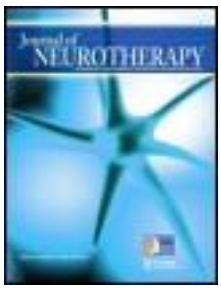

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Poster Presentation Abstracts

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POSTER PRESENTATION ABSTRACTS

Relationships Between Eyes-Closed and Eyes-Open QEEG Parameters: Implications for Neurotherapy Treatment

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Introduction

One of the paradoxes in the world of neurotherapy is, "How can we use eyes-closed databases to guide eyes-open neurotherapy treatment protocols?" The present study examines how eyes-closed and eyes-open quantitative electroencephalographic (QEEG) measures correlate to each other to better understand the generalizability of eyes-closed database driven protocols.

Methods

EEG data were collected from 30 unmedicated children (average age = 9 years, 9 months; range = 7 to 14 years) presenting in the Riverside EEG Biofeedback Services clinic with AD/HD symptomology. The EEG data were imported into the NX-Link Neurometric database for analysis. Two minutes of artifact-free data were obtained for each condition. Nineteen sites based on the International 10-20 System were used and frequencies included Delta (1.5-3.5 Hz), Theta (3.5-7.5 Hz), Alpha (7.5-12.5 Hz), and Beta (12.5-25.0 Hz). QEEG measures examined in this study included absolute power, relative power, and mean frequency.

Results

Data were submitted to Spearman R nonparametric correlation tests. Data were examined at both nominal ($p < .05$) and Bonferroni adjusted ($p < .0026$) alpha levels. For absolute power, across frequencies and sites, correlations ranged from .45 to .96 with 67% to 100% being sig-

nificant. More specifically, the Delta, Theta and Beta bandwidths had most of the 19 sites meeting both alpha criteria. The Alpha bandwidth showed similar correlations except for the posterior region having only a few significant sites.

Relative power showed correlation values from .38 to .85 with 11% to 100% being significant. In particular, the Delta, Theta and Beta bandwidths showed a majority of the 19 sites meeting the .05 alpha criteria. The Theta and Beta bands showed a similar pattern with the Bonferroni adjusted criteria, but the Delta band showed less than half of the sites meeting criteria with significant sites in the frontal-central-parietal regions. The Alpha band showed half of the sites meeting .05 criteria with significant sites in the frontal-central-parietal regions, and only two central sites meeting Bonferroni adjusted criteria.

Mean frequency correlation values ranged from .38 to .76 with 0% to 89% being significant. More specifically, the Theta and Alpha bands showed a majority of sites meeting .05 criteria, while approximately half of the sites in both bands met the Bonferroni adjusted criteria. The Theta band showed a central-temporal-parietal pattern and the Alpha band showed a frontal-central-parietal pattern. The Delta and Beta bands showed less than half of the sites meeting .05 criteria with a central-temporal-parietal pattern. After Bonferroni correction, the Delta and Beta bands did not show any significant sites.

Discussion

Overall, absolute and relative power QEEG parameters showed more significant correlations than mean frequency. Within absolute and relative power the Delta, Theta, and Beta bandwidths showed stronger correlations while the Alpha band showed the most inconsistency between the two conditions. This finding is not surprising given the role of the Alpha frequency in attenuation when the eyes are open versus closed particularly in the posterior region. A different pattern emerged in the mean frequency parameter. The Theta and Alpha bands showed more correlations than the Delta and Beta bands while showing similar patterns across regions.

Because the participants in this study were aged seven to 14 years, it is not clear if this information generalizes to adults. However, the patterns found in this study suggest that eyes-closed QEEG data can be used to create valid eyes-open neurotherapy treatment plans.

QEEG and MMPI-2 Characteristics of a Sample of 12 Persons with Childhood Sexual Abuse

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Childhood sexual abuse (CSA) has been shown to be associated with a host of maladies including depression, anxiety, substance abuse, sexual dysfunction, suicidal ideation and attempts, as well as other self-destructive behaviors. CSA has been found in groups experiencing dissociation, PTSD, seizure disorder, chemical dependency, eating disorder, psychogenic amnesia, and headaches. CSA groups show significantly higher MMPI-2 basic scale scores for F, 2, 4, 6, 7, 8, and 9 than do non-CSA groups. Commonly seen on the MMPI-2 among CSA groups are floating profiles (six or more scales > 70) as well as the 4-5-6 configuration. No research currently exists examining adult QEEG correlates of CSA, though researchers have looked at sexually and/or physically abused children. Researchers at McLean Hospital found that patients with a history of physical and/or sexual abuse were twice as likely as non-abused to have an abnormal EEG, and these abnormalities were found to affect the left hemisphere. Specifically, abused children had higher levels of left hemisphere coherence and reversed asymmetry, with left hemisphere coherence significantly exceeding right hemisphere coherence. Also, theories related to high QEEG alpha power and its relationship to dissociation in CSA exist. MRI studies show evidence for reduction in left hippocampal volume in female victims of CSA, as well as evidence for reduction of the corpus collosum (middle portion) in girls who have experienced sexual abuse. PET studies of trauma survivors during exposure to traumatic stimuli related to their trauma showed high metabolic activity in right hemisphere, amygdala region, while Brocas' area on the left showed reduced activity as compared to non-traumatized individuals.

The purpose of the current study is to: (1) determine if there are significant differences between adults with a history of CSA and adults without a history of CSA in the MMPI-2 and QEEG, and (2) determine if there is some combination of MMPI-2 and QEEG patterns that predict a history of CSA in adults.

Participants

Participants consisted of past clients of the University of North Texas Neurotherapy Lab who had a MMPI-2 and QEEG. Twelve clients were

identified who had reported a history of CSA. The control group was formed from clients who denied a history of CSA and were matched to the experimental group for age and sex. Participants were not excluded based on age, race, or presenting problem. Clients with a history of any abuse were not included in the control group due to possible confounding effects.

Method

All participants had been given the MMPI-2 and a QEEG. The same technician was responsible for preparation of each participant's data for analysis in the NeuroRep brainwave analysis software.

Results

To determine differences between the two groups, independent samples t-tests were performed on MMPI-2 scale scores and alpha relative power. The CSA group was significantly higher ($p < .05$) on MMPI-2 scales F, 1, 2, 3, 4, 7, 8 and PS. Alpha relative power was significantly lower ($p < .05$) in all sites except F7 and T3. Levene's Test for Equality of Variances showed increasingly significant differences in variances moving toward the occipital region. Therefore, the two groups showed important differences.

In order to determine ability to predict group membership, models were developed using MMPI-2 scales and alpha relative power at each site. Potential predictors for the models were chosen using a principal components analysis to reduce the number of variables. The variables selected from this procedure were inserted into two- and three-predictor models. Bootstrapping techniques were used to validate and calibrate the models due to the small sample size. Two models were chosen based on statistical and clinical significance. The first model included two predictors, scale 4 of the MMPI-2 and alpha relative power at T6. Dysfunction in the temporal lobes is often related to problems in interpretation of one's environment, which can lead to deviant thinking patterns. Because these symptoms relate closely to the Psychopathic Deviate, Scale 4, this model was labeled a model of deviant thinking. After validation and calibration, this model accounted for 55.8% of the variance between the two groups (corrected R2 = .558, $p = .0008$). The second predictor model included three predictors, and was labeled a depression model. The three predictors in this model were scale 2 (Depression), and alpha relative power at sites F3 and FP1. After validation and cali-

bration, this model accounted for 60.7% of the variation between the two groups (corrected R2 = .607), $p = .0008$).

Exploratory analysis of the data showed frontal to posterior coherences were negatively correlated with coefficient of variation among posterior sites. A higher coefficient of variation in posterior sites was found for the CSA group, implying diffuse alpha relative power posteriorly. Focal versus diffuse alpha relative power posteriorly is related to frontal-posterior connectivity (coherence) only in the Non-CSA group. Differences between the two groups are depicted well through the use of a differences map provided by NeuroRep software.

Discussion

Although research literature hypothesizes that the CSA group should have exhibited higher alpha amplitude, it was not shown in the current study. The differences in coefficient of variation as it relates to coherence might be explained within a dysregulation model of the posterior sites via the frontal cortex in adults with a history of CSA.

A limitation of the current study is the very small sample size that decreased statistical power, thus limiting the number of potential predictors used in the models. Also, the CSA group was very heterogeneous. A larger sample size could have reduced the heterogeneity, or could have made the differences within the group more interpretable. (An extension of this study is designed to solve this problem by recruiting more participants.) This study also did not account for medication effects. Although this may have weakened internal validity, it likely strengthened external validity. A final caveat of this study was that it did not take into account the level of pathology of each individual due to CSA. An extension of this study will increase sample size and take into account medication effects and level of pathology.

Medical Study and Aid in Central Asia

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Introduction

Central Asia has remained shrouded in mystery for thousands of years. The average Westerner gave little thought to this part of the world until recent events made it a focus, yet our knowledge of signifi-

cant happenings there still rivals medieval ignorance. This land has helped provide us many of the things we now take for granted via the Great Silk Road, the first and last great route of the ancient world, linking east and west cultures for the first time. Tales of the wonders of Central Asia, first told by Marco Polo, fired the imaginations of generations of writers, artists and adventurers. But it was rulers, such as Ginghas Khan, Tamur the Lame and others, via war, invasion and betrayal, which gave the land its monuments and history, and plunged the area into a cycle of wars and rebellions that produced its fiercely independent residents.

The Soviet Union had nuclear weapon, submarine missile and torpedo, and intercontinental ballistic missile testing areas in three republics of Central Asia, Uzbekistan, Kyrgyzstan, and Kazakhstan. These republics had many "Russian" experts in residence until the recent collapse of Soviet technology efforts and finally the Union. Now Newly Independent States (NIS), these republics are in economic and social chaos. In addition to economic difficulties, the former Soviet Union has one of the highest alcoholism rates in the world. In addition to this, Central Asia also has a very large drug problem. However, these are the very reasons initiatives were begun almost three years ago to develop communication with health care professionals in these Central Asia republics.

Although our major mission to help others, it is not just for purely humanitarian reasons that Cup of Water is interested in helping the medical professionals in Central Asia. One of the largest cited reasons for failure of the traditional medical community, insurance/HMO/PPO companies, and society to accept "non-traditional" (in the Western sense) medical and rehabilitation methods is failure to have standardized large-scale studies and results. For many treatments this is true, many of the positive results are via small N studies and coincidental reports. Another reason for non-acceptance is inertia and set corporate/educational agendas that are not easily changed. In Central Asia we have a wonderful opportunity to aid people very much like us, who are struggling to help their fellow man under terrible conditions, and also do work that will benefit the US and other nations in the West. There is a large trained and highly dedicated professional medical community, with an excess of staff and (older) facilities, facing severe economic hardships. The average medical doctor salary is about $30 per month and everywhere people are facing impending clinic closings and reductions in staffing. But there are no places where these experienced medical professionals can seek employment. Hence, they are extremely

interested in the introduction of new technology and using it to aid their skills in treating patients. There also is an acceptance of "alternative" therapies in society. Often medical treatment consists of seeing a "native healer" and outside of the major cities there are usually no trained doctors (in the Western sense).

Methods

Communications were begun to investigate the situations in Kyrgyzstan and Uzbekistan to determine the present medical situation, establish rapport with health professionals there, and ultimately to pave the way for visits to investigate interests in cooperative medical studies. As almost all medical facilities are centralized in one or two major cities, mostly in the capital, this is not as exhaustive as it would first seem. The initial visit was to Bishkek, Kyrgyzstan in the summer of 2000. Three weeks were spent there touring the country visiting various health facilities, including the World Health Organization for Central Asia, major hospitals, and counseling facilities. There was a notable lack of data processing, record keeping and research computers in government medical facilities. The major children's first aid hospital complex had a 286 computer that they used for research!

An effort was made to procure network computers to bring back to the children's first aid complex. They were brought to Kyrgyzstan in December 2000 and were installed in the hospital. At the same time inquiries were made about interest in receiving computerized equipment (particularly EEG and LORETA) and participation in large-scale studies in efficacy of various types of equipment, treatments and/or pharmaceuticals, with a particular interest in addiction, brain injury, and child abuse (major problems there). Response was overwhelming–discussions and presentations were made at every major hospital and training facility, several universities and counseling facilities, the High Altitude Institute of the National Academy of Science, the National Guard, and even the All Asia Kick Boxing Association. A library of materials on EEG, child abuse prevention, play therapy, LORETA, and substance abuse has been provided to the consortium of interested individuals in Bishkek to help answer some of their questions and provide some advance education on new subjects.

Results–Future

Initial hopes were of obtaining facilities and personnel to perform a several month long study at a comparable cost of that of a several day

study in the US. However, numerous hospitals and facilities volunteered their facilities and personnel at no charge if we could provide the updated equipment, and train and supervise their personnel. Many facilities vied for the opportunity to participate in studies and education. Unfortunately, due to uncertainties about the participation of others and limited funding, we were not able to commit to any of the anxious parties or give a firm schedule for the future. However, there are many, many ready and willing healthcare professionals in Kyrgyzstan and in adjacent Uzbekistan in dire need of assistance–both in upgrading their physical equipment and knowledge. In doing so we can achieve a true win-win situation.

Discussion–Your Contribution

Many Americans have asked, "what can I do" to help relieve the suffering of fellow human beings in the aftermath of September 11th. It is an unfortunate fact, not obvious to the average American, but hundreds of thousands of people die daily in the world due to violence, hunger and lack of medical care. Although America supplies much humanitarian aid to impoverished countries, the disparity in how much we have and how little others have, feeds fanatical groups aimed at destroying our materialistic lifestyle. Unfortunately, unfamiliarity and ignorance on both sides, adds to misunderstandings and stereotyping.

On a regular basis individuals and companies in the US discard equipment and supplies that can save lives if taken to more needy countries. As an international traveler for over 30 years, I have on a regular basis taken discarded medical supplies and equipment overseas where they have been welcomed with open arms. In recent years several nonprofit corporations have been formed to send obsolete medical equipment to needy countries. Staff members of Cup of Water have connections in the transportation industry and are able to send quantities of supplies overseas at very nominal costs. Identified needs in Kyrgyzstan and Kazakhstan are: (a) Books or papers on counseling, play therapy and substance abuse, (b) Play toys and games, (c) Inflatable or foam patient in-bed supports or splints, (d) Any computers, monitors or accessories (486, dot matrix OK), (e) Any medicine, (f) Any medical training or consultation.

If you have access to any of the above items and they are surplus, please consider donating them for our effort in Central Asia. All donations are tax deductible and no member of Cup of Water receives a salary for his/her services. If you are interested in participating in work on

education, prevention of injury, identification of injury, efficacy of early medical treatment, pharmaceutical treatments, cognitive rehabilitation, or "alternative" therapies regarding brain injury, or prevention and treatment of abused children, please contact the author at <eegrobert@hotmail.com>. Other ideas are certainly welcomed.

Neurofeedback Enhanced by Light Closed Loop EEG and Electromagnetic Closed Loop EEG in a Case of Sleep Deprivation Post Methadone Withdrawal

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A 25-year-old student, with an eight-year history of opiate addiction, and bipolar disorder diagnosed in childhood, came to our office four months after methadone treatment was stopped. She presented symptoms of chronic sleep deprivation such as anxiety, anger, depression, confusion, memory impairments, etc. Over a two and one-half month period prior to coming to our office, while under psychiatric care, she was put on 32 different medications in an effort to obtain a normal sleep pattern. None of these had any positive effect nor did homeopathic remedies, acupuncture, or herbal supplements. She was evaluated using our standard evaluation, and Neurofeedback training started on Neurocybernetics instrument. At the evaluation we found that she had predominant high amplitudes of the higher beta frequencies, and lower amplitudes for theta and alpha, over the central sensory motor area as well as over occipital and frontal areas. The TOVA test showed three out four parameters off the normal range with a significant low level for variability (59). Four sessions of Neurofeedback on Neurocybernetics did not produce any changes in her anxiety levels or sleep pattern. Consequently we started training her on the ROSHI/Brain-Link® instrument. Different protocols enhancing SMR or alpha over central, occipital or frontal areas were used. After only three sessions on ROSHI/Brain-Link® using Neurofeedback enhanced by light closed loop EEG and electromagnetic closed loop EEG, the patient reported a nine-hour stretch of continuous sleep. A total of 47 sessions were done over a two-month interval, with four boost-up sessions two months later. The sleep pattern was corrected and her emotional arousal had calmed down by session 43 and remained consistent. Her sense of well being is firmly established now, and she feels no more need for drugs of any kind.