each other as well as the therapeutic role of EEG in some of these disorders.

4. [Developments in EEG brain scans could detect mental disorders early](#)

Recent advances in electroencephalography (EEG) technology could benefit those suffering from neurological or mental disorders, including **autism, ADHD and dementia,** by offering earlier diagnosis, ensuring proper management of diseases early.

Brainwave Abnormalities

5. [The Electroencephalogram in the Management of Psychiatric Conditions](#)

The prevalence of **EEG abnormalities** in psychiatric patients is significantly elevated and ranges from 20% to 68% higher than in healthy controls. EEG findings in psychiatric populations include generalized or focal slowing of cortical activity and a variety of focal or generalized paroxysmal EEG discharges and seen in **panic attack, confusional state, ADHD, depression vs dementia, brain injury or stroke.**

6. [In search of biomarkers in psychiatry-EEG-based measures of brain function](#)

EEG has attracted increased interest for development of biomarkers for psychiatric diagnosis and phenotype definition. The advantages of these new **EEG source imaging methods** bring EEG to the **forefront of functional neuroimaging**, and thus **biomarker** and phenotype definition in psychiatry.

7. [Pulsed Electromagnetic Field Therapy \(PEMF\): Indications for management](#)

The benefits of **PEMF** are based on **Evidence Based Medicine**. It is a safe & noninvasive procedure & can be utilized in primary, secondary & tertiary care Institutes & the great benefit is that it can be used in home care . The common diseases in which **PEMF** is **utilized** are 3) Neurological diseases : **Depression, Stroke rehabilitation, Cerebral Palsy, Migraine & Parkinson's disease.**

Anxiety

1. [Physiological and psychological measures in anxious patients](#)

Drug-free patients suffering from **chronic anxiety** states were compared with normal controls. The patients showed **increased EEG voltage, shorter latencies of the evoked response, higher skin conductance levels, higher pulse rate and less pupillary constriction, and they responded less to the increase in activation.**

2. [Worry, Generalized Anxiety Disorder, and Emotion: Evidence from the EEG Gamma Band](#)

As hypothesized, the EEG gamma band was useful for differentiating worry from baseline and relaxation. **During worry induction, GAD patients showed higher levels of gamma activity than control participants.**

3. [Appearance of Frontal Midline Theta Activity in Patients with Generalized Anxiety Disorder](#)

The present results suggest that the appearance of **frontal midline Theta** might be closely related to an improvement in **the anxiety** symptoms associated with generalized anxiety disorder.

Anxiety

4. [QEEG related changes following the treatment of anxiety disorders: case series](#)

In this case series, we presented four cases with a diagnosis of **anxiety spectrum disorder** and evaluated their **qEEG changes before and after the treatment.**

5. [A Review of EEG Biofeedback Treatment of Anxiety Disorders](#)

Alpha-Enhancement, Alpha-Suppression, Alpha-Theta-Enhancement, **Generalized Anxiety Disorder, Obsessive-Compulsive Disorder, Phobic Anxiety Disorder, Post-traumatic Stress Disorder, Theta-Enhancement.**

6. [Brief Transcranial Pulsed Electromagnetic Stimulation In Patients With Anorexia And In Those With Anxiety](#)

There was a **statistically significant improvement following one month of biweekly PEMF in the anxiety group:** the patients' scores on Hamilton Anxiety Scale, Hamilton Depression Scale, and Yale-Brown Obsessive Compulsive Scale significantly decreased ($p < .05$, 1-tailed).

Insomnia

1. [Normal Sleep EEG](#)

Sleep is generally divided into 2 broad types: nonrapid eye movement (NREM) sleep and REM sleep. In general, in the healthy young **adult NREM sleep** accounts for **75-90%** of sleep time (3-5% stage I, 50-60% stage II, and 10-20% stages III and IV). **REM sleep** accounts for **10-25% of sleep time**.

2. [EEG Recording and Analysis for Sleep Research](#)

Detailed protocols describe recorder calibration, electrode application, EEG recording, and computer EEG analysis with power spectral analysis. Sample data are provided for a typical night's **analysis of EEG during NREM (non-REM) and REM sleep**.

3. [Sleep Stage Classification Using EEG Signal Analysis: A Comprehensive Survey and New Investigation](#)

Automatic Sleep Stage Classification (ASSC) systems. a novel and efficient technique that can be implemented to 10 s epochs of single-channel EEG signals.

Insomnia

4. [Neurofeedback for Insomnia: A Pilot Study of Z-Score SMR and Individualized Protocols](#)

Baseline EEGs showed excessive sleepiness and hyperarousal, which improved post-treatment. Both Z-Score NFB groups improved in sleep and daytime functioning. Post-treatment, all participants were normal sleepers.

5. [Impulse magnetic-field therapy for insomnia: a double-blind, placebo-controlled study](#)

In the **active-treatment group**, the **values of all [insomnia - intensity of sleep latency, frequency of interruptions, sleepiness after rising, daytime sleepiness, difficulty with concentration, and daytime headaches] criteria were significantly lower at study end ($P < .00001$)**. No adverse effects of treatment were reported.

6. [PEMFs and SLEEP](#)

One of the almost universal phenomena that I see in people using PEMFs, regardless of PEMF system, is that people **almost universally describe improvement in sleep**. The people receiving active treatment consistently had better results for sleep whether it was at 2 weeks or 6 weeks. Results were stronger at 6 weeks.

Concentration/ Focus

1. [Effects of an Integrated Neurofeedback System with Dry Electrodes: EEG Acquisition and Cognition Assessment](#)

Evaluated the effectiveness of the [neurofeedback] system in a single-blind control experiment in healthy people, who **increased the alpha frequency band power** in a neurofeedback protocol. We found that upregulation of the alpha power density **improved working memory** following short-term training (only five training sessions in a week).

2. [EEG correlates of Working Memory \(WM\) performance](#)

Beta 2 power increased with the increasing WM load and did not significantly depend on the type of the task. At the level of individual differences, we found that the high performance (HP) group was characterized by **higher alpha rhythm power**. The HP group demonstrated task-related **increment of theta power** in the left anterior area and a gradual increase of theta power at midline area.

3. [Rhythmic control of 'brain waves' can boost memory](#)

Memory performance can be enhanced by rhythmic neural stimulation, using both invasive and non-invasive techniques.

Concentration/ Focus

4. [Dynamic links between theta executive functions and alpha storage buffers in auditory and visual working memory](#)

WM [working Memory] task-relevant **brain regions are coordinated by distant theta synchronization** for central executive functions, by local **alpha synchronization** for the memory storage buffer, and by **theta-alpha coupling** for inter-functional integration.

5. [Can PEMF \(pulsed electromagnetic fields\) make your \(or your child's\) brain grow stronger?](#)

Compared to controls, the **brains of treated mice had developed stronger connections between neurons**, indicating better function. Brain showed **proliferation of stem cells in areas associated with learning, memory, and moods**. **Children focused better** but what was even more remarkable to me was that they were happier, and this was often the first change we noticed. **Autistic children's behaviors became more appropriate**: they no longer screamed in public places or woke up the entire family at all hours of the night.

ADHD

1. [The increase in theta/beta ratio on resting-state EEG in attention-deficit/hyperactivity disorder \(ADHD\) is mediated by slow alpha peak frequency](#)

[The] **increased theta/beta ratio in ADHD** may reflect individuals with **slow alpha peak frequencies** in addition to individuals with **true increased theta activity**.

2. [Brain functional connectivity abnormalities in attention-deficit hyperactivity disorder](#)

TD (Typically Developing) and ADHD groups demonstrated significant **FC (Functional Connectivity)** differences in the interval preceding the appearance of the target in the CPT A-X task. Specifically, the ADHD group exhibited robust prefrontal and parieto-frontal FC increases that were not apparent in the TD group. **The FC differences observed in the ADHD group are discussed in the context of inadequate suppression of cortical networks that may interfere with task performance.**

3. [Non-invasive Brain Stimulation in Pediatric ADHD: A Review](#)

Potential **diagnostic and therapeutic applications** of TMS and tDCS in pediatric **ADHD**.

4. [Transcranial direct current stimulation in attention-deficit hyperactivity disorder \(ADHD\): A meta-analysis of neuropsychological deficits](#)

This meta-analysis supports a **beneficial effect** of tDCS on **inhibitory control** and **WM (Working Memory)** in **ADHD**. tDCS seems to be a promising method for improving neuropsychological and cognitive deficits in ADHD.

Stress

1. [EEG Signals to Measure Mental Stress](#)

EEG signals can successfully be used to measure mental stress. In this paper, a survey of physiological studies to measure mental stress is presented. The concepts of stress from its origin to detection are discussed

2. [QEEG Biomarkers: Assessment and Selection of Special Operators, and Improving Individual Performance](#)

Such a **quantitative EEG Normative Database (qEND)** will function as the **benchmark** for screening, assessment, selection and even training of targeted individuals **required to work effectively as operators under extreme stresses and for extended periods.**

3. [Analysis of EEG signals during relaxation and mental stress condition using AR modelling techniques](#)

Electroencephalography (EEG) is the most important tool to study the brain behavior. This paper **presents an integrated system for detecting brain changes during relax and mental stress condition.**

4. [Biofeedback Intervention for Stress, Anxiety, and Depression among Graduate Students in Public Health Nursing](#)

With increasing severity of mental health problems on university campuses and limited resources for mental health treatment, alternative interventions are needed. This study investigated the **use of biofeedback training to help reduce symptoms of stress, anxiety, and depression.**

Stress

5. [QEEG Analysis of Cranial Electrotherapy: A Pilot Study](#)

After a single 20-minute treatment with CES there is a **significant increase in alpha** frequency activity and a **significant decrease in delta and theta** activity. The post treatment maps indicate the effect of single session cranial electrotherapy treatment (CES) on QEEG is congruent with the reports of the research volunteers of **decreased anxiety and increased relaxation**.

6. [Waking QEEG to assess psychophysiological stress and alertness during simulated on-call conditions](#)

On-call schedules are associated with stress and disrupted sleep. In a recent study, under non-sleep deprived conditions, low and high-stress on-call conditions did not significantly impact sleep quality but did impact next day performance. **Our aim was to determine whether quantitative electroencephalography (qEEG) would reflect changes in cortical activity in on-call conditions**, predicting that the high-stress condition would display faster qEEG frequencies compared with the control and low-stress condition.

7. [Effects of PEMF \(Pulsed Electromagnetic Fields\) on Stress](#)

Long term use of weak **PEMFs** may be able to **remodel tissues that tend to be hyper-reactive to chronic or acute stress** so that over time they will be less reactive.

Depression

1. [Brain stimulation improves depression symptoms, restores brain waves in clinical study](#)

Transcranial alternating current brain stimulation (tACS) significantly reduced symptoms in people diagnosed with major depressive disorder and **markedly improved depression symptoms in about 70 percent of participants [using] 10-Hertz tACS.**

2. [Noninvasive Brain Stimulation and Psychotherapy in Anxiety and Depressive Disorders:](#)

Pharmacotherapy and psychotherapy administered in monotherapy or in a combined regimen do not result in satisfactory outcomes in all patients. **Noninvasive brain stimulation (NIBS) has emerged as a safe tool to improve several neuropsychiatric symptoms.**

3. [Recent Advances in Non-invasive Brain Stimulation for Major Depressive Disorder](#)

Non-invasive brain stimulation (NBS) is a promising treatment for major depressive disorder (MDD). [This study] provides a reference for the **safety and efficacy of NBS methods in the clinical treatment of MDD.**

4. [Health-related quality of life assessment in depression after low-frequency transcranial magnetic stimulation](#)

Low-frequency rTMS **improves Health-related Quality of Life in unipolar and bipolar patients with medication-resistant depression.**

Depression

5. [Repetitive transcranial magnetic stimulation for treatment of major depressive disorder with comorbid generalized anxiety disorder](#)

Repetitive transcranial magnetic stimulation (rTMS) has shown promising results in treating individuals with behavioral disorders such as major depressive disorder (MDD), posttraumatic stress disorder [PTSD], obsessive-compulsive disorder [OCD], and social anxiety disorder [SAD]. Significant improvement in anxiety symptoms along with depressive symptoms was achieved in a majority of patients after bilateral rTMS application.

6. [Deep Brain Stimulation Improves Depression Symptoms: Study](#)

Deep brain stimulation can durably improve depression symptoms in people who don't respond well to other treatments, according to a small study published in *The American Journal of Psychiatry*. The findings, based on up to eight years of data from 28 people wearing brain-stimulating implants, showed that most people receiving the therapy responded well and maintained their improvements over time.

7. [Affective Processing in Non-invasive Brain Stimulation Over Prefrontal Cortex](#)

The prefrontal cortex (PFC) is the most frequently targeted brain region by non-invasive brain stimulation (NBS) studies. Non-invasively stimulating the PFC has been shown to both modulate affective processing and improve the clinical symptoms of several psychiatric disorders, such as depression and schizophrenia.

Other Disorders

1. [Brain oscillations reveal impaired novelty detection from early stages of Parkinson's disease](#)

Novelty detection impairment can be identified in neurophysiological terms from **very early stages of PD** [Parkinson's Disease], and such impairment **increases linearly as the disease progresses**.

2. [Transcranial Alternating Current Stimulation: A Potential Modulator for Pathological Oscillations in Parkinson's Disease?](#)

Newly developed NBS [non-invasive brain stimulation] **techniques such as theta-burst stimulation (TBS)** have tried to **simulate normal neuronal activity patterns** of the hippocampus by pairing gamma frequency trains of stimuli (50 Hz) with theta oscillatory rhythms (5 Hz)

3. [Impairment of brain functions in Parkinson's disease reflected by alterations in neural connectivity in EEG studies: A viewpoint](#)

The main observations were a **general slowing of background activity**, **excessive synchronization of beta activity**, and **disturbed movement-related gamma oscillations** in the BG [basal ganglia] and in the cortico-subcortical and cortico-cortical motor loops

4. [Enhanced Gamma Activity and Cross-Frequency Interaction of Resting-State Electroencephalographic Oscillations in Patients with Alzheimer's Disease](#)

This study aims to explore the interaction dynamics between different EEG oscillations in AD [Alzheimer's Disease] patients. we found **enhanced gamma rhythm power** in AD patients in addition to the **increased delta** and **decreased alpha power**.

Other Disorders

5. [Brain Stimulation in Alzheimer's Disease](#)

We reviewed the cutting-edge research on these brain stimulation techniques and discussed their therapeutic effects on AD [Alzheimer's Disease]. **Both IBS [invasive brain stimulation] and NIBS [non-Invasive brain stimulation] may have potential to be developed as novel treatments for AD**

6. [Abnormal oscillatory brain dynamics in Schizophrenia: a sign of deviant communication in neural network?](#)

Compared to healthy subjects the schizophrenia sample was characterized by **significantly more intense slow wave activity**, with maximal in frontal and central areas. **Frontal ASWA [abnormal slow wave activity] were related to affective symptoms**

7. [Frontal slow-wave activity as a predictor of negative symptoms, cognition and functional capacity in Schizophrenia](#)

Treatment-associated decreases in slow-wave activity could be accompanied by improved functional outcome and thus better prognosis.

8. [Electroencephalogram alpha-to-theta ratio over left fronto-temporal region correlates with negative symptoms in Schizophrenia](#)

Reduced alpha power over frontal regions might imply altered arousal and/or impaired attentional process, while abnormal theta range oscillations may relate to impairments in working memory via their influences on theta-gamma coupling.