Eductor has a 2nd + 3rd Wave form Generator

With Quantum Biofeedback We can Deepen Meditation by Using ETM which is Electro-Transcendental Meditation. People can Attain Faster Results with More Mental Control, Less Effort, Relaxed Peace and Aware Enthusiasm
The SC10/Eductor can make the meditation and Enlightenment Process much easier.
Transcendental Meditation Scientifically Proven To Prevent Disease

Josh Richardson, Prevent Disease Waking Times

More than 350 peer-reviewed research studies on the Transcendental Meditation (TM) technique have been published in over 160 scientific journals. It increases cardiovascular quality, lowers blood pressure, decreases anxiety and among quantum physicists is considered the fourth state of consciousness in which the entire brain is engaged.

Published research has demonstrated that the practice of regular meditation can increase brain density, boost connections between neurons, decrease symptoms of depression and anxiety, provide clarity of thought, and increase positive mood endorphins. Other published studies have shown meditation can improve physical functioning, decrease chronic disease risks, and enhance overall quality of life.

In a 2008 study published in the journal PloS One, researchers found that when meditators heard the sounds of people suffering, they had stronger activation levels in their temporal parietal junctures, a part of the brain tied to empathy, than people who did not meditate.

*This is a small segment of actor/comedian Russell Brand’s interview with renowned quantum physicist Dr. John Hagelin at the David Lynch Foundation’s 3rd annual Change Begins Within gala in Los Angeles. They discuss the science behind the Transcendental Meditation technique, the Unified Field.*

Most of scientific studies on TM were conducted at many US and international universities and research centers, including Harvard Medical School, Stanford Medical School, Yale Medical School, and UCLA Medical School.

**Cardiovascular**

On November 2012, a journal of the American Heart Association: 5-year randomized controlled study on patients with established coronary heart disease reported a 48% reduction in death, heart attack, and stroke in subjects in the TM group compared to controls.

**Hypertension**

June 2013, American Heart Association scientific statement, concluded that the TM technique is the only meditation practice that has been shown to lower blood pressure and recommends that TM may be considered in clinical practice for the prevention and treatment of hypertension.
Anxiety

October 2013: Meta-analysis of randomized controlled trials (RCTs) in The Journal of Alternative and Complementary Medicine, found significantly greater effect of TM in reducing trait anxiety than treatment-as-usual and other alternative treatments, including mindfulness-based therapy (MBT) and other meditation and relaxation practices.

According to a report published in the Journal of Alternative and Complementary Medicine, a meta-analysis of TM analyzed 16 trials and 1,295 participants. The conclusion was that TM worked better in reducing severe anxiety than psychotherapy or other relaxation techniques… As a bonus, TM also produced lower blood pressure, better sleep, improved family life, less substance abuse and a better employment situation.

These are just a few of hundreds of studies now showing the effectiveness of TM. It can make your life much more enjoyable and balanced. Many people say this easy-to-practice technique has a transforming effect — they report major health benefits.

It’s a simple, natural technique practiced 20 minutes twice each day while sitting comfortably with the eyes closed.

The TM technique is easy to learn and enjoyable to practice, and is not a religion, philosophy, or lifestyle. Over six million people have learned it — people of all ages, cultures, and religions.

Unlike other forms of meditation, TM practice involves no concentration, no control of the mind, no contemplation, no monitoring of thoughts.

The TM technique allows your mind to easily settle inward, through quieter levels of thought, until you experience the most silent and peaceful level of your own awareness — pure consciousness. This is known as automatic self-transcending.
Effects of cranial electrotherapy stimulation on resting state brain activity

Jamie D Feusner,1 Sarah Madsen,1 Teena D Moody,1 Cara Bohon,1 Emily Hembacher,2 Susan Y Bookheimer,3 and Alexander Bystritsky1

Abstract

Cranial electrotherapy stimulation (CES) is a U.S. Food and Drug Administration (FDA)-approved treatment for insomnia, depression, and anxiety consisting of pulsed, low-intensity current applied to the earlobes or scalp. Despite empirical evidence of clinical efficacy, its mechanism of action is largely unknown. The goal was to characterize the acute effects of CES on resting state brain activity. Our primary hypothesis was that CES would result in deactivation in cortical and subcortical regions. Eleven healthy controls were administered CES applied to the earlobes at subsensory thresholds while being scanned with functional magnetic resonance imaging in the resting state. We tested 0.5- and 100-Hz stimulation, using blocks of 22 sec “on” alternating with 22 sec of baseline (device was “off”). The primary outcome measure was differences in blood oxygen level dependent data associated with the device being on versus baseline. The secondary outcome measures were the effects of stimulation on connectivity within the default mode, sensorimotor, and fronto-parietal networks. Both 0.5- and 100-Hz stimulation resulted in significant deactivation in midline frontal and parietal regions. 100-Hz stimulation was associated with both increases and decreases in connectivity within the default mode network (DMN). Results suggest that CES causes cortical brain deactivation, with a similar pattern for high- and low-frequency stimulation, and alters connectivity in the DMN. These effects may result from interference from high- or low-frequency noise. Small perturbations of brain oscillations may therefore have significant effects on normal resting state brain activity. These results provide insight into the mechanism of action of CES, and may assist in the future development of optimal parameters for effective treatment.
**Keywords:** CES, default mode network, fMRI, fronto-parietal network, intrinsic connectivity networks, sensorimotor network

**Introduction**

Cranial electrotherapy stimulation (CES) is a noninvasive therapeutic device that applies pulsed, alternating microcurrent (<1000 μA) transcutaneously to the head via electrodes placed on the earlobes, mastoid processes, zygomatic arches, or the maxillo-occipital junction. The U.S. Food and Drug Administration (FDA) granted approval in 1979 for CES for the treatment of insomnia, depression, and anxiety, and it is commercially available for personal use. Controlled studies provide evidence that CES is effective for anxiety, headaches, fibromyalgia, smoking cessation, drug withdrawal symptoms, and (in some but not all studies) pain (see Bianco 1994; Klawansky et al. 1995; Kirsch 1996; DeFelice 1997; Gilula 2007; O’Connell et al. 2010 for review and meta-analyses). The majority of controlled studies have evaluated the efficacy of CES for treatment of anxiety, although most were performed in nonclinical samples (Klawansky et al. 1995; DeFelice 1997). However, in a six-week open-label pilot study of treatment of individuals with generalized anxiety disorder (GAD), CES applied to the earlobes was found to reduce symptoms of GAD, as demonstrated by a significant mean 40.4% decrease in Hamilton Anxiety Rating Scale scores at endpoint compared to baseline (Bystritsky et al. 2008).

Despite empirical evidence for treatment efficacy for these syndromes, skepticism remains as to how application of microcurrent to the earlobes or scalp could effect these clinical changes, likely because of the dearth of studies of its mechanism. As brain stimulation techniques increasingly hold promise for treatment of neurological and psychiatric disorders (George et al. 2007), better understanding of their mechanisms of action is crucial to further improve their efficacy, develop new technologies, and evaluate their safety.

It remains unclear how the electrical current from CES may alter brain activity. Forty-two to 46% of the applied CES current enters the brain, with the highest levels of current recorded in the thalamus (Rush and Driscoll 1968; Jarzembski and Sances 1970). One theory suggests that the cranial alternating current (AC) stimulation interferes with ongoing brain wave oscillations by introducing cortical noise (Zaghi et al. 2009). In vitro studies of rat brain slices show that high-frequency (50–200 Hz) sinusoidal AC stimulation suppresses activity in cell bodies and axons (Jensen and Durand 2007). Perhaps the most investigated effects to date of CES have come from electroencephalographic (EEG) studies, which have found recordings to be altered during and after treatment with CES. Alpha EEG waves were slowed following CES in monkeys, and this change was associated with a reduction in adverse reactions to stressful stimuli (Jarzembski 1985). Applying CES at 0.5- and 100-Hz with simultaneous EEG resulted in a downward shift in mean alpha frequency, with greater effect for 100-Hz stimulation (Schroeder and Barr 2001). CES also results in a decrease in alpha band median frequency and beta band power fraction (Itil et al. 1972). These changes are similar to EEG changes in trained meditators, and may be associated with a relaxed state (Banquet 1973). Although it remains unclear if these alterations in brain wave oscillation
patterns are a cause or effect of improved clinical states, pulsed current may interrupt nervous system function.

The goal of this study was to determine the immediate effects of CES stimulation on patterns of brain activity in the resting state, and on functional connectivity within intrinsic connectivity networks. This represents the first investigation of the direct effects of CES on brain activity using functional neuroimaging simultaneously with cranial stimulation. We hypothesized that CES would result in deactivation in cortical and subcortical (thalamic) regions, in line with evidence that stimulation interferes with oscillatory brain activity and is associated with reduction of brain wave frequencies (mean alpha power). We also predicted that 0.5- versus 100-Hz stimulation would result in different patterns. In addition, we hypothesized that stimulation would alter intrinsic connectivity networks such as the dorsal fronto-parietal network (FPN) ([Corbetta and Shulman 2002]) (due to evidence of improvements in attention with CES [Southworth 1999]), and the sensorimotor network (SMN) ([Mantini et al. 2007; Schopf et al. 2010]) (due to evidence of clinical efficacy for pain [Tan et al. 2011]). We also predicted it would alter connectivity within the default mode network (DMN), as the EEG beta band (which CES 100 Hz may affect [Schroeder and Barr 2001]) has been found to correlate with this network ([Mantini et al. 2007; Laufs 2008]).

Material and Methods

Participants

The UCLA Institutional Review Board approved the study protocol. Informed consent was obtained after the nature and possible consequences of the studies were explained.

Eleven healthy right-handed male and female participants aged 18–65 were recruited from the community. We administered the Mini International Neuropsychiatric Interview (MINI) ([Sheehan et al. 1998]) and excluded participants if they met Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for any Axis I psychiatric disorder including active substance abuse, and any participants whom the investigator judged were suicidal. Other exclusion criteria included any neurological disorders or any medical disorders that could affect cerebral metabolism. Participants were excluded if they were taking any psychotropic medications or any other medications with psychoactive properties. Pregnant or breastfeeding women and those of childbearing potential who were not practicing a reliable form of contraception were also excluded from the study. Due to constraints of magnetic resonance imaging (MRI) scanning, we excluded individuals who weighed greater than 280 lbs and those with implanted electronic devices or ferromagnetic materials.

CES device

We used the Alpha-Stim® 100 microcurrent and cranial electrotherapy stimulator for the experiment, provided by the manufacturer Electromedical Products, International (Mineral Wells, TX). The AlphaStim® 100 provides cranial electrical stimulation by generating
bipolar asymmetric rectangular waves with a frequency of 0.5, 1.5, or 100 Hz, and a current intensity that can be adjusted continuously to provide between 10 and 600 μA (http://www.alpha-stim.com). We tested 0.5- and 100-Hz pulse frequencies, as these are most commonly used in clinical treatment. For the purpose of the experiment, the manufacturer modified the device to automatically cycle between “on” blocks of 22 sec (specifically 10 sec on, then 2 sec off, then 10 sec on, due to constraints of the device) and “off” blocks of 22 sec. The device was connected via copper wires to adhesive nonferromagnetic electrodes (1.5-cm diameter contact area) that were placed on the participants’ right and left earlobes.

**Pre-MRI sensory threshold CES testing**

Participants received individualized subsensory current intensities to minimize the possibility that the current could be felt consciously in the scanner. This was done in order to avoid activation patterns associated with perception of stimulation, and also conforms to the way the device is used clinically. Testing was done using a forced-choice test outside of the scanner, to ensure that the participants could not guess if the device was on or off, at greater than chance level (see Supporting Information for details).

**CES safety testing in the MR environment**

Prior to the experiment, we tested the use of CES in the MRI scanner to ensure safety in terms of current, voltage, and temperature, and to verify that it did not produce any artifacts or field inhomogeneities in the MR image (see Supporting Information for details).

**Behavioral measurements**

To assess for any changes in anxiety related to CES stimulation, participants completed the state portion of the State-Trait Anxiety Inventory (STAI) (Spielberger et al. 1983) before and after the fMRI scan.

**fMRI**

Participants were positioned in the scanner and the electrodes were applied to their earlobes. These were connected via long copper wires to the CES device, which the investigator operated in the scanner control room. Participants were instructed to: “keep your eyes closed for the duration of the scan but try not to fall asleep. You do not have to think about anything in particular.” After the scan, they were informally questioned about whether they could feel the stimulation during the scan.

The experiment consisted of a blocked design in which six “on” blocks of 22 sec alternated with six “off” blocks of 22 sec. There was 37.5 sec of baseline prior to the “on” and “off” cycles, and 33.5 sec of baseline following it. The total duration of each experimental run was 5 min and 35 sec. Participants completed one run each of the 0.5- and 100-Hz pulse frequencies, the order of which was counterbalanced between participants. Although the investigator in the control room knew when the CES was cycling between “on” and “off” during the scan, the participants did not have any contact with him during each experimental
run, and therefore could not be influenced implicitly or explicitly by the investigator’s knowledge. In this way, a control condition was built into the experiment in which there were blocks when the CES was off, but the participants did not know when this was occurring.

We used a 3-Tesla Trio (Siemens) MRI scanner to evaluate BOLD contrast, using T2*-weighted echo planar imaging (EPI) gradient-echo pulse sequence (repetition time (TR) = 2.5 sec, echo time (TE) = 21 msec, flip angle = 75°, matrix = 64 × 64, field-of-view = 24 × 24 cm, in-plane voxel size 3.1 × 3.1 mm, slice thickness 3 mm, 1-mm intervening spaces, and 34 total slices). We obtained matched-bandwidth T2-weighted images for functional image registration. We also obtained higher resolution T1-weighted three-dimensional magnetic resonance images with 1-mm³ voxel size for each participant to provide detailed brain anatomy. For these, magnetization-prepared rapid gradient echo (MP-RAGE) sequences were used, with the parameters: TE = 2.26 msec, TR = 1900 msec, TI = 900 msec, flip angle = 9.00°, field-of-view = 240 × 256, matrix = 240 × 256, slice thickness = 1 mm, 176 slices.

Image processing included motion correction, skull stripping, spatial smoothing of 5-mm full-width/half-maximum Gaussian kernel, mean-based intensity normalization of all volumes by the same factor, and high-pass temporal filtering. We coregistered functional images of each participant to corresponding matched-bandwidth structural images in native space, then performed a second-stage registration to their MP-RAGE scans, and finally registered these to structural standard images, defined by the Montreal Neurological Institute averaged 152 standard brain. Registration to high-resolution and standard images was carried out using FLIRT (Jenkinson and Smith 2001; Jenkinson et al. 2002).

**Statistical analysis**

**Voxel-wise analysis**

For image analysis, we used FEAT software (FMRI Expert Analysis Tool) Version 5.98, part of the Oxford Centre for Functional Magnetic Resonance Imaging of the Brain Software Library (FSL), [http://www.fmrib.ox.ac.uk/fsl](http://www.fmrib.ox.ac.uk/fsl). FMRIB’s Improved Linear Model (FILM) was used for time-series statistical analysis, using local autocorrelation correction (Woolrich et al. 2001). We thresholded Z-statistic images using clusters determined by $Z > 2.3$ and a (corrected) cluster significance threshold of $P = 0.05$ (Worsley 2001).

For the first-level (individual subject) analysis, we modeled the hemodynamic response function using a convolution of the experimental paradigms of each “on” period versus baseline with the canonical hemodynamic response function and its temporal derivative (Aguirre et al. 1998). We analyzed the normalized data using regressors to model hemodynamic changes associated with the contrasts of “on” versus baseline for both the 0.5- and 100-Hz frequencies. For the “on” 22-sec blocks, we modeled only the two 10-sec periods that the device was actually on, and not the 2 sec intervening off period. The baseline consisted of the six “off” blocks plus the 33.5 sec of baseline at the end of the run. We tested both relative activation (modeled as “1”) and deactivation (modeled as “−1”). For the second-level (group) analysis, we combined data across participants using FLAME 1 + 2
(FMRIB’s Local Analysis of Mixed Effects) (Beckmann et al. 2003), with participant as the random factor. We additionally performed a contrast to compare activation associated with the 0.5- versus 100-Hz frequencies.

**Region-of-interest (ROI) analysis**

To test our hypothesis about the effect of CES on thalamic activity, we used an anatomical mask for the thalamus from the Harvard-Oxford subcortical probabilistic structural atlas supplied with FSL (50% probability mask). We calculated mean percent signal change in each region and compared “on” versus baseline using paired t-tests.

**Exploratory analysis with current intensity**

To investigate the relationship between stimulation current intensity and brain activation patterns, we used participants’ individualized current intensities (Table S1) as a regressor in the general linear model.

**“On” versus baseline block-by-block analysis**

To understand the reliability of the effects on brain activity of the device being “on” versus baseline, we analyzed the percentage BOLD signal change for each “on” block individually, averaged across the regions found to be significantly deactivated from the voxel-wise analysis. To reduce bias for this secondary analysis due to nonindependence, and as an internal cross-validation, we used a leave-one-subject-out (LOSO) method (Esterman et al. 2010) (Fig. S1, and see Supporting Information for methods).

**Psychophysiological interaction (PPI) analysis**

We investigated functional connectivity in three well-characterized resting state networks: the DMN (Shulman et al. 1997; Buckner et al. 2008), the SMN (Mantini et al. 2007), and the FPN (Sridharan et al. 2008; Spreng et al. 2010). To test how CES affects these networks, we used a psychophysiological interaction (PPI) analysis (Friston et al. 1997). A PPI analysis is a linear regression method that utilizes one regressor to represent the BOLD time course across the brain associated with activation of a seed region (the “physiological” regressor), one regressor that represents the brain activation associated with the device being “on” versus baseline (the “psychological” regressor), and one regressor that is the interaction of the previous two regressors. This third interaction regressor conceptually represents the regions of the brain for which there is increased functional connectivity with the seed region, specifically associated with CES being “on.”

We used a 4-mm sphere seed region in bilateral posterior cingulate gyrus (centered at Montreal Neurological Institute (MNI) coordinates −14, −56, 12 and 6, −56, 16—consistent with previous studies that identified DMN [De Luca et al. 2006; Uddin et al. 2009]). We used a seed region in bilateral postcentral gyrus (centered at MNI coordinates −29, −32, 57 and 33, −29, 56—consistent with a previous study that identified SMN [Mantini et al. 2007]). We used a seed region in the inferior parietal lobule (IPL) (centered at MNI coordinates 50, −45, 51 and −41, −57, 51—consistent with a previous study that identified FPN [Mantini et al. 2007]). To constrain our investigation to other nodes within each
network, we used masks created from the Harvard-Oxford Cortical probabilistic atlas supplied with FSL. The DMN mask consisted of the medial prefrontal cortex, the hippocampus, and the IPL (specifically, the angular gyrus and supramarginal gyrus). The SMN mask consisted of the precentral and postcentral gyri, the supplementary motor area (SMA), and the paracingulate cortex. The FPN mask consisted of the precentral gyrus and middle frontal gyrus.

FMRI data processing was carried out using FEAT Version 5.98. Higher level analysis was carried out using OLS (ordinary least squares) simple mixed effects. We thresholded Z-statistic images using clusters determined by $Z > 2.0$ and a (corrected) cluster significance threshold of $P = 0.05$ (Worsley 2001). We used a lower statistical threshold ($Z > 2.0$) for the PPI analysis because of the low power inherent to this type of analysis due to possible multicollinearity between the physiological and/or psychological regressors and the interaction term.

Results

Participant demographics (Table S1)

Thirteen participants were initially enrolled. One participant was disqualified because he could feel the stimulation at the lowest possible current of 10 μA. Another potential participant was unable to perform the fMRI experiment due to claustrophobia. Data were therefore collected and analyzed for eleven participants.

Behavioral data (Table S1)

Mean ratings on the STAI did not differ significantly before and after the experiment (before: 21.9 ± 3.9; after: 22.6 ± 3.1; $t_{18} = .428 P = .674$). Only one participant reported awareness of any sensation during the scan; she felt a constant “sensation” on her left earlobe during the entire duration of the scan, at the location where the headphones pressed on her earlobe (but not at the electrode site).

“On” versus baseline voxel-wise analysis (Figs. 1, 2 and Table 1)

Figure 1

Regions of decreased brain activity as a result of cranial electrotherapy stimulation (CES) for 0.5-Hz stimulation (blue), 100-Hz stimulation (yellow), and regions of overlap between the two frequencies (green).
Regional brain deactivation (BOLD percentage signal change ± SEM) associated with 0.5- and 100-Hz “on” CES stimulation versus baseline, based on local maxima from the voxel-wise analysis.

### Table 1

<p>| Local maxima for regional deactivation from cranial electrotherapy stimulation (CES) |
|-----------------------------------------------|---|---|---|</p>
<table>
<thead>
<tr>
<th>Z score</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.5 Hz</td>
<td>Left supplementary motor cortex</td>
<td>3.71</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Right postcentral gyrus</td>
<td>3.66</td>
<td>-44</td>
</tr>
<tr>
<td></td>
<td>Right precentral gyrus</td>
<td>3.51</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Right posterior cingulate cortex</td>
<td>3.41</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Left postcentral gyrus</td>
<td>3.36</td>
<td>-24</td>
</tr>
<tr>
<td></td>
<td>Left postcentral gyrus</td>
<td>3.36</td>
<td>-40</td>
</tr>
<tr>
<td></td>
<td>Right lateral occipital cortex</td>
<td>3.31</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Left precuneus</td>
<td>3.31</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td>Right precuneus</td>
<td>2.75</td>
<td>6</td>
</tr>
</tbody>
</table>

At both frequencies, participants exhibited deactivation in frontal, parietal, and posterior midline regions. A total of 0.5-Hz stimulation was associated with decreased activation in regions including the left SMA, bilateral precentral and postcentral gyri, right posterior cingulate cortex, right lateral occipital cortex, and bilateral precuneus. A total of 100-Hz stimulation was associated with decreased activation in regions including the right/left SMA, right supramarginal gyrus, right superior parietal lobule, and left superior frontal gyrus. There were no regions of increased activation for either frequency. A direct comparison of 0.5- and 100-Hz activation patterns revealed no significant differences between frequencies.

The block-by-block analysis, performed to understand the pattern of deactivation for each stimulation time period over the experimental run, revealed that the majority of the blocks for both 0.5 and 100 Hz demonstrated a reliable pattern of deactivation during “on” and relative activation during baseline (Fig. 3).
Time course of activation/deactivation block-by-block, averaged for regions for which there was overlap from all 11 participants’ leave-one-subject-out group activation maps (see Fig. S1).

**ROI analysis**

We found no differences in mean thalamic activity when the device was “on” versus baseline for either the 0.5- or 100-Hz CES.

**Current intensity regression**

A voxel-wise analysis using current as a regressor revealed positive associations between current and activation for 100-Hz but not 0.5-Hz stimulation. Regions included right/left posterior cingulate cortex, left superior parietal lobule, left angular gyrus, left supramarginal gyrus, and left lateral occipital cortex (*Table S2*). There were no significant associations with brain deactivation in any region. This pattern for current intensity therefore differed from what was found in the “on” versus baseline analyses, suggesting that cortical deactivation may depend more on frequency than intensity of stimulation.

**PPI analysis (Fig. 4 and Table 2)**

[Figure 4](#)

Regions of altered connectivity with the posterior cingulate seed within the default mode network associated with 100-Hz stimulation. Regions of increased connectivity are depicted in yellow–orange and decreased connectivity are depicted in blue–light ...

[Table 2](#)
Regions of altered functional connectivity associated with CES stimulation at 100 Hz between the bilateral posterior cingulate gyrus (seed region) and other regions within the default mode network. Z-scores and MNI coordinates for local maxima (x, y, ... 

For the DMN analysis, 100 Hz was associated with increased connectivity between the posterior cingulate cortex seed and the left planum temporale, bilateral postcentral gyrus, and bilateral anterior supramarginal gyrus (Fig. 4 and Table 2). A total of 100 Hz was also associated with decreased connectivity between the posterior cingulate cortex seed and the left posterior supramarginal gyrus, the left angular gyrus, and the left superior lateral occipital cortex. A total of 0.5 Hz was not associated with any significant changes in connectivity. For the SMN, neither 100-Hz nor 0.5-Hz stimulation was associated with any significant changes in connectivity. For the FPN, there were no significant alterations of connectivity detected for either frequency.

**Discussion**

Results from this study suggest that 0.5- and 100-Hz CES causes cortical brain deactivation in midline prefrontal and parietal regions. In addition, 100-Hz stimulation significantly altered connectivity within the DMN. CES thus appears to result in similar cortical deactivation patterns for 0.5- and 100-Hz, but is associated with stronger alterations in functional connectivity for 100-Hz stimulation. Moreover, cortical deactivation patterns differed from those associated with current intensity, suggesting that cortical deactivation may depend more on frequency than intensity of stimulation. These results may help shed light on potential mechanisms of action of CES. Previously proposed mechanisms have included changes in brain oscillation patterns, neurotransmitter and endorphin release, interruption of ongoing cortical activity, or secondary effects from peripheral nerve stimulation (Zaghi et al. 2009). These proposed mechanisms may not be mutually exclusive. For example, the oscillating current from CES may reach the cortex where it may interrupt normal resting state cortical activity, resulting in deactivation. In doing so, CES may alter brain oscillation patterns. The observation of reduced BOLD signal associated with stimulation in the current study fits with previous EEG studies of CES that demonstrated downward shift in mean or median alpha frequency with stimulation (Itil et al. 1972; Schroeder and Barr 2001), as lower frequency brain activity has been found to be associated with lower BOLD signal in studies of simultaneous colocalized electrophysiological and fMRI recordings (Magri et al. in press) and in epilepsy (Archer et al. 2003). The different alterations in connectivity observed in this study with 100-Hz relative to 0.5-Hz stimulation could be related to the overlapping but somewhat differential effects of these frequencies on EEG patterns found in previous studies (Schroeder and Barr 2001). The observation that 100-Hz but not 0.5-Hz stimulation significantly affected connectivity in the DMN in this study may be related to previous observations that 100-Hz but not 0.5-Hz affects the beta band, which has been found to correlate strongly with activity in the DMN (Mantini et al. 2007; Laufs 2008).
In regards to how the current reaches the brain, because this study used earlobe electrodes, the alternating microcurrent may initially stimulate afferent branches of cranial nerves. Stimulation may initially occur at branches of the facial, glossopharyngeal, and/or the vagus nerves that originate near the electrode placement on the earlobe, then are carried to the brainstem, the thalamus, and finally the cortex.

Two different clinically effective frequencies (100 or 0.5 Hz) were associated with brain deactivation, but the amplitude of current was not. This provides additional mechanistic evidence that CES may exert its effects through interruption of normal cortical activity, possibly through the introduction of high- or low-frequency noise that interferes with certain brain oscillation patterns.

The results of this study may have several important clinical implications. Applying AC to the brain at different frequencies may alter communication between nodes of the DMN. Studies in clinical populations, including anxiety disorders and depression, have found abnormalities in these intrinsic connectivity networks (for review see [Broyd et al. 2009]). One study found that anxiety disorder patients, when presented with threat-related words, demonstrated decreased activity in regions that overlap with the DMN including the posterior cingulate cortex (PCC) and inferior parietal lobule, as well as medial prefrontal cortex and thalamus (Zhao et al. 2007). Liao et al. (2010) found decreased functional connectivity in individuals with social anxiety disorder within the SMN and DMN (Liao et al. 2010). In addition, individuals with both acute (Mantini et al. 2009) and chronic pain (Baliki et al. 2008) have been shown to have abnormal functional connectivity in the DMN.

How the specific effects of CES on brain deactivation and on intrinsic connectivity networks translate to impacting clinical symptoms still remains to be investigated. In patients with anxiety and those with depression, one possibility is that alterations of the DMN may have a therapeutic effect of disengaging worry- or rumination-promoting internal dialogue (Hamilton et al. 2011) and/or promoting attention to external stimuli. One way this may occur is that increasing connectivity within the DMN between the PCC and supramarginal gyrus and postcentral gyrus (as found in this study) may lead to increased integration of external sensory information (Bear 1983). With an improved understanding of these processes, it may be possible that CES parameters such as frequency could be tuned for individuals to therapeutically target different connections within abnormally functioning intrinsic connectivity networks.

This study has several limitations to consider. The small sample size may have resulted in insufficient power to detect smaller changes in resting brain activity. Another limitation is that we did not use a pure sham condition. Rather, we tested sensory thresholds prior to scanning to ensure that participants could not detect if the stimulation was on or off, effectively incorporating control blocks (used as “baseline”) within the experimental design, from which to compare to “on” stimulation blocks. Although we used these same individualized subsensory currents during the experiment, we did not have an accurate way of verifying if participants perceived the stimulation during the scan block by block, as this would have interrupted the “resting state” nature of the experiment. However, questioning participants after the scan revealed that only one participant reported feeling a constant
(nonalternating) “sensation” on the left earlobe, which was inconsistent with the pattern of CES used in the experiment and instead likely due to the pressure of the headphone. Another limitation comes from the fact that the stimulation was brief and intermittent in this experiment, limiting the ability to extrapolate findings to changes over longer durations of treatment. In addition, since this was a nonclinical sample, anxiety levels were low before and after stimulation; this limits the ability to understand immediate effects, if any, on this symptom domain. Similar studies in clinical populations are needed to further elucidate how cortical deactivation and changes in intrinsic connectivity networks may translate to therapeutic mechanisms of action.

Conclusions

This study provides evidence that CES stimulation may result in cortical deactivation, as well as altering brain connectivity in the DMN. This suggests that relatively small perturbations in brain oscillation patterns may cause significant changes in brain activity and within intrinsic connectivity networks. Findings from this study provide evidence of the mechanism of action of CES and can serve as a guide for testing in treatment trials in clinical populations. Optimizing CES parameters for effective treatment can then be developed based on how specific brain systems and pathways may modulate clinical states such as anxiety, pain, or insomnia.

Acknowledgments

Funding provided by a grant from the Saban Family Foundation (Bystritsky). This work was also supported by a grant from the National Institute of Mental Health (5K23 MH079212—Feusner). The authors would like to thank M. Burock for his input on the study design, and E. Pierce, J. Alger, and J. Kaplan for their assistance with safety and artifact testing in the MR scanner.

Conflict of Interest

None of the authors have any conflicts of interest to report.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

**Figure S1.** Group results from the leave-one-subject-out analyses.

**Table S1.** Demographic data, sensory threshold testing results, and current intensities.
Table S2. Local maxima for regions positively associated with current intensity for 100-Hz CES stimulation.

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References


LUCID DREAMING STUDY
Induction of visual dream reports after trans-cranial direct current stimulation (tDCs) during Stage 2 sleep – JAKOBSON – 2012 – Journal of Sleep Research

Posted on September 7, 2012 by John

This is encouraging because a previous study showed minimal effect on dreaming using tDCS. In both experiments a significantly greater number of imagery reports were found on awakening after tDCs (cathodal–frontal, anodal–parietal), compared to the blank control conditions. However, in Experiment 2 the frequency of imagery reports from the tDCs (cathodal–frontal, anodal–parietal) was not significantly different from the other two tDC conditions, suggesting a non-specific effect of tDCs. Overall, it was concluded that tDCs (cathodal–frontal, anodal–parietal) increased the frequency of dream reports with visual imagery, possibly via a general arousing effect and/or recreating specific cortical neural activity involved in dreaming.
Lucid dreaming can be induced by electric scalp stimulation, study finds

Scientists discover that use of electric currents can influence sleepers' brains, potentially allowing them to control their dreams.

Nicola Davis
Sunday 11 May 2014 18.00 BST

Scientists have discovered that it is possible to induce lucid dreaming in sleepers by applying mild electrical currents to their scalps, a study says.

Lucid dreaming is when a sleeper recognises they are dreaming and may even be able to manipulate the dream's plot and control their behaviour.

"The key finding is that you can, surprisingly, by scalp stimulation, influence the brain. And you can influence the brain in such a way that a sleeper, a dreamer, becomes aware that he is dreaming," said Professor J Allan Hobson,
from Harvard Medical School, who co-authored the paper published in Nature *Neuroscience*.

Previous research, led by Dr Ursula Voss of Johann Wolfgang Goethe-University in Germany, suggests lucid dreaming is a unique state that displays aspects of both REM-sleep – the stage of sleep in which most of our dreams occur – and waking. By examining the sleepers' brainwaves over a range of frequencies, scientists have found that lucid dreamers demonstrate a shift towards a more "awake-like" state in the frontal and temporal parts of the brain, with the peak in increased activity occurring around 40Hz.

"Lucid dreaming is a very good tool to observe what happens in the brain and what is causally necessary for secondary consciousness," Voss said.

Now Voss and her team have reported that it is possible to induce lucid dreaming by delivering electrical stimulation, in the form of an alternating current to a sleeper's scalp at this frequency.

The study involved 27 volunteers, none of whom had experienced lucid dreaming before. The researchers waited until the volunteers were experiencing uninterrupted REM sleep before applying electrical stimulation to the frontal and temporal positions of the volunteers' scalps.

The applied stimulation had a variety of frequencies between two and 100Hz, but neither the experimenter nor the volunteer was informed which frequency was used, or whether a current was applied. Five to 10 seconds later the volunteers were roused from their sleep and asked to report on their dreams. Brain activity was monitored continuously throughout the experiment.

The results showed that stimulation at 40Hz resulted in an increase in brain activity of around the same frequency in the frontal and temporal areas. A similar, but smaller effect was observed at 25Hz. They also found that such stimulation often, but not always, induced an increased level of lucidity in the dreams of sleepers. At higher or lower frequencies, or when no current was applied, no change in brain activity was observed.
Hobson said the study could have implications in psychiatric research. "As a model for mental illness, understanding lucid dreaming is absolutely crucial. "I would be cautious about interpreting the results as of direct relevance to the treatment of medical illnesses, but [it's] certainly a step in the direction of understanding how the brain manages to hallucinate and be deluded."

The authors suggest triggering lucid dreaming in sleepers might enable them to control nightmares, for example in those suffering with post-traumatic stress disorder.
INCREASE THE MEDIATION WITH THE CYBERMAGNETIC CHAIR
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Using the computer's headphone and microphone jacks, we can first analyze the patient's voice patterns for energetic disturbance and then choose sound files for relaxation, healing, or energy. The music is sent into the body through the headphones and a magnetic field generator. A magnetic field detector then receives the signals from the body establishing a cybermagnetic loop. The computer can then change the music to help the patient's body electric.

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Why Meditate?

- Find your inner guidance
- Learn to relax and walk your inspired path
- Learn to lucid dream and explore inner space
- Understand the subtle body & the human energy system
- Awaken the kundalini and open the third eye
- Learn to easily open the chakras
- Heal the body, find your Self
- Obtain the ability for tremendous concentration and focus
- Control heart rate, blood chemistry, and other autonomic functions

Benefits of Meditation:

The benefits are unique for each person, but both physiological and psychological balancing are common. Some of the benefits of meditation will be realized quickly, and others over many months, so don't be discouraged. Meditation is like a martial art in that there are different forms of meditation. Therefore, you will derive benefits according to the form of meditation you practice.

(e.g. In the basic QiGong meditation for martial arts, one meditates in order to focus the energy gathered in the extremities during practice towards the mental clarity of advancing one's martial skill (nei dan kung). In turn, the internal energy (Qi) gathered during practice of one's physical skill (wai dan kung) is once again focused towards mental clarity for further advancement through meditation (nei dan kung). In essence, all forms of meditation should have a feedback effect for your mental as well as physical self enhancement.)

What Meditation Does for You

Meditation is a way to change your attitude towards life. The act of practicing meditation changes you from inside. It takes a lot of work, but slowly you become more relaxed and more connected to people. It's not an easy solution. But it is a solution. As in martial arts a beginner needs experienced instruction in the basics before practicing on his own. Like a martial art - meditation requires the necessary discipline to actually affect your life. Once you have disciplined yourself to meditate, the feedback from the meditation will increase your discipline. In turn, you will understand and appreciate the needs of others when they need or achieve internal discipline.

Reducing and eliminating stress

As the mind settles down, the body also achieves a unique state of rest. The changes that take place have been measured in physiological tests and are found to directly reverse the adverse effects of stress.

Everyone is aware of the negative effects of stress. It decreases performance, harms relationships, and creates physical wear and tear. In short, it curtails enjoyment of life.

Nowadays, stress is a fact of life. Furthermore it tends to build up in the system over the course of a lifetime. Even a good night's sleep or an extended holiday may not enable us to recover fully.

There may or may not be things we can do to restructure our lives externally in order to help to reduce stress. But whether or not this is an option, regular practice of Meditation actually eliminates stress physiologically. This results in a more balanced outlook and greater appreciation.

One of the first things that people often notice when they learn Meditation is a reduction of stress. Research shows that when you meditate, the body experiences deep relaxation. Psychological stress has many adverse physical effects on the human body including a direct and damaging influence on the immune system.
Physiological Indicators of Deep Rest

A meta-analysis, the preferred scientific procedure for drawing definitive conclusions from large bodies of research, found Meditation produced a significant increase in basal skin resistance compared to eyes-closed rest, indicating profound relaxation. Deep rest and relaxation were also indicated by greater decreases in respiration rates and plasma lactate levels compared to ordinary rest. These physiological changes occur spontaneously as the mind effortlessly settles to the state of restful alertness, pure consciousness.

Decreased Stress Hormone

Plasma cortisol is a stress hormone. Study's show that plasma cortisol decreased during Meditation, whereas it did not change significantly in control subjects during ordinary relaxation.

Natural Change in Breathing

Subjects have been measured for changes in breathing rate during the practice of the Meditation techniques. Breath rates fell from about 14 breaths per minute to about 11 breaths per minute, indicating the Meditation technique produces a state of rest and relaxation. The change in breath rate is natural, effortless, and comfortable.

The final obstacle in meditation is ecstasy; you feel great bliss and happiness and want to stay in that ecstasy. Do not yield to it but pass on to the next stage which is great calm.

Sri Ramana Maharshi.

Reduced Anxiety

A statistical meta-analysis conducted at Stanford University of all available studies-146 independent outcomes-indicated that the effect of Meditation programmes on reducing anxiety. This analysis also showed that the positive Meditation result could not be attributed to subject expectation, experimenter bias, or quality of research design.

Unfolding the potential of the mind

Throughout the day we experience the mind in its busy active state. Often it may seem as if the mind is constantly filled with thoughts. During Meditation this activity settles down in a natural way, until the finest level of thought is "transcended" and the mind is left in a simple state of least excitation - a refreshing and deeply relaxing state of restful alertness. After we have finished meditating, the mind is fresher, quieter, more alert, happier. Any problems that there may have been prior to meditation are frequently seen in a better light.

It has been accepted for some time by psychologists that most people use about 5-10% of their full creative potential. Our mind is our most under-utilized resource! By gaining access to the quieter, deeper, more comprehensive and intuitive levels of thinking, Meditation helps unfold the potential of the mind. Regular practice sustains this development.

Increased Creativity

This study used the Torrance Tests of Creative Thinking to measure figural and verbal creativity in a control group and in a group that subsequently learned to Meditate. On the post test 5 months later, the Meditation group scored significantly higher on figural originality and flexibility and on verbal fluency.

Broader Comprehension and Improved Ability to Focus

Field independence has been associated with a greater ability to assimilate and structure experience, greater organisation of mind and cognitive clarity, improved memory, greater creative expression, and a stable internal frame of reference. The results show that practice of Meditation technique develops greater field independence. This improvement in meditators is remarkable because it was previously thought that these basic perceptual abilities do not improve beyond early adulthood.
**Improved Perception and Memory**

College students instructed in Meditation displayed significant improvements in performance over a 2-week period on a perceptual and short-term memory test involving the identification of familiar letter sequences presented rapidly. They were compared with subjects randomly assigned to a routine of twice-daily rest with eyes closed, and with subjects who made no change in their daily routine. (I might add that college research in meditation only reaffirms what is known already for millenia, yet only scratches the tip of the iceberg in comparison to the adepts who can instantly achieve a trance state.)

**Greater Orderliness of Brain Functioning**

EEG coherence increases between and within the cerebral hemispheres during Meditation. EEG coherence is a quantitative index of the degree of long-range spatial ordering of the brain waves. They found high levels of coherence even before meditation began, spreading of coherence to high and lower frequencies about half way through the meditation period, and continuing high coherence even into the eyes-opened period after meditation.

Transcendental meditation, zen meditation or your own form of meditation, when used daily, can fully transform and empower your life. Whether you’re a beginner, expert, or somewhere in between, you can find incredible power with meditation techniques and concepts from all traditions throughout the world. By the same token, when the people of the world practice meditation for their own good, studies have found that the people are spiritually enlightened with increased intelligence, therefore, more interested in advancing their society.

**What are brainwaves?**

The brain is a neurochemical information processor that gives off electrical signals as electrochemical circuits close and open a million each second. If this is so, why can't we detect these signals? Primarily because our skulls are too thick and the signals too weak for them to resonate outside our heads. With the exception of perhaps the most clairvoyant and telepathic among us, brain wave patterns are impossible to detect without the aid of a special amplifier called an electroencephalograph or EEG, which detects and records the changes in the voltage emanating from the brain. These electrical patterns tend to be similar in their general rhythm or rate of pulsation, and can be placed along the consciousness continuum.

The first pattern is described as **beta waves**, of short amplitude and very rapid pulsations of 30-14 cycles per second (Hertz or Hz). This pattern is optimal for intense mental activities such as calculations, linear logical analyses, and other highly structured functions.

The second pattern is described as **alpha waves**, characterized by a slightly larger amplitude of 13-9 Hz. This pattern typically occurs in daydreaming, relaxed awareness, guided or focused imagery and smoothly rhythmic athletic activity. There is often a euphoric, effortless feeling of “flow” as the doer is absorbed in activity, and subject and object are felt to be united.

The third pattern is described as **theta waves**, pulsations that are more ragged and irregular, in the 8-4 Hz range. While this range is rather small, a difference of 1 or 2 Hz in this zone is very noticeable, as it is proportionately much larger than it would be in the beta or alpha range. This pattern is associated with deep unconscious imagery, and thus creativity, as the person drops into a state of drowsiness and near-sleep.

The last main pattern is that of **delta waves**, pulsations that range between 3-1 Hz. In this range of profound relaxation, images and dreams have largely subsided, as the person slides into a state of slow wave restorative sleep. Meditators who remain aware during this state of near unconsciousness report tranquillity and peace.

Obviously, being able to control a mind state (the subjective mental state that typically accompanies a brainwave pattern) would be helpful in optimizing human functioning in contexts that required specific kinds of concentration and relaxation. While there have always been brainwaves, only recently have we become aware of them and been able to effect their change. This accessibility with demonstrable, rapid results has great potential for the relief of suffering and the evolution of the social mind of our society.
Where did the persistent statement that humans use 10% of their brains originate and is it valid?

It was first coined by William James, a philosopher and psychologist. Some professionals have even stated even lower percentages, like Margaret Mead saying that we use 6% of our brains³. If this statement is true, it implies that humans could behave very differently and perhaps with greater thought and purpose. If the statement is a fallacy, it supports the brain equals behavior theory, such that the brain is not harboring unused capacities and behaviors.

The 1012 neurons in the brain have not all been researched for activity or not, but researchers have found no evidence for unused abilities or large, unused regions of the brain. Researchers know that humans do not use every region of their brain for every behavior, unless we are doing something so complex that it requires all of the brains capacities.

At any given point in time, about 5% of the neurons are active, but over time and change of ones behavior, PET scans and fRMIs show that the vast majority of the brain is active². Perhaps this is an evolutionary adaptation: To conserve energy and prevent an electrical and chemical overload from all the neurons firing and inhibiting.

The brain is about 3 pounds, using an inproportionate 20% of the body’s oxygen-rich blood, but is only 2% of the bodys total weight³. The significance of the brain receiving so much of the body’s energy supply, reveals its ability to perform important functions. The heart and the lungs main function is to provide the brain with oxygenated blood, presumably because the brains will be performing essential neuronal activity relevant to the days behavior.

The highly specialized regions of the brain give some insight into the many functions that the brain is capable of doing. So the development of the brain into specific sections that have been researched to facilitate specific functions, provides evidence that these regions are active in a normal human's lifetime.

The fact that the brain has a highly ordered procedure for developing, leads researchers to believe that each region of the brain is essential. In fact, researchers have found several regions to account for one function, to imply that the collaboration of several brain regions is sometimes necessary for normal functioning.

Other evidence against the statement that humans only use 10% of their brains

Of the 1012 neurons, humans possess extra neurons, but these neurons serve the purpose of repair when severe head traumas occur, like a stroke³. These neurons function like the lost neurons, giving an appearance of regeneration, by expanding the neurons dendritic field to compensate for the loss neurons⁴.

Research has been done on the plasticity of the brain and its implications. The plasticity factor is the brains ability to constantly change its structure and function in response to experiences coming in from the outside.

An increase in neuron size, thicker cerebral size, and more neuron connections are all examples of the plasticity of the brain. A study designed to show the effects on rats in a rich and stimulating environment found that the rats brain weight increased by about 7-10% after 60 days, with synaptic connections increasing by about 20%⁴. It has also been experimentally shown that new and novel experiences increase the number of
excitatory synapses per neuron and decreases the number of inhibitory ones in the visual cortex\textsuperscript{4}.

The modification of the excitatory and inhibitory balance is a direct result of the plasticity factor in action. Also, the plasticity factor can increase or decrease the number of neurons depending on the richness or depravity of the experience. The neuronal increase was approximately 35-40\% more neurons in the olfactory region\textsuperscript{4}.

During human development, connections are being built at the speed of about 3 billion a second, reaching 1,000 trillion connections in the whole brain. All of these many neurons, connections, and maintenance thereof do not exist to remain dormant.

The implications of the plasticity factor include the fact that the brain has been empirically seen to physically reconnect itself, so that it improves its present functional state\textsuperscript{3}. So perhaps the brain does not use its full potential, after all.

Perhaps, instead of less usage, we can improve our usage through education. Biologically, education increases the number of neuronal connections, improving memory, spatial and problem solving skills, and a number of other functions. The plasticity of the dendrites morph or extend and retract its processes when stimulated, in response to neuronal activity, chemicals, and neuronal damage\textsuperscript{4}. Therefore, dendrites, composing about 95\% of the receptor surface that neurons form connections, are the best tools to determine the plasticity of the central nervous system\textsuperscript{4}.

It was experimentally discovered that dendritic fields also change, changing the structural organization of the central nervous system, according to stimulation. Behaviorally, education improves the number of positive values and attitudes about health and an increased self esteem\textsuperscript{4}.

There is evidence that humans can build more brain capacity through specific exercises that increase neuronal connections and efficiency. Education makes us more immune to disease and premature aging\textsuperscript{1}.

And the earlier the educational exercises occur, the increased the mental capacities become\textsuperscript{4}. If one performs these mental exercises throughout their life, it is like getting a booster shot of mental capabilities. In recent studies, it has revealed a relationship between dendrite atrophy and decreased function and increased dendritic space leads to an increasing function. This suggests that there is a relationship between brain plasticity and behavioral change\textsuperscript{4}.

So if neurons have more connections and are structurally larger, the brain is hypothesized into having a greater influence over behavior. There is evidence that activity caused by experiences could increase the activity of genetic mechanisms responsible for dendritic and synaptic growth, ultimately influencing behavior.

Since there is evidence for the plasticity factor, it does not seem so outrageous for people who are left or right brain dominant to become ambidextrous. Being left or right brain dominant does not imply that the non-dominant hemisphere of the brain is not active at all. Many of the activities that humans perform everyday use both right and left brain specialties, such as sensory input. Hemisphericity is a dependence on one side of the brain to solve intellectual issues and physical issues, like unilateral thinking and headaches and insomnia\textsuperscript{5}.

The body strives for homeostasis, which cannot be achieved by being left or right brained dominant. Perhaps the plasticity of the brain can lead to a more holistic brain, functioning in right and left brain dominant activities, like analyzing math problems and addressing issues of emotion. Practice using the neglected hemisphere through mental drills proves useful in becoming a more balanced individual\textsuperscript{1}. For instance, using the body in new ways helps, like doing routine activities with the non-dominant hand. Another exercise is doing something different everyday, like breaking from your daily routine to allow your brain to experience different situations to produce those chemical and structural changes in the nervous system\textsuperscript{1}. 
Development of Intelligence

Students at Maharishi International University in Fairfield, Iowa, who regularly practised Transcendental Meditation, increased significantly in intelligence over a 2-year period, compared to control subjects from another Iowa university. This finding corroborates the results of two other studies showing increased IQ in Maharishi International University students.

The Maharishi Effect

When a small, but sufficient, proportion of a population \( (sqr(1/10 \times 1\% \text{ of population})) \) regularly experiences transcendental consciousness, through the Transcendental Meditation® (TM) or TM-Sidhi programs, an influence of progress and harmony spreads through the whole society. This phenomenon was named the Maharishi Effect after Maharishi, who first predicted it. Both the TM technique and the more advanced TM-Sidhi program were derived by Maharishi from the ancient Vedic tradition. The Vedic tradition is thought to be the oldest recorded tradition of knowledge in the world.

Maharishi has long held that war is the result of collective stress reaching such a high intensity that it must explode into violence. (Consider the economically depraved, politically fortified attitude of the U.S. people against "terrorism." ) Moreover, in his view, criminal violence within the nation, and other signs of social disorder, derive from the same source. Thus, though the consideration moves from the international sphere to the internal affairs of nations, the underlying principle remains the same.

Reduction of this collective stress through the Maharishi Effect technology may simultaneously explain decreases in war intensity and violent crime, as well as improvements in international relations and progress within the nation. Thus, although the bulk of Maharishi Effect research concerns variables at the city, state or national levels, these are thought to be directly relevant to national and international conflict. (See the Maharishi Effect in different schools of the U.S. Courtesy of the Natural Law Party.)

N A T U R E

Nature makes available to all of us a renewable energy source that we can tap into every day. Yet because most of us live in ignorance of it, we are forced needlessly to exhaust ourselves, to stretch our physical and mental resources to breaking point, even while the energy, relaxation and inspiration we crave is all around us. This is not just a bunch of new age treacle. Adepts advanced at psionic's are quite able to draw energy from clouds, water, sometimes fire, trees, as well as other people (known as spiritual vampirism). The honorable adepts usually draw upon atmospheric and universal energy.

Mantras:

A mantra is a sound, word, or phrase that is repeated to yourself. It could be spoken aloud, as a chant, or silently, as in meditation. Many people think that the best mantras are sounds which have no clear meaning, and are used as a way of displacing your usual thoughts and moving your awareness inward. There are many mantras ranging from words taken from Hindu Sanskrit to Christian scripture (especially when "saying the rosary," where the repetition of the prayer is meditative). The classic method of enunciation ranges from guttural to lingual to labial (when saying "AUM" for example). The esoteric schools of meditation concentrate on certain energy centers of the body such as "the third eye" by focusing the vibrations of the mantra at that energy center (or chakra in Hindi). In the case of the "the third eye" or seventh chakra, we focus guttural vibrations here in order to induce sensitivity to the more subtle, etheric forces.

("Prayer is your talking to God; meditation is your listening to God.")

-Yogi Amrit Desa
When to Meditate:

It is recommended that a person meditate twice a day. Before breakfast and before dinner are ideal. A full stomach tends to attract the psychic force away from those areas necessary to achieve a controlled trance state. The human circadian rhythm is in direct alignment with the passing of the day. The yin-yang symbol represents both extremes of sleeping and wakefulness; it also represents the passing phases between sympathetic and parasympathetic nervous systems. A point on the yin-yang symbol where a "head" and "tail" merge can be considered an apex which represents dusk while the other represents dawn. That apex is also where sympathetic and parasympathetic nervous systems merge (the trance state between sleeping and waking may be considered a tai chi state since it is a state of transition), therefore, dusk and dawn are optimal times for meditation. Noon and midnite are reserved for more advanced practitioners because of the extreme "yang" and "yin" conditions, respectively. This is the applied logic from Chinese medical theory of [Chi Kung meditation](#) used to program the psyche for greater achievement.

Growing in sensitivity

Meditation will bring you sensitivity, a great sense of belonging to the world. It is our world - the stars are ours, and we are not foreigners here. We belong intrinsically to existence. We are part of it; we are the heart of it. And this sensitivity will create new friendships for you - friendships with trees, with birds, with animals, with mountains, with rivers, with oceans, with stars. Life becomes richer as love grows, as friendliness grows. In essence, a spiritually enlightened person is in touch with his environment and tends to align himself with science and philosophy oriented towards nature and peaceful coexistence.

Of course, a busy lifestyle does not lend itself to true appreciation of our natural resources. There are not enough "civilized" people who have the time, much less, the discipline to devote to psychic exercises. A quick fix, magic pill, mechanistic culture does not lend itself to "strange science." This would include meditation. For those few who are busy, convenience oriented, yet crave and understand the benefits of meditation there is hope. For the rest of you who see no point in further stimulating your brains, you should consider the aging factor:

The Aging Brain

As the brain ages it may lose some of its neural circuitry. Specifically, we experience a shrinkage and reduction in the number of dendrites, the filament-like extensions of the axons or main nerve fibers. In normal circumstances the dendrites of a given axon connect with the dendrites of many other axons, thus fostering full communication of information. As these connections shrivel with age, the communicating ability decreases. We find ourselves forgetting names of people, and then names of things and facts. Short-term memory begins to fail, e.g., going into the next room to get something and then forgetting what you are there for. We find it more difficult to follow instructions or to memorize material. These symptoms can start in our 40s.

That's discouraging news; the good news, however, is that the more we can stimulate our brains, the more we can slow down this process and even reverse it.

Dr. Diamond's amazing old rats

At UCLA [Dr. Marion Diamond](#) examined the maze learning ability of aged rats and found the usual deficits in keeping with their advanced age. However, when she took half the rats and increased the stimulation in their environment, their learning ability and other aspects of their functioning improved significantly. When the brains of both groups were later examined, Dr. Diamond was amazed to find that the brains of the stimulated group actually weighed more and had more dendrites than the control group who received no more than the usual stimulation. Dr. Diamond concluded that the unusual stimulation promoted the dendritic growth that contributed to the extra density and weight of these brains.
Does this happen in humans?

Large scale studies have not yet been done in this area of interest; however, Dr. Harold Russell, a Texas researcher and clinician, has completed a number of individual case studies on brain injured and aged individuals. Dr. Russell and his colleagues Drs. Carter and Ochs are exploring the use of audio/visual stimulation with such clients. Although their results are anecdotal (not part of a controlled study), preliminary indications are still impressive: in almost all of the case studies of stroke or other brain damaged victims, whose conditions had "plateaued" a number of years earlier, significant progress was made after using the stimulation daily over a period of months. Again, this research is still preliminary and firm conclusions cannot be rendered at this time.

It is noteworthy that Diamond and her former graduate student Allison McKenzie, Ph.D., found that brain damaged rats (stimulated strokes) recovered more quickly and more fully if stimulated regularly than the control group which received no special stimulation. Finally, Dr. Diamond also discovered that the stimulated rats developed a stronger immune response than those not stimulated.

"Welcome to the enlightened world of Electronic Stimulation for enhanced brain function"

Throughout the ages humankind has searched for new means to reach higher levels of consciousness. Most of this exploration has been shrouded in the occult and sought through spiritual or mystical experimentation. With the advent of the technological age science has joined the quest for the Holy Grail of expanded experience. This state of awareness has been sought in all cultures and described in the ancient eastern teachings as Nirvana, the state of bliss. The scientific exploration of this field has developed through psychology, studying human behavior and psyche, sensory deprivation with John Lily's floatation tank, the psychedelic days with Tim Leary and friends, and finally to the most recent and technologically advanced form yet, electronic Nirvana.

Much research on brain and mind development has led to and been conducted on behalf of the development and use of transformational electronic devices. Included in the technology are tapes that emit sounds or tone that synchronize the left and right hemispheres of the brain; some include music or subliminal positive affirmations.

- Some devices reduce the effects of ELFs (extremely low frequencies) from electrical appliances.
- There are machines that create fields of resonant frequency that balance energies in the body.
- Brainwave bio-feedback is available and can be run off a regular desktop computer.

Electrostimulation sends small transmissions of electricity to the brain stimulating certain levels of consciousness and modifying behavior. And, of course, there are the popular light and sound synchronizers equipped with goggles and headphones that emit sound and light patterns that balance the brain hemispheres and adjust their wave frequencies.

Recent findings have revolutionized the theories surrounding brain science. The old model of the brain depicted its functions as limited in terms of growth. Intelligence was determined at birth and although knowledge could be attained, I.Q. remained the same throughout life. In addition it was previously believed that the brain would atrophy as life progressed and there was no way of thwarting the process of deterioration. While it was recognized that other cells in the body regenerated brain cells were thought of as incapable of this function. It was also believed that the brain fluctuated from the right and left hemisphere, dominated by the right when dealing with abstract thought intuition or creativity and the left hemisphere when thinking logically or analytically.

The new model of the brain/mind based on modern experimentation presents an entirely different perspective. Intelligence as well as brain size can be increased through exercising or stimulating certain regions of the brain. Studies have proven that neurons can regenerate under the right circumstances. It has been discovered that dendrites, the tentacle-like nerve extensions that receive impulses from the axon or core of other nerve cells, when stimulated become stronger and naturally extended. Extended dendrites have greater capacity to receive impulses from the axon or core of other nerve cells, when stimulated becomes stronger and naturally extended. Extended dendrites have greater capacity to receive impulses, enhancing their propensity toward complex cell transmissions. This means intelligence is actually increased.
The new brain model also recognizes that certain mental states such as deep meditation or intense creativity promote what is called synchrony or whole-brain thinking, which involves the synchronization of the right and left hemispheres. In such states human potential is heightened. Brainwave studies have shown that while or after being in such states, individuals can perform mental functions more effectively such as learning, memory recall or problem solving. Brain electro stimulation, light and sound devices and some audio-recorded sound tapes are designed to achieve synchrony. Although little conclusive research has been done with light and sound machines clinical physicians to successfully treat drug addiction, stress and depression and other psychological maladies have used them.

It is known that whenever a new stimulus is introduced to the brain such as meditation, psychedelics, sensory deprivation or alpha/theta stimuli it disrupts the arrangements for stored sense data, i.e., memory tapes, producing expanded awareness. This is one reason so many users of these devices report altered and even mystical states.

Altered states of consciousness may be produced by changes in brain wave cycles. When you decelerate frequencies in brain waves going from beta (14 - 30 Hz) to delta (0.5 - 3.5 Hz) the amplitude increases. Maximum impact on the human body is when the brain waves are in delta. This is when whole brain functions take place. Neurochemical secretions of endorphins and opiates produce sensations of bliss and access to the multidimensional levels of human experience.

The Paranormal Connection

Speaking of multidimensional, we must also consider the inherent quantum characteristics in each living cell. A structure within the cytoskeleton known as the microtubule has demonstrated quantum characteristics. Microtubules demonstrate the quantum coherence necessary to maintain our existence in any one particular universe according to the Many Worlds Theory of quantum physics.

Psychic enhancement through meditation is a key for opening our senses to manifold eigenstates or quantum coherence; this leads to the so called "sixth sense" of parallel realities, alternate dimensions, and hyperspace.

Paranormal abilities may seem unnatural, but a few people are mistakenly mislabeled as schizophrenics because they receive too much information due to their extra sensory perception. Others use their extraordinary abilities for scientific research. One of the goals of transcendental meditation is control and focus of the "sixth sense." Electrostimulation of brain activity is a faster route to achieving E.S.P. In this case, the control would be in cooperation with a device. As beginners to this subject of brain stimulation we should, first, understand the basics.

Addiction Treatment

There have been more extensive electro stimulation studies done in the area of healing as opposed to learning or mind expansion. In such research a wide variety of effects have been corroborated. Doctor Alan Brovar conducted a test on the use of cranial electrotherapy on chemical dependency. His results conclusively showed that patients admitted for treatment for cocaine abuse had much greater success in giving up the drug and far fewer relapses when electro stimulation was used as part of the treatment. Other health related findings include the reduction of pain in cancer patients and success in treating psychological disturbances and neurological disorders.

A noteworthy experiment done by Doctors Richard Madden and Daniel Kirsch confirms the positive effects of electro stimulation on learning. In a double blind test participants were tested in learning a computer game. The electrically stimulated group performed better throughout successive games than the control group.

According to Michael Hutchison "In addition to the physiological benefits many people report personal transformations. Some well-known musicians such as Pete Townsend, Eric Clapton and Keith Richards were treated with electrical stimulation of the brain for drug addiction. They as well as others report that not only were they able to get off drugs but they experienced a transformation. They no longer had addictive personalities."

Life-Positive Behavioral Response

Michael Hutchinson tells of a woman who, as a child, lost her mother in a car accident. "She realized that she had been blaming her mother for many of her current problems. She was under psychiatric treatment and taking antidepressant medication for severe depression. She couldn't hold down a job. she was a total mess. After a couple minutes on a light and
sound device, I noticed there were tears falling down her face. Afterward she said she had met her mother during the session and was able to create a reconciliation. They expressed their love for one another and her mother told her she wanted her to succeed and be happy. Later I found that she stopped taking the medication, got a job, lost twenty pounds and got married. She went through a life transformation from something that started as twenty-five minutes on the machine.

"I'm not saying she actually went and met the spirit of her mother but something very important obviously happened to her. She was clearly ready for it. And something else might have produced the same effect. But the fact is that the machine acted as a catalyst."

Machines and tapes that synchronize and achieve different brain wave levels can also result in experiences of euphoria. Beta is the fastest level of brain wave function. It is associated with everyday brain awareness and moves at thirteen or more cycles per second. Alpha (8 - 13 Hz) is the next slowest level at eight to thirteen cycles per second. This level indicates a relaxed yet alert state of mind. Theta (4 - 7 Hz) waves at four to seven cycles per second produce greater insight, intuition and sometimes archetypical images. Delta is the slowest level ranging approximately from zero to four cycles per second. Delta is generally associated with deep sleep.

Stimulating Self Control

Perhaps the most important discovery that has come from new research is that not only can all these effects be obtained, but humans can learn to control their own mental states. This is where brain bio-feedback becomes useful. Through sensors touching the scalp electrical impulses from the brain are fed into a computer. The computer feeds back information either through a sound or visual monitor on the brain wave the user is emitting.

The user can then learn to produce the brain wave and state he or she wishes to experience. One of the most noteworthy accomplishments of the new technology is that the participation of sciences in extra-dimensional experience creates a new appreciation and the inevitable mass consensus that comes from pragmatic verification. More than ever before in history the benefits of meditation and energy exchange are being experienced by the many instead of just the few.

According to Michael Hutchison, "People can learn to take control of their mental state. People tend to operate under the assumption that if they feel depressed they have to wait for their anger to be gone. The fact is that once you learn how, it is very easy to switch out of one brain state and into a higher or more beneficial one. As more and more people get into these higher states they will carry them into their lives and the world will be a better place. The whole point to brain technology is people learning to function in a high energy, high coherence and high efficiency brain state. We are talking about a momentous leap forward in human evolution.

"People are learning how to work their own software. Just like in computer work, you can use a particular program like WordPerfect as a typewriter. As you get deeper into the program you learn there are all sorts of hidden tricks you can use for different possibilities. As people get into their own personal software they are learning there are all kinds of hidden possibilities of which they weren't even aware."

Among the many beneficiaries of brain stimulation machines, there are quotes from businessmen and women who use the technology for stress release, scientists that measure and experience the effects, Wall Street analysts who use it to focus and clear their minds for more effective work and doctors and therapists who use it for treating patients.

But is there any benefit for meditators who have had many years of experience with heightened states of awareness? Michael answers this question with the following example. "A psychiatrist came to one of my workshops. He told me that he had twenty years of experience meditating twice a day and he is very suspicious of all this stuff. I put him on one of the machines and afterwards he looked at me and said 'I can't believe it, this is my meditative experience.'"

Now he uses the technology in his psychiatric practice to help people who have difficulty getting into meditative states. Many experienced meditators tell me that they can get into their meditative states faster and at times when their stress level might normally make it very difficult. It becomes a kind of meditation booster in that way.
It seems however that there is an experiential difference between brain stimulation and meditation. You cannot help but get the sense that you are giving up your process to a machine and perhaps losing some of the benefit that comes from flexing those meditative muscles. Michael gives his version of this idea. "The metaphor I often use is this: You can set out walking from San Francisco to New York. You will wear out some shoes and get sore feet but in the meantime you will meet fascinating people and undergo personal growth experiences by the time you reach your destination in about five hours. In a way these brain machines are like the jet plane. They can get you to pretty much the same place in less the time, but you won't have undergone the same kind of personal growth that involves the discipline."

Nevertheless, it is apparent that sometimes a quick flight is better than missing your appointment with bliss altogether. There is another point of import that should be addressed when offering a system of easy transformation to the general public. Meditation is more than a process of stress reduction. It is transmutative in nature. It is most effective when applied with a program of discipline and a reaching for a higher sense of self-awareness. Could it be that reaching higher states of consciousness without these important elements can lead to more difficulty than good?

Elucidates the nature of mediation?

"In the classical context, meditation is a clarification in consciousness; it is an upheaval in one’s being, an explosion in one’s depth, a process of purification in addition to being a process that yields an experience of elevated awareness or bliss. The brain wave frequencies, in addition to creating physiological and psychological euphoric responses, relate to the data banks of the brain/mind computer.

When the brain goes into alpha theta and delta, windows open to the subconscious and unconscious. When we are in theta/delta all data that are incongruent with the experience we are having, which is one of increasing non-duality or oneness, has to be released or reprogrammed to be congruent with the experience.

When people start meditating they get a taste of the bliss and peace, and then they have to confront all their anger, anxieties and fears. This is particularly important for the western culture, as our culture is particularly suppressive. As a result Westerners experience a great deal more catharsis in their meditating. So it is imperative not only to use the technology available for accessing higher mental states but also to utilize the reprogramming and rescripting dimensions that address the integration of the upheaval. Then and only then is there a proportional expansion of awareness."

So the executive using a brain machine to de-stress or tune his brain for more effective use may begin to experience forms of catharsis. It is important that people be aware that this may happen, and be prepared to take the steps toward integration.

It becomes apparent that the use of technology in and of itself as a transformation media can be limiting. Equal to the ignorance of the neophyte enlightened who believes that technology is unnatural has no place in the evolution of consciousness is that of the technological addict who uses the devices as a crutch. We can recognize that science and technology, just as any available tool can, as Brother Charles put it, "accelerate integration through greater precision in the transformation process."

We must also acknowledge that this acceleration ultimately is monitored and created by inner awareness. It is important in an age of advanced technology that we remember who is the creator and who is the machine. You can most effectively utilize the mechanical tools by learning to induce heightened awareness with your own internal powers.

In addition to being passive and blissful, meditation can be creative and active. On the active side of the spectrum one can use subliminal tapes and other methods for integration. These tools used consciously can help entrain the inward process that moves one into more effective levels of actualization.

It is an exciting time in which we are living. The age-old polarity between physics and metaphysics is breaking down. In this integration we have the spiritual ideal manifesting on the physical plane as well as physical proof validating the spiritual ideal. Thus philosophy and science are beginning to embrace the one truth.

We are in the beginning of a new phase of human evolution. Science and metaphysics working hand in hand is a phenomenon in its infancy. We would be wise to proceed with enthusiasm secured with caution. All the effects of the devices mentioned, although decorated with examples of many benefits, have not yet been determined. As we learn more
about this new field, its functions will be improved and the benefits augmented. In working with and enjoying our new abilities to electronically experience self-realization we are wise to fall back on a familiar message from ancient wisdom. Trust your inner knowing.

"Some people come into our lives and quickly go. Some people move our souls to dance. They awaken us to understanding with the passing whisper of their wisdom. Some people make the sky more beautiful to gaze upon. They stay in our lives for awhile and leave footprints on our hearts forever"

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Eductor

The word 'Doctor' comes from the Latin word 'Eductor' which means 'to teach'.

Thomas Edison said that the doctor of the future will teach the patient how to live and how to eat, exercise and meditate.

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