

Pilot Research Results

Effects of a Relaxation CD on Stress Factors In Cancer Patients Receiving Chemotherapy as Measured by Quantitative EEG: A Pilot Study

According to the American Cancer Society, cancer is the second leading cause of death in the US. In the year 2006 about 1,220,100 new cancer cases will be diagnosed and about 552,200 Americans are expected to die of this disease. Research has shown that stress can compromise the immune system and therefore may become a significant factor for cancer patients (Anderson et al., 1998; Boormeester & Butzelar, 1999). Music has often been used as a stress-reliever and there is much research to support this as a therapy. This pilot study looked at the effects of a music CD designed to induce relaxation.

Five subjects were enlisted in this study. The data of one subject was determined to be too contaminated, with muscle artifacts, and was therefore removed. That left four subjects. Each subject was given a Quantitative EEG (QEEG) pre and post treatment. After the pre QEEG they were instructed to listen to a music CD (*The Magic Mirror* relaxation solo harp CD by Amy Camie) once a day for ten consecutive days. They were also instructed to fill out a daily questionnaire. At the end of the ten day listening period a post QEEG was done.

The QEEG data was analyzed by [Dr. Robert Thatcher's](#) normative database (NeuroGuide). Each subject's data was looked at in terms of the degree to which it deviated from the norm. The spreadsheet below is a summary of the findings. It is color coded so you can see at a glance that each subject showed pre study indications of EEG abnormalities and significant changes in the post QEEG. The categories (Delta through High Beta) are EEG frequencies (see definitions below) and Asymmetry through TBI Index are ways of looking at the cortex's efficiency at processing information (see definitions below). [Pre/Post QEEG Images](#)

Red = significant deviation from the norm (before listening to the music)

Green = a statistically positive change or normalization (after listening to the music)

Subject	Delta	Theta	Alpha	Beta	High Beta	Asymmetry	Coherence	TBI Index
JM Pre	elevated				elevated	Alpha-abnormal		
JM Post	normalized				reduced	Alpha-normal		
PJ Pre		elevated		elevated	elevated	Alpha-abnormal		Yes
PJ Post		reduced		reduced	reduced	Alpha-normal		Yes
KH Pre	low	low					Delta-abnormal	

KH Post	normalized	normalized					Delta-normal	
HG Pre		elevated		elevated	elevated	Alpha-abnormal		Yes
HG Post		reduced		reduced	reduced	Alpha-reduced		Yes

Frequency

Frequency refers to the rate at which a brainwave repeats its cycle within one second. The number of cycles per second is called “hertz” (Hz). The more times a brainwave repeats its cycle per second, the FASTER it is said to be. Some practitioners divide the frequency of brainwaves into categories:

Delta (0.1-3 Hz):

Distribution: generally broad or diffused, may be bilateral, widespread

Subjective feeling states: non-REM sleep, when awake – an internal focus

Theta (3-8 Hz):

Distribution: usually regional, may involve many lobes, can be lateralized or diffuse;

Subjective feeling states: intuitive, creative, switching thoughts, drowsy;

Alpha (8-12 Hz):

Distribution: regional, usually involves entire lobe; strong occipital w/eyes closed

Subjective feeling states: relaxed, not agitated, but not drowsy; tranquil, conscious

Low Beta (12-15 Hz), formerly "SMR":

Distribution: localized by side and by lobe (frontal, occipital, etc)

Subjective feeling states: relaxed yet focused, integrated

Midrange Beta (15-18 Hz):

Distribution: localized, over various areas. May be focused on one electrode.

Subjective feeling states: thinking, aware of self & surroundings

High Beta (above 18 Hz):

Distribution: localized, may be very focused.

Subjective feeling states: hyper alertness, agitation

Cortical Processing:

Sensory integration is an innate neurobiological process and refers to the integration and interpretation of sensory stimulation from the environment by the brain. For us to adequately understand the world around us we need to effectively interpret and process all the information our senses take in. Asymmetry refers to similar signal strength across areas of the cortex that are doing the processing. Different signal strengths decrease information processing efficiency. Coherence is another aspect of cortical processing which impacts efficiency. Inclusion in the TBI Index indicates QEEG similarities with a traumatic brain injured population.

The indications that can be drawn from this pilot study are:

1. *The Magic Mirror* relaxation solo harp CD has a significant effect on EEG

- frequencies
2. *The Magic Mirror* relaxation solo harp CD has a significant effect on cortical processing of information.
 3. The frequencies most affected are the High Beta and Theta.
 4. Asymmetry is most often problematic and positively affected cortical processing measure.
 5. A general comment that can be made is that *The Magic Mirror* relaxation solo harp CD calms and quiets the brain resulting in greater ability to focus and process information.

Comment on Study:

There are a number of important facts that need to be considered when reviewing the data. The subject EEG data was processed through one of the most reputable database available. Dr. Thatcher has been published in the most prestigious peer review journals in neurology. Subject EEG is being compared to normative data and only deviation from the norm is considered. Neurological functioning as measured by EEG is approaching normal. The intervening variable (treatment) is *The Magic Mirror* relaxation solo harp music. By using a normative database the results are indicating a significant change in critical EEG functions. Subjective reports from the subject's daily log indicated a daily positive effect of the music. This is subjective whereas the EEG data is not. [Further Comments on Study](#)

In future studies the research could focus on:

1. Validating the pilot study by using a larger sample size.
2. Isolate factors that contribute to stress and decreased processing efficiency.
3. Increase the time subjects listen to the CD to determine if the effects increase or not.
4. Do post cancer treatment QEEG to determine if QEEG normalizes without the use of the CD.
5. Determine if this one aspect impacts the subject's cancer progression in time and size.

This pilot study was conducted by William Collins, Ph.D. www.rhistl.com