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NEUROFIELD: THREE CASE STUDIES

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NeuroField is an extremely low intensity electromagnetic stimulation device designed for use in neurotherapy. Three case studies are presented involving treatment of premenstrual dysphoric disorder, attention deficit/hyperactivity disorder, and posttraumatic stress disorder using one NeuroField treatment protocol. Each person was evaluated with a pre- and post-NeuroField quantitative EEG. Two of the cases received 15 sessions of NeuroField treatment. The third person received only one NeuroField treatment. Individual analysis of variance statistical analyses showed significant changes in absolute power, relative power, asymmetry, coherence, and phase in all three cases. External measures also showed significant changes. These findings suggest that NeuroField may have clinical value and warrants further research.

INTRODUCTION

I am convinced that the therapy of the future will employ heat, light, electricity and agents yet unknown. Toxic drugs shall cede their place to physical agents the employment of which at least has the advantage of not introducing any foreign body into the organism. — Arsene D'Arsonval (1896)

The use of energy to address human ailments has been a source of exploration for centuries, beginning with the use of electric eels; to the use of static electricity; to various forms of magnetic therapies that used stones, ore, and the laying on of hands to heal those afflicted with various illnesses (Kellaway, 1946; Krieger, 1975; Payne, 1990; Quinn, 1984, 1992; Quinn & Strelkauskas, 1993). In the past 30 years there have been many different types of energy techniques offered as a form of valid therapy. One of these modalities is known as transcranial magnetic stimulation (TMS).

TMS was originally developed by Anthony Barker at the University of Sheffield in 1985. Barker demonstrated an evoked motor

response (thumb movement) by applying an electromagnetic stimulation (electromagnetic field [EMF] strength of 1-2 Tesla) over the motor cortex of humans (Barker, Jalinous, & Freeston, 1985). As the technology evolved, it became possible to give multiple pulses to people, which gave rise to *repetitive* transcranial magnetic stimulation (rTMS). Since that time, a great deal of research has been conducted strongly suggesting that rTMS has clinical value for the treatment of depression and other psychiatric conditions (Arns, Spronk, & Fitzgerald, 2010; Avery et al., 2006; Brakemeier et al., 2008; Pascual-Leone et al., 1999).

The rTMS protocols are known as being either high frequency (HF-rTMS, EMF stimulation at 5 Hz or higher) or low frequency (LF-rTMS, EMF stimulation at 1 Hz or less). The EMF frequency and site of stimulation is theorized to have clinical effects that can have either an excitatory or inhibitory impact on neuronal cellular activity. However, due to the high intensity of the EMF, giving stimulation faster than 20–30 Hz in frequency at intensities greater than 1 Tesla for long durations can

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result in the generation of heat, which can damage tissue. As a result rTMS protocols are typically given in short pulses with an “on” and “off” time that prevents tissue damage but limits the frequency range in which the therapy can be given. rTMS therapy was deemed safe by the Food and Drug Administration (FDA) in 2008 and approved for the treatment of depression in the United States.

The findings documenting that low-intensity electromagnetic stimulation could be of clinical value was one of the driving forces behind the development of the NeuroField technology (Dogris, 2009; Hammond, 2009). The NeuroField X2000 is a four-channel frequency generator that is capable of generating a low intensity electromagnetic pulse ranging from 1 to 3 *milligauss*, which is *10,000,000 times weaker* than a pulse given by rTMS devices. Because the output of NeuroField is so low, it is possible to give EMF stimulation faster than 20–30 Hz, at long durations, without the concern of generating heat thereby causing tissue damage. As a result the X2000 can reliably generate frequencies ranging from 0.31 Hz to 300,000 Hz. Last, the X2000 has two channels of EEG and heart rate variability (HRV) measurement capabilities. The device can give a low-intensity stimulation and then immediately measure EEG and/or HRV. The EMF stimulation does not occur while the EEG or HRV are active, allowing for immediate measurements that are not contaminated by the stimulation.

The NeuroField system was initially evaluated by 10 beta testers within the United States, all of whom are licensed health care professionals. This author has written many more than 50 experimental protocols for the system that have been rated by NeuroField users as having clinical value. The inflammation reduction protocol has been given the highest ratings with more than 30 NeuroField users confirming observed inflammation reduction in their clients, and one case involving severe chronic pain found very significant and sustained improvement in the level of pain that endured on 1-year follow-up following 10 NeuroField treatment sessions (Hammond, 2009). The X2000 is

currently in the process of obtaining electrical certification as a medical device from Underwriters Laboratories and is slated for FDA 510K registration in 2011.

The following case studies are intended to demonstrate that a low-intensity device like NeuroField can have a clinical effect.

CASE 1

This patient was a 42-year-old woman who had been diagnosed with Premenstrual Dysphoric Disorder (PMDD). She reported being diagnosed with PMDD more than 10 years earlier, and she had episodes of depression consistent with the luteal phase of her monthly menstrual cycle. The author evaluated this patient on two different dates prior to treatment. On her first visit she was having a PMDD episode, and her second visit was in the follicular phase a week after her menstrual cycle had finished. Her score on the Beck Depression Inventory–II (BDI–II) was 34 during her PMDD episode and 3 in the follicular phase of her cycle.

Apart from PMDD her history was unremarkable. She reported having tried antidepressant medications but indicated that she did not tolerate them well. She denied any history of head injury or significant medical problems. The onset of PMDD was after the birth of her first child. She lives a healthy lifestyle and engages in good nutrition and daily exercise. She denied using drugs or alcohol. She previously sought help with acupuncture and other “alternative” techniques without relief. She had also been treated by her physician with hormone replacement therapies but found they were not well tolerated.

During her initial visit, while she was having a PMDD episode, an eyes-open and eyes-closed quantitative EEG (QEEG) was obtained. The data were collected with a Deymed TrueScan 32 EEG. The data were analyzed with the NeuroGuide program and normative database (NeuroGuide, St. Petersburg, FL, USA). Her initial QEEG showed excess in absolute power in high beta in the occipital and frontal lobes. She also had a deficiency

of absolute power delta, theta, alpha, and beta at T3. There were significant asymmetry, coherence, and phase connectivity problems as well (see Figure 1).

Treatment only consisted of using the “10–100” protocol, which provided 5 s of stimulation at each frequency from 10–100 Hz in each session at the most deregulated absolute power sites. In this case O1, O2, Fz, F4, F8, T3, T5, and T6 were stimulated and then immediately monitored with NeuroField EEG.

At the end of 15 sessions of treatment, a follow-up QEEG obtained in luteal phase, 3 days prior to the beginning of her menstrual cycle (see Figure 2), which showed a significant reduction in excess high beta activity and in the left temporal delta deficit. Another BDI–II was collected at that time as well. Her BDI–II score had decreased from 34 to 5. She reported what would be considered normal “ups and downs” and stated that she had not felt “severe depression” after the 9th week of treatment.

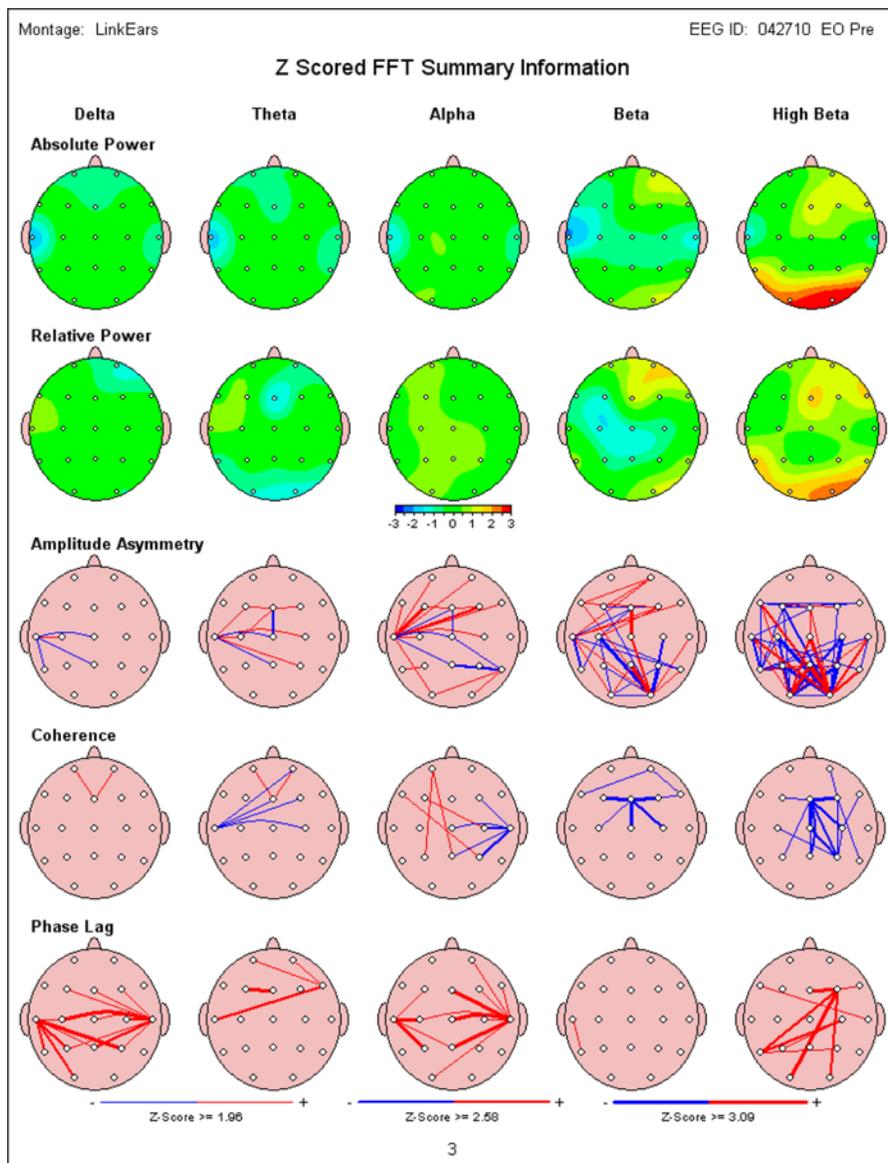


FIGURE 1. Case #1, pretreatment quantitative EEG.

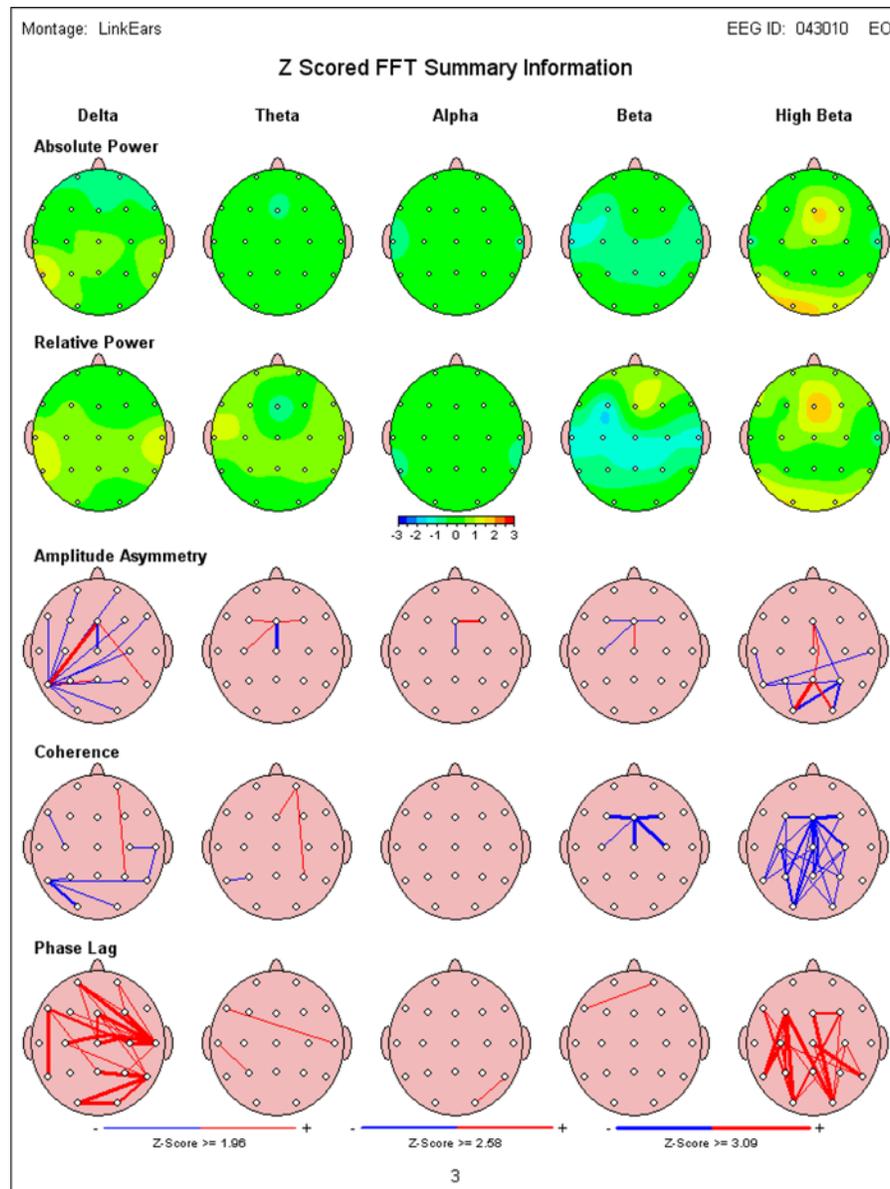


FIGURE 2. Case #1, posttreatment quantitative EEG.

The pre- and posttreatment data were statistically analyzed using NeuroGuide. The results show statistically significant changes in absolute power, relative power, asymmetry, coherence, and phase.

Treatment lasted a total of 4 months. The client reported that she had “moderate” symptoms of depression during treatment sessions 1 to 8 and “minor” symptoms of depression during sessions 9 to 16. As of the writing of this article, the client has had a follow-up visit once

a month for 3 months. She reported no significant depression during the luteal phase prior to her menstrual cycle.

CASE 2

The second case was a 17-year-old female adolescent diagnosed with attention deficit/hyperactivity disorder, anxiety, and conduct disorder. She was referred by the court for treatment after she had been incarcerated for

public intoxication and fighting. She had a long history of mental health problems and had been in treatment for the past 10 years. She also had a long history of alcohol and drug abuse and had significant issues with rage. Her treatment history included a wide range of medications, including selective serotonin reuptake inhibitor antidepressants, anticonvulsants, and stimulant medications. When she was referred to the author for treatment she had been off all of her medications for 30 days.

She was given a full battery of psychological tests along with a QEEG evaluation (see Figure 3). One of the tests administered during the initial evaluation was the Integrated Visual Auditory Continuous Performance Task (IVA-CPT). Her score on the IVA was 57, which is 3 standard deviations below the mean for young women in her age range. Her QEEG displayed excessive high beta, beta, alpha, theta, and delta. The amount of absolute power high beta that was in excess of 3 z scores was at P3

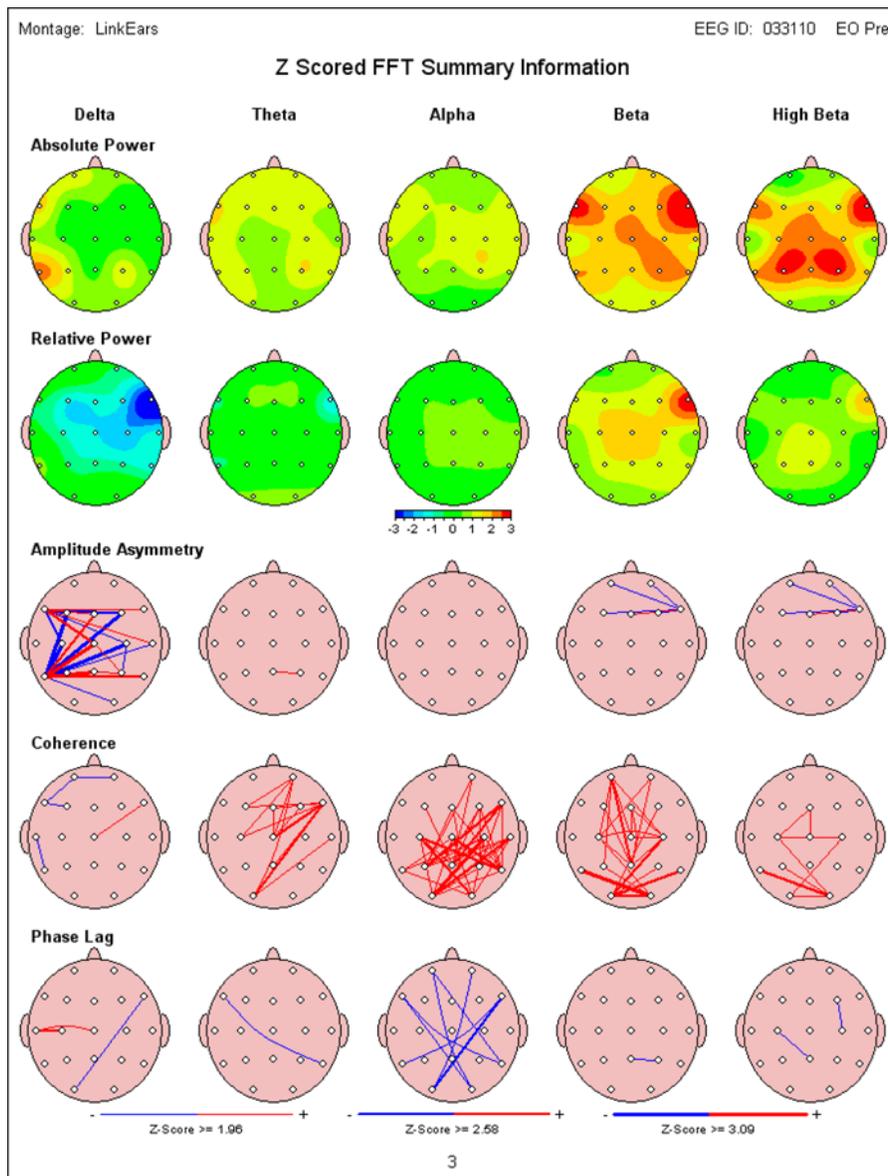


FIGURE 3. Case #2, pretreatment quantitative EEG.

and P4. She reported that she had no ability to manage her anger and she had a long history of getting into fights without knowing why. Her developmental history was unremarkable with her meeting all developmental milestones at the appropriate times. She reported no significant medical problems.

This client was given the 10–100 Hz NeuroField protocol once a week for 15 weeks. During this time she remained medication free. She participated in psychotherapy with a licensed health care professional who

consulted with the author throughout her NeuroField treatment. Upon completion of treatment another QEEG was obtained (see Figure 4).

The results of her posttreatment QEEG show a significant reduction in high beta, beta, alpha, theta, and delta frequency absolute power activity. She was given a posttreatment IVA-CPT, where she had a full scale score of 91, which is in the normal range. The client had no incidents of fighting and reported that she had developed the ability to manage her

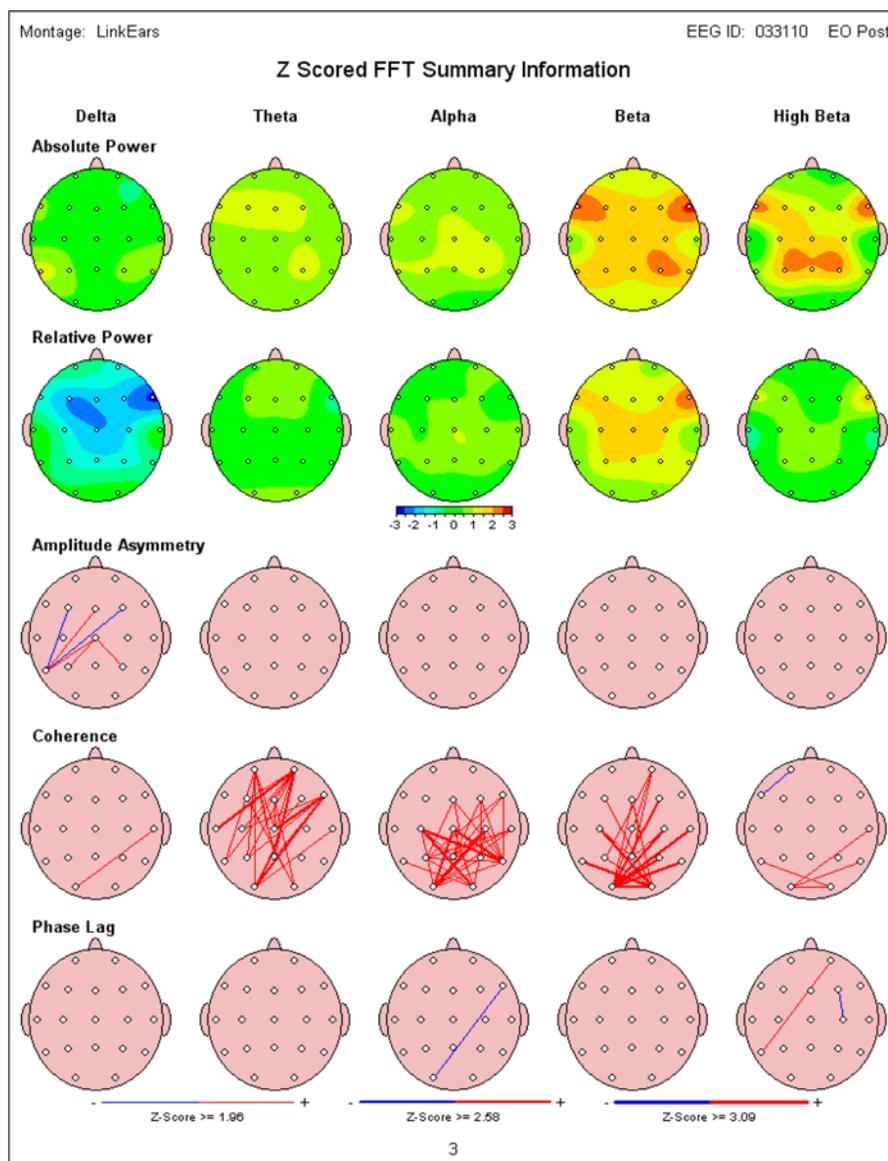


FIGURE 4. Case #2, posttreatment quantitative EEG.

anger and “control” herself. Her probation officer reported that all of her drug tests were negative and that the client was passing all of her classes in school. The client’s mother reported that her daughter was “calmer” and that for the first time in their relationship were having “talks” about life and were “closer” to each other emotionally. The author was particularly impressed with this young woman’s insight regarding rage episodes and how she came to the realization that she did not have to engage in hostile self-attacks to complete tasks.

The QEEG data were analyzed using the NeuroGuide statistical package, and the analysis of variance found statistically significant changes in absolute power, relative power, asymmetry, coherence, and phase.

CASE 3

The third case was a 29-year-old man who had served in the military in Iraq for 3 years. During that time he reported being “blown up” more than 10 times during building clearings. These

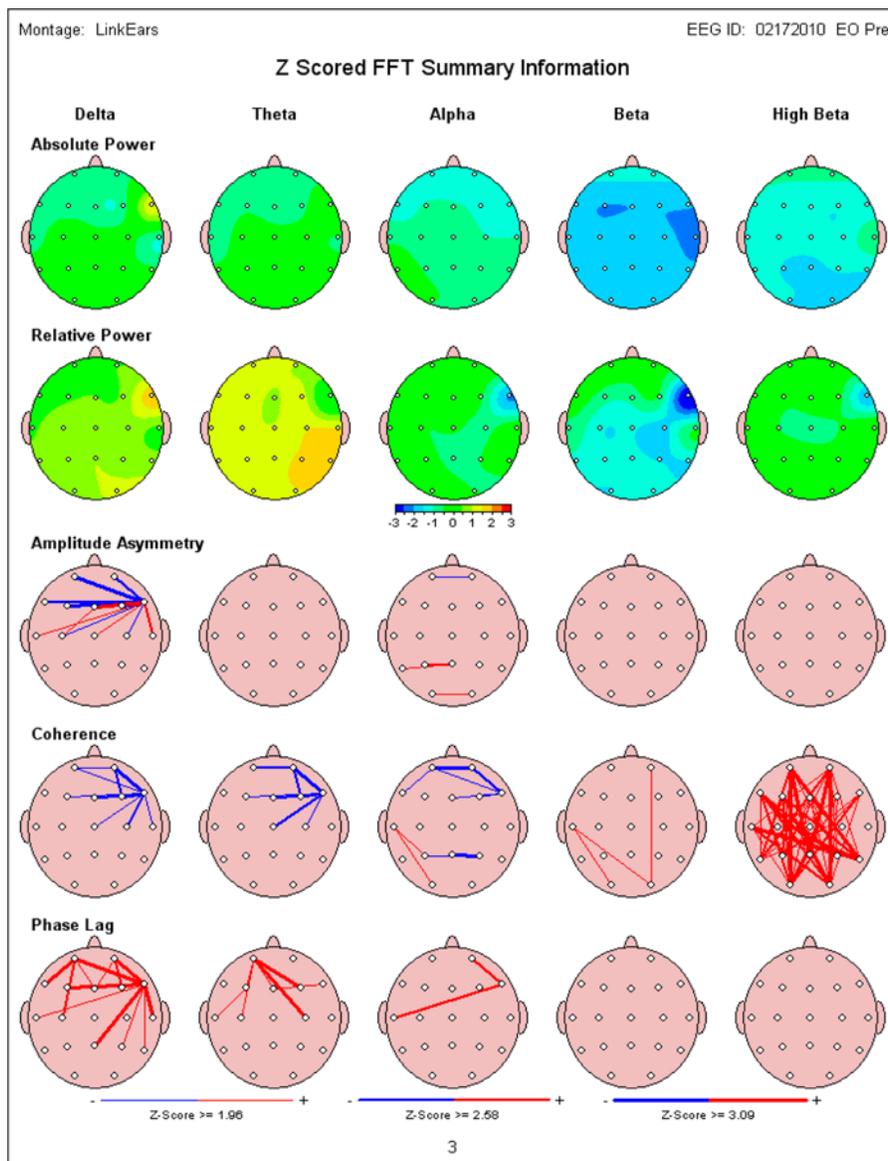


FIGURE 5. Case #3, Pre-NeuroField session quantitative EEG.

blast injuries resulted in his developing severe posttraumatic stress disorder (PTSD) and a wide array of cognitive problems. Upon initial evaluation he reported taking Prozac, Welbutrin, and Trazadone. He had extreme anxiety, depression, nightmares, and insomnia; had startle responses; and violently acted out. A QEEG was obtained during the initial evaluation and showed a deficiency in high beta and beta absolute power. The QEEG also showed a great deal of hypercoherence in high beta (see

Figure 5). He was administered the 10–100 NeuroField protocol immediately after his QEEG had been acquired. Then, following the 10–100 protocol, another QEEG was obtained.

After the QEEG cap was removed the client began reporting that “memories” were coming to the “surface.” The client then had an immediate, severe abreaction and began reexperiencing a flood of trauma that he had witnessed during the war. The author was

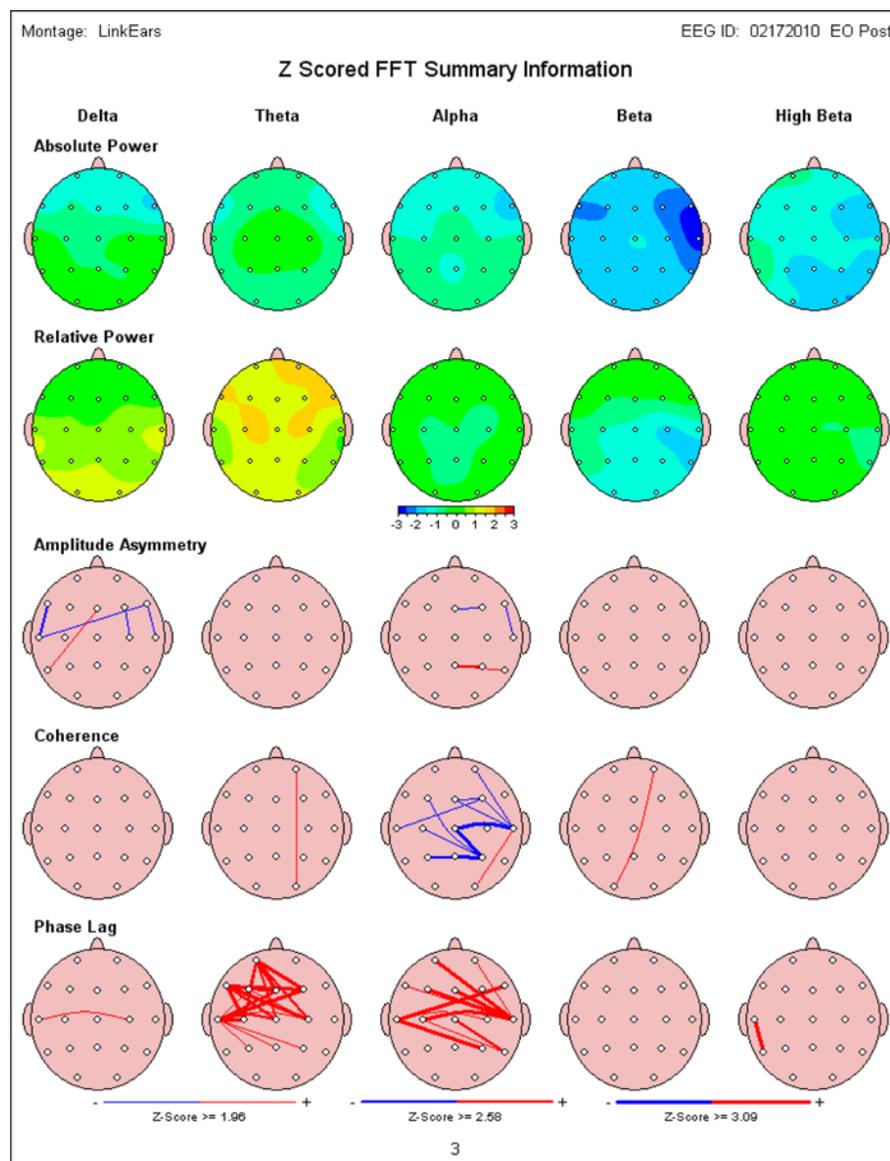


FIGURE 6. Case #3, Post-NeuroField quantitative EEG.

trained in Eye Movement Desensitization and Reprocessing (EMDR) in 1994, which is a trauma therapy specifically used to treat PTSD. EMDR was administered immediately for a period of 1.5 hr. After this time, the clients' abreaction ceased and he reported feeling exhausted. The QEEG that was obtained immediately after his NeuroField treatment showed significant changes in high beta hyper-coherence (see Figure 6).

The client was seen 2 days after the one treatment session, at which time he reported a dramatic reduction in his symptoms of anxiety. He indicated that he was aware of how his response to trauma memories was "different" and not as intense as they had been. Unfortunately, this client was unable to continue with treatment because he was moving out of the area. He was given a referral to continue with psychotherapy and neurotherapy treatment with another health care professional.

DISCUSSION

Based on uncontrolled clinical experiences of the author and several dozen other clinicians, NeuroField low-intensity, electromagnetic stimulation appears to have potential as a form of neurotherapy treatment. However, formal controlled clinical trials need to be conducted. Thus far, however, the author has collected more than 30 pre- and posttreatment QEEGs simply using the 10–100 protocol, and the individual data on *all* cases have shown significant changes in the QEEG. This result suggests that further research with NeuroField low-intensity electromagnetic stimulation is warranted. Research is particularly needed to evaluate effects of additional NeuroField protocols that stimulate other frequency ranges and experimental protocols that have been developed to focus on specific clinical problems such as anxiety reduction and improving concentration.

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