

INFORMED CONSENT: QEEG AND NEUROFEEDBACK

Quantitative EEG & Brainwaves

Quantitative EEG, sometimes referred to as brain mapping, is the measurement through digital technology of electrical patterns at the surface of the scalp which primarily reflect cortical electrical activity or “brainwaves.” Brainwaves occur at various frequencies. Some are fast and some are quite slow. The classic names of these EEG bands are delta, theta, alpha, and beta.

Beta brainwaves are small, faster brainwaves (above 13 Hz.) associated with a state of mental, intellectual activity and outwardly focused concentration. This is basically a “bright-eyed, bushy-tailed” state of alertness. **Alpha** brainwaves (8-13 Hz.) are slower and larger. They are associated with a state of relaxation and basically represent the brain shifting into idling gear, relaxed and disengaged, waiting to respond when needed. If we merely close our eyes and begin picturing something peaceful, in less than half a minute there begins to be an increase in alpha brainwaves. These brainwaves are especially large in the back third of the head. There are two levels of **Theta** (4-8 Hz.) brainwaves. The range of 4-6 hz basically represents the twilight zone between waking and sleep. It is a profoundly calm, serene, floaty, drifty state that occurs just before we fall asleep. It is a range where conscious intellectual activity is not occurring. The higher range of theta (6-8 hz.) is associated with mental inefficiency generally, but in the central front part of the brain is associated with a state of very inwardly focused attention such as occurs when we are engaging in complex, inwardly focused problem solving (such as mental arithmetic). This is also the level that people enter when they go into in a deep hypnotic or meditative state (extremely relaxed but inwardly focused). **Delta** brainwaves are the slowest, highest amplitude brainwaves, and are what we experience when we are asleep. In general, different levels of awareness are associated with dominant brainwave states.

Each of us, however, always has some degree of each of these brainwave bands present in different parts of our brain. Delta brainwaves will also occur, for instance, when areas of the brain go “off line” to take up nourishment. If we are becoming drowsy, there are more delta and slow theta brainwaves creeping in, and if we are inattentive to external things and daydreamy, there is more theta present. If we are exceptionally anxious and tense, an excessively high frequency of beta brainwaves is often present. Persons with ADD, ADHD, learning disabilities, head injuries, stroke, Tourette’s syndrome, epilepsy, and often post-polio syndrome, chronic fatigue syndrome and fibromyalgia tend to have excessive slow waves (usually theta and sometimes excess alpha) present. When an excessive amount of slow waves is present in the executive (frontal) parts of the brain, it becomes difficult to control attention, behavior, and/or emotions. Such persons generally have problems with concentration, memory, controlling their impulses and moods, or with hyperactivity. They can’t focus very well and exhibit diminished intellectual efficiency.

During the 1970's and 1980's there was a great deal of experimentation with QEEG. The American Medical EEG Association Ad Hoc Committee on QEEG has stated that QEEG “is of clinical value now and developments suggest it will be of even greater use in the future.” QEEG has scientifically documented ability to aid in the evaluation of conditions such as mild traumatic

brain injury (Thatcher et al., 1991, 1998a,b, 1999), ADD/ADHD (Bresnahan & Barry, 2002; Chabot & Serfontein, 1969; Clarke et al, 1998, 2001a,b; Mann et al., 1992; Monastra et al., 1999; 2001), learning disabilities (Ahn et al., 1980; Chabot et al., 1996; Flynn & Deering, 1989; Harmony et al., 1990; Harmony et al., 1995), depression (Davidson,1998a,b), obsessive-compulsive disorder (Perros et al., 1992; Prichep et al., 1993), anxiety and panic disorder (Heller et al., 1995, 1997; Weidemann et al., 1999), and a variety of other conditions (Hughes & John, 1999) including autism, schizophrenia stroke, epilepsy, and dementia. QEEG has even been able to predict outcomes from treating conditions such as ADD/ADHD (Suffin & Emory, 1995), alcoholism (Bauer, 1993, 2001; Winterer, 1998), and drug abuse (Prichep et al, 1996a,b). The American Psychological Association (Board of Professional Affairs, 1995) has also endorsed QEEG and neurotherapy as being within the scope of practice of psychologists who are appropriately trained, and there are national associations for professionals from the multiple disciplines who are utilizing these procedures. Professional standards have also been established for the use of QEEG for guiding neurofeedback (Hammond et al., 2004), including licensed health care professionals who are not physicians or psychologists. Dr. Lyle is certified in neurotherapy by the Biofeedback Certification Institute of America, and is a member of the Board of Directors of the largest international professional society in this specialty. He is an Associate Professor & Program Director, Marriage and Family Therapy Program, Mt. Mercy University where he is active in research utilizing neurofeedback training and author of numerous publications in the field of Marriage and Family Therapy, Neurofeedback training, and other topics.

A quantitative EEG is an assessment tool to evaluate a person's brainwaves. The procedure takes about 1½ hours. It consists of placing a snug cap which contains small electrodes on the head to measure the electrical patterns coming from the brain--much like the way that a physician listens to your heart from the surface of your skin. We gather information on the brainwave patterns, interactions between different parts of the brain, and the efficiency of communication between different parts of the brain. This is done while the patient is resting quietly with his or her eyes closed, and usually also with the eyes open or during a task. Afterwards, we then go through a tedious and lengthy procedure to remove any artifacts that occurred when the eyes moved or blinked, patients moved slightly in the chair, or tightened their jaw or forehead a little bit. The brainwave data we gathered is then put into a sophisticated normative database and compared to norms for how the brain should be functioning at their age. This assessment procedure allows us to then determine in a highly scientific, objective manner whether and how a patient's brainwave patterns are significantly different from normal.

The QEEG assists us in knowing if there are abnormalities in brain function that EEG neurofeedback might be helpful in treating, and lets us know how we can individualize neurofeedback to the unique problems of each patient. For example, there have been many subtypes of ADD/ADHD which have been identified in scientific research--none of which can be diagnosed from observing the person's behavior. Some clinicians use a one-size-fits-all approach that uses a standardized intervention based only on the fact, for example, that someone has received the unrefined, overall diagnosis of ADD/ADHD based on their behavioral symptoms. However, a sophisticated QEEG brain map allows us to look much deeper and to tailor treatment to each individual patient's brain pattern. When treatment is focused on altering brain function, we

strongly recommend that you allow us to follow a careful approach to treatment planning that is founded on a scientific psychophysiological (QEEG) evaluation, rather than prematurely beginning neurofeedback based on limited information, educated guesses or theories about what the underlying problems and processes may be.

Once the assessment is complete and treatment goals have been established, we usually place two electrodes on the scalp and one or more on the earlobes during neurotherapy training sessions. The trainee then watches a display on the computer screen and listens to audio tones, sometimes while doing a task such as reading. These training sessions are designed to teach the person to gradually retrain their brainwave patterns. With continuing feedback, coaching, and practice, we can usually learn to produce the desired brainwave patterns. Some persons may need to learn to increase the speed or size of brainwaves in some parts of the brain. Other individuals need training to decrease the speed of brainwaves in certain areas of the brain. Neurofeedback training may many times only require 20-30 sessions with anxiety or insomnia, but with other conditions such as ADD/ADHD or learning disabilities it will more often involve 40-60 sessions of about 40-45 minutes in length. In treating very complex conditions or when multiple disorders or diagnoses are present, a clinician cannot always stipulate in advance how many treatment sessions may ideally be needed.

Clinical Applications of Neurofeedback Research

ADD/ADHD & Learning Disabilities: Since the late 1970's, neurofeedback has been researched, refined, and tested with ADD/ADHD and learning disabilities. Clinical work with attention-deficit/hyperactivity disorder and learning disorders by Lubar and his colleagues (1995; 2003; Lubar, Swartwood, Swartwood, & O'Donnell, 1995; Mann, Lubar, Zimmerman, Miller, & Muenchen, 1992; Rasey, Lubar, McIntyre, Zuffuto, & Abbott, 1996) and others (Fernandez et al., 2003; Fuchs et al., 2003; Kaiser & Othmer, 2000; Linden et al., 1996; Monastra et al., 2002; Othmer et al., 1999; Rossiter & La Vaque, 1995; Tansey, 1990) demonstrates that it is possible to recondition and retrain brainwave patterns. Neurotherapy teaches children and adults how to suppress slower or inappropriate brainwave activity while increasing more efficient brainwave activity. This neurofeedback research is quite strong in demonstrating its effectiveness in treating ADD/ADHD. Whereas the average stimulation medication study follow-up is only three weeks long and only two long-term follow-up medication studies went 14 months or longer with ADD/ADHD, Dr. Lubar at the University of Tennessee has published 10 year follow-ups on cases and has found that in up to 80% of cases this can substantially improve the symptoms of ADD and ADHD (Lubar, 1995, 2003). A comprehensive review of neurofeedback with ADD/ADHD estimated improvement in over 75% of patients (Monastra, Lynn, Linden, Lubar, Gruzelier, & LaVaque, 2005). A sophisticated recent study (Levesque, Beauregard, & Mensour, 2006) documented with functional MRI neuroimaging the positive changes in brain function in ADHD children after neurofeedback treatment. Rossiter and LaVaque (1995) found that 20 sessions of neurofeedback produced comparable improvements in attention to taking ritalin, and Fuchs et al. (2003) and Rossiter (2005) likewise found that neurofeedback produced comparable improvements to ritalin. Monastra et al. (2002), in a one year follow-up, found neurofeedback produced superior improvements to ritalin, without needing to remain on drugs. Fernandez et al.

(2003) demonstrated in a placebo-controlled study the effectiveness of neurofeedback with learning disabilities. Other papers have also been published on the value of neurofeedback with learning disabilities (Orlando & Rivera, 2004; Tansey, 1991; Thornton & Carmody, 2005).

Neurofeedback training for ADD/ADHD is commonly found to be associated with decreased impulsiveness/hyperactivity, increased mood stability, improved sleep patterns, increased attention span and concentration, improved academic performance, and increased retention and memory. Fascinatingly, every ADD/ADHD or learning disability study that has evaluated IQ pre- and post-treatment has found IQ increases following neurofeedback training. These improvements have ranged from an average of 9 IQ points improvement (Linden et al., 1996) in one study, to an average 12 IQ point improvement in another study (Thompson & Thompson, 1998), to a mean of 19 IQ points (Tansey, 1990), and even up to an average increase of 23 IQ points in still another study (Othmer, Othmer & Kaiser, 1999).

Neurofeedback training is done through the use of a sensitive electronic instrument called an electroencephalograph (EEG) that measures the frequency and strength of an individual's brain electrical activity and immediately sends this information to a high-speed computer. Almost instantly, these brainwave signals are processed by the computer and presented to the individual in the form of both visual and auditory feedback. Using sophisticated computerized programs, Dr. Lyle can then assist the patient in learning how to use this "neurofeedback" to both recognize and better regulate his or her brainwave patterns. With children, the computer programs sometimes take the form of games. With continuing feedback, coaching, and practice, the patient learns to produce the desired brainwave patterns. At first, the changes in brainwave activity are brief and transitory. Soon, the new patterns become more firmly conditioned in frequency ranges associated with better performance. Once the patient has practiced enough to be skilled at focusing and has reconditioned their brainwave pattern, training is concluded.

Neurofeedback with Alcoholism & Substance Abuse. EEG investigations of alcoholics (and the children of alcoholics) have documented that even after prolonged periods of abstinence, they have lower levels of alpha and theta waves on background cortical EEG's, and excess fast beta activity. This means that alcoholics (and many of their children) tend to be hard-wired differently from other people and this can make it difficult for them to relax. However, following the use of alcohol, alpha and theta increases, which is extra reinforcing for these individuals. Thus, individuals with a biological predisposition to developing alcoholism (and their children) may be particularly vulnerable to the effects of alcohol, finding self-medicating with alcohol or marijuana to be unusually reinforcing in facilitating the production of a relaxed mental state associated with an increase in alpha-theta activity. Without realizing it, alcoholics seem to be trying to self-medicate and treat their own brain pathology. Research (Bauer, 1993, 2001; Prichep et al., 1996a, b, 2002; Winterer et al., 1998) has also found that the amount of excess beta brainwave activity can predict who is most likely to relapse among alcoholics and cocaine abusers far better than their substance abuse history, severity of abuse, personality, patient history, or demographic variables.

Neurofeedback training has been used to recondition the brainwave patterns of alcoholics, inhibiting excess beta activity while increasing alpha and theta brainwaves. This approach appears to have very promising potential as an adjunct to alcoholism treatment. Peniston and

Kulkosky (1989) used such training with chronic alcoholics compared to a nonalcoholic control group and a traditional alcoholism treatment control group. Alcoholics receiving 15 sessions of brainwave training demonstrated significant increases in percentages of their EEG record with alpha and theta rhythms, and increased alpha rhythm amplitudes. The neurofeedback treatment group also demonstrated sharp reductions in depression compared to controls. Alcoholics in standard (traditional) treatment showed a significant elevation in serum beta-endorphin levels (an index of stress and a stimulant of caloric [e.g., ethanol] intake), while those with brainwave training added to their treatment did not demonstrate an increase in beta-endorphin levels. On four-year follow-ups (Peniston & Kulkosky, 1990), only 20% of the traditionally treated group of chronic alcoholics remained sober, compared with 80% of the experimental group. Furthermore, the experimental group showed improvement in psychological adjustment on 13 scales of the Millon Clinical Multiaxial Inventory compared to traditionally treated alcoholics who improved on only two scales and became worse on one scale. On 16-PF personality inventory, the brainwave training group demonstrated improvement on 7 scales, compared to only one scale among the traditional treatment group. Thus neurofeedback training appears to hold encouraging promise as an adjunctive module in the treatment of alcoholism, and it may have real potential in both treating and in remediating damage done through drug abuse (Burkett, Cummins, Dickson, & Skolnick, 2005).

Posttraumatic Stress Disorder. Peniston and Kulkosky (1991) added thirty 30-minute sessions of alpha/theta EEG biofeedback training to the traditional V.A. hospital treatment provided to a group of PTSD Vietnam combat veterans, and compared them at 30 month follow-up with a contrast group who only received traditional treatment. On follow-up, all 14 traditional treatment patients had relapsed and been rehospitalized, while only 3 of 15 brainwave training patients had relapsed. While all 14 patients treated with neurofeedback had decreased their medication requirements by follow-up, among traditionally treated patients, only 1 patient decreased medication needs, 2 reported no change, and 10 required more psychiatric medications. On the Minnesota Multiphasic Personality Inventory, brainwave training patients improved significantly on all 10 clinical scales--dramatically on many of them--while there was no significant improvements on any scales in the traditional treatment group. The alpha/theta brainwave training seemed to both recondition brainwave patterns and to provide self-management skills, similar to self-hypnotic or meditation skills, that exhibited a profound calming effect on seriously disturbed patients.

Epilepsy, Brain Injuries & Stroke. Uncontrolled epileptic seizures have also been effectively treated using neurofeedback. Research in this area began in the early 1970's, and is very extensive and rigorous, including blinded, placebo-controlled, cross-over studies (Sternman, 2000). Neurofeedback has been found to be helpful with all kinds of epilepsy, including grand mal, complex partial, and petit mal (absence) seizures. Several training protocols have been used successfully. Although the larger proportion of seizure patients are adequately controlled by medication, most of the individuals who have been treated with neurofeedback in research studies are among the most severe epilepsy patients, where anticonvulsant drug therapy was unable to control their seizures. However, even in this most severe group of patients, research has found that neurofeedback training on average produces a 70% reduction in seizures. For a few

individuals the neurofeedback may be ineffective or only mildly helpful; in others, it may reduce up to 100% of seizures. In most of the severe cases of medically intractable epilepsy, neurofeedback has been able to facilitate greater control of seizures 82% of the time, and often reducing the level of medication required, which can be very positive given the long-term negative effects of some medications. Many patients, however, will need to remain on some level of medication following neurofeedback. Walker and Kozlowski (2005) reported on 10 consecutive cases and 90% were seizure free after neurofeedback, although only 20% were able to cease taking medication. **Neurofeedback treatment outcome studies of closed and open head injuries are also now beginning to be seen (Ayers, 1987, 1991, 1999; Bounias et al., 2001, 2002; Byers, 1995; Hoffman et al., 1995, 1996a b; Keller, 2001; Laibow et al., 2001; Shoemaker et al., 2001; Thornton, 2000; Tinius & Tinius, 2001), as well as with stroke (Ayers, 1981, 1995a,b, 1999; Bearden et al., 2003; Putnam, 2001; Rozelle & Budzynski, 1995; Wing, 2001), but continued research needs to be done in these areas. We believe that neurofeedback offers a valuable additional therapy to assist in rehabilitation.**

Other Clinical Applications of EEG Biofeedback Training. Neurofeedback has good research support for its effectiveness in treating **anxiety** (reviewed in Moore, 2000). It is also being used to work with other clinical problems such as **depression** (Baehr, Rosenfeld & Baehr, 2001; Hammond, 2001, 2005), **chronic fatigue syndrome** (Hammond, 2001), **fibromyalgia** (Donaldson et al., 1998; Mueller et al., 2001), **sleep disorders, Tourette's, obsessive-compulsive disorder** (Hammond, 2003, 2004), **autism** (Jarusiewicz, 2002), **Parkinson's tremors** (Thompson & Thompson, 2002), **tinnitus** (Gosepath et al., 2001; Schenk et al., 2005; Weiler et al., 2001), **swallowing or gagging, incontinence and physical balance** (Hammond, 2005), and **essential tremor**. Neurofeedback is being utilized in **peak performance training**, for instance in enhancing musical performance (Egner & Gruzelier, 2003), dance performance (Raymond et al., 2005), with athletes, business executives, for **cognitive and memory enhancement** in normal individuals (Hanslmayer et al., 2005; Rasey, Lubar, McIntyre, Zoffuto & Abbott, 1996; Vernon et al., 2003), and for **"brain brightening"** to counter effects of normal aging (Budzynski, 1996). However, these areas of application do not yet have strong research validation. Somewhat similar to treating ADD/ADHD, research has also been directed at learning to suppress theta brainwaves to enhance vigilance and signal detection (e.g., for air traffic controllers).

References cited concerning neurofeedback may be found on the internet as part of a Comprehensive Bibliography compiled by Dr. Corydon Hammond at www.isnr.org.

The Low Energy Neurofeedback System. Depending on the brain patterns that are found, sometimes Dr. Hammond recommends the use of the Low Energy Neurofeedback System (LENS). LENS training differs from other forms of neurofeedback in that it introduces a very, very tiny electromagnetic signal which is only about the intensity of the output coming from a watch radio battery. The feedback stimulus is so small that if you hold a cell phone to your ear for 1 second, that is 400 times stronger. This very low intensity feedback stimulus is introduced down the electrode wires for a few seconds. Its frequency varies depending on the dominant brainwave frequency from moment-to-moment and it is designed to gently help the brain become more flexible and self-regulating, reducing excess amplitude and variability of the brainwaves. Several

encouraging research reports have been published on this system (Cripe, 2006; Donaldson et al., 1998; Hammond, 2006; Larsen, Harrington, & Hicks, 2006; Larsen, Larsen, Adinaro, Johnson, Hanne, Sheppard, Hammond, & Ochs, 2006; Mueller et al., 2001; Shoenberger et al., 2001). LENS is unique in that it does not require the patient to “work” during neurofeedback, but to simply remain relatively still for less than a minute at a time. The fact that the patient is not required to have the impulse control, attention, or the stamina to concentrate for significant periods on a computer screen can be particularly appealing. These factors open up new possibilities for the treatment of patients who are very young, oppositional, seriously autistic or disabled, minimally able to cooperate, and even for the humanitarian treatment of animals with brain-based disorders. An added advantage of the LENS system is that it often appears to produce positive results 35%-40% faster than other methods of neurofeedback.

priHEG Neurofeedback Training System.

Passive Infrared Hemoencephalography Neurofeedback utilizes a particular bandwidth of infrared light which is projected toward the brain on the forehead and which then measures the difference as the projected light is reflected back to the surface. This information is registered as changes in temperature. The changes are relayed to a computer which displays a DVD of the client's choice. A threshold is determined and as long as the client is able to maintain the temperature above the threshold the DVD continues to play; when the temperature falls below the threshold the movie stops playing. A full volume of the Journal of Neurotherapy (2004, Vol. 8, 3) was devoted to the preliminary research on the effectiveness of Hemoencephalography as a form of neurofeedback. While pirHeg awaits full controlled studies to determine its full level of effectiveness, preliminary research indicates it to be of benefit for a variety of conditions; specifically, migraines, ADD/ADHD and other conditions.

Delimitations & Potential Risks:

It is important for you to understand that a QEEG is not the same as a “clinical EEG” which is used in medical diagnosis to evaluate epilepsy or to determine if there is serious brain pathology, such as a tumor or dementia. The quantitative EEG that we do evaluates the manner in which a particular person's brain functions. It is not designed and we do not try to diagnose tumors, epilepsy, or other medical conditions in a manner like an MRI or CAT scan. The QEEG neurometric statistical analysis allows us to know, in many cases with a 90% degree of accuracy, that someone has functional brain abnormalities, but it cannot perfectly predict. The QEEG also provides valuable input that assists in the diagnosis of various psychiatric-psychological conditions, but it is a fundamental principle that one method alone should not be used to make a diagnosis or for decision making. You should recognize that the QEEG evaluation is noninvasive and no electrical current is put into the brain, but the electrode cap is tight fitting and can become uncomfortable before the evaluation is over. In order to obtain good electrode connections, it is also not unusual for the skin to be slightly abraded in tiny areas under a few of the electrodes.

A mild side effect can sometimes occur during neurofeedback training. For example, occasionally someone may feel tired, spacey, “wired,” anxious, experience a headache, have

difficulty falling asleep, or feel irritable. Many of these feelings pass within a short time after a training session, and in a recent review (Monastra et al., 2005) of neurofeedback with ADD/ADHD, such mild side effects were estimated to only occur in 1-3% of patients treated by well trained clinicians. If you make Dr. Lyle aware of any such feelings if they should occur, he can alter training protocols and usually quickly eliminate such mild adverse effects. In doing alpha/theta training (which is primarily done with alcoholism or PTSD), some patients have reported the emergence of memories from the past which may potentially be distressing. It is important to recognize that there is no research on the reliability of such memories. Therefore, a client should not regard them as necessarily being accurate unless they can be independently corroborated.

Although believed to be relatively infrequent, it is possible with neurofeedback for a more significant negative effect to occur (Hammond et al., 2001; Hammond & Kirk, 2008) if training is not being supervised by a knowledgeable, certified professional where the training is individualized. A “one-size-fits-all” approach that is not tailored to the individual will undoubtedly pose a greater risk of either producing an adverse reaction or of simply being ineffective. There is heterogeneity in the brainwave activity within broad diagnostic categories (such as ADD/ADHD, head injuries, depression, autism, or obsessive-compulsive disorder) that requires individualization of treatment. Thus we emphasize once again that everyone does not need the same thing and that if training is not tailored to the person, the risk is greater of it being ineffective, or very infrequently, even harmful. For instance, Lubar et al. (1981) published a reversal double blind controlled study with epilepsy which documented that problems with seizure disorder could be improved with neurofeedback, but they could also be made worse if the completely wrong kind of training was done. Similarly, Lubar and Shouse (1976, 1977) documented that ADD/ADHD symptoms could both improve, but also be worsened when inappropriate training was done. Therefore, doing a thoughtful assessment of brain function (e.g., with a QEEG) is deemed to be vitally important, which some practitioners do not do. It has also been noted that as neurofeedback progresses with ADD/ADHD, if the client remains concurrently on stimulant medication, they may notice increased irritability, moodiness and hyperactivity in the middle to late stages of treatment, because of improved cortical activation from neurofeedback. Consulting the prescribing physician about requesting that he or she gradually reduce medication levels is recommended later in treatment because this has been associated with elimination of this type of side effect (Monastra et al., 2005).

Although neurofeedback often produces very beneficial and lasting change, there are cases where damage to the brain is such that remediation may not be possible, or as is more often the case, there may be partial improvement. Good research suggests that in working with ADD/ADHD, if the client remains in treatment for an appropriate length of time, lasting improvement can be anticipated in 75%-80% of cases (Lubar, 1995, 2003; Monastra, 2005). There are, however, differences of professional opinion and some individuals believe more placebo-controlled research should be done and they prefer to utilize medication as the mainstay of treatment. Comprehensive reviews of neurofeedback with anxiety disorders (Hammond, 2005; Moore, 2000) concluded this treatment is effective (even though many studies were brief and only used 5-8 sessions) and provides benefits beyond placebo effects. Excellent blinded, placebo-

controlled research also validates the usefulness of neurofeedback with seizure disorders, where 82% achieve significant improvement (Sterman, 2000). It must be acknowledged, however, that the use of neurofeedback with a variety of other problems (e.g., head injury, effects of stroke, chronic fatigue syndrome, fibromyalgia, depression, alcoholism and drug abuse, sleep disorders, PTSD, post-polio syndrome, effects of aging, PMS, sleep disorders, Parkinson's, dyslexia, Tourette's, physical balance, developmental disorders, anoxia, obsessive-compulsive disorder), while appearing promising or encouraging to many professionals, must still be regarded as an exploratory treatment given the absence of large, carefully controlled studies, and we do not yet know with certainty the effectiveness rates. In many ways this is similar to the "off-label" prescribing of medication that is often done in psychiatry. In working with these less validated areas, we encourage the patient to try approximately 15 sessions to evaluate progress. It is the patient's own responsibility to monitor effects of training and to continue training so long as benefit is perceived.

Although there are many health care practitioners who are convinced that EEG neurofeedback has been validated as efficacious (and several thousand clinicians who are using neurofeedback training), you should be aware that some insurance company personnel (whose job it often is to save their company money), and some professionals (many of whom may not be aware of the latest published research), may regard all EEG neurofeedback as experimental. Even for well validated biofeedback treatments, *some* insurance companies insist on defining biofeedback as experimental and, thus, may not reimburse for these services. Although, we agree to provide you with claim forms for reimbursement to your insurance company when it is appropriate, there is no assurance that they will reimburse for these services. Ultimately, the responsibility for treatment reimbursement is yours. Signing this informed consent agreement is a tacit acceptance of that responsibility. You should also be aware that neurofeedback training, depending on the type of problem, often requires 20-80 sessions (and sometimes more, particularly with head injury, stroke, or complicated/chronic conditions).

Medication & Consultation with Your Physician

If you are taking medication (e.g., for migraines or headaches, seizures, emotions, hyperactivity, attention, perception, movement, spasticity) it is important to remain in close communication with your physician. It has been clinically observed that the need for some of these medications may decrease after numerous neurofeedback sessions, but they may remain in your system and some individuals may have negative side effects because of the decreased need of the body to rely on them. Some clients have a tendency to want to decrease medications without consulting with their physician. I strongly encourage that all changes of medication be done with the consultation of the prescribing physician, as decreasing or stopping some medications may be life threatening, cause withdrawal effects, or be detrimental to your health. Please, consult your physician. Also, realize that EEG biofeedback is not a substitute for effective standard medical treatment.

Benefits & Risks of Other Treatments for ADD/ADHD & Other Conditions

In many instances with ADD/ADHD, medications (e.g., ritalin, dexedrine) seem to make a significant difference in alertness and impulsive, hyperactive behavior, although the effects do not persist if medication does not continue to be taken. In some instances, however, such medications also have risks and side effects. One study showed, for instance, that 69% of children on ritalin or other stimulants suffered from one or more side effects (e.g., headaches, anorexia, vomiting, sleep disturbances, mood changes, “zombie-like” emotion-less behavior, gastrointestinal disturbances, tic disorders, urinary problems, seizure disorders). Some individuals are also of the opinion that there is a potential for abuse or dependency. A massive literature review also found that medications did nothing or produced an adverse response for at least 25% of children with ADD/ADHD. A recent, thorough review of studies on stimulant treatment with this problem found that they provided “temporary improvement,” but “on the other hand, changes that point toward longer-term improvement (e.g., in academic outcome, antisocial behavior, or arrest rate) were not found, and only small effects were observed on learning and achievement.” The average length of follow-up studies on ADD/ADHD drugs in children is only 3 weeks long. A Council on Scientific Affairs report from the American Medical Association concluded in 1998 that pharmacotherapy alone, while effective in short-term symptomatic improvement, “has not yet been shown to improve the long-term outcome for any domain of functioning (classroom behavior, learning, impulsivity, etc.).” More recent studies have reached the same conclusion, even finding no difference between ADD/ADHD students on stimulants compared with those not taking stimulants on 3 year follow-up.

In comparison to neurofeedback, a meta-analysis (Schachter, Pham, King, Langford, & Hoher, 2001) of randomized controlled studies of medication treatment for ADD/ADHD concluded that the studies were of poor quality, had a strong publication bias (meaning that drug company funded studies which failed to support the effectiveness of their product tended to never be submitted for publication), and often produced side effects. They concluded that long-term effects (beyond placebo effects) for longer than a 4 week follow-up period were not demonstrated. A recent comprehensive review (Drug Effectiveness Review Project, 2005) of medication treatment for ADD/ADHD concluded that there was no evidence on the long-term safety of the medications and that good quality evidence is lacking that drug treatment improves academic performance or risky behaviors on a long term basis, or in adolescents or adults. In relation to the findings of this review, one of the latest studies (El-Zein, Abdel-Rahman, Hay, Lopez, Bondy, Morris, & Legator, 2005) concluded that “the lack of research on long-term effects of methylphenidate [Ritalin] use in humans warrants great concern” (p. 7) because they discovered that after only 3 months on Ritalin, 100% of children experienced chromosomal aberrations which could increase cancer risk, not unlike the genetic damage that has been found in adult methamphetamine users (Li, Hu, Chen, & Lin, 2003). In light of these findings, neurofeedback provides an important, non-invasive, relatively side effect free treatment alternative for ADD/ADHD.

Nonetheless, medication is a treatment alternative that has been shown to often produce short-term symptomatic improvement with ADD/ADHD. Parenting training is also recommended in the treatment of children with ADHD and referral can be made for this and for books to read on

this topic. Cognitive-behavioral and insight-oriented psychotherapy treatments, however, have failed to reliably promote improvement in ADHD. It must be acknowledged with ADD/ADHD that there are also potentially very negative risks from not seeking treatment, including continued inattentiveness that may seriously compromise academic achievement and preparation for future career choices, greater likelihood of dropping out of school (32-40%), to rarely complete college (5-10%), have few or no friends (50-70%), to underperform at work (70-80%), to engage in antisocial activities (40-50%), to experience teen pregnancy (40%) and sexually transmitted diseases (16%), to experience depression (20-30%), have low self-esteem, engage in impulsive behavior and have problems completing tasks that may harm future relationships, have greater risk of speeding and having multiple car accidents, and greater risk for tobacco or substance abuse, and have personality disorders (18-25%). There is also a higher incidence of suicide among ADD/ADHD adolescents, and a higher incidence of incarceration for criminal activity in adolescents and adults.

Many psychiatric/psychological conditions (e.g., depression, anxiety) can also be improved with medication, although they can be associated with side effects and withdrawal effects. An independent review of medication study data obtained from the FDA on the 6 most popularly prescribed antidepressants found that they, on average, only produced mild improvement (only an 18% effect over and above placebo effects). A recent follow-up study of FDA released data found that antidepressants on average only produced a mild statistically significant improvement in the most severely depressed patients. Side effects are also common with most psychiatric medications. An informative book for the general public which summarizes the literature on the side effects and actual effectiveness rates of psychiatric medications is entitled, *Rethinking Psychiatric Drugs: A Guide for Informed Consent*, by Grace E. Jackson, M.D., which was published in 2005. Some people, however, prefer to rely on or add medication to their treatment approach, and if this is the case, a referral can be made. Cognitive-behavioral (behavior modification) treatments are also available for many conditions, such as depression, anxiety, insomnia, OCD, and stress-related illnesses and Dr. Lyle can provide such treatment, or use it as an adjunct to neurofeedback, or make a referral for such treatment. In addition to neurofeedback, in the treatment of other conditions (e.g., head injuries, epilepsy, chronic fatigue syndrome, fibromyalgia, Tourettes, stroke, sleep disorders, physical balance, autism, alcoholism, etc.), there are multiple other treatment options available. These include medications, various types of traditional psychotherapy and behavior therapy, and also in the case of brain injuries, speech, occupational, and physical therapy. Overall about 25-30% of persons entering psychotherapy do not change, or in a few cases get worse. If in doubt, you may certainly seek more information either through reading or seeking another opinion.

Training Side Effects

As indicated earlier, only very rarely have significant side effects from neurofeedback training been noted. However, occasionally someone may feel tired, spacey, wired or anxious, have difficulty falling asleep, feel irritable, or experience a headache. Many of these feelings pass within a short time of a training session. If they do not, you should inform Dr. Lyle of any negative side effects so that a modification can be made in the training protocol.

Confidentiality

Information shared in therapy is kept strictly confidential and not disclosed without your written permission. Exceptions are those required by law, such as: 1) Danger to yourself or others (e.g., threats of homicide or suicide); 2) Abuse of children or the elderly. Some insurance companies require not only a diagnosis, but also details concerning problems, symptoms, and treatment plans, before authorizing payment. It is our policy always to provide only the minimum amount of information necessary.

Fee Policies

The charge for a neurotherapy session is \$130, and \$750 for a quantitative EEG. Discounted packages are also available. The cost for 20 sessions paid in advance is \$1800.00 and the cost for 40 sessions paid in advance is \$3000.00. These fees are payable at the time of service, but are commonly reimbursed through flexible spending accounts. We accept Visa, MasterCard and American Express. If you need to cancel an appointment, 24 hours notice is required, or for Monday appointments, we require notification by 3:00 p.m. on Friday. Otherwise, full fee will ordinarily be charged. Please be aware that insurance carriers will not reimburse for cancellation charges. Fees are due at the end of each session. Statements will be prepared for insurance, but submission will be your responsibility.

Physician Contact & Emergencies

Physical and psychological symptoms often interact and we encourage you to seek medical consultation when warranted. In addition, medication can certainly sometimes be helpful. Referral for consultation about such matters can be arranged. When Dr. Lyle is unavailable or it is after hours, if there is an emergency, please call 911 or go to your nearest emergency room, where a crisis worker should be available.

Training Goals. We are seeking neurofeedback from Dr. Lyle for the following goals:

Voluntary Participation and Consent

Dr. Lyle has explained to me the reasons why he recommends performing a QEEG and using EEG neurofeedback in my therapy (or the therapy of my child). He has also explained that there are multiple other options, such as medication or psychotherapy, available to me or my child should I decline to give my informed consent. I have read this form and Dr. Lyle has provided me with an explanation about the nature of QEEG and neurofeedback, and my questions about them and the anticipated costs, risks, experimental nature of some applications, and benefits have been

answered. I am willing to accept these risks. I understand that although results of neurofeedback are encouraging with many problems, improvements in any individual case with medical or psychological conditions cannot be guaranteed, and to some degree depends on the willingness of patients to commit themselves to treatment and to work hard in sessions. I hereby agree, freely and voluntarily, to undergo (or have my child undergo) a QEEG evaluation and EEG neurofeedback to assist me in improving my health or psychological status.

Signed by Client

Signed by Parent of Child

Date

Randall R. Lyle, Ph.D, LMFT, BCIA-EEG