

ALTERNATIVE HEALTH PRACTICES IN ADDICTION TREATMENT

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There are many therapies and practices in American substance abuse treatment that can be labeled as "Complementary" or "Alternative" Medicine (CAM). Alternative health practices, in general, have been gaining popularity and prevalence in the U.S. for at least the past half century (Kessler et al., 2001). During the past decade, scientific publications and the popular press have raised awareness of these therapies and their widespread use by the general public. Surveys suggest that a large percentage of physicians are willing to consider the possibility that at least some alternative therapies hold promise for the treatment of various symptoms and diseases (Boucher and Lenz, 1998). In addition, the National Institutes of Health has been supporting the scientific evaluation of alternative therapies through the National Center for Complementary and Alternative Medicine (NCCAM), formerly the Office of Alternative Medicine, since 1992. While definitive outcome data may not yet be available for many of these therapies, preliminary findings suggest that some may have efficacy. Furthermore, it seems reasonable that some alternative therapies may offer symptomatic relief and/or may offer comfort or other benefits

when the treatments are supported by the health beliefs of the patient. For instance, traditional treatments (based on cultural health traditions of the community), if safe and inexpensive, can form a useful component of culturally competent, community oriented, comprehensive care, especially for rural, remote and culturally distinct populations.

The goal of this chapter is to provide basic information for (1) researchers and students unfamiliar with CAM in the treatment of substance abuse, (2) addiction clinicians not necessarily interested in using alternative therapies themselves, so they will be equipped to answer questions from patients who are using or considering CAM for their mental or physical health problems, and (3) clinicians willing to consider recommending or using alternative therapies for patients who have special needs or for whom standard therapies have been ineffective or unacceptable.

To this end we will review several of the most frequently utilized or promising therapies, such as acupuncture, biofeedback, and nutrition. For each modality we will provide a brief description followed by a summary of the current state of science. We will also discuss some of the primary debates and questions facing both researchers and practitioners.

Overview of Complementary and Alternative Medicine (CAM)

The use of CAM extends around the world and, in many countries, constitutes the most prevalent form of treatment. Therapies seem to gain a designation of "alternative" in US biomedicine, based on their alternative origin. If they come from the medical traditions of other cultures or originate anywhere outside of the hospital-based, research-oriented biomedical culture of the industrialized west, they are subjected (sometimes properly so) to greater skepticism and greater demands for evidence than if they come from a surgical research center or other regular medical setting. Unfortunately, this skepticism has also made it more difficult for either proponents or curious researchers to accumulate acceptable data to support or refute their efficacy. American consumers, however, have demonstrated less skepticism than their physicians. It has been estimated that consumers spent \$27 billion dollars out-of-pocket on CAM in 1997, and research suggests that U.S. consumers use CAM therapies for a wide variety of conditions, visiting CAM providers more frequently than they do primary care physicians (Eisenberg, Davis et al., 1998). Use of CAM does not appear restricted by social class, educational levels, or gender (Wolsko, Ware et al., 2000; Eisenberg, Davis et al., 1998).

Patient and physician surveys are not the only indication of CAM's increasing prevalence. For instance, CAM courses are now offered in over half of U.S. medical schools, and in growing numbers of public health programs, and the University of Minnesota School of Medicine now offers a minor in CAM. Some health plans have started to reimburse for CAM therapies, such as chiropractic and acupuncture, and others will soon follow suit (Stoneham, 1998). Eight states have at least one insurance mandate for CAM, seven states with mandates for acupuncturists (Sturm and Unutzer, 2000). Changes in terminology from "unconventional" or "alternative" to "complementary" and "integrative" speak to the increasing cooperation between conventional and alternative health disciplines.

Three recent studies have found that CAM use is more common among individuals with self-reported mental conditions, including substance use disorders, depression, and anxiety (Druss,

Rosenheck, 2000; Kessler, Soukap, 2001; Unützer, Klap, 2000). The lack of a magic bullet to treat most substance use disorders and the high rates of relapse may help explain the influx of CAM into addiction medicine, relative to other specialties. Physicians may be more willing to refer or recommend patients to CAM practitioners for complaints which conventional medicine has been unable to alleviate. For example, the appearance of crack cocaine in the 80s probably contributed to the popularity of acupuncture in treatment centers and drug courts throughout the United States.

CAM and Addiction Medicine

Some of the landmarks in the history of addiction medicine demonstrate the recurrent interaction of standard practice with modalities and practices considered to be "alternative." In the late 1800s, sanatoria for people with alcohol and opiate addictions offered, among other things, saline and electric baths. At the turn of the century, vendors on the streets sold remedies for every complaint imaginable, including alcoholism and "Soldier's sickness" (morphine addiction). The remedies themselves were unregulated, and often contained a variety of addictive ingredients including morphine and cocaine (Morgan, 1981). In the mid-1900s, treatment took a spiritual path as people suffering from addictive disorders found fellowships where they were instructed to turn their life over to a higher power (Miller, 1990; Chappel, 1993). Today, Twelve Step programs and group treatment using the Alcoholics Anonymous (AA) model are the most popular approach to addiction in the United States (Vaillant, 1993; Peteet, 1993). This utilization occurs even though the 12-step treatment approach came from outside the biomedical establishment and still suffers a paucity of randomized trial data. Such self-help groups were still included as alternative therapies in Eisenberg et al's landmark survey. While there is much evidence that entry into, and length of time spent in the drug treatment setting has a strong association with improved outcome in addictive disorders, it has been difficult to disentangle the specific efficacy of many treatment components. Low cost, safe alternative therapies that are culturally relevant or popular in the community being served, may enhance the social marketing of the "treatment package." Unproven alternative therapies would have less of a role in this "treatment package" if offered in the absence of other treatment components associated with long-term outcome benefits. In this manner, the use of acupuncture, nutrition, and even homeopathy is increasing in the American treatment of substance abuse disorders, despite the lack of conclusive research regarding the efficacy of these modalities. It might be noted that this is consistent with many standard medical practices which are based on less than adequate evidence.

Although there have been many significant findings during the past two decades regarding the physiological, neurochemical, and pharmacological basis of addiction, many scientists and physicians are no longer looking for a 'magic bullet,' but a combination of therapies to treat this disease. Efforts to broaden the practitioner's therapeutic arsenal have run parallel with the growing popularity of CAM. Chemical dependency treatment programs increasingly use a combination of both conventional and alternative methods, for example, the use of acupuncture in conjunction with counseling and methadone. Within the past three decades researchers have begun to take an active role in the exploration of CAM therapies for the treatment of addictive disorders. The fluid nature of CAM's boundaries, and the changing nature of addiction medicine, provide a rich and variable field for research.

Defining CAM.

CAM represents a wide range of interventions not currently considered an integral part of the conventional American medical system. Attempts to create an operational definition have been limited due in part to changing attitudes, and the accumulation of clinical experience and scientific data. Such definitions are culturally relative and specific to the jurisdiction in which they occur. This is demonstrated, even in the industrialized west, by the acceptance of acupuncture in conventional French medicine, as merely another medical specialty, like surgery or psychiatry; or the well regulated and accepted role in German medicine of phytomedical (herbal) and even homeopathic remedies. At America's National Institutes of Health (NIH), the NCCAM groups CAM therapies into five domains: (1) mind-body interventions, (2) biologically-based treatments, (3) manipulative and body-based methods, (4) energy therapies, and (5) alternative medical systems (<http://nccam.nih.gov/fcp/classify>).

The label "CAM" may be applied to entire systems of medicine such as Ayurvedic Medicine, a specific modality or therapy like massage or ear acupuncture, a profession or practice such as naturopathy, or an explanation of efficacy such as spiritual rather than behavioral or neurochemical. The particular use of a modality may also be considered CAM such as the use of dietary restrictions and recommendations for the prevention of relapse to drugs and alcohol in contrast to heart disease or diabetes for which dietary treatments are conventional. Similarly, spirituality has become a standard of care in addiction medicine through Twelve Step programs, but not for the treatment of cancer. Definitions of CAM have been unable to precisely distinguish between lifestyle choices which may or may not be practiced as medicinal or preventative therapies, such as a vegetarian diet, prayer, art therapy, or meditation. In this paper, we will not resolve these problems of definition but will attend to those practices commonly understood to be representative of CAM.

Researching CAM.

Although the application of "Western" research methodology to the realm of CAM research is relatively recent, it would be shortsighted to assume that the difference between CAM and conventional therapies is that the former are unproved and the latter are proven. While there is scant knowledge about the efficacy of CAM modalities, it is generally accepted that a majority of treatments currently recommended by US physicians also lack adequate evidence of efficacy (Goldstein, 1989). Nevertheless, the relative absence of scientific validation is particularly detrimental to physician acceptance of CAM (Schachter, Weingarten & Kahan, 1993; Himmel, Schulte & Kochen, 1993; Visser & Peters, 1990; Wharton & Lewith, 1986; Hadley, 1988; Marshall, 1992; Berman, Singh, Lao, Singh, Ferentz & Hartnoll, 1995). Case studies, clinic data, and pilot studies with inadequate power, randomization, and/or controls comprise the majority of CAM research at present.

Controlled clinical trials have become the gold standard in the process of confirmation or refutation of medical interventions. Skepticism of new treatments is justified because numerous treatments throughout history have been initially applied with enthusiasm only later to be found ineffective or even harmful (Shapiro & Morris, 1978). It is important however, to strive for clarity in the interpretation and communication of research results. There is an important and

often overlooked difference, for instance, between a study that fails to find effectiveness and a study that finds ineffectiveness, including the statistical need for the latter study to usually be much larger than the former. Additionally, improvements in laboratory measurements do not always mean improvements in the health outcomes associated with those measurements. Rigorous application of clinical epidemiology is essential and neither conventional nor CAM modalities should be excluded from the evidence-based decision process, simply on the basis of their origin.

It is also important for researchers studying CAM to understand the special methodologic problems inherent in studying some of these treatments or the difficulties that may arise around the issue of standardization. Other obstacles such as blindedness need also be considered. Acupuncture has become the most thoroughly researched and utilized CAM modality for the treatment of substance abuse in the United States. The methodological challenges inherent to CAM and substance abuse research may be illustrated by the acupuncture experience (see McLellan for review) (McLellan, Grossman, Blaine & Haverkos, 1993).

Standardization. Many alternative therapies are rooted in paradigms which focus on the entire individual (or even the whole community) rather than on a disease entity. For example, in traditional Chinese medicine (TCM), different individuals addicted to alcohol may be "diagnosed" with a number of different patterns of disharmony, such as "damp heat condition of the liver" or "kidney yin heart deficiency." Traditional treatment of individuals with the same western diagnosis would vary, based upon this alternative system of assesment.

In the interests of clinical expediency and research efficiency, however, treatment protocols for addictive disorders (among others) are often standardized, rather than individualized. The protocol most commonly studied in the US for addiction treatment was derived from the clinical practice at Lincoln Hospital in New York and adopted by the National Acupuncture Detoxification Association (NADA). This is done in a group setting, with patients seated and three to five needles placed in each ear, and referred to as bilateral auricular acupuncture (Smith & Khan, 1988; Culliton & Kiresuk, 1996; Brumbaugh, 1993) or "Acudetox" .

However, in clinical practice, the issue of standardization is controversial. The number of needles and the placement may vary between practitioners, as well as the use of unilateral or bilateral auricular placement or the use of points elsewhere on the body. The needles may or may not be moved or twirled. The skin may or may not be penetrated. Furthermore, electrical current and moxibustion, which are standard in general acupuncture, are not included in the NADA protocol and may or may not be used. The number of sessions attended over a given period of time also varies widely. Thus, variations in methodology make comparison between studies difficult, and the relevance of research protocols to clinical practice has been questioned.

Other Methodological Issues.

These issues remain complex. If standardized points are to be used, how should these points reliably be identified? Some practitioners locate points by experience, by the responses of individual patients, and others may use a galvanometer which measures skin impedance or conductivity. This relates to the level of practitioner experience. While it would be ideal to

conduct double-blind studies of acupuncture, only an untrained practitioner could be blinded to whether they were delivering a "true" or "control" treatment. However, an untrained acupuncturist might well lack the skills to know by site or patient reaction whether they are needling the appropriate location, calling treatment reliability into question. To date, reliability has taken priority over blindedness, and a double blind trial of acupuncture for addiction has not been conducted. Attempts to conduct double blind trials have actually been fought, and in at least one case prevented (Washburn et al., 1993) by organized groups of acupuncturists.

Regarding appropriate control groups, the identification of "placebo" or "sham" needling points has also been controversial. This may be due, in part, to the difficulty seen in many studies of demonstrating significant difference between "true" and "sham" treatment groups (Avants et al., 1995; Lipton, Brewington & Smith, 1994; McLellan, Blaine et al., 1993;). Other studies, however have demonstrated such differences (Washburn et al, 1993, Avants et al, 2000)

There are other important debates. For example, electroacupuncture has been shown to release endorphins and this has been hypothesized to be the primary mechanism of action in the relief of opiate withdrawal symptoms. However, unstimulated needles have not been shown to have the same effect (Ulett, Han & Han, 1998; McLellan, Grossman et al., 1993). If we accept that the endorphin system is an important mechanism for the efficacy of acupuncture in treating drug abuse (Ulett, Han & Han, 1998; McLellan, Grossman et al., 1993; Brewington, Smith & Lipton, 1994; Kosten, Kreck et al., 1986; Pomeranz, 1987), further investigation of electro-acupuncture is warranted.

Finally, researchers have failed to design a fair or standard set of expectations for acupuncture. Trials of acupuncture may deal with several stages of addiction including detoxification (the majority of animal studies), or relapse prevention (U.S. human trials). Whether acupuncture is most effective for one stage of treatment or another is a question yet to be addressed.

Many practitioners and researchers question whether CAM can be accurately evaluated using conventional standards for research. Due to variations in philosophy, the individualization of treatments, and the difficulties in assigning appropriate placebos, some researchers and practitioners claim that western science is not capable of assessing the efficacy of many alternative therapies. However, before CAM is further integrated by physicians, clinics, and managed care organizations, it must be subjected to evaluation using methodologically sound research strategies (Lewith, Kenyon & Lewis, 1996). In the interim, it seems wise to maintain a reasonable skepticism while not arbitrarily discounting any approach that may improve treatment outcome or reduce complaints associated with addictive disorders.

Placebo and Non-Specific Effects. Particular attention has been paid to the relationship of CAM to placebo effects. At this time, it remains unclear to what extent the effects of modalities like acupuncture are the result of placebo effects in contrast to neurophysiologically induced treatment effects. Classically defined, a placebo effect is an effect that occurs after the administration of a therapeutically inactive substance. An example of a placebo treatment would be the substitution of a sugar pill in place of active medication. If the patient's physiological response to the sugar pill is similar to the effects that would normally result from active treatment, a placebo effect is said to have occurred. Non-specific effects are effects that occur

after treatments that do not use medication or procedures having known or presumed mechanisms for their action. In conventionally treated alcoholics, nonspecific treatments (as defined by Frank) such as information, evaluation only, advice, encouragement, and exhortation have been shown to have salutary effects (Miller & Hester, 1980; Miller & Baca, 1983; Powell et al., 1985; McLellan, Lubrosky et al., 1985).

The concern is of more than academic interest, since variously defined placebo and nonspecific treatments are reputed to be as effective as certain forms of surgery, influence the effectiveness and action of medications and hypnotic analgesia in dentistry, enhance tolerance of pain, increase survival rates in the elderly, reduce post-surgical length of stay and requests for pain medication, and, in certain individuals and cultures, cause death (Ader & Cohen, 1975; Justice, 1987; Kaptchuk, 2001; Lefcourt, 1973; Mumford, Schlesinger & Glass, 1982; Richter, 1957). Jerome Frank's work (Frank, 1973) on the role of persuasion in healing has been followed by many reviews of the topic indicating its importance in any form of treatment delivery (Kiresuk, 1988; Bowers & Clum, 1988; Shapiro, Struening & Shapiro, 1980).

Early accusations, that the therapeutic effect of alternative therapies such as acupuncture were attributable to suggestibility, stimulated animal experiments and an investigation of the inhibitory effects of naloxone on hypnotic analgesia in humans. Both lines of inquiry indicated that the effects of acupuncture were not explained by suggestion alone. The role of nonspecific effects in acupuncture, as in many other approaches to addiction treatment, has not been adequately studied.

It is important to note, however, that the placebo and its effects are not simple concepts. For example, Shapiro states that in placebo research there are conflicting findings (Kiresuk, 1988). Replication of research findings have failed even when identical procedures were used on highly similar populations and when the same subjects were given identical placebo stimuli in different environments. The placebo effect has not been consistently associated with particular patient characteristics that might make some individuals "placebo responders" rather than others, nor has it been found to be consistently related to the attributes of suggestibility, acquiescence, social desirability, dependency, external locus of control, or particular psychopathology.

In a major review and critique of the placebo literature, Kienle and Kiene (Kienle & Kiene, 1996) challenge the commonly accepted, Beecher popularized, 35% placebo effect concept. They found that Beecher had been misquoted in 10 of the 15 studies referring to him.

In their review of often-cited placebo studies, Kienle and Kiene have pointed out that the possibility of a specific effect being produced by the procedure can never be entirely ruled out. Kienle and Kiene make observations that are particularly relevant for many forms of CAM that are conceived as dealing with the total system of the body's mental and physical energy, equilibrium, and self sustaining tendencies. The term "placebo" is operationalized as applying "to the imitation of a treatment, not to all those therapeutic endeavors aimed at mobilizing the body's self-healing powers (p.40)." Kienle and Kiene go on to state:

If our analyses erase doubts about the existence of the placebo effect in its narrow sense (i.e., true therapeutic effects achieved by mere imitation of a therapy), it does not rule out

the possibility that the patient's self-healing powers may be influenced by a wide variety of non-pharmacological approaches (p.51).

Self-healing powers may also be influenced by a wide variety of non-therapeutic distortions such as procedures of informed consent and conditions of administration in clinical versus research settings. Kaptchuk (2001) has argued that these distortions have strong implications for research, but they may also have clinical repercussions. Furthermore, practitioner attitudes and behaviors, as well as styles of health care, have been shown to produce measurable differences in outcome. These findings in particular could have significant ties to CAM research and practice (Kaptchuk, 2001). A recent meta-analysis of 114 studies (involving 8525 patients) has even re-opened questions about the very clinical significance of the placebo effect. The authors conclude, "The use of placebo outside the aegis of a controlled, properly designed clinical trial cannot be recommended" (Hrobjartsson & Gotzsche, 2001).

It is difficult to draw conclusions regarding the nature of, or to suggest effective ways of measuring, the placebo effect. Until more information is available, Kienle and Kiene provide a statement that can serve as our recommendation regarding placebo concepts and CAM. They caution against prematurely dismissing therapeutic procedures:

[Placebo] may all too easily mask our own ignorance and lack of understanding when research attempts at understanding would be more appropriate (p.51).

Acupuncture/Electro-Acupuncture

In 1973, Wen noted that opium addicts being treated with post-surgical analgesic electro-acupuncture reported relief from withdrawal symptoms (Wen & Cheung, 1973). Wen conducted a series of studies using electro-acupuncture on opiate dependent rodents and humans and preliminary results suggested that opiate withdrawal symptoms could be mitigated using electro-acupuncture (Brewington, Smith & Lipton, 1994). Research on humans combining naloxone with EA yielded a drug-free rate of 51% at the one-year follow-up. Wen's distinction between craving and abstinence and between detoxification and subsequent psychosocial rehabilitation underlie the importance of his research (Wen & Cheung, 1973; Wen & Teo, 1975; Wen, 1979).

Five animal studies were conducted using opiate dependent rats and mice, and each demonstrated a significant decrease in morphine withdrawal symptoms in the EA group compared to controls (Brewington, Smith & Lipton, 1994). Findings suggest that EA may alleviate symptoms associated with dependence to various substances and may be responsible for various neurophysiologic changes observed. However, there have been no systematic controlled studies of electro-acupuncture for the treatment of addiction in humans. Furthermore, the majority of studies have been criticized for faulty methodology such as inadequate controls or, in the animal studies, excessive electrical current. To date no significant negative side effects have been reported.

Research in the United States has focused on daily auricular acupuncture therapy with no electrical stimulation based on a three to five point auricular acupuncture protocol established by Smith and colleagues at Lincoln Hospital in New York (Smith & Khan, 1988). Smith began

treating detoxifying drug addicts using acupuncture in the mid-1970s, and his early clinical research showed promising results. Smith's protocol was utilized in the first two randomized-controlled trials conducted by Bullock and colleagues (Bullock, Umen, Culliton & Olander, 1987; Bullock, Culliton & Olander, 1989), and the method was later adopted as the treatment standard by the National Acupuncture Detoxification Association (NADA). Founded in 1985, NADA presently has over 4,000 members (Culliton & Kiresuk, 1996).

Both EA and Acupuncture are based upon the belief that health is determined by a balanced flow of *qi*, the vital life force flowing in all living organisms. There are 12 major pathways of flow, called meridians, and each is linked to a specific internal organ or system. Acupoints exist along the meridians and in a traditional treatment setting the practitioner places approximately 10 to 12 small stainless steel needles into the skin at points determined by the TCM assesment. This is said to help correct and re-balance the flow of qi and consequently restore health. During EA, the needle is linked to a small device which delivers mild electricity to the acupuncture site.

A proposed hypothesis of addiction states that when naturally occurring endogenous opioids (e.g., enkephalins and endorphins) occupy specific receptor sites in the brain individuals experience well-being and absence of craving. Drugs such as ethanol may displace endogenous opioids by acting as agonist binding sites, over time inhibiting the production of the natural endorphins. Craving may be linked to the deficiency of enkephalins and endorphins, as well as from other genetic or ethanol related neurochemical deficits (McLellan, Grossman et al., 1993; Brewington, Smith & Lipton, 1994; Kosten, Kreck et al., 1986; Culliton & Kiresuk, 1996).

The work of Pomeranz, Ulett, and Steiner provide support for the use of acupuncture to treat addictions. The work of Pomeranz suggests that acupuncture stimulates peripheral nerves that send messages to the brain to release endorphins (Pomeranz, 1987). Ulett agrees that endorphins are involved, based on work showing that naloxone can prevent EA-induced analgesia (Ulett, 1998). Ulett, like Wen, emphasizes the importance of electrical stimulation of needles during treatment, and suggests that manual acupuncture for the addictions may be little more than a placebo. Steiner reported that acupuncture has been shown to alter levels of other central neurotransmitters, including serotonin and norepinephrine, and also to affect regulation of other hormones, including prolactin, oxytocin, thyroid hormone, corticosteroid, and insulin (Steiner, May & Davis, 1982). These findings suggest a preliminary model for the mechanism of acupuncture for pain and addiction.

Acupuncture has been studied in the treatment of heroin, alcohol, cocaine, methamphetamine, and nicotine addiction. Acupuncture is not considered effective for reducing nicotine withdrawal symptoms (White, Resch, Ernst, 1999). Several reviews of the literature have outlined study findings to date (see Table 1).

Insert Table 1 approximately here

Two controlled studies of alcoholic populations conducted by Bullock et al. resulted in significantly better program attendance and less self-reported need for alcohol. The second study also found that placebo subjects self-reported over two times the number of drinking episodes and had twice the number of admissions to the local hospital detoxification unit compared to

subjects treated with acupuncture at each follow-up. Other controlled studies have had mixed results. Toteva reported statistically significant differences in the treatment group compared to controls on some measures including an increased rate of treatment retention and increased abstinence (Toteva, Milanov, 1996). However, Worner (Worner, Zeller, Schwarz, Zwas, Lyon, 1992) and Sapir-Weise (Sapir-Weise, Berglund, Frank, Kristenson, 1999) reported no statistically significant differences between the groups on variable such as rates of relapse, treatment retention, drinking days or craving. The first large-scale RCT to study the efficacy of acupuncture for the treatment of alcoholism, funded by NIAAA, has been completed and a publication is currently in review.

Smith has reported positive outcomes in open clinical trials of acupuncture for the abuse of cocaine, "crack" cocaine, and other substances in 1,500 volunteers in New York City (Smith, 1988). Prospective preliminary studies have shown mixed outcomes (Otto, Quinn, Sung, 1998; Avants, Margolin, Holford, Kosten, 2000). However the results of the first randomized placebo controlled research study, conducted by Bullock, et al (N=438), showed that cocaine use did not differ significantly between groups post treatment (Bullock et al., 1999). The results from a second RCT (N=602) known as the Cocaine Alternative Treatments Study are in preparation.

Transcutaneous cranial electrical stimulation (TCES)

Transcutaneous cranial electrical stimulation (TCES), also known as TENS or CES, was a Russian invention, originally called "electrosleep," and was used in the 1950s for the treatment of insomnia (Brewington, Smith & Lipton, 1994). Sometimes known as "Limoge current," this consists of high frequency, low intensity electrical stimulation which has, among other things, been shown to decrease anesthetic and analgesic requirements for abdominal surgery (Mignon et al., 1996). This is felt to be mediated by the release of central endogenous opioids. In a typical TCES session, surface electrodes are placed bilaterally on the mastoid region (behind the ear) and, as in electro-acupuncture, stimulated using a low amperage alternating current.

Several studies have examined the role of TCES in the treatment of addictions, particularly with opiates, however evidence in support of the therapy is weak. In a review of the literature by Brewington, Smith and Lipton (1994) three studies were identified as having somewhat positive results for the treatment of opiates. However, serious methodological flaws and a fourth study reporting that TCES is less effective than methadone reduce our confidence in these findings (Gossop, Bradley, Strang & Connell, 1984). A fifth study by Gariti, et al., (Gariti, Auriacombe, Incmikoski et al., 1992) was a randomized, double blind study of opiate and cocaine users hospitalized and detoxified using TCES. Rate of completion for the 12-day study was 88%. However, other than a comfortable detoxification, there were no significant differences between the active and placebo groups.

There have been fewer studies conducted on alcohol addicted populations, and available studies have focused primarily on the reduction of anxiety and depression levels rather than consumption. These studies have either had serious methodological difficulties or had findings which failed to provide adequate support (Patterson, Patterson, Winston & Patterson, 1993; Patterson, Krupitsky, Flood, Baker & Patterson, 1994; Brewington, Smith & Lipton, 1994). More recently Taub, Steiner, Weingarten and Walton (1994) conducted a study using TCES for

the treatment of alcoholism. Even when administered in conjunction with AA and counseling, Taub failed to find support for TCES as a treatment for alcoholism.

Biofeedback

Biofeedback did not develop out of any one healing tradition or discipline, rather it evolved during the 1950s and 1960s from several disciplines including electronics and psychophysiology. Researchers envisioned a wide range of possible applications for the new modality (Winer, 1977). The 1960s were especially active periods of research in biofeedback, and while the concept of controlling physiological functions was not new in the west, the outstanding finding of early work was that highly specific responses could be learned (Winer, 1977).

Research on the effects of biofeedback for substance abuse has been varied and the outcomes used have been questionable. Some confusion has arisen due to the variety of biofeedback methods used. In the early 1970s, EEG alpha biofeedback was discounted as largely ineffective, particularly for the treatment of substance abuse. The addition of theta brainwave training to the alpha protocol has resulted in more positive clinical reports (Fahrion, 1995; Peniston & Kulkosky, 1990). Other researchers have turned to EMG or thermal biofeedback techniques and preliminary studies have shown some efficacy (Denney, Baugh, Hardt, 1991; Taub et al., 1994).

Despite investigator and clinician preferences, research has suggested that these three conditions have much the same effect on subject brainwaves. In one study, adults in treatment for substance use disorders were given one of three types of EEG biofeedback, EMG, standard alpha-theta feedback, and alpha feedback alone. The authors reported no significant differences, using Quantitative EEG, between groups in the percentage of time in Theta/Alpha crossover or in the ratio of theta amplitude to alpha amplitude averaged over session. These findings suggest that all three conditions can be effective in achieving positive therapeutic outcomes (Trudeau, 2000). However due to a lack of rigorous research, the specific mechanism of biofeedback in the treatment of substance abuse is unknown, as is the extent of its efficacy.

In the 1970s and 1980s, the Menninger Center for Applied Psychophysiology began using alpha-theta brainwave training to treat patients suffering from addictive disorders and the results were generally positive. This work was modified by Peniston in the late 1980s, sparking a wave of research and criticism (Graap, Freides, 1998). Studies to date have shown similar responses regardless of the patient's drug of choice, though biofeedback has not yet been applied to methamphetamine addictions (Fahrion, 1995). Previous studies of alpha-theta feedback have suggested effects on various measures of mood and personality associated with clinical outcome (Fahrion, Walters, Coyne & Allen, 1992; Peniston & Kulkosky, 1990). The studies have not yet controlled for the placebo and nonspecific effects inherent in increments of any therapy.

EMG biofeedback teaches the subject to reduce muscle tension rather than affect brainwaves. Research linking EMG biofeedback to the treatment of addictions has been scant. The findings of case studies have been mixed, and only one randomized controlled trial has been conducted. A randomized controlled trial was conducted by Taub and colleagues (1994) with EMG biofeedback as one of the four treatment arms (N=125). The study found support for the use of

EMG biofeedback for use in the prevention of relapse in alcoholics, and the EMG group did significantly better than the control group at the end of treatment and at follow-up.

Research has been conducted which shows that the use of alcohol or nicotine results in poor performance during biofeedback sessions. The ability of smokers to modulate blood pressure is restricted when compared to non-smokers and the ability to manipulate skin temperature appears to be greatest in non-smokers and impossible for people who smoke just prior to the biofeedback session (DeGood & Valle, 1978; Birbaumer et al., 1992; Grimsley, 1990; Schneider, Elbert & Heimann, 1993).

Hypnosis

Hypnotic suggestion in one form or another has been used in healing throughout the world since ancient times, and was a focal point of treatment in early Greek healing temples (Alternative Medicine, 1994). However, the roots of modern hypnosis can be traced to the 18th century and the work of Franz Anton Mesmer. Mesmer used what he called "magnetic healing" to treat a variety of psychological and psychophysiological disorders (Alternative Medicine, 1994). Hypnotic methods have varied widely across time and still vary between practitioners (Katz, 1980). Despite controversy over the validity of hypnosis, historically it has been one of the most important techniques of psychotherapy (Katz, 1980).

In 1958, the American Medical Association (AMA) formally sanctioned the use of hypnosis as a valid medical treatment, and in the past 50 years the clinical application of hypnosis by physicians, dentists, psychologists, and other health professional for numerous ailments, including addictive disorders, has increased (Alternative Medicine, 1994). Hypnosis attempts to place patients in a state of attentive and focused concentration. Typically practitioners either lead patients through relaxation and mental imagery exercises often using suggestion, or teach clients a form of self-hypnosis which may be practiced at home. Contrary to popular folklore, patients must be willing to undergo hypnosis, and despite being relatively unaware of their external environment, are capable of responding to stimuli (Alternative Medicine, 1994).

Research and clinical reports have repeatedly demonstrated that hypnotic methods are capable of generating notable changes in memory, cognition, perception, and physiology in susceptible subjects (Katz, 1980). Studies have shown that hypnosis may result in decreased sympathetic nervous system activity, oxygen consumption and carbon dioxide elimination, lowered blood pressure and heart rate, and increased activity in certain kinds of brain waves (Spiegel et al., 1989). However, the difficulties with defining hypnosis, the inability to externally measure the presence of hypnotic states, and the lack of standardized methods in research have hampered efforts at systematic evaluation (Stoil, 1989). Moreover, the mechanism of action of hypnosis is unknown.

To say that "hypnosis" has been used as a treatment for an addictive disorder means the patient could have been exposed to any of 20 or more strategies, including suggestions to reduce urges, symptom substitution, ego strengthening, or cue sensitization (Katz, 1980). Therefore, it is difficult to compare the few controlled trials which have been conducted. However, practitioner claims of cure rates as high as 95% have never been verified through controlled research (Haxby,

1995). Several case studies using either hypnotherapy or self-hypnosis for the treatment of substance abuse have reported successful outcomes (Page, Handley, 1993; Orman, 1991), and some clinical data has demonstrated high rates of abstinence (Johnson & Karkut, 1994; Schwartz, 1992).

Generally the results of controlled trials have not supported these preliminary findings. A review of four studies conducted prior to 1975 evaluated hypnosis negatively (Miller, Brown, Simpson et al., 1995), and more recent studies have demonstrated some short-term benefits which were not maintained through follow-up (Rabkin et al., 1984; Hyman et al., 1986; Lambe, Osier & Franks, 1986). Furthermore, research has been criticized for lack of proper controls, insufficient follow-up, and poor reporting of data (Johnston & Donoghue, 1971; Katz, 1980; Holroyd, 1980). Most researchers and modern practitioners believe that hypnosis alone is not an effective therapy, though it may enhance the effects of other therapies (Haxby, 1995; Stoil, 1989).

Transcendental Meditation

Transcendental Meditation (TM) was introduced to the United States in the 1960s by the Maharishi Mahesh Yogi as a simplified form of yoga (Alternative Medicine, 1994). Derived from the ancient Vedic tradition of India, TM is a significant component of the modern version of Ayurvedic medicine (O'Connell & Alexander, 1995b). Proponents say TM is a truly holistic modality, addressing the physiological, psychological, spiritual, as well as environmental/social factors. However, controversy surrounds the Maharishi Mahesh Yogi and TM including accusations of deceptive practices and fraud. Some critics even cite evidence of the considerable harm which can result from the practice of TM (Singer, 1992; Alexander, 1992; Chopra, 1992; Tompkins, 1992; Skolnick, 1992). Since its introduction, TM has been used for stress management and health maintenance, as well as for conditions such as high blood pressure, chronic pain, and addiction. While most studies have been done specifically on TM, Herbert Benson, an authority on TM research, claims that similar results can be obtained from any similar meditative approach that invokes the "Relaxation response" by mental repetition of any simple word or phrase (Benson, 1990; Benson, Beary & Carol, 1974; Lazar et al., 2000; Stefano, Fricchione, Slingsby & Benson, 2001)

Repetitive or perpetual stressors (chronic stress) may result in an ineffective or destructive stress response, producing homeostatic imbalance or disease in the body. TM philosophy contends that substance abuse arises in an attempt to achieve homeostasis, or "substance abuse is an attempt to optimize one's psychophysiological state [using] exogenous chemicals" (Walton & Levitsky, 1995). However, substance abuse results in increased imbalance, distress, and eventually more drug use. Therefore the objective of TM is to optimize psychophysiological function and balance, simply and naturally, thus interrupting the cycle and need for addictive substances. Proponents clearly state that this view does not exclude the possibility of genetic factors predisposing some individuals to addiction. Mechanisms involved in the maintenance of homeostasis may be effected by genetic differences, inclining these individuals toward substance abuse (Walton & Levitsky, 1995).

Studies indicate that during TM physiological arousal is significantly decreased compared to simply resting with the eyes closed as indicated by lower respiration rate, skin conductance level,

and plasma lactate. Studies have also shown that in as little as four months, TM significantly increases serotonin and reduces cortisol, and that TM results in a more rapid mobilization, habituation, and stability of autonomic response to stressful stimuli than various control conditions (O'Connell & Alexander, 1995a). The implications of these findings for addiction medicine have been reviewed in several publications (O'Connell & Alexander, 1995a).

Over 30 studies have been conducted on the efficacy of TM for the treatment of substance abuse and addiction. While rates of success have ranged from 65% in a controlled study of skid row recidivist alcoholics (with two year follow-up) to 98% in a retrospective analysis of drug use among TM program participants, most of the studies have lacked rigorous methods and appropriate controls. Methodological difficulties have included a failure to control for the type of drug(s) used, the subject's history of use, or the severity of misuse. Moreover, studies often are retrospective, lack appropriate randomization and controls, are rarely blinded, and are usually conducted by researchers affiliated with the Maharishi University.

Gelderloos, Walton, Orme-Johnson and Alexander (1991) reviewed 24 studies and positively evaluated all of the studies despite often serious methodological flaws. Success in these studies was measured by "discontinued or reduced use", however reduced use was never quantified and abstinence not reported separately. Furthermore, for 10 of the 24 studies the authors simply cited a percentage of subjects who succeeded without adequately defining the criteria by which that was assessed.

Most recently, TM, biofeedback, and electro-neurotherapy were compared in a randomized controlled trial conducted by Taub, Steiner, Weingarten and Walton (1994). At a two-year follow-up, the TM and biofeedback groups significantly increased the number of non-drinking days compared to the electric neurotherapy and AA/counseling controls. However, because non-drinking days was used as the primary indicator, rather than rates of abstinence, these findings are difficult to interpret and compare.

Relaxation Training.

Relaxation training can take a number of forms, and is sometimes considered to be either a form of or a component of meditation. On the other hand, "relaxation" groups are sometimes used as controls in research on meditation or even acupuncture. Due to the variety of definitions and methods, studies of relaxation training may be difficult to compare.

In general, the intent of relaxation training in treating substance abuse has been to provide a substitute for the sedative effects of drugs such as alcohol and tobacco. However, the validity of this philosophy has been questioned, as most addictive drugs are primarily consumed for their euphoric, rather than tranquilizing, effects (Klajner, Hartman & Sobell, 1984; Surawy & Cox, 1986). Furthermore, relaxation training for the treatment of substance abuse has not fared well in evaluations of past research (Holder, Longabaugh, Miller & Rubonis, 1991; Miller, Brown, Simpson et al., 1995). One study did show a reduction in measures of anxiety with the use of relaxation training, but this was not linked to a reduction in drug consumption (Ormrod & Budd, 1991). Finally, biofeedback (Taub, Steiner, Weingarten & Walton, 1994) has been shown to be more effective the relaxation for treating substance use disorders, as measured by abstinence.

Restricted Environmental Stimulation (REST)

The late 1950s and 1960s marked the beginnings of academic interest in research on sensory deprivation and restricted environments; effects on the mind and body (Lilly, 1956) (Suedfeld, 1964; Lawes, 1963). By the 1970s interest had expanded to include research on the effects of restricted environmental stimulation therapies (REST) on smoking and drinking behaviors (Suedfeld, Landon, Pargament & Epstein, 1972; Suedfeld & Ikard, 1974; Jacobson, 1971; Suedfeld & Best, 1977; Rank & Suedfeld, 1978).

Chamber REST and flotation REST are two methods used to produce a sensory deprivation environment. In chamber REST the individual is placed in a light and sound proof room for between 12 and 24 hours, or longer, with only a comfortable bed, a toilet, and access to food. Flotation REST also takes place in an enclosed tank, heated to skin temperature and supersaturated with Epsom salts to a specific gravity of 1.26 to 1.28. The individual floats effortlessly for approximately 30 to 150 minutes (Borrie, 1990-1991).

Researchers and practitioners have suggested a number of potential psychological and psychotherapeutic uses for REST in both adolescent and adult populations. By isolating the individual from the majority of sensory stimuli (visual, auditory, tactile, gustatory, and olfactory) REST attempts to reduce stress and increase introspection, allowing the body to re-balance and heal (Borrie, 1990-1991).

Various studies have shown that REST may result in a number of significant biochemical changes including reduced plasma and urinary cortisol levels, plasma renin, ACTH, and aldosterone levels, lowered blood pressure, and enhanced EEG alpha activity following treatment (Turner & Fine, 1983; Barabasz, Barabasz & Mullin, 1983) (McGrady, Turner, Fine & Higgins, 1987; Borrie, 1990-1991). It also has been hypothesized that REST may stimulate the release of beta-endorphins and thus stimulate the brain's reward mechanism. REST has been offered by advocates as an alternative method, in place of alcohol or drugs, to stimulate pleasure and relaxation.

The majority of clinical research involving REST and addictive disorders has focused on smoking behavior. In preliminary quasi-experimental and clinical designs, chamber REST has shown better results in smoking cessation than floatation REST. There is some evidence to indicate that chamber REST may result in significant reductions of smoking behavior which may be sustained through a two year follow-up (Suedfeld, 1990; Suedfeld & Ikard, 1974; Suedfeld, Landon, Pargament & Epstein, 1972). There also is some evidence to suggest that REST is more effective when combined with other treatment modalities. A six month follow-up of a multi-modal program using REST, self-management, and social support reported an 88% rate of abstinence. Another study combined REST with hypnosis and reported abstinence rates of 47% at four months post treatment (Barabasz, Baer, Sheehan & Barabasz, 1986). While floatation REST has been considered unsuccessful for promoting smoking cessation (Borrie, 1990-1991), there is some evidence that the psychotic-like symptoms of people on PCP and LSD may be diminished using this therapy, and that floatation REST may be useful for the treatment of drug withdrawal symptoms (Borrie, 1990-1991).

Less research has been conducted on REST for the treatment of alcohol consumption, though preliminary studies of both floatation and chamber REST have shown positive results (Rank & Suedfeld, 1978; Borrie, 1990-1991).

Nutrition/Vitamins

Food and nutrition has long played an important role in numerous healing traditions. For example, in Traditional Chinese Medicine food is categorized by its energetic qualities. Prevention oriented prescriptions are emphasized, but in the case of illness dietary interventions are tailored based on the physical characteristics of the patient and the illness disturbance (Alternative Medicine, 1994). Western medical traditions also have recognized the importance of nutrition, using foods and micronutrients for the treatment of disease. Moreover, Western science has demonstrated links between basic vitamin-mineral deficiencies and some severe, chronic and even terminal disease, for example iron and anemia, vitamin C and scurvy, or vitamin D and rickets. Conventional medicine has also started to incorporate nutritional substances in the prevention and treatment of various disease states, such as the use of thiamine for the prevention of Wernicke-Korsakov encephalopathy.

An increasing number of clinical settings have begun to incorporate nutritional therapies. In 1990 the American Dietetic Association took the position that improved nutritional status through the use of supplements, modified diets, and nutrition education may improve the efficacy of chemical dependency treatment (Beckley-Barrett & Mutch, 1990), and to date this statement has not been revised. Some advocates of nutritional therapy attribute depression and other ailments found in drug users to nutritional deficits, undiagnosed hypoglycemia, and unidentified food allergies, and claim these ailments can be treated through special diets, exercise, and vitamin and mineral supplements.

While scientists seem to agree that excessive intake of alcohol and other drugs may cause a number of nutritional deficiencies, including malnutrition and thiamine deficiency (Werbach, 1991)(Mohs, Watson & Leonard-Green, 1990; Watson & Mohs, 1990), the link between nutrition disorders and addiction has not been fully accepted. Furthermore, the belief that special diets or nutritional supplements may be viable adjunct or stand alone treatments for addictive disorders has not been adequately researched.

Preliminary human studies have shown positive results using nutritional programs or supplements for the treatment of alcoholism, including increased abstinence, reduced craving, and decreased depression (Biery, Williford & McMullen, 1991; DesMaisons, 1996; Mathews-Larson & Parker, 1987; Brown, Blum & Trachtenberg, 1990; Blum, Trachtenberg et al., 1988). In the early 1980s, one study of alcoholics was conducted in a VA center comparing a standard treatment group, counseling and Twelve Step meetings, to a standard treatment with the addition of a whole foods diet, nutritional supplements, and nutritional education. After six months, 81% of the nutrition group compared to 38% of the control group were sober (Guenther, 1983). A clinical study followed patients through a 28 day program involving both counseling and nutrition. One year post treatment 74% of those treated for alcoholism remained sober (Beasley et al., 1991). A third study conducted a six-month follow-up of 100 patients who had received six weeks of outpatient counseling and nutritional therapy and reported that three percent were

abstinent from alcohol (Mathews-Larson & Parker, 1987). Most recently, DesMaisons conducted a preliminary trial of 29 subjects with two drunk driving offenses using a dietary protocol. She compared the treatment group to 29 self-selected controls. Alcohol consumption and recidivism were significantly reduced in the treatment group (DesMaisons, 1996).

Preliminary studies of amino acid supplementation (with neurotransmitter precursors) have also shown promising results for the treatment of alcohol and cocaine abusers; however, no large-scale controlled trials have been conducted. Amino acid supplements were tested in an open trial on 30 patients who tested positive for alcoholism, and 30 patients addicted to cocaine. Rates of relapse were 13% for the alcohol group and 20% for the cocaine group, and 53% and 87% respectively for the placebo controls (Blum, Trachtenberg et al., 1988).

However detailed experimental or clinical studies are limited, and published studies are frequently outdated, lack methodological rigor, or lack adequate sample size (Mohs, Watson & Leonard-Green, 1990). Preliminary animal studies testing the effects of various nutrients on withdrawal and free choice ethanol consumption have also shown promise (Werbach, 1991; Collipp et al., 1984; Eriksson & Pekkanen, 1980; Pekkanen, 1980; Forander, Kohonen & Suomalainen, 1958; Pekkanen, 1980; Register et al., 1972; Rogers, Pelton & Williams, 1956). The majority of human and animal studies have been restricted to alcohol abuse, neglecting the impact of nutritional therapies on other types of addiction. Research on nutrition has been slow due to the lack of resources to follow up on promising preliminary results (Alternative Medicine, 1994).

Herbal Remedies

Herbal remedies for the treatment of illness date back to prehistoric times. The earliest written records detailing the use of medicinal herbs were the Mesopotamian clay tablets, dated earlier than 2,000 BC. Numerous other cultures also produced writings and systems of herbal medicine. Between 2,000 BC and 1 AD the Chinese, Greek, and East Indian peoples all created materia medica including reviews of up to 1,000 substances. The current version of the Chinese materia medica (1977) contains over 5,500 entries (Alternative Medicine, 1994). While less than 10 percent of plants today have been extensively studied for medicinal applications, around 25 percent of Western medicine contains plant material (Alternative Medicine, 1994; McKenna, 1996). Furthermore the modern use of nearly 75 percent of plant derived pharmaceutical medicines directly correlates with their traditional uses (Mack, 1997).

Critics argue that synthetic compound screening and combinatorial chemistry are more efficient and legitimate methods for determining pharmaceutical leads than pursuing ancient nostrums based on anecdotal evidence (Mack, 1997). Proponents point to the prevalence of plant material in modern medicine and speak of the advantages of acknowledging the thousands of years of experimentation and folk knowledge. For example, the Chinese ethnopharmacopoeia is written, taught in medical schools, and has been utilized and revised over thousands of years.

Difficulties of herbal research include: (1) the lack of a methodology capable of studying the herb as a whole rather than its component parts or derivatives, (2) the difficulties of securing a standardized preparation of herbs and herbal compounds so that the results of trials will be

reliable and valid, and (3) the cost of meeting FDA guidelines for the introduction of new pharmaceuticals. Because botanicals are not patentable, though they can be patented for use, herb companies may not recover their expenses, and pharmaceutical companies will not risk the loss (Mack, 1997; *Alternative Medicine*, 1994). While many herbal remedies have few or no side effects, others can be toxic if improperly administered.

Despite the barriers, some research on herbal medicines for the treatment of addictive disorders has been conducted. The majority of this research has been conducted on traditional Chinese herbs. For example, Leguminosae *Pueraria lobata*, kudzu, is a perennial vine native to eastern Asia which is also widely available in the southern US (Keung & Vallee, 1993b; Althoff, 1994). An extract from the root, *radix pueraria*, has been used in traditional Chinese medicine for thousands of years, and has been used as an antipyretic, antidiarrhetic, diaphoretic, and antiemetic, as well as an anti-inebriation agent (Keung & Vallee, 1993b; Xie, Lin, Antony et al., 1994). An "anti-drunkenness" effect was first noted in 600 AD, and *radix pueraria* was described as a treatment for alcoholism circa 1580 (Keung & Vallee, 1993b).

The mechanism of *radix pueraria* for the treatment of alcohol abuse is as yet elusive, though it seems unlikely that the herb works through either the ADH or the ALDH enzyme systems (Keung, 1993; Keung, Lazo, Kunze & Vallee, 1995). Also, it has been hypothesized that kudzu may work through the serotonergic systems of the brain or through the calcium channels regulator (Lee, 1996).

One of the primary animal models used in the research of kudzu and its isoflavones diadzin and diadzein for the treatment of alcoholism (Keung & Vallee, 1993b; Keung, Lazo, Kunze & Vallee, 1995) has been soundly criticized (McMillen & Williams, 1995; Piercy & Myers, 1995; Lankford, Roscoe, Pennington & Myers, 1991; Lankford & Myers, 1994). Nonetheless, four studies using Wistar (P) rats reported similar findings including decreased peak blood alcohol levels, shortened sleep time induced by ethanol intoxication, and reduced free choice ethanol intake (Xie, Lin, Antony et al., 1994; Lee, 1996). However, in the first preliminary human trial (Shebek and Rindone, 2000) the addition of kudzu to standard treatment did not significantly improve outcomes. Other investigations of kudzu containing compounds are underway at Harvard (Overstreet, Lee, Chen, Rezvani, 1998; Overstreet, Lee, Rezvani, Criswell, Janowsky, 1996).

Other herbs and herbal compounds have been identified by practitioners as effective in the reduction of craving and assisting in the process of detoxification (Petri & Takach, 1990; Shanmugasundaram, Subramaniam, Santhini & Shanmugasundaram, 1986), however virtually no work has been done to assess their efficacy.

Hallucinogens

The hallucinogenic properties of lysergic acid diethylamide (LSD) were discovered by Hofmann in 1943 (Abbott, Aldridge & Gogia, 1996). Upon introduction to the United States and Europe in the late 1940s and 1950s, this and other potent agents became available to large populations for religious, recreational, and scientific purposes. By the mid-1960s it appeared that medicine had found a new tool for generating insights into things like the mechanisms of nerve cell

transmission or the phenomenology of schizophrenia, as well as a potential treatment for a number of psychiatric disorders (Riedlinger, 1994).

However, beginning in 1968, a series of papers were published regarding the potential dangers of hallucinogens and by the mid-1970s the majority of investigations of therapeutic uses for hallucinogens had ceased (Halpern, 1996; Abbott, Aldridge & Gogia, 1996). It is difficult to know which came first, political and societal pressure to abandon research or the belief that models of therapy were lacking validity (McKenna, 1996; Abbott, Aldridge & Gogia, 1996; Halpern, 1996). Only recently with the introduction of new agents touting hallucinogenic properties, such as ibogaine, has there been a resurgence of interest in the potential utility of hallucinogens.

It is hypothesized that craving may be attenuated through the use of agonist/antagonists of the neurotransmitter serotonin (5-HT) (Halpern, 1996). LSD, like DMT, mescaline, and psilocybin, is characterized by a serotonergic pharmacology (McKenna, 1996) and is an agonist/antagonist at the discrete serotonin receptors 5-HT₁ and 5-HT₂. If serotonin mediates reward-related behavior, then LSD and other hallucinogens may exhibit anti-craving features (Halpern, 1996). Ibogaine also has an effect on serotonergic pharmacology and is an NMDA antagonist. Preclinical data suggest that these compounds are effective in attenuating the development of tolerance and in decreasing the symptoms of dependence of all abused substances examined to date (Popik, Layer & Skolnick, 1995).

During the 1960s and 70s, the use of LSD to treat alcoholism was examined more thoroughly than any other therapeutic application of hallucinogenic agents. Reviews of these studies are mixed (Halpern, 1996; Abbott, Aldridge & Gogia, 1996; Ludwig, Levine & Stark, 1970). Studies of hallucinogens conducted in the 1960s and 1970s have been criticized based on their varied methodology, dosing, and criteria for improvement, as well as their failure to adhere to the now accepted double blind, placebo controlled standards. However, it appears that while case studies and data from open trials resulted in encouraging findings, controlled studies failed to replicate these results (Halpern, 1996). A review of the controlled studies conducted during that era suggests that in the majority of studies there were no differences between treatment groups, and in fact the findings suggest that LSD may even possess some anti-therapeutic effects (Ludwig, Levine & Stark, 1970).

Based on review of single dose studies, it has been suggested that the anti-addictive properties offered by hallucinogens may be of limited duration. Peak-theories recommend dosing at intervals which would provide the addict a continuous or steady state benefit, perhaps every one or two months (Halpern, 1996). However prior to consideration of further testing involving dosing, the clinical difficulties of administering hallucinogenic agents to patients must be addressed. Besides their current status as Schedule I substances, these include: (1) the need to monitor patients for hours or even days after the agent is administered to minimize adverse effects, (2) the need for therapists to be extensively trained as guides for the sessions, and (3) the degree of adjustment and accommodation that would be required by psychotherapists wishing to incorporate these drugs into practice (Riedlinger & Riedlinger, 1994).

The root bark of a West African shrub, *Tabernanthe iboga* yields the psychoactive indole alkaloid known as ibogaine (Rezvani, Overstreet & Lee, 1995). Ibogaine is a stimulant, though at high doses has hallucinogenic properties. Historically, ibogaine has been used in ritual by various indigenous populations, and has been used by hunters and warriors to help them stay awake for long periods. Like the classic serotonergic hallucinogens, ibogaine is classified as a Schedule I substance by the U.S. Drug Enforcement Administration (DEA) (Popik, Layer & Skolnick, 1995). However, ibogaine is available throughout much of the European community, and in some locations is available as a treatment for substance abuse (Sheppard, 1994). High doses of ibogaine can be fatal (Popik, Layer & Skolnick, 1995) with some gender-specific data emerging that females may be more susceptible than males to the toxic effects.

Studies have been conducted to document the effects of ibogaine on a variety of animal populations and ibogaine has been shown to attenuate alcohol intake and reduce cocaine preference (Rezvani, Overstreet & Lee, 1995; Sershen, Hashim & Lajtha, 1994). Other research has focused on the impact of ibogaine on dopaminergic systems, opioid systems, serotonergic systems, intracellular calcium regulation, cholinergic systems, γ -aminobutyric acid systems, voltage-dependent sodium channels, glutamatergic systems, α receptors, and adrenergic systems (see Popik, Layer & Skolnick [1995] for a review). However because ibogaine appears to be dose, setting, sex, and species specific, further testing is necessary.

Anecdotal reports regarding the efficacy of ibogaine as a treatment for substance abuse have been impressive, and preliminary human case studies using single doses of 700 to 1800 mg of ibogaine for the treatment of heroin addiction have been encouraging but inconclusive (Sheppard, 1994). Despite its use on clinical populations in Europe and on St. Kitts Island in the Bahamas (D. Mash, personal communication), no controlled clinical data is available on the use of ibogaine for the treatment of addictions.

Other Alternative Therapies

Several other alternative therapies have been utilized for the treatment of chemical dependency. At this time, clinical and controlled data on efficacy is lacking. A brief description of each follows.

Light Therapy.

Light Therapy is probably best known for its use as a treatment for depressive disorder characterized by seasonal onset (seasonal affective disorder or SAD). While a specific mechanism of action which can explain the efficacy of light therapy has not been identified, SAD may be linked to serotonin or melatonin deficits. A connection between SAD and some cases of substance abuse has been proposed based on preliminary case studies (Satel & Gawin, 1989; McGrath & Yahia, 1993) and basic science research (Dilsaver & Majchrzak, 1988). However, studies looking for seasonal patterns of alcoholism have produced contradictory findings (Eastwood & Stiasny, 1978; Poikolainen, 1982; APA, 1988). Currently, proponents suggest the use of light therapy as an adjunct to standard treatment modalities for those patients with seasonal patterns of dependence.

Yoga/Tai-chi.

Yoga is a physical and mental discipline which has been practiced in India for thousands of years, as part of a lifestyle based on Vedic scriptures. In modern times, the practice of yoga has adopted various components of this traditional lifestyle that involves postures, flowing movement, breathing, and meditation. Over 70 years of scientific research have shown that through the practice of yoga a person can learn to control physiological parameters including blood pressure, cardiac and respiratory function, and brain waves (Alternative Medicine, 1994). It has been suggested that there may be some potential in the use of yoga for the treatment of addictive disorders and their psychosocial complications. The rationale for using yoga sounds similar to that of biofeedback, though once again little convincing evidence can be found on specific mechanisms of action. One pilot study (N=59) has been conducted on the use of yoga for the treatment of opiate addiction (Shaffer & LaSalvia, 1997). All subjects received daily methadone and one group was randomized to training in hatha yoga, while the other participated, instead, in modern psychodynamic group therapy. Shaffer and LaSalvia found no significant difference in outcomes between the two groups. Neither psychodynamic group therapy nor yoga have been shown to be efficacious components of treatment for opiate addiction.

Tai-chi is a form of martial arts, mid-range boxing, which has been practiced in China for centuries. The practice of tai-chi applies the principles of Yin-Yang and other components of traditional Chinese medicine (TCM), put into physical motion as exercises and active meditations. As the popularity of tai-chi increases in North America, it has been suggested that tai-chi may assist individuals in the process of withdrawal and relapse prevention. No studies have been published on the efficacy of tai-chi for the treatment of addictive disorders, although it has been shown to improve balance function and reduce the number of dangerous falls in the elderly (Li, Hong & Chan, 2001; Hartman et al., 2000).

Eye Movement Desensitization and Reprocessing (EMDR).

Eye movement desensitization and reprocessing (EMDR) is a relatively new psychological method based on the belief that eye movement, such as the rapid eye movement (REM) experienced during sleep, can stimulate the brain's self-healing capacities (Coates, 1996). To date, EMDR has been targeted at and research has focused on patients dealing with the psychological consequences of traumatic incidents such as sexual assault, combat, or grief (Shapiro, Vogelmann-Sine & Sine, 1994; Montgomery & Ayllon, 1994; Silver, Brooks & Obenchain, 1995). EMDR has been recommended for those substance abusers with an underlying history of mental trauma who have progressed through the initial stage of withdrawal. Proponents feel that EMDR may aid the recovery of these substance abusers by helping them to confront their denial and distortions (Shapiro, Vogelmann-Sine & Sine, 1994). Research of the efficacy of EMDR for the treatment of substance abuse is ongoing.

Homeopathy.

The theory of homeopathy was first described 200 years ago by Samuel Hahnemann (Abbott & Stiegler, 1996). In the early part of the 19th century, homeopathy was introduced to the United States where its apparent successes during the cholera epidemics won it many allies. By 1900,

there were 22 homeopathic medical schools, more than 100 hospitals, and around 15,000 practitioners in the United States. It is believed that the American Medical Association (AMA) was founded by physicians in 1847 partly as a response to homeopathic competition (Coulter, 1982). However by 1920, with the increasing use of modern pharmaceuticals and standardization of conventional medical training, with funding guidelines favoring AMA approved programs, homeopathic hospitals and schools had all but disappeared from the US (Starr, 1982). This included the loss of almost all Womens' medical colleges, which had been predominantly homeopathic. While homeopathy remained part of the medical landscape interenationally, in places like Germany, England and India, interest in homeopathy was almost absent from American medicine until a resurgence began in the 1970's.

Homeopathy is based on the "Law of similars," which states that a substance can cure a syndrome in a sick person who has a constellation of symptoms like those caused in healthy people by that same substance; or as Hahneman wrote "Similia similibus curenter" (like cures like). Hahnemann began this process by administering small doses of various substances to healthy volunteers, in studies he called "Provings," to determine the agents' symptom profile. He then would use each substance in patients who had symptom profiles matching those seen in the group that had "Proven" each remedy (Mirman, 1994). Classical homeopathy asserts that each patient should receive only one remedy, tailored to their particular and individual needs, while pluralist practitioners will often prescribe several remedies at the same time.

The aspect of homeopathic theory which most disturbs critics is that many of the remedies are "potentized" by diluting them in a water-alcohol solution. The final concentration may be diluted as low as 10-30 or 10-20,000, far beyond the point at which any molecules of the original substance are still likely to be found in the solution (Alternative Medicine, 1994). Haneman felt that by serially diluting and succusing (vigorously shaking) the remedy, he would dilute the toxic effects of the original substance, while maximizing the individually curative "Potency" of the remedy. To date, no one has been able to provide an adequate explanation for the possible mechanism of such potentization or of homeopathy in general. Meta-analyses and reviews of homeopathic research have come to different conclusions regarding the efficacy of the modality (Reilly, Taylor, Beattie, et al., 1994; Kleijnen, Knipschild & Ter Reit, 1991; Hill & Doyon, 1990; Bellavite, 1990; Walach & Righetti, 1996; Kurz, 1992). In some cases, skeptics have been forced by their methods to admit some suggestions of efficacy (Kleijnen, Knipschild & Ter Reit, 1991), while homeopathic proponents, perhaps bending over backwards, have re-reviewed those analyses saying that no such conclusion is possible (Linde K, Scholz M, Ramirez G, Clausius N, Melchart D, Jonas WB. Impact of study quality on outcome in placebo-controlled trials of homeopathy. J Clin Epidemiol. 1999 Jul;52(7):631-6).

There is evidence that homeopathy is being used to treat substance abuse in parts of Europe, including the UK, and to a lesser extent in the United States. To date, no research on the homeopathic treatment of substance abuse has been published in biomedical journals.

Aromatherapy.

Aromatherapy is a branch of herbal medicine where fragrant essential oils, extracted from various plants, are inhaled or applied to the skin, primarily for the the sake of their odor. Many

essential oils are highly toxic if ingested orally and aromatherapy materials should be kept far away from the reach of children. Advocates believe that specific olfactory sensations, evoked by the oils, promote health and can be useful in the prevention and treatment of disease. The odor of each oil is said to have specific physiologic and/or psychologic properties.

There have been clinical reports to suggest that this modality can and is being used for the treatment of substance abuse. However, data are not available on the efficacy of aromatherapy for the treatment of addictive disorders.

Culturally Specific Healing Practices

Cultural differences exist regarding the use and meaning of psychoactive drugs. For example, substance use in religious ceremonies or rituals has been frequent across cultures and time, from the use of alcohol in Jewish and Christian ceremonies to the use of peyote by the Native American Church, or opium at certain Hindu marriages (Westermeyer, Lyfoung, Westermeyer & Neider, 1991). Cultural differences exist in treatment philosophies and health beliefs and behaviors. Below we discuss the case of traditional, indigenous, Native American healing practices being used in the treatment of alcoholism. Many of the issues raised in this example are applicable to the debates regarding the treatment of other culturally distinct communities and peoples.

It has long been recognized that alcohol is a major drug of abuse among Native Americans. Native Americans have a mortality rate from alcoholism at least three to four times greater than the general US population. Inhalant abuse is a particularly prevalent and dangerous problem among Native American youth. Native Americans tend to do less well than European Americans in addiction treatment programs, as measured by reported relapse, and recidivism to treatment and detoxification facilities (Kivlahan, Walker, Donovan & Mischke, 1985; Query, 1985; Hanson, 1985). American Indian tribes are recognized as having unique culture, heritage and needs, as well as distinctly unique relationships to the Federal government as sovereign nations with specific treaty rights. Thus it has been suggested that treatment services for these (and other minority populations) need to be more sensitive to the cultural perspectives and health beliefs of the community (Abbott, 1998; Hanson, 1985).

The range of Native American healing practices used in the treatment of drug and alcohol addictions is quite diverse, including sweat lodges, various herbal traditions, cultural reeducation, peyote rituals, and Sun Dance (Abbott, 1998; Hall, 1986; Beauvais & La Boueff, 1985). Though cultural supports are given attention by some treatment centers, the availability of culturally specific programs is limited, and funding is often lacking (Seale & Muramoto, 1993). The Center for Substance Abuse Treatment (CSAT) began a program in the early nineties to fund enhanced treatment programs for rural, remote and/or culturally distinct populations. These programs were required to be comprehensive and to offer the conventional drug-treatment modalities, but were also encouraged to include culturally specific healing practices familiar to, or requested by, the communities being served. The half dozen programs funded under this initiative offered a variety of healing practices, most often conducted in a group setting, that included sweat lodge and traditional Hawaiian medicine, among others.

The lack of agreement among treatment professionals and the literature regarding the meaning of "culturally-specific" or "culturally-appropriate" treatments have made replication and research difficult. The terms imply that the programs are in some way designed for, adapted to, or responsive to the needs of the patients based on their cultural heritage. However, the essential differences between culturally-specific and non-specific programs have not been defined. Furthermore there are no standards for defining the cultural competence of counselors, nor formal policies in place for regulating referrals of clients to culturally specific treatment programs.

Despite the argument that cultural identification may influence the patient's response to treatment (Babor & Mendelson, 1986; Iber, 1986; Flores, 1985-1986; Hall, 1986) research results have been contradictory (Abbott, 1998; Beauvais, 1992; Brady, 1995; Flores, 1985-1986; Hanson, 1985; Parker, Jamous, Marek & Camacho, 1991; Rhodes, Mason, Eddy, Smith & Burns, 1988; Beauvais & La Boueff, 1985; Westermeyer & Peake, 1983; Westermeyer & Neider, 1986; Gutierrez, Russo & Urbanski, 1994). There has been some evidence to suggest that Native Americans who withdraw temporarily from their cultural communities may have better rates of recovery (Westermeyer & Peake, 1983). Conclusions and recommendations have been drawn from epidemiologic data as controlled research has not been conducted. It is important to remember that different individuals from the same culture or the same community, even with the same diagnosis and demographic descriptors, may have vastly different interests and needs with respect to the culturally specific components of their treatment plan. Indians practising Christianity, for instance, may be loath to participate in tribal rituals rejected by their parents or grandparents. On the other hand, 12-step work may be significantly enhanced, when it is translated from it's usual Euro-Centric matrix into forms more familiar to Native American patients. For instance, it may be preferable to pass a "talking stick" around the whole circle of participants, allowing each member of the circle to speak in turn, rather than expecting individuals to put themselves ahead of everyone else in the group, by seizing an initiative to speak without it being clearly their turn.

However, there are no randomized controlled studies that look at specific forms of alcohol treatment intervention in these populations (Abbott, 1998). In addition, research on treatment outcomes has failed to separate the cultural influences from the demographic differences among ethnic groups using the appropriate statistical controls (Babor & Mendelson, 1986). Not all tribes or individuals are going to respond identically to any given situations (Beauvais & La Boueff, 1985) and ethnicity is not the only factor to be considered, as we understand that substance abuse problems also vary with regards to age, gender, education, and socioeconomic status (Seale & Muramoto, 1993; Westermeyer & Peake, 1983). Furthermore, researchers have failed to consider the possibility that culturally specific healing practices may also be used in a trans-cultural way to treat non-native peoples (Babor & Mendelson, 1986).

Spirituality/Prayer

Though spirituality and religion are frequently used in the prevention and treatment of substance abuse, drugs and alcohol have also been used during religious rituals and in the quest for spiritual transcendence. From the use of alcohol in Jewish and Christian ceremonies to the use of opium at certain Hindu marriages, the use of psychoactive drugs in ritual is common, transcending

culture and time (Westermeyer, Lyfoung, Westermeyer & Neider, 1991). Furthermore, drugs or mixtures with hallucinogenic properties may be used to bring about religious visions. The use of psychoactive herbal drugs in the quest for transcendence predates history, and spans the globe (Miller, 1997).

History of early drug use seemed related to an individual's involvement in the Eastern-oriented religions finding new footholds in the sixties. New Religious Movements (NRM) such as the Hare Krishna, the Jesus Movement, and new age pagan groups also have been associated with drug use. However, there is some evidence to suggest that for some, participation in new religions may actually relieve psychiatric symptoms and psychological distress, including chemical dependency. Through the provision of a reinforcing community, the NRMs may serve a "halfway house" function, helping participants recover and reintegrate into a new social system (Muffler, Langrod, Richardson & Ruiz, 1997).

Indigenous therapies used in the treatment of addictions usually incorporated aspects of the spiritual. Spirit dancing, peyote ceremonies, and Shakerism have been used by Native Americans; spiritual churches, "Voodoo" and Black Hebrew divine healing by Blacks. Hispanic healing ceremonies have used Curanderismo, Pentecostalism and Espiritismo with an intent to treat addictions (Singer & Borrero, 1984). For example, in Espiritismo it is believed that people may be made ill or cured by spirits. The treatment of spiritists, then, involves mediums who perform spiritual consultations and conduct cleansing rituals (Singer & Borrero, 1984; Muffler, Langrod, Richardson & Ruiz, 1997). Treatment which addresses a patient's faith and culture may be an important component of healing (Muffler, Langrod, Richardson & Ruiz, 1997; Miller, 1997).

Evangelical and Pentecostal churches teach individuals seeking treatment to pray and to depend on God. This belief teaches that by accepting a savior, an individual may be "born again," free themselves from the mistakes of their "former" life, and thus recover. Programs like Teen Challenge developed with the belief that religious conversion is capable of combating addictions (Muffler, Langrod, Richardson & Ruiz, 1997).

Mainline Protestant denominations and Catholicism, are more frequently associated with chemical dependency treatment than other religious or spiritual forms, in this country. However, many programs that historically emphasized religious values, have evolved to include more secular approaches. The majority of efforts sponsored by the Protestant and Catholic churches have been institutionalized and are housed in hospitals or community centers rather than church facilities. The influence of earlier Protestant treatment efforts, and the emphasis on religious values, remains visible in popular Twelve Step programs such as Alcoholics Anonymous and Narcotics Anonymous. Programs such as the latter can become problematic, if they demand that participants give up proven medical treatments such as methadone. Physicians using life-saving pharmacologic interventions in their patient's addiction treatment should be certain to inquire about the policies of individual groups, before referring their patients to them.

Religious involvement seems to be a major source of help for people trying to change involuntary habits. In a large number of studies, epidemiological research has demonstrated a negative correlation between personal "religiousness" and substance abuse (Benson, 1992).

However, there has been no direct research into spirituality/prayer as a treatment for substance abuse. A small body of research does some provide suggestive evidence that spiritual healing may influence outcome, even when other psychological factors are controlled for (Hodges & Scofield, 1995). One study of intercessory prayer (prayer by others on behalf of the patient) failed to benefit the "Prayed-for" group. However, on hearing that this study was being conducted, there were a number of treatment professionals around the country who declared that they would be "praying for the control group." Much more data will be needed, before anything useful can be said about the efficacy of personal or intersessory prayer.

Efficacy and Effectiveness of CAM

There may be confusion regarding the benefits to be obtained from CAM, and indeed, for any current treatment of substance abuse. In the treatment of medical conditions, treatment benefits may consist of alleviation or cure of the underlying illness or disease. In this sense, antibiotic treatment of certain forms of respiratory illness may be considered efficacious. On the other hand, many treatments can be shown to be effective in dealing with symptoms related to cancer, but the condition itself does not improve. In substance abuse treatment, even if proper controls cannot be put together to document efficacy, treatments that lack efficacy may still have "effectiveness" or utility for some populations. For instance such treatments may be sufficiently attractive to bring the patient into the treatment setting, or the patient may return to the treatment setting because of subjective alleviation of craving or other effects of addiction. In addition, compliance with the other aspects of the treatment program may be enhanced.

Spontaneous Remission

It has been argued that true addiction can be characterized by the inability of individuals to stop independently. It has been written that addiction is degenerative and without treatment can only get worse (Sobell, Elingstad, Sobell, 2000). However, there is a body of literature which suggests that some people "mature out" of substance abuse, or spontaneously remit, without the benefits of formal intervention (Walters, 2000; Klingemann, 1991; Stall & Biernacki, 1986; Klingemann, 1992; Tuchfield, 1981; Prugh, 1986).

The most familiar example of addiction maturing out or spontaneously remitting is that of nicotine addicts in this country. Of people who stop smoking, it has been estimated that 80 to 90 percent will do so on their own (Sobell, Elingstad, Sobell, 2000). A recent review of studies indicates that between 18.2% and 26.2% of substance users, including tobacco, alcohol, and illicit drugs, will spontaneously remit (Walters, 2000). However studies looking at natural recovery have generally been exploratory and methodologically weak (Sobell, Elingstad, Sobell, 2000; Walters, 2000).

Sobell et al. (2000) have made recommendations for future research of spontaneous remission, including the consideration of demographics and substance use histories. We believe it is also important to look for links between these events and social or spiritual experiences that may be associated with them. If there are interventions that can interrupt addiction or increase the probability of spontaneous remission or maturing out, then these would be valuable tools in the

clinical armamentarium. Many of the CAM therapies described in this chapter may serve this purpose.

Drop-outs and Relapse

Conventional treatment approaches to substance abuse have been criticized on a number of levels. Dropout rates from most treatment programs are extremely high; rates of 50% or more are common for alcohol misuse and 75 to 85% for cocaine or crack addiction (Hoffman, Caudill, Koman & Luckey, 1994b; Vaillant, Clark, Cyrus et al., 1993; Chappel, 1993; Mammo & Weinbaum, 1991). Some facilities do not include dropout rates in their outcome assessment, significantly inflate their rates of success, and misrepresent their capabilities in other ways to the public. Addiction treatment is all too often based on philosophy rather than data.

Critics have also pointed out that treatment facilities are often not available or accessible to special populations and the high rate of drop-out and relapse of these special populations suggests that their needs are not being met. Furthermore, critics question whether current programs are unable to handle the full scope of physiological, sociological, and psychological problems of addiction patients, all of which must be addressed during a successful recovery. The increasing treatment reliance in the US on the Minnesota model and the prominence of the Twelve Step self-help groups (AA, NA, CA, etc.) despite the lack of controlled research demonstrating the efficacy of these programs has often been questioned (Chiauzzi & Liljegren, 1993; Hester, 1994; Holder, Longabaugh, Miller & Rubonis, 1991).

One way to improve the outcomes of existing programs may be to increase the frequency, intensity, and/or types of treatment services offered. Many studies have indicated that increasing the number of modalities available in a program increases the rate of treatment success (Hoffman, Caudill, Koman & Luckey, 1994b). In this context CAM may offer to expand and enrich the treatment continuum.

Conclusions

There are several reasons to consider the use of CAM. Some treatments show promise in preliminary clinical reports and early research which suggests that at least some effectiveness (as described above) or utility may be expected. In addition, however, many of the treatments described in this chapter have the capacity to elicit salubrious changes in personal and interpersonal status. One of the lessons of biofeedback, yoga, tai chi, relaxation, transcendental meditation, is that the individual can learn to control their own mental and physical processes. In this way a gateway to the concept of self efficacy may be opened. A common concept underlying many alternative therapies is the elicitation and strengthening of a natural healing process. This concept of self healing may be one of the learning experiences of the patients. There is also another characteristic of treatments such as culturally derived treatment systems and spirituality that leads individuals out of themselves and into a community of supportive people and strengthen their capacity to interact with the larger world around them.

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