

The Peniston-Kulkosky Brainwave Neurofeedback Therapeutic Protocol: The Future Psychotherapy for Alcoholism / PTSD / Behavioral Medicine

Eugene O. Peniston, Ed.D., A.B.M.P.P., B.C.E.T.S., F.A.A.E.T.S.

EARLY DEVELOPMENT OF ALPHA AND THETA BRAINWAVE TRAINING

Electroencephalographic (EEG) biofeedback has been in use since the early 1970's for treatment of anxiety disorders and a variety of psychosomatic disorders. Early work conducted by researchers such as Kamiya and Klitnerman focused on alpha wave biofeedback (Kamiya & Noles, 1970). Much of this initial research associated changes in EEG state with different states of consciousness (Basmajian, 1989). Researchers learned that certain tasks, such as mental arithmetic, reduce or suppress alpha wave production. Furthermore, researchers found that these changes in brain activity were positively correlated with changes in electromyographic (EMG) activity and skin temperature. This finding was significant in that it suggested that brainwave activity could be operantly conditioned in the same manner as EMG or temperature. Alpha waves are smooth, high amplitude waves in frequency range of 9-13 Hertz (Hz). Alpha wave biofeedback was explored by some researchers, as a treatment adjunct for alcohol abuse (Passini, Watson, and Dehnel, 1977). There were two theoretical rationales: first, investigators had reported that EEGs of alcoholics were "deficient in alpha rhythms and alcohol use induced more alpha wave activity (Pollock, Volavka, Goodwin, et al., 1983). Clinicians speculated that alcoholics might drink less if they could be taught to produce more alpha waves (Jones & Holmes, 1976). Secondly, many alcoholics and other drug abusers reported using alcohol or other drugs to relax. Thus, biofeedback training was proposed as a way teach alcoholics an alternative to using alcohol to relax. Alpha training did not, however, appear to be of benefit to most alcohol abusers because they were unable to learn to increase their production of alpha waves.

Various types of relaxation training and/or stress reduction techniques have been used in the treatment of alcoholism. These techniques include progressive relaxation training (Klajner, Hartman, & Sobell, 1984), meditation (Wong, Brochin and Gendron, 1981), Hypnosis (Wadden & Penrod, 1981), and alpha wave feedback training (Passini, Watson, Dehnel, Herder & Watkins, 1977; Watson, Herder, & Passini, 1978).

Several studies have investigated the effects of alpha biofeedback training in the

treatment of alcoholism (Passini et al., 1977; Watson et al., 1978). The theoretical rationale for the use of relaxation procedures has usually included two assumptions: (a) that substance abuse is caused or exacerbated by stress and anxiety, and (b) that relaxation training is effective because it reduces anxiety and increases an individual's sense of perceived control over stressful situations (Klajaer et al., 1984). Results indicate that alpha training reduces chronic anxiety and does appear to have some long range therapeutic effects on anxiety levels. However, even though there has been some evidence of positive findings attributable to the use of these relaxation techniques, many of the studies involved poor methodology and results are equivocal at best.

Interest in the combination of alpha-theta training evolved from investigation of sleep and creativity (Budzynski, 1973). One earlier study found that, as individuals became drowsy, their brain waves commonly changed from high-amplitude alpha to low-amplitude theta (Vogel, Foulkes, & Trosman, 1966). During the transition, some individuals experienced a hypnagogic state in which they had vivid visual imagery and auditory and visual hallucinations. Investigators studying creative individuals noted that when their subjects were in a state of "reverie," they produced increased amounts of 6-8.5 Hertz (Hz) activity (Green, Green & Walters, 1970). In an effort to facilitate production of the reverie state and hypnagogic imagery, the investigators developed an alpha-theta biofeedback system that provided information to the subject about both alpha and theta production. As memory for the content of images in the hypnagogic state is often poor, subjects were asked to verbalize the imagery. The investigators thought that the production of the alpha-theta twilight state "should prove to be a powerful technique for the study creativity enhancement in particular, and the hypnagogic state, in general." They suggested the possibility of using the alpha-theta state for psychotherapy (Budzynski, 1973).

Alpha brainwaves are smooth, high-voltage brainwaves in the frequency range of 9-13 Hertz. Some research suggests that alpha brainwaves are associated with a subjective state of relaxed alertness or tranquillity (Brown, 1970; Stoyva and Kamiya, 1968) while other research suggests that alpha brainwaves are not associated with any particular subjective physiological state (Walsh, 1973).

The theta rhythm state is defined as a dominance for 4-7 Hertz brainwaves. Transient elevation of theta occur during Zen meditation (Kassamatsu & Hirai, 1969) or while entering the early stages of sleep and are reported to be associated with vivid visualization, imagery and dream-like states. The origin of theta waves is predominately the hippocampus (Michel et al., 1991), although theta activity can be recorded throughout the cortex and cerebellum (Green, Green & Walters, 1971).

In the late 1980's, the advances in digital processing technology gave clinicians

and researchers biofeedback equipment that significantly improved the quality of EEG neurofeedback signal compared with that previously available using analog filters. The availability of high-speed desktop computers opened new possibilities for neurofeedback training and research. New neurofeedback equipment incorporated high-speed analog-to-digital converters and computers for data logging and the creation of data displays using fast-fourier transforms. In addition, some neurofeedback equipment could now automate data logging and session statistics.

It was during the late 1980s and early 1990's that Peniston and Kulkosky developed an innovative therapeutic EEG alpha-theta neurofeedback protocol (Peniston & Kulkosky, 1989, 1995) for the treatment of alcoholism and prevention of its relapse. The Peniston/Kulkosky brainwave neurofeedback therapeutic protocol combined systematic desensitization, temperature biofeedback, guided imagery, constructed visualizations, rhythmic breathing, and autogenic training incorporating alpha-theta (3-7 Hz) brainwave neurofeedback therapy (Blankenship, 1996; Peniston & Kulkosky, 1989, 1990, 1991, 1992; Saxby & Peniston, 1995). These investigations prompted a reexamination of EEG neurofeedback as a treatment modality for alcohol abuse. Successful outcome results included a) increased alpha and theta brainwave production; b) normalized personality measures; c) prevention of increases in beta-endorphin levels; and d) prolonged prevention of relapse. These findings were shown to be significant for experimental subjects who were compared with traditionally treated alcoholic subjects and non-alcoholic control subjects. Subjects in several studies were chronic alcoholic male veterans, some of whom also suffered from combat-related posttraumatic stress disorder. For many subjects, pharmacological treatment was not generally beneficial. Data suggested that alpha-theta brainwave neurofeedback training appeared to have potential for decreasing alcohol craving and relapse prevention.

EXPERIMENTAL DATA

Consider the following experiment that examined the Peniston/Kulkosky EEG alpha-theta neurofeedback protocol with a sample of chronic alcoholics. There were three interventions utilized with this group of subjects including: (a) alcoholic alpha-theta brainwave neurofeedback therapy (PKBWNT), (b) traditional psychotherapy, and (c) non-alcoholic control group. Subjects were age matched and evaluated for alcoholic history, number of prior hospitalizations, IQ, and socioeconomic status. Before and after treatment subjects were given the Beck Depression Inventory (BDI), the Millon Clinical Multiaxial Inventory (MCMI), and the Sixteen Personality Factor Questionnaire (16PF). Subjects were also tested for EEG characteristics and serum radioimmunoactive beta-endorphin levels. This investigation showed enhanced percentages of alpha and theta waves in the EEGs of the PKBWNT group after treatment compared to pretreatment status.

The control group showed no such increase. Alcoholic subjects receiving PKBWNT also showed a gradual increase in alpha and theta brain rhythms as the thirty experimental sessions progressed. The increase in alpha and theta activity were desirable outcomes of this study. The theta increase may have made the visualization experiences (which were part of the training and discussed at the end of each training session) easier to access and more effectively integrated and processed. **It was concluded that alpha training may promote a more relaxed state and lead to better perceived control of stress; this may, subsequently, decrease the occurrences of stress-related drinking or stress-related craving in the recovery phase.** The PKBWNT group had shown sharp reductions in self-assessed depression (BDI) and sustained abstinence with significantly less relapse episodes (2/10) than the traditional therapy group (8/10) in a 36-month follow-up study. The traditional therapy group showed a significant elevation in serum beta-endorphin levels at the end of treatment compared to their own pretreatment levels as well as the repeated measurement levels of the non-alcoholic control group. (The beta-endorphins are stress-related hormones and are elevated during the experience of physical or emotional stress. Successful treatment would stabilize beta-endorphin levels, so that stress-related increases would be less likely to occur.) Since elevations in serum beta-endorphin levels are associated with stress, their elevation in the traditional therapy group may indicate that this group is experiencing the stress associated with abstinence and fear of relapse. It is interesting that the PKBWNT group did not show an increase in this stress hormone after treatment, but instead showed a stabilization (Peniston & Kulkosky, 1989). On the MCMI and I6PF, prior to treatment, both groups of alcoholics showed significantly higher scores (in the pathological ranges) than non-alcoholics on most of the clinical scales and characteristic scales. Administration of PKBWNT was accompanied by significant decreases in all of the MCMI clinical scales (i.e., within normal limits) and normalization on the 16 PF characteristic scales. Alcoholics receiving traditional therapy showed significant decreases only in two MCMI scales (avoidant and psychotic thinking) and an increase on one MCMI scale (compulsive), and showed only a significant increase on the I6PF in concrete thinking (Peniston & Kulkosky, 1990). Evidence corroborating some of the findings from the aforementioned experiment come from the work of Fahrion (Fahrion et al., 1992).

EEG alpha-theta brainwave neurofeedback therapy (Peniston/Kulkosky protocol) had also been employed in a clinical study using twenty male Vietnam combat veterans with a dual diagnosis of posttraumatic stress disorder and alcohol abuse. A goal of that study was to determine the efficacy of brainwave training in developing brain region synchronization and altering amplitudes of intrasubject brainwaves. It was discovered that during sessions in which patients reported abreactive imagery, the PKBWNT sessions displayed a statistically reliable interaction seen as a "cross-over" pattern in which theta waves gradually increased and the alpha waves decreased. This pattern identifies a state of

consciousness which is believed to optimize the surfacing of abreactive images. A follow-up study revealed that only three of the twenty experimental patients had relapsed to alcohol by twenty-six months after PKBWNT (Peniston et al., 1995).

In addition to the aforementioned clinical studies, the Peniston/Kulkosky protocol was employed in private group practice in the treatment of fourteen depressed alcoholic outpatients (8 males and 6 females) (Peniston & Saxby, 1995). After training, subjects showed significant improvement on BDI scores. At 21 months after PKBWNT training, only one subject was observed to relapse. Other clinical studies using the alpha-theta brainwave neurofeedback therapy (Bodenhamer-Davis & deBeus, 1995; Blankenship, 1996; Peniston & Kulkosky, 1990; Peniston et al., 1993; Saxby & Peniston, 1995; Sealy et al., 1991; Sullivan, 1993; White, 1993, 1995) provide promising evidence for the effectiveness of the alpha-theta brainwave therapeutic protocol in: a) changing EEG scores and self-assessed depression; b) stabilizing serum beta-endorphin levels and; c) producing long-term prevention of alcohol relapse. PKBWNT also produced significant personality changes, reductions in the need for psychotropic medications, some relapse prevention of PTSD symptoms, and in some studies, optimized the surfacing of abreactive images in Vietnam theater combat veterans. The recent ten year follow-up clinical evaluation of the original Peniston/Kulkosky alpha-theta brainwave neurofeedback (Peniston & Kulkosky, 1989) clinical study confirmed the long-term effectiveness of this therapeutic intervention. Such a success rate of a treatment modality has never before been achieved.

The Peniston/Kulkosky EEG alpha-theta neurofeedback protocol (Peniston & Kulkosky, 1989, 1995) is being used by many practitioners to treat alcohol and other psychoactive substance disorders. Some alcohol treatment programs using the Peniston/Kulkosky EEG alpha-theta neurofeedback protocol as a primary treatment modality for alcohol addiction have demonstrated that intensive neurofeedback-based treatment has exerted a positive influence on a number of factors which contribute to alcohol intake including stress levels, depressive personality traits, beta endorphin output, resting levels of alpha and theta brainwaves, and prolonged abstinence (Boeving, 1993, 1994; Blankenship, 1996; Day & Cook, 1997; Dyers, 1992; Fahrion, 1995; Finkelberg et al., 1993; Peniston & Kulkosky, 1989, 1990, 1991; Peniston, 1993; Rodenhamer-Davis et al., 1995; Saxby & Peniston, 1995; Sealy, Bernstein & Magid, 1991; Shubina et al., 1997; Sullivan, 1993; White, 1995; Wultke, 1992). Data supporting the efficacy of the Peniston/Kulkosky method are of particular interest for the treatment of substance abuse because successful outcome is being discovered with patients who are difficult to treat in traditional alcohol treatment programs including patients with post traumatic stress disorder (Peniston and Kulkosky, 1991) and chronic alcoholic problems (Peniston and Kulkosky, 1989, 1990; Saxby & Peniston, 1995).

If the EEG alpha-theta neurofeedback training protocol can increase the retention of patients in alcohol treatment programs and decrease the relapse rates of

alcoholism, then this form of behavioral treatment would be a significant new therapeutic intervention for clinicians. Traditional interventions for alcohol dependency have often resulted in high attrition rates and release rates (Alford, 1980; Emrick & Hanson, 1983; Marlatt, 1983; McLachlan & Stein, 1982; Miller & Hester, 1980; Moos & Finney, 1982, 1983; Vaillant, 1983).

Although psychopharmacological treatments for alcohol dependence are being investigated by many individual researchers and by NIDA's Medications Development Division, at present no psychopharmacological agents have been established as safe and effective for treatment of alcohol dependence.

This is an additional reason for making the development of effective treatments for alcohol dependence a high priority. Alcohol abuse is associated with cirrhosis (e.g., liver), fetal alcohol syndrome, several alcohol-related illnesses, and various types of accidents (e.g., motor vehicle). New treatment strategies that would attract alcohol users to treatment and keep them in treatment would be of immense value in reducing alcohol-related morbidity and mortality among the American population in the United States.

The PKBWNT represents cutting edge methodology which has moved from the preoccupation with the voluntary muscular and autonomic nervous system to the central nervous system, and in particular to alpha-theta brainwave neurofeedback. It has been indicated that the self-induced reverie state (i.e., theta state of consciousness) which the PKBWNT protocol produces, makes it possible for patients to regain some control of their behaviors and improve the outcomes of treatments for several disorders including: (1) alcoholism; (2) depression; (3) combat-related PTSD syndrome and; (4) bulimia nervosa. My associate, Paul Kulkosky and I have found that combining temperature biofeedback, guided-imagery, constructed visualization, autogenic training and systematic desensitization with alpha-theta brainwave neurofeedback and booster sessions contributed to sustained prevention of relapse in alcoholics and posttraumatic stress disorder.

THE CRISIS IN MENTAL HEALTH CARE

The conflict between productivity/cost efficiency and quality of care will intensify in the future. At the level of individual practitioners, managed care in healthcare will require seeing more patients, for shorter treatment sessions, over shorter time-frames. As always, the goal of maintaining and improving outcomes, is paramount. The emphases on preventive health care and on outpatient treatment will resemble the broader healthcare environment. Skills in assessment, particularly in areas of neuropsychology and in behavioral medicine will be preferred. Skills in briefer cognitive-based therapies will be desirable. Most mental health care plans will explicitly call for a reduction of bed days of care.

This may result in an increase in the need for community-based clinics for acute and longer-term mental health/substance abuse treatment, PTSD treatment programs and behavioral medicine programs. These clinics can serve as alternatives to treatment in private, government, or psychiatric hospitals.

It is suggested that neurofeedback therapy can become the future alternative choice of treatment for subgroups of addicts who are alienated by the religious overtones of traditional 12-step recovery programs. Moreover, such an intervention may prove to be more useful for treating depression, posttraumatic stress disorder, learning disabilities, attention deficit disorder (ADD), eating disorders and psychosomatic health problems. The PKBWNT has been scientifically proven, for some disorders, to be a more efficient therapeutic intervention (when compared to traditional psychotherapy), and is more cost-effective over the long-term. PKBWNT attempts to address causes rather than symptoms of disorders. Neurofeedback therapy works by assisting one's own mind-body connection to heal itself as opposed to relying on the use of medication.

Insurance company guidelines, however, tend to devalue psychotherapy, particularly long-term therapy, by limiting the number of sessions that a person can utilize in a year and by dictating which professional will provide the therapy. This means that patients may end up paying money out of pocket for therapeutic treatment (that they may truly need) or go without treatment altogether. Managed care companies may also suggest psychotropic medications to patients for several reasons (e.g., to minimize the costs of therapy).

PKBWNT protocol is a unique treatment because the frequency, cost, and length of therapy is effective and well-controlled. The future of PKBWNT holds even greater promise for the refinement of our present knowledge about alpha-theta brainwave training. Moreover, it may facilitate treatment and research with cognitive and emotional dysfunction and in the areas of behavioral medicine.

The neurofeedback therapeutic modality requires intensive training in the Peniston/Kulkosky alpha-theta brainwave neurofeedback therapeutic protocol. This consists of a period of continuous supervision with a variety of clients and close monitoring by a properly trained licensed Psychologist or Psychiatrist. Other therapists can use the technique with regular supervision and only under the direction of the aforementioned licensed professionals. Therapists who are not properly trained and supervised in the PKBWNT protocol in the mental health specialties, run the risk of their clients experiencing and suffering from some debilitating side effects including: depression (result of too much theta feedback); experiences of depersonalization; tunnel vision and other experiences reflecting immediate dissociative responses to trauma; alteration of time; disorientation; confusion; altered pain perception.

REFERENCES

Alfor, G.S. (1980). Alcoholics anonymous: An empirical outcome study. *Addictive Behaviors*, 5, 359-370.

Armor, D.J., Polich, J.M., & Stambul, H.B. (1978). *Alcoholism and Treatment*. New York: Wiley.

Basmajian, J.V. (1989). *Biofeedback: Principles and Practice for Clinicians*. Baltimore: Williams and Wilkins.

Blankenship, B. (1996). Court loan approved for drug program. *The Topeka Capital Journal* (July).

Bodenhamer-Davis, E., and DeBeus, M. (1995). Neurotherapy for the treatment of alcohol and drug abuse: Results of a two-year study. Paper presented at the meeting of the Society of Study of Neuromal Regulation, Scottsdale, AZ.

Boeving, H. (1993). Watching addiction disappear, *Menninger Perspective*, 1, 9-11.

Brown, B.F. (1970). Recognition of aspects of consciousness through association with EEG Alpha activity represented by a light signal. *Psychophysiology*, 6, 442-452.

Budzynski, T.H. (1973). Sonic applications of biofeedback produced twilight states. In D. Shapiro, T. Barber et al. (Eds.). *Biofeedback and Self-Control*. Chicago: Aldine Publishing Company, pp.145-151.

Byres, A. P. (1992). The normalization of a personality through neurofeedback therapy. *Subtle Energies*, 3(1), 1-17.

Day, L. & Cook, J. (1997). EEG biofeedback in the treatment of alcoholism. A single subject design. Paper presented at the Association of Applied Psychophysiology and Biofeedback, AAPB Twenty-Eighth Annual Meeting, March 12-16.

Emrick, C.D. & Hansen, J. (1983). Assertion regarding effectiveness of treatment for alcoholism: Fact or fantasy? *American Psychologist*, 38, 1078-1088.

Fahrion, S.T., Walters, E.D., Coyne, L., & Allen T. (1992). Alterations in EEG amplitude personality factors and brain electrical mapping after alpha-theta brainwave training: A controlled case study for an alcoholic in recovery. *Alcoholism: Clinical and Experimental Research*, 16(3), 547-552.

Finkelberg, A., Sakhadze, E.T., Lipatin, A.A., Shubina, O., Kahorina, L., Shak,

A., & Shtark, M. (1993). The application of alpha-theta EEG biofeedback training for psychological improvement in the process of rehabilitation of patients with pathological addictions. *Biofeedback: Magazine of the Association for Applied Psychophysiology and Biofeedback*, 37.

Green, E., Green, A., & Walters, D. (1970). Voluntary control of internal states: Psychological and physiological. *Journal of Transpersonal Psychology*, 1, 1-26.

Green, E., Green, A., & Walters, D. (1971). Voluntary control of internal states: Psychological and physiological. *Journal of Transpersonal Psychology*, 1, 2-26.

Holmes, D. S. (1974). *Abnormal Psychology*. New York: Harper-Collins.

Jones, F.W., & Holmes, D.S. (1976). Alcoholism, alpha production, and biofeedback. *Journal of Consulting and Clinical Psychology*, 44, 224-228.

Kamyi, J. & Noles, D. (1970). The control of electroencephalographic alpha rhythms through auditory feedback and associated mental activity. *Psychophysiology*, 6, 76.

Kasamatsu, A., & Hirai, T. (1969). An electroencephalographic study of Zen meditation (zazen). *Psychologia*, 12, 205-225.

Klajner, F., Hartman, L.M., & Sobell, M.B. (1984). Treatment of substance abuse with relaxation training: A review of its rationale, efficacy and mechanisms. *Addictive Behavior*, 9, 41-55.

Marlatt, G.A. (1983). The controlled drinking controversy: A commentary. *American Psychologist*, 38, 1097-1110.

Michel, C.M., Lehmann, D., Hengelev, B., & Brandeis, D. (1991). Localization of the sources of EEG delta, theta, alpha, and beta frequency bands using the FFT dipole approximation. *Electroencephalography and Clinical Neurophysiology*, 82, 38-44.

Miller, W.R. & Hester, R.K. (1980). Treating the problem drinker: Modern approaches. In *Treatment of alcoholism, drug abuse, smoking, and obesity*, pp. 111-141. Oxford: Pergamon.

Moos, R., & Finney, J.W. (1983). The expanding scope of alcoholism treatment evaluation. *American Psychologist*, 38, 1030-1044.

McLellan T.A., Iuborsky, L., Woody, G.E., & O'Brien, C. (1980). An improved diagnostic evaluation instrument for substance abuse patients. *The Addiction*

Severity Index. *Journal of Nervous and Mental Diseases*, 168, 26-33.

McLachlan, J.F. & Stein, R.L. (1982). Evaluation of a day clinic for alcoholics. *Journal of Studies on Alcohol*, 43, 261-272.

Passini, F.T., Watson, C.B., Dehnel, L., et al. (1977). Alpha wave biofeedback training therapy in alcoholics. *Journal of Clinical Psychology*, 33, 292-299.

Peniston, E.G. & Kulkosky, P.J. (1989). Alpha-theta brainwave training and beta endorphin levels in alcoholics. *Alcoholism: Clinical and Experimental Results*, 13(2), 271-279.

Peniston, E.G. & Kulkosky, P.J. (1990). Alcoholic personality and alpha-theta brainwave training. *Medical Psychotherapy: An International Journal*, 3, 37-55.

Peniston, E.G. & Kulkosky, P.J. (1991). Alpha-theta brainwave neurofeedback therapy for Vietnam veterans with combat-related posttraumatic stress disorder. *Medical Psychotherapy: An International Journal*, 4, 47-60.

Peniston, E.G. & Kulkosky, P.J. (1992). Alpha-theta EEG biofeedback training in alcoholism and posttraumatic stress disorder. *The International Society for the Study of Subtle Energies and Energy Medicines*, 2, 5-7.

Peniston, E.G., Marrinan, D.A., Deming, W.A., & Kulkosky, P.J. (1993). EEG alpha-theta brainwave synchronization in Vietnam theater veteran with combat-related posttraumatic stress disorder and alcohol abuse. *Medical Psychotherapy: An International Journal*, 6, 37-50.

Peniston, E.G. & Kulkosky, P.J. (1989, 1995). *The Peniston/Kulkosky Brainwave Neurofeedback Therapy for Alcoholism and Posttraumatic Stress Disorders: Medical Psychotherapist Manual*. Certificate of Copyright Office. The Library of Congress, 1-25.

Pollack, V.E., Valavka, J., Goodwin, D.W., et al. (1983). The EEG after alcohol in men at risk for alcoholism. *Archives of General Psychiatry*, 40, 857-864.

Rosenfield, J.P. (1992). EEG treatment of addictions: Commentary on Ochs, Peniston and Kulkosky. *Biofeedback: Magazine of the Association for Applied Psychophysiology and Biofeedback*, 20(2), 12.

Ryan, M. (1996, July). Substance abuse prevention: Putting our minds to it. *The Topeka Capital Journal*.

Saxley, E. and Peniston, E.G. (1995). Alpha-theta brainwave neurofeedback

training: An effective treatment for male and female alcoholics with depressive symptoms. *Journal of Clinical Psychology*, 51(5), 685-693.

Sealy, R.C., Bernstein, B.E., & Magid, D.T. (1991). New developments in brainwave training. Paper presented at the Biofeedback Society of New York, Thirteenth Annual Meeting.

Shubina, O., Skok, A., et al. (1997). EEG-training in the treatment of addictive disorders. Paper presented at the Association for Applied Psychophysiology and Biofeedback, Twenty Eighth Annual Meeting, March 12-16.

Silver, S.M., Brooks, A., & Obenchain, J. (1995). Treatment of Vietnam war veterans with PTSD: A comparison of eye movement desensitization and reprocessing, biofeedback, and relaxation training. *Journal of Traumatic Stress*, 8, 337-341.

Stoyva, J. & Kamiya, J. (1968). Electrophysiological studies of dreaming as the prototype of a new strategy in the study of consciousness. *Psychological Review*, 75, 192-205.

Sullivan, A. (1993). Applied psychophysiology in the treatment of chronic alcoholism symposium: Combining psychophysiological and psychotherapeutic methods treating addictive and MICA. Paper presented at the American Psychological Association Annual Meeting, Toronto, Canada, August.

Taub, E., Steiner, S.S., Smith, R.B., Weingarten, E., & Walton, K.G. (1994). Effectiveness of broad spectrum approaches to relapse prevention in severe alcoholism: A long-term, randomized, controlled trial of transcendental meditation, EMG biofeedback, and electronic neurotherapy. *Alcohol Treatment Quarterly*.

Vaillant, G.E. (1983). *The natural history of alcoholism: Causes, patterns, and paths to recovery*. Cambridge, MA: Harvard University Press.

Vogel, G., Foulkes, D., & Trosman, H. (1966). Ego functions and dreaming during sleep onset. *Archives of General Psychiatry*, 14, 238-248.

Watson, C.G., Herder, J., & Passini, F.T. (1978). Alpha biofeedback therapy in alcoholics: An 8-month follow-up. *Journal of Clinical Psychology*, 34, 765-769.

Watson, C., Tuorila, J.R., Vickers, K.S., Gearhart, L.P., & Mendez, C.M. (1997). The efficacies of three relaxation regimens in the treatment of PTSD in Vietnam war veterans. *Journal of Clinical Psychology*, 53, 917-923.

Walsh, D.H. (1973). Interactive effects of alpha feedback and instructional set on subjective states. *Psychophysiology*, 11, 235-428.

White, N. (1995). Alpha-theta training for chronic trauma disorder: A new perspective. *The Journal of Optimal Performance*, 2(4), 44-50.

Wultke, M. (1992:). Addiction, awakening, and BEG biofeedback. *Biofeedback: Magazine of the Association for Applied Psychophysiology and Biofeedback*, 20, 18-22.

Wong, M.R., Brochin, N.E., & Genfron, K.L. (1981). Effects of meditation on anxiety and chemical dependency. *Journal of Drug Education*, 11, 91-105.

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