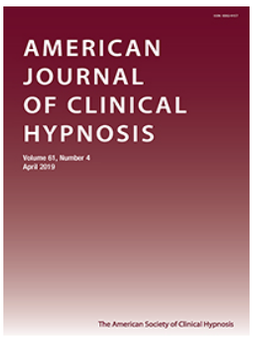

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Integrating Clinical Hypnosis and Neurofeedback

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Hypnosis and neurofeedback each provide unique therapeutic strengths and opportunities. This article provides an overview of some of the research on neurofeedback and hypnosis. The author's perspective and recommendations are provided on the relative clinical utility of using either neurofeedback or hypnosis as the initial treatment of choice with various clinical conditions.

Keywords: Neurofeedback, EEG biofeedback, hypnosis, biofeedback

Neurofeedback and hypnosis each offer unique ways to influence symptoms and mind–body interactions. The author believes that having skills in both therapeutic modalities can be invaluable. In some areas, hypnosis has excellent research validation, where neurofeedback currently does not have research support. In other conditions, neurofeedback has far more research support than hypnosis. This article provides an overview of research on neurofeedback, documenting those clinical conditions in which it would be prudent for clinicians to utilize neurofeedback, rather than hypnosis, as the intervention of choice because the evidence base for neurofeedback is so large. Most persons reading a hypnosis journal have far greater familiarity with literature on the efficacy of hypnosis in comparison with neurofeedback. Therefore, this article provides a more extensive review of the literature on neurofeedback, but then more briefly reviews a sampling of the research documenting the unique strengths of hypnosis. It concludes with the author's recommendations, based on 26 years of experience in using neurofeedback and 40 years of experience with clinical hypnosis, regarding how and when each modality may be best utilized and integrated in a treatment plan.

Overview of Research Supporting the Efficacy of Neurofeedback

For readers unfamiliar with this treatment modality, neurofeedback is electroencephalogram (EEG) (brainwave) biofeedback. During typical training, one or more electrodes are placed on the scalp and reference and ground electrodes are placed on the earlobes. Electroencephalographic equipment provides real-time, instantaneous feedback (usually

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auditory and visual) about brainwave activity. Ordinarily we cannot reliably influence our own brainwave patterns because we lack awareness of them. However, when we can see our brainwaves on a computer screen a few thousandths of a second after they occur, it gives us the ability to influence and recondition brain functioning. Research commonly documents significant improvements about 75% to 80% of the time. Length of treatment varies from 15 sessions to 40 sessions, or more.

Attention deficit/hyperactivity disorder

Reviews of research (e.g., Arns, Heinrich, & Strehl, 2014; Hammond, 2011) document the effectiveness of neurofeedback in comparison to control conditions, including medication treatment. A few illustrations of these studies are cited here. A randomized controlled study by Levesque, Beauregard, and Mensour (2006) documented (with functional magnetic resonance imaging [fMRI] neuroimaging) positive changes in brain function in children with attention deficit/hyperactivity disorder (ADHD) that mirrored their behavioral changes following neurofeedback. Studies (Fuchs, Birbaumer, Lutzenberger, Gruzelier, & Kaiser, 2003; Rossiter, 2005; Rossiter & La Vaque, 1995) have found that neurofeedback produced improvements comparable to taking Ritalin, or improvements superior to Ritalin (Monastra, Monastra, & George, 2002), in a one-year follow-up without requiring continuation of medication. Leins et al. (2007) demonstrated that treatment including 30 neurofeedback sessions was effective in producing cognitive, attentional, behavioral, and intelligence quotient (IQ) improvements that remained stable six months after treatment.

Neurofeedback studies with individuals who had attenion-deficit disorder (ADD)/ADHD or learning disabilities, which evaluated IQ pre- and posttreatment, commonly have found that scores increased nine to 23 IQ points (Linden, Habib, & Radojevic, 1996; Othmer, Othmer, & Kaiser, 1999; Tansey, 1990; Thompson & Thompson, 1998).

A randomized controlled study by Gevensleben et al., 2009) documented the superiority of neurofeedback training (effect size .60) in comparison with computerized attention skills training. Behavioral and attentional improvements were stable on six-month follow-up in research studies reported by Strehl et al. (2006) and Gevensleben et al. (2010), and the latter likewise found that neurofeedback training produced superior results to computerized attention skills training, as did Holtmann et al. (2009). A randomized, double-blind placebo controlled study (deBeus & Kaiser, 2011) documented the effectiveness of neurofeedback with ADHD. A two-year follow-up (Gani, Birbaumer, & Strehl, 2008) of the Heinrich, Gevensleben, Freisleder, Moll, and Rothenberger (2004) research found not only that improvements in attention and behavior were stable but also that some parent ratings had shown continued improvement.

In contrast to these findings, long-term follow-up studies of stimulant medication for ADD/ADHD have failed to demonstrate maintenance of initial short-term changes (Drug Effectiveness Review Project, 2005; Joughin & Zwi, 1999; Molina et al., 2009; Swanson et al., 2007) and have identified numerous side effects from medication treatment. In one large stimulant medication study (MTA Cooperative Group, 1999), 64% of children reported side effects, 11% of them moderately severe and 3% severe. Side effects were so common that less than 50% of children maintain prescribed dosages for more than six months (Hoagwood, Jensen, Feil, Vitiello, & Blatara, 2000).

Follow-up evaluations of neurofeedback range from three months to 10 years (Gani et al., 2008; Heinrich et al., 2004; Lubar, 1995; Monastra et al., 2002; Strehl et al., 2006), providing strong support that improvements from neurofeedback with ADD/ADHD endure. A meta-analysis (Arns, De Ridder, Strehl, Breteler, & Coenen, 2010) concluded that neurofeedback treatment of ADD/ADHD meets the criteria for being classified as an efficacious and specific treatment—the highest level of scientific validation (La Vaque et al., 2002), with side effects estimated to occur in only 1% to 3% of cases (Monastra et al., 2002). In contrast, there are no controlled studies of the effectiveness of hypnosis in treating ADD/ADHD, although two uncontrolled studies (Anderson, Barabasz, Barabasz, & Warner, 2000; Warner, Barabasz, & Barabasz, 2000) found improvements using a combined procedure of neurofeedback with alert hypnosis.

Learning and developmental disabilities

There are no known studies of hypnosis with learning disabilities (LDs). However, Fernandez et al. (2003) demonstrated in a placebo-controlled study that neurofeedback was an effective treatment, and the improvements were sustained on two-year follow-up (Becerra et al., 2006). An additional report (Fernandez et al., 2007) on 16 children with LDs documented significant EEG changes two months after neurofeedback compared to a placebo control group, and 10 of 11 children in the neurofeedback group showed objective changes in academic performance(in comparison with one in five children in the placebo group). Many other case reports and case series have also been published on the value of neurofeedback with LDs. A randomized controlled study of children with dyslexia (Bretler, Arns, Peters, Giepmans, & Verhoeven, 2010) documented significant improvement in spelling.

A case series (Surmeli & Ertem, 2007) evaluated neurofeedback with Down syndrome, and all eight children who completed treatment showed significant improvements in attention, concentration, impulsivity, behavior, speech and vocabulary, and on quantitative EEG measures. Surmeli and Ertem (2010) also reported on neurofeedback treatment of 23 children with mild to moderate mental retardation that showed clinical

improvement in 22 out of 23 children on a behavioral measure; in addition, 19 of 23 showed improvement in IQ and on a computerized test of attention.

Uncontrolled epilepsy

Medication treatment of epilepsy is successful in completely controlling seizures in only two-thirds of patients (Iasemidis, 2003), and the long-term use of many anti-seizure medications has health risks. Neurosurgery has limited success (Witte, Iasemidis, & Litt, 2003). However, extensive, rigorous research (reviewed in Sterman, 2000; in a meta-analysis by Tan et al., 2009) has established that neurofeedback can produce significant improvements in 82% of the most severe, out-of-control, medication-treatment-resistant patients, with an average 70% decrease in seizure frequency, often reducing the amount of medication required.

Neurofeedback for peak performance

Just as hypnosis has been used to control anxiety and increase peak performance, neurofeedback is likewise increasingly utilized in peak performance training (Vernon, 2005). As an example, a randomized, blinded controlled study (Egner & Gruzelier, 2003) demonstrated that neurofeedback significantly enhanced musical performance, and a similarly designed study (Raymond, Sajid, Parkinson, & Gruzelier, 2005) documented significant improvements in ballroom dance performance. Similar improvements have been reported with golf (Arns, Kleinnijenhuis, Fallahpour, & Bretler, 2007), archery (Landers, 1991; Landers et al., 1994), singing performance (Kleber, Gruzelier, Bensch, & Birbaumer, 2008; Leach, Holmes, Hirst, & Gruzelier, 2008), and acting performance (Gruzelier, Inoue, Smart, Steed, & Steffert, 2010). One fascinating controlled study (Ros, Moseley, Bloom, Benjamin, Parkinson, & Gruzelier, 2009) with opthalmic microsurgeons found that only eight sessions of one type of neurofeedback produced significant improvements in surgical skill, decreases in anxiety, and a 26% reduction in surgical task time. Hypnosis research has a long way to go in documenting such outcomes for enhancing optimal performance.

Neurofeedback with other conditions

Neurofeedback has, however, been used with a variety of other conditions, as this brief sampling of results demonstrates. Some placebo-controlled studies have demonstrated positive outcomes of using neurofeedback with anxiety (Raymond, Varney, Parkinson, & Gruzelier, 2005), improving sleep latency and declarative learning (Hoedlmoser et al., 2008), cognitive enhancement in the elderly (Angelakis et al., 2007), memory improvement in normal individuals (Boulay, Sarnacki, Wolpaw, & McFarland, 2011; Egner & Gruzelier, 2003; Egner, Strawson, & Gruzelier, 2002; Fritson, Wadkins,

Gerdes, & Hof, 2007; Gruzelier, Egner, & Vernon, 2006; Hanslmayer, Sauseng, Doppelmayr, Schabus, & Klimesch, 2005; Hoedlmoser et al., 2008; Keizer, Verment, & Hommel, 2010; Rasey, Lubar, McIntyre, Zoffuto, & Abbott, 1996; Zoefel, Huster, & Hewrrmann, 2010), and depression (Choi et al., 2011). Other publications have reported positive outcomes that suggest the value of using neurofeedback with head injuries (Hammond, 2010; Schoenberger, Shiflett, Esty, Ochs, & Matheis, 2001), in specific cases even reversing posttraumatic anosmia (loss of smell) (Hammond, 2007b), restless leg syndrome (Hammond, 2012), and obsessive-compulsive disorder (Hammond, 2003, 2004; Surmeli, Ertem, Eralp, & Kos, 2011), although much more research is needed.

Neurofeedback has also been documented to improve problems of physical balance (Azarpaikan, Torbati, & Sohrabi, 2014; Hammond, 2005). Other controlled group studies demonstrated very significant outcomes with chronic alcoholism (Peniston & Kulkosky, 1991a), substance abuse (Arani, Rostami, & Nostratabadi, 2010; Scott, Kaiser, Othmer, & Sideroff, 2005), post-traumatic stress disorder (Peniston & Kulkosky, 1991b; van der Kolk et al., 2016), and insomnia (Cortoos, De Valck, Arns, Breteler, & Cluydis, 2010; Hammer, Colbert, Brown, & Ilioi, 2011; Hauri, 1981; Hauri, Percy, Hellekson, Hartmann, & Russ, 1982; Hoedlmoser et al., 2008), as well as in a placebo-controlled study with autism spectrum disorder (Coben, Linden, & Myers, 2010; Pineda et al., 2008) with six-month (Kouijzer, van Schie, De Moor, Gerrits, & Buitelaar, 2010) and one-year follow-ups (Kouijzer, De Moor, Gerrits, Buitelaar, & van Schie, 2009) documenting maintenance.

Review of Conditions Where Research Supports the Efficacy of Hypnosis

There are many clinical conditions for which controlled research has validated the efficacy of hypnosis, yet there are limited or no studies on neurofeedback. Due to space limitations in this article, providing a comprehensive list of all the supporting studies will not be possible.

Hypnosis with pain, surgery, vascular control, and cancer

In is this author's opinion, the research (e.g., Montgomery, DuHamel, & Redd, 2000) indicates that hypnosis is the most effective nonmedication, nonsurgical treatment for pain. There is no controlled research on neurofeedback with pain. Patients high in hypnotic responsiveness may actually obtain analgesic relief that is more effective than morphine (Stern, Brown, Ulett, & Sletten, 1977). Hypnotic preparation for surgery and the use of suggestions under anesthesia are also valuable in the relief of pain, reducing blood loss, controlling nausea and vomiting, promoting healing, and reducing inflammation (e.g., Ginandes, Brooks, Sando, Jones, & Aker, 2003; Ginandes & Rosenthal, 1999). Hypnosis has even been used as the sole anesthetic for surgery (Hammond,

2008). Lang et al. (2000) documented the effects of hypnotic relaxation in reducing pain, anxiety, and need for medication in surgical patients, as well as in achieving greater hemodynamic stability, in patients undergoing large core breast biopsies (Lang et al. (2006) and in patients during interventional radiological procedures (Lang, Joyce, Spiegel, Hamilton, & Lee, 1996). Similar positive effects have been documented in hand surgery (Mauer et al., 1999), dental surgery (Dyas, 2001), surgery in children (Calipel, Lucas-Polomeni, Wodey, & Ecoffey, 2005), and in bone marrow transplants, in comparison to cognitive behavioral coping skill training and other control conditions (Syrjala, Cummings, & Donaldson, 1992). Hypnosis has proven effective for reducing nausea and vomiting following surgery in a randomized double-blind study (Eberhart, Doring, Holzrichter, Roscher, & Seeling, 1998) of thyroidectomy patients and in a randomized, blinded, prospective study with woman undergoing breast surgery (Enqvist, Bjorkllund, Engman, & Jakobsson, 1997).

Thus, hypnosis offers unique benefits for controlling pain in surgical patients. When Lang and Rosen (2002) evaluated the cost-effectiveness of hypnosis in patients undergoing interventional radiological procedures, they documented that the standard sedation cost was $638, but when hypnosis was used along with sedation the cost was reduced to only $300 a case—a cost savings of more than 50%.

Hypnosis can also influence vascular control. In surgeries where preoperative or intraoperative suggestions (Fredericks, 2001; Hammond, 1990) are given, there is commonly less blood loss (Chaves, Whilden, & Roller, 1979; Enqvist, Von Konow, & Bystedt, 1995)—up to 65% less. In working with hypnosis to produce blood clotting in severe hemophilia patients, hypnosis has been found to be effective compared to a control group (Swirsky-Sacchetti & Margolis, 1986). There was a very significant correlation (.56) between changes and the practice of self-hypnosis.

The Sellick and Zaza (1998) review of five alternative medicine strategies for management of cancer pain found only one randomized controlled study for acupuncture, one for massage therapy, and none for therapeutic touch, acupuncture, or biofeedback, but six for hypnosis. The 12-member National Institutes of Health Technology Assessment Panel on Integration of Behavioral and Relaxation Approaches into the Treatment of Chronic Pain and Insomnia (1996), following an extensive literature search, concluded, “The evidence supporting the effectiveness of hypnosis in alleviating chronic pain associated with cancer seems strong” (p. 315). Hypnosis is also well established as a treatment for managing nausea and vomiting associated with chemotherapy (Liossi & White, 2001; Syrjala, Cummings, & Donaldson, 1992; Walker, 1998; Walker et al., 1999; Zeltzer, Dolgin, LeBaron, & LeBaron, 1991; Zeltzer, LeBaron, & Zeltzer, 1984). A large body of controlled research has also documented the effectiveness of hypnosis in the treatment of headache and migraine (Hammond, 2007a).

Irritable bowel and inflammatory bowel disease

There is strong research support for the efficacy of hypnosis with irritable bowel syndrome (IBS) and inflammatory bowel disease (IBD). Whorwell, Prior, and Faragher (1984) found long-term follow-up rates of 95% success with classical, refractory IBS cases (in individuals who had previously failed with an average of six types of treatment), and this work was replicated by Galovski and Blanchard (1999). In this study, 82% of hypnotically treated patients improved (and 27% were symptom free), compared to 0% control patients, and when the wait-list patients crossed over to hypnotic treatment 67% of them significantly improved. On two-month follow-up, the effects of treatment were relatively enduring.

Many others have replicated this work with IBS (see a review in Palsson, 2015), and some have found encouraging results with ulcerative colitis and other gastrointestinal disorders. In a carefully controlled study of duodenal ulcer patients, with a one-year follow-up, Colgan, Faragher, and Whorwell (1988) found that 100% of control patients (who received medication until after ulcers were healed) had relapsed, in comparison with only 53% who had been taught self-hypnosis.

Hypnosis with anxiety, post-traumatic stress disorder, and depression

In one study, hypnotic cognitive behavior therapy (CBT) was found to produce significantly greater improvements in depression and anxiety than CBT alone (Alladin & Alibhai, 2007). Another study (Schoenberger, Kirsch, Gearan, & Montgomery, 1997) examined the effects of a multidimensional cognitive behavioral treatment of anxiety for public speaking compared with the same treatment but with the exception that the relaxation training was referred to as a "hypnotic induction" and automatic thoughts were referred to as "self-suggestions" (although some explicit hypnotic suggestions for improvement were also added). Other than labeling the procedure as hypnotic and adding hypnotic suggestions for improvement, the two procedures were identical. Subjects in both conditions improved more than wait-list control subjects. However, labeling the treatment as hypnosis (and adding a few suggestions) appeared to mildly improve the treatment effectiveness (effect size .4). Similar results with labeling CBT procedures as hypnosis have also been found in relation to medical procedures (Kirsch, Montgomery, & Sapirstein, 1995) and acupuncture (Li et al., 2002; Zeltzer et al., 2002). Other studies of hypnosis with anxiety have documented improvements comparable to or superior to behavior therapy (Forbes & Pekala, 1993; O'Neill, Barnier, & McConkey, 1999) and meditation (Benson et al., 1978), and with patients with anxiety who have traumatic brain injuries, stroke, or multiple sclerosis (Sapp, 1992), and test anxiety (Schreiber, 1997; Stanton, 1994).

Autogenic training (a structured German form of self-hypnosis training) has likewise demonstrated anxiety reduction effects (DeBenedittis, Cigada, & Bianchi, 1994; Hippel,

Hole, & Kaschka, 2001; Houghton, 1996; Kanji, White, & Ernest, 2004). There are also sophisticated research studies demonstrating positive effects of hypnosis on immune function, and these studies have also included measures documenting significant decreases in anxiety (Gruzelier et al., 2002; Gruzelier, Smith, Nagy, & Henderson, 2001; Kiecolt-Glaser, Marucha, Atkinson, & Glaser, 2001; Whitehouse et al., 1996). The results provide encouraging evidence that hypnotic interventions may reduce the immunological dysregulation associated with acute stressors.

Efficacy of hypnosis with other conditions

In controlled studies, hypnosis has been documented to be valuable in obstetrics and gynecology (e.g., Brann & Guzvica, 1987; Freeman, MacCauley, Eve, & Chamberlain, 1986; Harmon, Hynan, & Tyre, 1990; Jenkins & Pritchard, 1993; Mairs, 1995; Martin, Schauble, Rai, & Curry, 2001), including reducing hyperemesis gravidarum with good to excellent results more than 80% of the time (Fuchs, Paldi, Abramovici, & Peretz, 1980) and improving more than medication treatment with premature labor (Omer, 1987; Omer, Friedlander, & Palti, 1986). Hypnosis has proven effective with dermatologic and allergic disorders (e.g., Ben-Zvi, Spohn, Young, & Kattan, 1982; Castes et al., 1999; Ewer & Stewart, 1986; Inoue, Kobayashi, & Chiba, 1995; Kohen, 1986; Kotses, Rawson, Wigal, & Creer, 1987; Morrison, 1988; Murphy et al., 1989; Pastorello, 1987; Pastorello et al., 1987; Research Committee of the British Tuberculosis Society, 1968; Spanos, Stenstrom, & Johnston, 1988; Spanos, Williams, & Gwynn, 1990; Tausk & Whitmore, 1999; Zachariae, Oster, Bjerring, & Kragballe, 1996).

Selecting Hypnosis or Neurofeedback As the Intervention of Choice

Both clinical hypnosis and neurofeedback offer powerful therapeutic opportunities. In this section, I explain my personal decision tree for selecting interventions and my rationale. First, I use what I have called my "law of parsimony" (Hammond, 1990), which is applicable whether it is applied to hypnosis or neurofeedback: Use the least complex intervention to get the job done. Thus, with hypnosis, I may begin by using a suggestive hypnotic approach for one to three sessions. If the patient seems very responsive to hypnosis, but change is not occurring, then we may shift to a more insight-oriented, exploratory hypnotic approach (e.g., Hammond, 1998). Similarly, with neurofeedback interventions I prefer to initially use the least complex neurofeedback approach and shift to more complex neurofeedback methods only when the less complex approach is not yielding dividends.

In choosing between hypnosis and neurofeedback, it is important to consider the preferences and expectations of patients. Initial predispositions or expectations for what treatment approach patients believe will be the most successful have long been shown to

be related to dropout rates in therapy (e.g., Arnoff, Glass, Shea, McKain, & Sydnor-Greenberg, 1987; Garfield & Wolpin, 1963; Heine, 1962; Heine & Trosman, 1960; Kupst & Schulman, 1979; Overall & Aronson, 1962), especially in the early stages of treatment. Once the therapeutic alliance is established, initial expectations may become less important. As Arnold Lazarus (1971) suggested, "It is usually bad therapeutic practice to argue and try and sell one's own therapeutic system in place of that which the patient believes can best help" (p. 43).

A treatment approach that has credibility to the patient and is congruent with his or her perception of the causes of the problem will have the greatest probability of success, particularly when the patient's expectations and perceptions are strongly held. Matching the patient's expectations and preferences is very congruent with Erickson's (1959) utilization philosophy. Therefore, with hypnosis, if the patient strongly believes that unconscious factors are the cause of the problem, modify your approach and begin with an insight-oriented hypnotic technique. Some very rational and scientifically minded patients find neurofeedback and brain mapping appealing—especially when they have read about brain-based treatment approaches or have friends who have experienced positive improvements from neurofeedback. Other patients will come with positive expectations of hypnosis, and that may be the initial intervention used—unless the presenting problem has no research support.

Another time-honored alternative to meeting initial patient expectations is to determine how effective it may be to structure (Orlinsky & Howard, 1986; Wolberg, 1967) or modify initial expectations, especially when they are not firmly held. One method for doing this is to treat client and therapist beliefs as "hypotheses" to be tested, thus avoiding fruitless argument (Kirsch, 1990). When expectations are held more strongly by the patient and are contrary to the clinician's best judgment, the clinician may suggest,

> If your hypothesis is correct, then doing *x* should be effective. I think that's entirely possible, so let's proceed on that assumption, because we're often the world's authority on ourselves. However, it is possible that *y* may be occurring, and *z* will be necessary to bring about change. We'll just have to find out. I'll respect your opinion about that and suggest that we may begin by doing *x*, but if that isn't effective, I'd suggest we do *z*. How does that sound to you?

This approach also seems appropriate given research suggesting that allowing patients the freedom of choice to select a treatment enhances positive outcomes (e.g., Devine & Fernald, 1973; Gordon, 1976; Kanfer & Grimm, 1978).

In light of the research evidence reviewed earlier, if I am working with pain, headache, or cancer patients, or preparing patients for surgery, I choose hypnosis as my first intervention. On the other hand, if a patient has mental fogginess and cognitive slowing following chemotherapy or radiation, neurofeedback is recommended (Alvarez, Meyer, Granoff, & Lundy, 2013). The author prefers to use hypnosis as the initial intervention with presenting

problems of stress or generalized anxiety that are not too severe or chronic, as well as with insomnia, irritable bowel syndrome, allergic responses, habit disorders, asthma, hyperemesis gravidarum, preterm labor, preparation for childbirth, for influencing blood flow in hemophilia, or dermatologic conditions (e.g., pruritis, warts, dermatitis).

On the other hand, neurofeedback is my treatment of choice when I want to improve cognitive dysfunction after stroke, uncontrolled epilepsy, head injuries, ADD/ADHD, learning disabilities, autism spectrum problems, alcoholism, substance abuse, depression, obsessive-compulsive disorder, or cognitive decline associated with aging. There are also many cases in which I may utilize a combination of hypnosis and neurofeedback, for example, with peak performance training, chronic depression, and to teach self-calming with uncontrolled epilepsy. In cases where hypnosis has produced only partial improvement (e.g., with anxiety, headache, insomnia), then neurofeedback is added. Patients with fibromyalgia or chronic fatigue often benefit from brief self-hypnosis training followed by neurofeedback.

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