

MULTIPLE SCLEROSIS

In-depth Studies have been performed into Multiple Sclerosis, providing indications which support the therapeutic use of Pulsing Electromagnetic Field Therapy across many elements of the disease:

- MRI Scan Shows Significant Recovery
- Progressive Cognitive Improvement
- Positive Therapeutic Effects on MS Patients
- Carbohydrate Craving Attenuation
- Improved Depth Perception
- Recovery from MS-induced Fatigue
- Resolution of Lhermitte's Sign in MS Sufferers
- Reversal of Long-term Clinical Course (Chronic MS)
- Resolution of Sleep Paralysis
- Rapid Vision Improvement

Literature:

Therapeutic effects of alternating current pulsed electromagnetic fields in multiple sclerosis.

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Multiple sclerosis is the third most common cause of severe disability in patients between the ages of 15 and 50 years. The cause of the disease and its pathogenesis remain unknown. The last 20 years have seen only meager advances in the development of effective treatments for the disease. No specific treatment modality can cure the disease or alter its long-term course and eventual outcome. Moreover, there are no agents or treatments that will restore premorbid neuronal function. A host of biological phenomena associated with the disease involving interactions among genetic, environmental, immunologic, and hormonal factors, cannot be explained on the basis of demyelination alone and therefore require refocusing attention on alternative explanations, one of which implicates the pineal gland as pivotal. The pineal gland functions as a magnetoreceptor organ. This biological property of the gland provided the impetus for the development of a novel and highly effective therapeutic modality, which involves transcranial applications of alternating current (AC) pulsed electromagnetic fields in the picotesla flux density. This review summarizes recent clinical work on the effects of transcranially applied pulsed electromagnetic fields for the symptomatic treatment of the disease.

J Altern Complement Med 1997;3(4):365-386
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Lack of a Correlation between Demyelinating Plaques on MRI Scan and Clinical Recovery in Multiple Sclerosis by Treatment with Electromagnetic Fields.

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A 50 year-old woman presented in January of 1995 with a prolonged history of symptoms of multiple sclerosis (MS) and was classified at the time with a remitting-progressive course. Her chief symptoms included slurring of speech, impairment of vision with intermittent diplopia, difficulties with gait and balance with spastic-ataxic gait, mental depression, insomnia, fatigue, impaired cognitive functions notably poor short term memory and recurrent urinary tract and sinus infections.

An MRI scan showed multiple nodular demyelinating lesions scattered in the subcortical white matter and periventricularly of both cerebral hemispheres. Over the following 18 months, while receiving three treatment sessions per week with electro-magnetic fields (EMFs) which were applied extra-cranially, she showed a significant recovery in both physical and mental symptoms and additionally experienced decreased susceptibility to infections.

In addition, the course of her disease appeared to have stabilized as opposed to the preceding 5 years during which time she experienced insidious, steady deterioration in her functioning. Despite this remarkable clinical recovery through the application of EMFs, and MRI scan obtained at the same diagnostic center 18 months after initiation of treatment with EMFs showed no changes in the number and size of the demyelinating plaques.

These findings demonstrate lack of a correlation between recovery of symptoms and the number and extent of demyelinating plaques on MRI scan. It has been known since the days of Charcot in the latter half of the 19th century that in MS there is a great disparity between the histopathological changes of the disease and neurologic deficits.

This report enhances the notion that demyelination may reflect an epiphenomenon of the disease.

PMID: 9134446 [PubMed - indexed for MEDLINE]

Double-blind study of pulsing magnetic field effects on multiple sclerosis.

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We performed a double-blind study to measure the clinical and sub-clinical effects of an alternative medicine electromagnetic device on disease activity in multiple sclerosis (MS). The MS patients were exposed to a magnetic pulsing device where the frequency of the magnetic pulse was in the 4-13 Hz range (50-100 milliGauss). A total of 30 MS patients wore the device on pre-selected sites between 10 and 24 hours a day for 2 months. Half of the patients (15) randomly received a device that was magnetically inactive and the other half received an active device. Each MS patient received a set of tests to evaluate MS disease status before and after wearing the device. The tests included (1) a clinical rating (Kurtzke, EDSS), (2) patient-reported performance scales, and (3) quantitative electro-encephalography (QEEG) during a language task. Although there was no significant change between pretreatment and post-treatment in the EDSS scale, there was a significant improvement in the performance scale (PS) combined rating for bladder control, cognitive function, fatigue level, mobility, spasticity, and vision (active group -3.83 +/- 1.08, $p < 0.005$; placebo group -0.17 +/- 1.07, change in PS scale). There was also a significant change between pre-treatment and post-treatment in alpha EEG magnitude

during the language task recorded at various electrode sites on the left side. In this double-blind, placebo-controlled study, we have demonstrated a statistically significant effect of the magnetic pulsing device on patient performance scales and on alpha EEG magnitude during a language task.

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Progressive Cognitive Improvement in Multiple Sclerosis from Treatment with Electromagnetic Fields.

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It has long been recognized that cognitive impairment occurs in patients with multiple sclerosis (MS) particularly among patients with a chronic progressive course. MS is considered a type of "subcortical dementia" in which cognitive and behavioral abnormalities resemble those observed in patients with a frontal lobe syndrome.

The Bicycle Drawing Test is employed for the neuropsychological assessment of cognitive impairment specifically that of mechanical reasoning and visuographic functioning. It also provides clues concerning the patient's organizational skills which are subserved by the frontal lobes. Extracerebral pulsed applications of picotesla flux intensity electromagnetic fields (EMFs) have been shown to improve cognitive functions in patients with MS.

I present three patients with long standing symptoms of MS who, on the initial baseline, pretreatment Bicycle Drawing Test, exhibited cognitive impairment manifested by omissions of essential details and deficient organizational skills.

All patients demonstrated progressive improvement in their performance during treatment with EMFs lasting from 6-18 months. The improvement in cognitive functions, which occurred during the initial phases of the treatment, was striking for the changes in organizational skills reflecting frontal lobe functions.

These findings demonstrate that progressive recovery of cognitive functions in MS patients are observed over time through continued administration of EMF flux intensity.

It is believed that the beneficial cognitive effects of these EMFs are related to increased synaptic neurotransmission and that the progressive cognitive improvement noted in these patients is associated with slow recovery of synaptic functions in monoaminergic neurons of the frontal lobe or its projections from subcortical areas.

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Pulsing magnetic field effects on brain electrical activity in multiple sclerosis

Richards TL, Acosta-Urquidi, J

Multiple sclerosis (MS) is a disease of the central nervous system. Clinical symptoms include central fatigue, impaired bladder control, muscle weakness, sensory deficits, impaired cognition, and others. The cause of MS is unknown, but from histologic, immunologic, and radiologic studies, we know that there are demyelinated brain lesions (visible on magnetic resonance images) that contain immune cells such as macrophages and T-cells (visible on microscopic analysis of brain sections). Recently, a histologic study has also shown that widespread axonal damage occurs in MS along with demyelination. What is the possible connection between MS and bio-electromagnetic fields? We recently published a review entitled "Bio-electromagnetic applications for multiple sclerosis," which examined several scientific studies that demonstrated the effects of electromagnetic fields on nerve regeneration, brain electrical activity (electroencephalography), neurochemistry, and immune system components. All of these effects are important for disease pathology and clinical symptoms in multiple sclerosis (MS). EEG was measured in this study in order to test our hypothesis that the pulsing magnetic device affects the brain electrical activity, and that this may be a mechanism for the effect we have observed on patient-reported symptoms. The EEG data reported previously were measured only during resting and language conditions. The purpose of the current study was to measure the effect of the electromagnetic device on EEG activity during and after photic stimulation with flashing lights. After photic stimulation, there was a statistically significant increase in alpha EEG magnitude that was greater in the active group compared to the placebo group in electrode positions P3, T5, and O1 (analysis of variance $p < .001$, $F = 14$, $DF = 1, 16$). In the comparison between active versus placebo, changes measured from three electrode positions were statistically significantly even after multiple comparison correction.

In Biologic Effects of Light 1998 Symposium, Eds Holick MF, Jung EG, Kluwer Academic Publishers: Boston, pg. 337-342, 1999
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Treatment with electromagnetic field alters the clinical course of chronic progressive multiple sclerosis--a case report.

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It is estimated that 10-20% of patients with multiple sclerosis (MS) have a chronic progressive (CP) course characterized by an insidious of neurological deficits followed by steady progression of disability in the absence of symptomatic remission. No therapeutic modality has shown specific efficacy in the treatment of patients with CP MS and there are no data to indicate that any pharmacologic or other modality alters the clinical course of CP MS. Treatment with picotesla electromagnetic fields (EMFs) is a highly effective modality for the symptomatic management of MS including the chronic progressive form. In addition, this treatment also appears to alter the natural course of the disease in CP patients. A 36 year-old man experienced, at the age of 31, insidious weakness in the legs and several months later developed difficulties with balance with ataxia of gait. His gait abnormality progressed slowly over the following years and at the age of 35 he was severely disabled with spastic paraparesis and ataxia using a rolling walker for ambulation and a scooter for longer distances. In particular, his disability had progressed rapidly over the six months preceding the initiation of treatment with EMFs. He as classified have CP MS and his prognosis was considered extremely unfavorable due to the

degree of cerebellar and pyramidal tract involvement and the rapid course of deterioration. In July 1995 the patient began experimental treatment with EMFs. While receiving three treatment sessions a week over 12 months he experienced improvement in cerebellar functions such as gait, balance and tremor as well as bowel and bladder functions, mood, sleep and cognitive function and resolution of diplopia, blurring of vision, dysarthria, paresthesias in the hands, and fatigue. Most remarkably, there was no further progression of the disease during the course of magnetic therapy. This case illustrated that treatment with EMFs, in addition to producing symptomatic improvement, also reverses the clinical course of CP MS.

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Treatment with weak electromagnetic fields improves fatigue associated with multiple sclerosis.

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It is estimated that 75-90% of patients with multiple sclerosis (MS) experience fatigue at some point during the course of the disease and that in about half of these patients, subjective fatigue is a primary complaint. In the majority of patients fatigue is present throughout the course of the day being most prominent in the mid to late afternoon. Sleepiness is not prominent, but patients report that rest may attenuate fatigability. The pathophysiology of the fatigue of MS remains unknown. Delayed impulse conduction in demyelinated zones may render transmission in the brainstem reticular formation less effective. In addition, the observation that rest may restore energy and that administration of pemoline and amantadine, which increase the synthesis and release of monoamines, often improve the fatigue of MS suggest that depletion of neurotransmitter stores in damaged neurons may contribute significantly to the development of fatigue in these patients. The present report concerns three MS patients who experienced over several years continuous and debilitating fatigue throughout the course of the day. Fatigue was exacerbated by increased physical activity and was not improved by rest. After receiving a course of treatments with picotesla flux electromagnetic fields (EMFs), which were applied extracranially, all patients experienced improvement in fatigue. Remarkably, patients noted that several months after initiation of treatment with EMFs they were able to recover, after a short period of rest, from fatigue which followed increased physical activity. These observations suggest that replenishment of monoamine stores in neurons damaged by demyelination in the brainstem reticular formation by periodic applications of picotesla flux intensity EMFs may lead to more effective impulse conduction and thus to improvement in fatigue including rapid recovery of fatigue after rest.

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Impairment of depth perception in multiple sclerosis is improved by treatment with AC pulsed electromagnetic fields.

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Multiple sclerosis (MS) is associated with postural instability and an increased risk of falling which is facilitated by a variety of factors including diminished visual acuity, diplopia, ataxia, apraxia of gait, and peripheral neuropathy. Deficient binocular depth perception may also contribute to a higher incidence of postural instability and falling in these patients who, for example, find it an extremely difficult task to walk on uneven ground, over curbs, or up and down steps. I report a 51 year old woman with secondary progressive MS who experienced difficulties with binocular depth perception resulting in frequent falls and injuries. Deficient depth perception was demonstrated also on spontaneous drawing of a cube. Following a series of transcranial treatments with AC pulsed electromagnetic fields (EMFs) of 7,5 picotesla flux density, the patient experienced a major improvement in depth perception which was evident particularly on ascending and descending stairs. These clinical changes were associated with an improvement in spatial organization and depth perception on drawing a cube. These findings suggest that in MS impairment of depth perception, which is encoded in the primary visual cortex (area 17) and visual association cortex (areas 18 and 19), may be improved by administration of AC pulsed EMFs of picotesla flux density. The primary visual cortex is densely innervated by serotonergic neurons which modulate visual information processing. Cerebral serotonin concentrations are diminished in MS patients and at least some aspects of deficient depth perception in MS may be related to dysfunction of serotonergic transmission in the primary visual cortex. It is suggested that transcranial AC pulsed applications of EMFs improve depth perception partly by augmenting serotonergic transmission in the visual cortex.

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Immediate recovery of cognitive functions and resolution of fatigue by treatment with weak electromagnetic fields in a patient with multiple sclerosis.

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Cognitive deficits are common among patients with multiple sclerosis (MS). The pathogenetic mechanisms underlying the cognitive impairment in MS are unknown and there is presently no effective therapeutic modality which has shown efficacy in improving cognitive deficits in MS. A 53 year old college professor with a long history of secondary progressive MS experienced, over the preceding year, noticeable deterioration in cognitive functions with difficulties in short and long term memory, word finding in spontaneous speech, attention and concentration span. Unable to pursue his academic activities, he was considering early retirement. Mental examination disclosed features of subcortical and cortical dementia involving frontal lobe, left hemispheric and right hemispheric dysfunction. Almost immediately following the extracerebral application of AC pulsed electromagnetic fields (EMFs) of 7.5 picotesla intensity and a 4-Hz sinusoidal wave, the patient experienced a heightend sense of well being, which he defined as enhancement of cognitive functions with a feeling "like a cloud lifted off my head." He reported heightend clarity of thinking and during the application of EMFs he felt that words were formed faster and he experienced no difficulty finding the appropriate words. His speech was stronger and well modulated and he felt "energized" with resolution of his fatigue. There was improvement in manual dexterity and handwriting and testing of constructional praxis

demonstrated improvement in visuospatial, visuoperceptive and visuomotor functions. It is suggested that some of the cognitive deficits associated with MS, which are caused by synaptic disruption of neurotransmitter functions, may be reversed through pulsed applications of picotesla range EMFs.

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Resolution of Lhermitte's Sign in Multiple Sclerosis by Treatment with Weak Electromagnetic Fields.

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Lhermitte's sign, the occurrence of an electrical sensation passing down the back to the legs on flexion of the neck is a common and characteristic feature of multiple sclerosis (MS) which is related to spinal cord lesions affecting the posterior columns and cervical nerve roots.

The Lhermitte's sign, which has been reported to occur at some time in up to 25% of MS patients, is seldom painful but is often a cause of distress to the patient and usually a marker of increased disease activity.

Treatment with extracranial picotesla range pulsed electromagnetic fields (EMFs) has been found efficacious in the management of various MS symptoms including pain syndromes.

The present communication concerns three MS patients in whom two brief applications of EMFs resulted in resolution of the Lhermitte's sign which emerged during a period of exacerbation of symptoms in one patient and during a prolonged phase of symptom deterioration in the other two patients.

As the cause of the Lhermitte's sign is thought to result from the spread of ectopic excitation in demyelinated plaques in the cervical and thoracic regions of the spinal cord, it is hypothesized that the effects of EMFs are related to the reduction of axonal excitability via a mechanism involving changes in ionic membrane permeability.

A systemic effect on pain control systems is also postulated to occur secondary to the effects of EMFs on neurotransmitter activity and pineal melatonin functions.

This report underscores the efficacy of EMFs in the management of paroxysmal pain symptoms in MS.

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Treatment with electromagnetic fields reverses the long-term clinical course of a patient with chronic progressive multiple sclerosis.

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It is estimated that 10-20% of patients with multiple sclerosis (MS) have a chronic progressive (CP) course characterized by an insidious onset of neurological deficits followed by steady progression of disability in the absence of symptomatic remission. To date no therapeutic modality has proven effective in reversing the clinical course of CP MS although there are

indications that prolonged treatment with picotesla electromagnetic fields (EMFs) alters the clinical course of patients with CP MS. A 40 year-old woman presented in December of 1992 with CP MS with symptoms of spastic paraplegia, loss of trunk control, marked weakness of the upper limbs with loss of fine and gross motor hand functions, severe fatigue, cognitive deficits, mental depression, and autonomic dysfunction with neurogenic bladder and bowel incontinence. Her symptoms began at the age of 18 with weakness of the right leg and fatigue with long distance walking and over the ensuing years she experienced steady deterioration of functions. In 1985 she became wheelchair dependent and it was anticipated that within 1-2 years she would become functionally quadriplegic. In December of 1992 she began experimental treatment with EMFs. While receiving regularly weekly transcortical treatments with AC pulsed EMFs in the picotesla range intensity she experienced during the first year improvement in mental functions, return of strength in the upper extremities, and recovery of trunk control. During the second year she experienced the return of more hip functions and recovery of motor functions began in her legs. For the first time in years she can now initiate dorsiflexion of her ankles and actively extend her knees voluntarily. Over the past year she started to show signs of redevelopment of reciprocal gait. Presently, with enough function restored in her legs, she is learning to walk with a walker and is able to stand unassisted and maintain her balance for a few minutes. She also regained about 80% of functions in the upper limbs and hands. Most remarkably, there was no further progression of the disease during the 4 years course of magnetic therapy. This patient's clinical recovery cannot be explained on the basis of a spontaneous remission. It is suggested that pulsed applications of picotesla EMFs affect the neurobiological and immunological mechanisms underlying the pathogenesis of CP MS.

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Resolution of sleep paralysis by weak electromagnetic fields in a patient with multiple sclerosis.

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Sleep paralysis refers to episodes of inability to move during the onset of sleep or more commonly upon awakening. Patients often describe the sensation of struggling to move and may experience simultaneous frightening vivid hallucinations and dreams. Sleep paralysis and other manifestations of dissociated states of wakefulness and sleep, which reflect deficient monoaminergic regulation of neural modulators of REM sleep, have been reported in patients with multiple sclerosis (MS). A 40 year old woman with remitting-progressive multiple sclerosis (MS) experienced episodes of sleep paralysis since the age of 16, four years prior to the onset of her neurological symptoms. Episodes of sleep paralysis, which manifested at a frequency of about once a week, occurred only upon awakening in the morning and were considered by the patient as a most terrifying experience. Periods of mental stress, sleep deprivation, physical fatigue and exacerbation of MS symptoms appeared to enhance the occurrence of sleep paralysis. In July of 1992 the patient began experimental treatment with AC pulsed applications of picotesla intensity electromagnetic fields (EMFs) of 5Hz frequency which were applied extracerebrally 1-2 times per week. During the course of treatment with EMFs the patient made a dramatic recovery of symptoms with improvement in vision, mobility, balance, bladder control, fatigue and short term memory. In addition, her baseline pattern reversal visual evoked potential

studies, which showed abnormally prolonged latencies in both eyes, normalized 3 weeks after the initiation of magnetic therapy and remained normal more than 2.5 years later. Since the introduction of magnetic therapy episodes of sleep paralysis gradually diminished and abated completely over the past 3 years. This report suggests that MS may be associated with deficient REM sleep inhibitory neural mechanisms leading to sleep paralysis secondary to the intrusion of REM sleep atonia and dream imagery into the waking state. Pineal melatonin and monoaminergic neurons have been implicated in the induction and maintenance of REM sleep and the pathogenesis of sleep paralysis and it is suggested that resolution of sleep paralysis in this patient by AC pulsed applications of EMFs was related to enhancement of melatonin circadian rhythms and cerebral serotonergic neurotransmission.

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