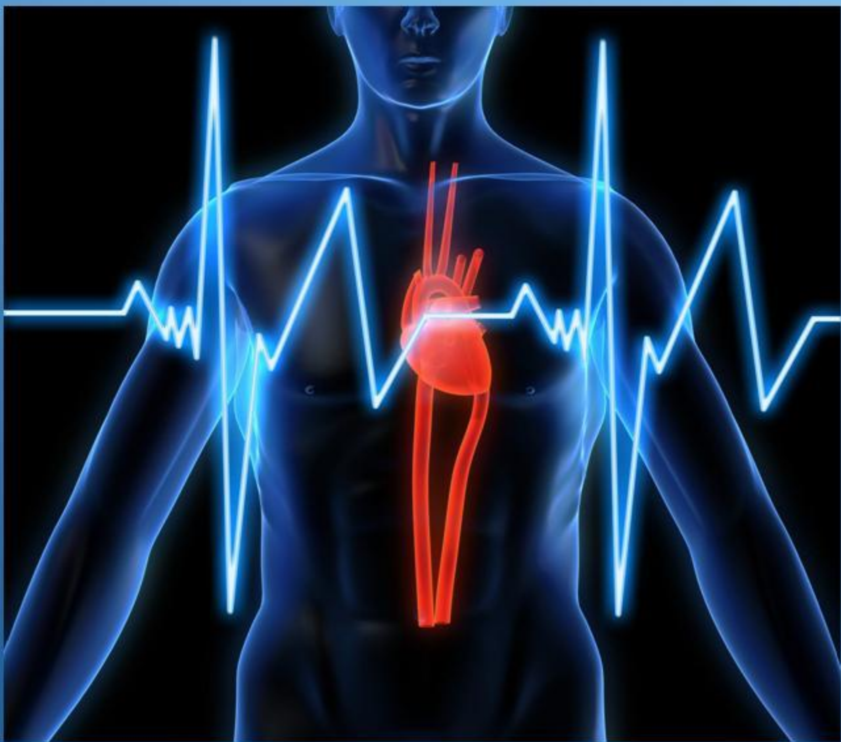
Psychophysiology Today

The mind body magazine



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PRESIDENTIAL NOTE

As a forum for a community of clinicians and scholars from around the world, the BFE meetings offer in-depth workshop training, critical discussions and presentations by international experts during the scientific sessions. The upcoming 2014 BFE meeting will take place in Venice, Italy and will continue in this tradition. We invite you, not only to join us, but to actively participate by submitting a presentation to the programming committee. Deadlines for posters, orals, symposia and papers has been extended to October 30, 2013 and submission forms can be found on our meeting website at:

http://bfe-meeting.blogspot.ca/p/abstract-submission.html

The field of applied psychophysiology continues to expand and clinicians and researchers are seeing that the mind and body are interconnected. Thus, successful training is embedded within a system perspective which can include the appropriate use of neurofeedback, biofeedback, physical movement, mindfulness and many other approaches by which people can mobilize their health and optimize their performance.

This issue *Psychophysiology Today,* the BFE e-journal, was put together under the outstanding leadership of Monika Fuhs.

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A Special Note of Thanks to Monika Fuhs...

The BFE would like to thank Monica Fuhs for her vision in creating the e-magazine, *Psychophysiology Today*, and for the countless hours spent in fulfilling that vision. It is with great sadness that we announce that she has stepped down from her position of Editior.

We would also like to acknowledge Monika's contribution to the BFE Annual Meeting. Monika was instrumental in creating the nurturing and supportive atmosphere at our meetings that so many attedees have expressed appreciation for. On behalf of all the participants who have attended the BFE meetings, and from the bottom of our hearts, we thank you for your dedicated, selfless service.

Monika has worked hard at promoting the concepts of biofeedback and self-healing. She continuously perceived that healing is more than just equipment but incorporated all aspects of the human being -- body, mind and spirit. We thank her for supporting the BFE and wish her much joy and success in her future ventures. Although we will miss her direct input and guidance, we look forward to her continued presence at the meeting.

Erik
And the BFE family

ORIGINAL ARTICLES

The Added Value of Psychophysiological Stress Profiling

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Introduction

Many people visit their general practitioner because of fatigue and pain. If a medical cause is suspected, the patient is referred to the hospital and when a medical explanation cannot be found, the patient will be referred to a psychologist with the label "stress related problems". The psychologist will look at cognition, behavior and personality and will start therapy hoping that the symptoms disappear spontaneously as the patient learns to cope better with problems and personal pitfalls. Sometimes that happens, but often the problems remain, especially when the patient is challenged in therapy to experiment with new behavior, which causes extra stress. Part of the therapy will probably be relaxation in some form. My experience, however, is that a large percentage of patients do not profit very much from relaxation exercises. An explanation can be that relaxation exercises are given without really knowing what is going on in the body of the patient. So it can happen that a patient with a normal breathing pattern is advised to do daily breathing exercises and a patient with a disturbed breathing pattern is advised to try progressive relaxation of the muscles. Wouldn't it be better for patients with stress related complaints if the therapist and patient are able to see clearly how the body reacts during relaxation and during stress? That is what psychophysiological stress profiling is about. By measuring body functions, like respiration, heart rate, muscle tension, hand temperature and galvanic skin conductance, the therapist gets a clear view of the way the body responds to stress and he sees whether the patient is able to relax when the stress is no longer there. Moreover, the therapist can really test the efficacy of a relaxation exercise, so he can give better advice about which relaxation exercise is best for his patient. Stress profiling makes it possible for the patient to understand his or her complaint and gives the therapist a tool to determine what kind of therapy is needed to tackle the stress related problem. In this article I will show the added value of psychophysiological stress profile by means of two case studies.

Health and Inner Balance

Health is all about balance. The brain, the nervous system and the heart all work together continuously to maintain body balance. If action is required by the body, these systems make sure that the body can act in the appropriate way. During this active or alert state, processes of growth and recovery (such as digestion and the immune system) are put on hold. This not only happens during physical activity, but also during mental effort and during the experience of danger or threat, for example in stressful situations or insecure environments. It is no problem to be in a state of alertness or activity for some time, but eventually the nervous system has to return to a more relaxed state to offer the body the chance to regenerate. Stress related problems occur when the body remains in an active or alert state for too long, without enough time to relax and to regenerate.

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The Psychophysiological Stress Profile

If we are in a relaxed state, respiration is slow and deep, heart rate is normal, muscles of the neck and shoulders are relaxed and the hands are warm and dry. When we are in a state of alertness or activity, a change in these signals can be observed. This change varies from person to person. When a person is challenged with a mental task, for example a difficult math task, some people start to sweat, others tense their muscles and yet another group of people will start to breathe more rapidly and shallowly. It is important to know how a patient reacts to a mental task, as this would probably be the same as the stress reaction that he will show in other stressful situations in his daily life. In my practice I use a standardized stress profile, measuring muscle tension in both trapezius muscles, respiration, heart rate, hand temperature and skin conductance. The test starts with a baseline of 6 minutes, in which the patient is reading in silence. This is to prevent the patient from being too occupied with relaxing. Then periods of relaxation, marked green in the graphs, are alternated with mental stressors, marked red in the graphs. The test ends with a particular breathing exercise, which is slow breathing at a rate of 5-8 breaths per minute, depending on the normal breathing rate of the person. The stressors used are mental stressors, in the following order: 1) saying the alphabet backwards out loud, 2) thinking of as many animals as possible, starting with the letter R and 3) performing serial seven's math task. As you will see from the following case studies, this 20 minute stress profile offers a lot of valuable information for both client and therapist.

Case Study: Headaches

Mr. W., age 33, had been referred to my psychology practice because of headaches that according to his general practitioner, were caused by a combination of stress and too much tension in the muscles of his head and shoulders. Mr. W. has had a stressful time with a lot of private and work related stressors. That was the time of onset of his headaches about 3 years ago. At the moment he leads a quiet, non stressful life, but his headaches have not disappeared, although the pain is less intense. The stress profile is conducted in the standardized way as described earlier in this article. See Figure 1.

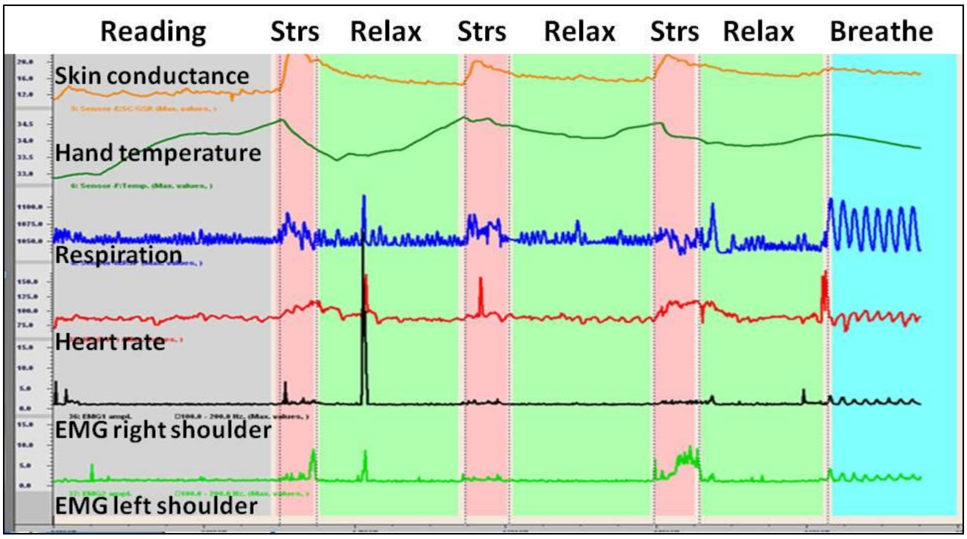

Figure 1: Stress profile of Mr. W. Most remarkable is the reactive skin conductance. Grey segment is baseline while reading, red segments are the stressors (strs), green segments are the periods of relaxation and the blue segment is the breathing exercise.

The stress profile shows that Mr. W. had relaxed shoulder muscles during almost the whole test. Apart from the muscle tension in the shoulders, I tested as a separate measurement the muscle tension in the masseter, frontalis and neck, but these muscles also appeared to be relaxed. Most certainly the cause of the headache could not be found in high muscle tension, as the general practitioner had suggested.

The stress profile however does show that the skin conductance does not show normal values. Skin conductance is a measure of reaction/emotion. An emotional reaction creates additional perspiration on the fingertips, causing an increase in skin conductance. The expected pattern is an increase in skin conductance during a mental task and a decrease in skin conductance during relaxation and during recovery from the mental task. The skin conductance of Mr. W. was extremely high, about 12 microsiemens instead of the normal value of about 0-3 microsiemens, and it shows continuous activity, even when the room was silent during the relaxation periods. It looks like he was reacting all the time. This he recognized. He said that his senses are active all the time, he sees and hears everything. What he did not realize was that this activity was preventing his body from relaxing. He understood that for his health, he would be better off if he could learn to put his senses to rest and turn his attention inward. Through biofeedback training he learned which techniques were effective for him to lower his skin conductance. He combined biofeedback with mindfulness exercises at home, such as the body scan. After a few weeks of training Mr W. reported that his head felt quieter and his headaches decreased. After 5 sessions, no further treatment was necessary because the headaches were gone.

Case Study: Fatigue

Mrs. B., 46 years old, visited my practice because she had been feeling fatigued, agitated and emotionally unstable for about 3 years. These feelings get worse in situations when she does not feel welcome or accepted as the person that she is. She experiences these feelings both at work and at family gatherings, where she does not feel at ease. Her stress profile (see Figure 2) shows two things: fast and shallow breathing and cold hands with the hand temperature decreasing further during the test. Also, unconsciously she tenses her shoulders. Hand temperature is determined by the amount of blood in the fingertips. When the body is in a state of alertness, the nervous system constricts the small blood vessels in the fingertips, to make extra blood available for the brain and large muscles that are needed to act quickly in the presence of danger or threat. Normally hand temperature decreases during mental effort and increases during relaxation and during recovery from a mental task. Cold hands may indicate that Mrs. B. approaches the world with suspicion and when I told her that, she admitted this immediately. She feels that people around her do not accept her, she feels alert, insecure and anxious. Her rapid shallow breathing can be explained by this as well, as it is a pattern associated with anxiety.

Although she previously was not aware of her breathing pattern, the stress profile made this visible for her and she wondered what would happen if she could learn to breathe deeper and slower. The therapy focused on the themes of safety and daring to be yourself. The breathing exercises allowed her to relax and she used deep breathing techniques in situations where she felt uncomfortable. She discovered that others accepted her, even if she dared to be herself, and she felt increasingly comfortable in groups. She found another job, which suited her better. After a while, her fatigue also diminished. In the last therapy session, we conducted the stress profile again and her hands were warm and she responded normally during the test.

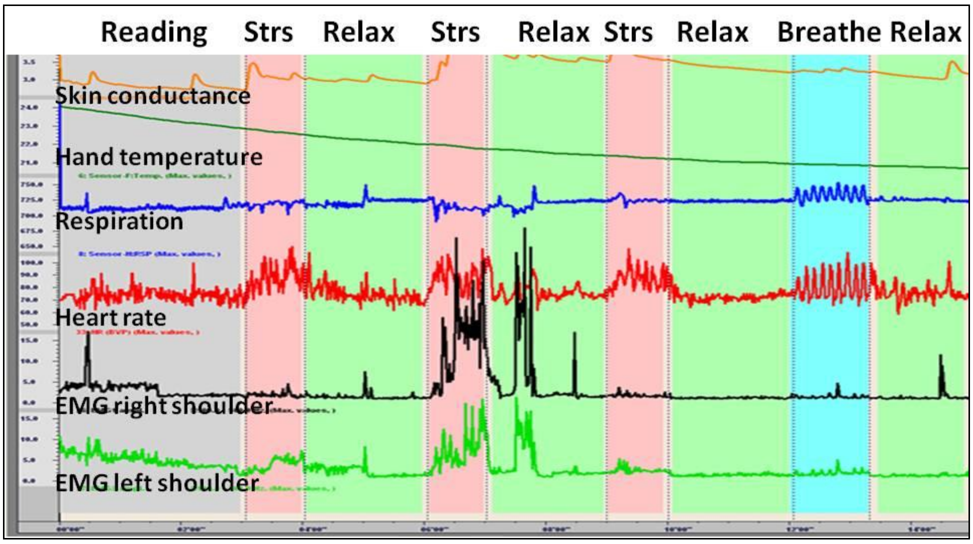

Figure 2: Stress profile of Mrs. B. showed a continuous decrease in hand temperature and rapid shallow breathing. Grey segment is baseline while reading, red segments are the stressors(strs), green segments are the periods of relaxation and the blue segment is the breathing exercise

Conclusion

The psychophysiological stress profile shows what happens in the body in response to stress and provides insight into the ability to relax and to regenerate after stress. In the case of stress related problems, the cause is made clearer and the treatment can be better tailored to the specific situation of the patient.

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ORIGINAL ARTICLES

Is the Effectiveness of Biofeedback Training Primarily Due to Its Being a Form of Hypnotic Induction?

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As I see it, the reason biofeedback has proven to be so effective for gaining control of involuntary physiological responses is that in actuality subjects going through biofeedback training are being put through a form of hypnotic induction. To fully understand the basis of this contention one has to be aware of my definition of hypnotic induction and hypnosis as presented in my theory of hypnosis. In the theory a hypnotic induction is defined as the giving of two or more suggestions in succession so that a positive response to one increases the probability of responding to the next one (Barrios, 2001, p. 171). The reason for this is that as a result of the positive response to the first suggestion, the belief factor is increased thus producing the beginnings of a state of hypnosis, which in the theory I define as a state of heightened belief. And I am not alone in this line of thinking. As you can see in the following quote from Skinner's Verbal Behavior (1957, pp. 160 & 357), he presents the same basic idea:

"Our belief in what someone tells us is similarly a function of or identical with our tendency to act upon the verbal stimuli which he provides. If we have always been successful when responding with respect to his verbal behavior, our belief will be strong... Various devices used professionally to increase the belief of the listener (for example by salesmen or therapists) can be analyzed in these terms. The therapist may begin with a number of statements which are so obviously true that the listener's behavior is strongly reinforced. Later a strong reaction is obtained to statements which would otherwise have led to little or no response. Hypnosis is not at the moment very well understood, but it seems to exemplify a heightened belief in the present sense. The world for a time is reduced to verbal stimuli which are in practically complete control of the hypnotized subject."

And the last sentence in this quote leads to my explanation of why it is that a heightened state of belief leads to greater control over involuntary responses. In my book, Towards Greater Freedom and Happiness, I define belief as "focusing on a thought to exclusion of anything that would contradict it". Thus the reason for one having greater control over involuntary responses via hypnosis and biofeedback is because the inhibitory set aspect of belief blocks out any interference from competing stimuli in what I refer to as the stimulus dominance hierarchy (Barrios, 2009, p. 17). At any one point in time there are any number of stimuli present (both cognitive and sensory) that compete for one's responding. If we want someone to, let's say, respond strongly to a suggestion or thought (a cognitive stimulus) of relaxation, we need to first block out interference from any competing, more dominant stimuli in the hierarchy. It should also be made clear why it is that biofeedback devices increase the chances of the subject seeing a positive response to a suggestion. It is because these devices amplify any initial minute responses to suggestion.

Although the use of biofeedback devices has only been around since for the most part the early 1970's, the basic principle behind biofeedback has been used to facilitate hypnotic inductions long before if we can look upon the Chevreul Pendulum as a hypnotic aid device; for if you stop to think about it, the Chevreul Pendulum is in actuality a biofeedback device. What the pendulum does is amplify minute ideomotor movements of the hand when the thought of a particular movement is suggested (e.g., suggestions that the pendulum will swing from left to right. or in a circle, or back and forth). Many in the field of hypnosis recommend use of the Chevreul Pendulum as a "warm up" procedure to get subjects in a more receptive mood for hypnosis (e.g., see Lynn and Sherman, 2000: p. 202). In fact a complete hypnotic induction procedure, starting with suggestions of movements of the pendulum has been devised (see the Pendulum Technique in Barrios, 1985: pp. 36-38). The following studies provide further support for the contention that biofeedback devices enhance responsiveness to hypnotic induction:

- Wickramasekera (1973) using forms A and B of the Stanford Hypnotic Susceptibility Scale found a significant increase (p=.001) in suggestibility upon using EMG biofeedback to reinforce suggestions of relaxation.
- Dikel and Olness (1980) compared three groups for effectiveness in raising and lowering fingertip temperature: Group A - self-hypnosis alone. Group B - self-hypnosis with biofeedback. Group C - biofeedback alone. Among other things, they found that "Some of the children in Group A who had little or no success with hypnosis only were very successful with the addition of biofeedback monitoring, suggesting a synergistic effect between biofeedback and hypnosis".
- Elton (1993) compared two groups of 20 subjects each being treated for stress and tension headaches. "In this study the use of hypnosis is compared with the use of hypnosis plus EMG biofeedback in the framework of behavioral therapy... The results indicated that both groups showed significant gains, but the hypnosis and biofeedback group showed better results and reported that they found it easier to accept hypnotic training and self-regulation".
- Somer (1995) found that using biofeedback to enhance the hypnotherapeutic treatment was effective because of the "continuous convincing feedback about the growing mastery" provided by the biofeedback.

Discussion

It is hoped that by pointing out that biofeedback training and hypnotic induction are very closely related if not equivalent, people in one field can now begin to profit from the techniques used in the other. Not only can hypnotherapists enhance the effectiveness of their hypnotic inductions with the help of biofeedback devices, but biofeedback therapists can increase their success rate with their patients by using some of the techniques that have proven successful in hypnotherapy.

For example, in my use of hypnotic induction I have for years used a thermal biofeedback device, my invention the Stress Control Biofeedback Card (Barrios, 1983), to reinforce suggestions of relaxation and thus increase the effectiveness of hypnotic induction in helping clients gain control over stress. And as an example of how techniques of hypnotherapists can help biofeedback therapists, I have developed (thanks to my theory of hypnosis) a number of techniques for enhancing post-hypnotic suggestions which can be used by biofeedback therapists to enhance post-biofeedback-training results. This includes a variety of visualization techniques for ensuring that suggestions of greater control in a number of typical situations will hold long after the hypnotic induction (Barrios, 1985: pp. 213-250). It also includes the giving of post-hypnotic suggestions that will further enhance achieving the goals of the therapy. For example, for the goal of stress control, post-hypnotic suggestions are given of using the conveniently portable Stress Control Biofeedback Card to lower the stress level any time during the day whenever stress rears its ugly head. (There are four relaxation techniques on the back of the card that the client can use to raise the fingertip temperature). Also, suggestions are given for installing positive mental attitudes (e.g., looking for the good in others; looking for the "silver lining" in bad situations; learning from your mistakes, etc.) that will ensure a lower level of overall stress (Barrios, 1985: pp. 58-71; and Barrios, 2009: p. 64).

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Epilepsy: New (old) Treatment without Drugs[1]

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Nothing is so hard as watching a child having a seizure.
–Elizabeth A. Thiele, MD, PhD, Professor of neurology at Harvard Medical School

Until recently, when people asked me, *"What would I suggest as a non-toxic/non-invasive biofeedback approach for the treatment of epilepsy?"* I automatically replied*, "A combination of neurofeedback, behavioral analysis treatment, respiration training, a low glycemic diet, and stress management and if these did not work, medications."* I have now changed my mind!

Epilepsy is diagnosed if the person has had two or more seizures. About one to two percent of the population is diagnosed with epilepsy and it is the most common neurological illness in children (Saunders, 2003; Thiele, 2012). Medication is usually the initial treatment intervention; however, in about one third of the people, the seizures will still occur despite the medications. In some cases, people–often without the support of their neurologist/healthcare provider–will explore other treatment strategies such as diet, respiration training, neurofeedback, behavioral control, or traditional Chinese medicine.

It is ironic that one of the tools to diagnose epilepsy is recording the electroencephalography (EEG) of the person after fasting while breathing quickly (hyperventilating). For some, the combination of low blood sugar and hyperventilation will evoke epileptic wave forms in their EEG and can trigger seizures. (For a discussion how this process also contributes to anxiety see Peper et al, 2009) More importantly, hyperventilation when paired with low sugar levels tends to increase slow wave EEG which would promote seizure activity as shown in figure 1 (Peper et al, 2009).

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[1] Adapted from the blog, *the peper perspective*-ideas on illness, health and well-being http://peperperspective.com/2013/03/10/epilepsy-new-old-treatment-without-drugs/ and previously published as Peper, E. (2013). Epilepsy: New (old) Treatment without Drugs. *NeuroConnections.*Summer 2013, 30-31.

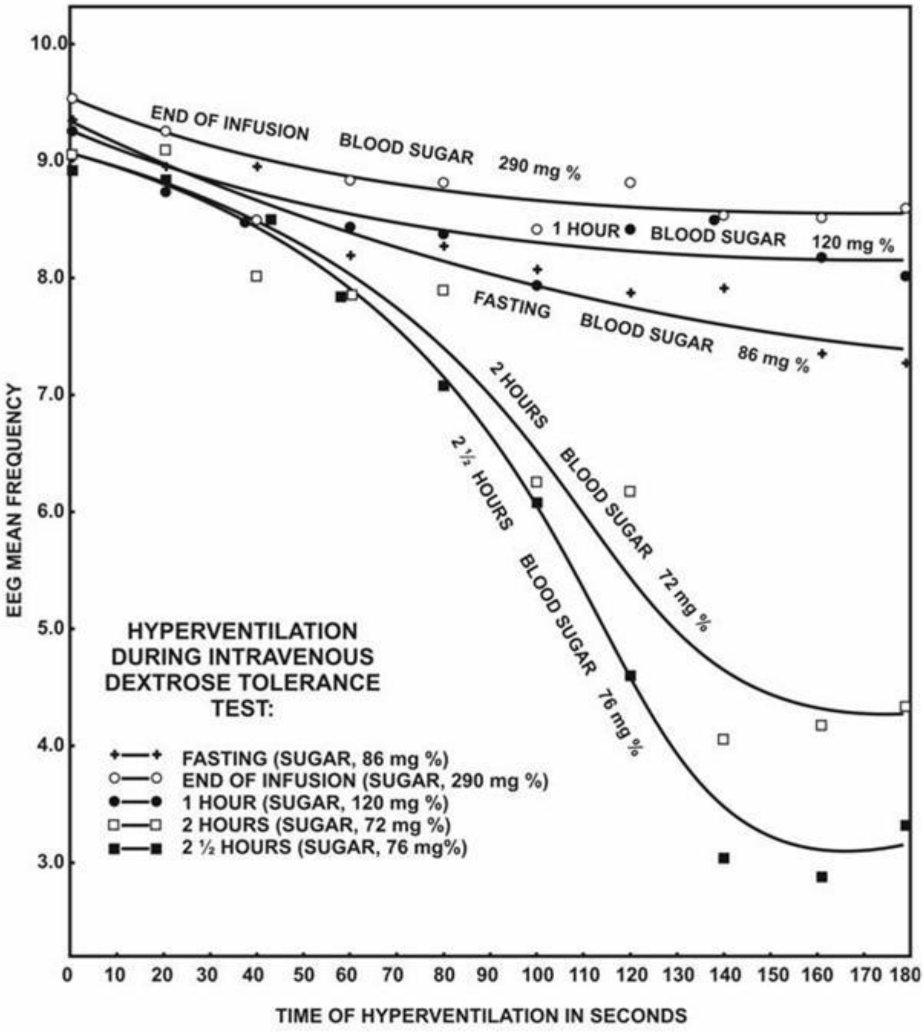

Figure 1. EEG mean frequency change at different blood-sugar levels in response to hyperventilation (redrawn from Engel, Ferris, & Logan, 1947).

If hyperventilation and fluctuating blood sugar levels are contributing factors in triggering seizures, why not teach breath and diet control as the first non-toxic clinical intervention before medications are prescribed? This breathing approach has shown very promising clinical success in the treatment of epilepsy and anxiety (Fried et al, 1984; Fried, 1987; Peper et al, 2009).

Self-management should be the first clinical intervention and not the last. Similarly, neurofeedback– brain wave biofeedback–is another proven approach to reduce seizures. This approach was developed by Professor Maurice B. Sterman at UCLA and was based upon animal studies. He demonstrated as early as 1968 that cats who were trained to increase sensory motor rhythm (SMR) in their EEG could postpone seizure onset when exposed to a neurotoxin that induced seizures (Sterman, 2000). He then demonstrated that human beings with epilepsy could equally learn to control their EEG patterns and inhibit seizures (Sterman & Egner, 2006). This approach, just as the breathing approach, is non-toxic and reduces seizures.

Underlying both these approaches is the concept of behavioral analysis to identify and interrupt the chained behavior that leads to a seizure. Namely, a stimulus (internal or external) triggers a cascading chain of neurological processes that eventually results in a seizure. Thus, if the person learns to identify and interrupt/divert this cascading chain, the seizure does not occur. From this perspective, respiration training and neurofeedback could be interpreted to interrupt this cascading process. Behavioral analyses includes all behaviors (movement, facial expressions, emotions, etc) which can be identified and then interrupted. As professors Joanne Dahl and Tobias Lundgren (2005) from Uppsala University in Sweden state, *The behavior technology of seizure control provides low-cost, drug free treatment alternative for individual already suffering from seizures and the stigmatization of epilepsy.*

Until recently, I would automatically suggest that people explore these self-control strategies as the first intervention in treatment of epilepsy and only medication for the last resort. Now, I have changed my mind. I suggest the ketogenic diet as the first step for the treatment of epilepsy in conjunction with the self-regulation strategies—medication should only be used if the previous strategies were unsuccessful.

As Elizabeth A. Thiele, MD, PhD, professor of neurology at Harvard Medical School points out, dietary therapy is the most effective known treatment strategy for epilepsy (Thiele, 2012). A ketogenic diet has a 90% clinical success rates in children–even in patients with refractory seizures. This diet stabilizes blood sugar levels and is very low on simple carbohydrates, high in fat, some protein, and lots of vegetables (a ratio of 4 grams of fat to 1 gram of carbohydrates and protein). In adults, the success rates drops to about 50%. The lower success rate may be the result of the challenges in implementing these self-regulatory diet approaches. Even though, a ketogenic diet is the most effective therapy, it is less likely to be prescribed than medications—there are no financial incentives; there are, however, many financial incentives for prescribing pharmaceuticals.

These lifestyle changes are very challenging to implement. They need to be taught and socially supported. Just telling people what to do does not often work. It is similar to learning to play a musical instrument. The person needs step by step coaching and social support which is an intensive educational approach. To learn more about the research underlying the ketogenic diet as the first level of intervention for epilepsy, watch Professor Thiele's video presentation from the 2012 Ancentral Health Symposium, *Dietary Therapy: Role in Epilepsy and Beyond.* (Thiele, 2012)

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EEG Bands During Wakefulness, Slow-Wave and Paradoxical Sleep as a Result Of Principal Component Analysis in Man

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Abstract: Human electroencephalogram (EEG) has been divided in bands established by visual inspection that frequently do not correspond with EEG generators nor with functional meaning of EEG rhythms. Power spectra from wakefulness, stage 2, stage 4 and paradoxical sleep of 8 young adults were submitted to Principal Component Analyses to investigate which frequencies co-varied together. Two identical eigenvectors were identified for stage 2 and stage 4: 1 to 8 Hz and 5 to 15 Hz (87.95 and 84.62 % of the total variance respectively). Two eigenvectors were extracted for PS: 1 to 9 Hz and 10 to 15 Hz (81.62% of the total variance). Three eigenvectors were obtained for W: with frequencies between 1 to 7 Hz, 7 to 11 Hz, and 12 to 15 Hz (78.32% of the total variance). Power for all frequencies showed significant differences among vigilance states. These results indicate that slow wave activity can oscillate at higher frequencies, up to 8 Hz, and that spindle oscillations have a wider range down to 5 Hz. No theta band was independently identified, suggesting either that delta and theta oscillations are two rhythms under the same global influence, or that the traditional division of theta band in the human cortical EEG is artificial. Alpha as a band was identified only during wakefulness. Principal component analysis upon spectral densities extracted broad bands different for each vigilance state and from traditional bands, consistent with functional significance of EEG and with frequencies of generators of rhythmic activity obtained in cellular studies in animals.

Key words: EEG; spectral analysis; NREM sleep; REM sleep; wakefulness; principal component analysis

INTRODUCTION

Human electroencephalographic activity (EEG) has been traditionally divided into broad bands established by visual inspection because they are readily apparent to eye inspection, show specific frequency, voltage, morphology and regional predominance, and have specific reactivity (i.e., they appear and disappear under specific physiological conditions) [1-3]. During wakefulness (W), the cortical EEG of normal adults is characterized by either beta or alpha rhythms. The alpha rhythm is characterized by waxing and waning, sinusoidal oscillations resembling spindles with a frequency range between 7—8 Hz and 11—12 Hz with a limited duration between 0.5 and 2 sec. They can appear isolated or in trains and they predominate in posterior and occipital regions [4-7]. The rest of the time, the EEG is dominated by low voltage higher frequencies from 12—13 Hz to approximately 30 Hz with irregular morphology that have been termed beta waves or low voltage fast activity or desynchronized activity due to their irregular morphology. Both rhythms coexist or predominate according to psychophysiological circumstances. Alpha predominates with eye closure in most of the subjects and disappears or is attenuated with eye opening, or when paying attention to external or internal stimuli when it is replaced by beta, so alpha has become a sign of internal relaxation, whereas beta predominates in states of arousal and it is evoked by external or internal stimuli and by electrical stimulation of activating systems [1-8]. In past decades, activity with higher frequencies up to 80 Hz, or gamma, has also been recorded in the human scalp during activated states and in response to several tasks [9-13] as well as during sleep [14,15]. Sleep is characterized by the vanishing of alpha activity and the appearance of slower rhythms comprised within delta (.5 to 3-4 Hz) and theta frequency ranges (3.5-4 to 7Hz), [1-3] and by specific waxing and waning oscillations between 12 and 14 Hz known as sleep spindles [16]. The classification of sleep stages is based on visual detection of the predominant EEG activity over a limited period of time or epoch usually of 20 or 30 seconds, together with electromyographic activity and eye movements. Stage 1 is defined by low voltage, mixed frequencies with predominance of activity from 2—7 Hz and alpha during less than 50% of the epoch; stage 2, by the presence of sleep spindles and of slow activity of 2 Hz or less during less than 20% of the epoch; stage 3, by slow activity between 20 and 50% and stage 4 by slow activity higher than 50% of the epoch and stage REM or PS by relatively low voltage mixed frequencies [16]. Quantitative EEG analysis yields far more information than visual inspection. The use of spectral analysis and period-amplitude analysis has allowed for the discovery of important features of sleep, such as EEG differences among sleep stages [17-20], among successive sleep cycles [21,22], between men and women [19,23], after sleep deprivation [18,24] and after extended sleep [25]. Most of these studies however, have focused on traditional EEG bands mostly delta, or arbitrarily defined bands [26]. Cellular recordings in animals have elucidated the molecular and cellular mechanisms underlying oscillatory activity particularly for slow waves, spindles and theta rhythm in animals. These studies have shown oscillatory activity in thalamo-cortical neurons or spindle oscillations with a frequency range between 6 and 14—16 Hz and slow oscillations from 1—4 Hz depending on the behavioral state of the animal and on the level of membrane hyperpolarization of thalamo-cortical neurons [5,6,8,27]. The frequency range of spindle activity does not correspond to human sleep spindles described by visual inspection. Oscillatory activity in hippocampal complex of rodents or theta rhythm, corresponding to oscillatory discharges of hippocampal theta cells, has also been described with a wider frequency range, from 3—4 to 10—12 Hz, than the traditional theta band described for the human EEG, therefore it has been termed slow rhythmic activity. This rhythmic slow activity in rodents is related to voluntary movement, to arousal and paradoxical sleep (PS) [28,29]. It does not correspond to the frequency of theta activity in humans and, more important, it does not appear under the same physiological conditions. In the case of the human EEG, theta is recorded during sleep or in the waking EEG after sleep deprivation simultaneous to performance deterioration [30-34], whereas in rodents it accompanies alertness and motor activity [28,29,35,36]. One of the most used techniques for quantitative analysis of EEG is the Fourier Transform. This analysis gives, by decomposing a complex signal in series of sine and cosine waves, the energy or power (micv2) accumulated over a period of time for every frequency within a given (which depends on the sample length and the sampling rate), even if they are concealed from visual inspection. Principal component analysis (PCA) allows for grouping variables that covary together and separating them from others that are orthogonally independent; it is therefore a useful tool to reduce variables and to investigate relationships between the new variables [37]. Those variables that get gathered together in the same eigenvector are responding to or reflecting some common influence, while they are independent from those gathered in a different eigenvector. PCA, therefore, can be used to investigate how frequencies from a power spectrum are grouped in bands [38-40]. The aim of the present investigation was to explore if, by means of PCA, broad bands could be obtained fitting better the knowledge on oscillatory activity obtained by cellular recordings and closer to the neurophysiological features of vigilance states. EEG activity of a particular frequency may have different meanings depending on the physiological state (i.e., 12 Hz, which is considered as alpha during wakefulness and as sleep spindle activity during sleep). Therefore, in order to investigate which frequencies are gathered into broad bands depending on the vigilance state, power spectra obtained from EEG epochs of W, stage 2 (S2), stage 4 (S4), and PS were submitted to separate PCA, one for each vigilance state. In a first approach it is necessary to perform these analyses starting from well-defined states. Since slow waves and sleep spindles are the predominant EEG activity during SWS, frequencies from 1—15 Hz entered the analyses.

METHODS

Eight adult right-handed male volunteers between 23 and 30 years of age, with regular sleep habits, apparently in good health and free of drugs, medications or caffeine intake participated in the study. Subjects were recruited from the university community and were interviewed and asked to fill out a questionnaire on sleep habits and health. All participants gave their consent to participate in the experiment. They spent two nights at the laboratory, the first one for adaptation to recording procedures. Electrical activity during spontaneous sleep from the second night spent at the laboratory and from previous wakefulness with eyes closed, was monopolarly recorded from F3, F4, C3, C4, T3 and T4 referred to ipsilateral earlobes, from left and right eye referred to A1, and bipolarly from chin muscles on a Grass model 8-20E polygraph with filters set at 1 and 35 Hz. All night EEG activity was also captured and stored directly on a PC computer (Pentium 100MHz) through an Advantech model PCL812 analogue-to-digital converter of 12 bits resolution with a sampling rate of 128 Hz by means of CAPTUSEN, a data acquisition program [41]. Sleep stages were identified on paper and computer recordings according to the standardized manual for sleep scoring [16] by two independent scorers. Two-second epochs, artifact-free, from Wand from S2, S4, and PS from the second cycle of the night were selected for further analysis. To assure that data entering PCA, and therefore the bands extracted, belonged to the corresponding sleep stage, sleep epochs were selected after six 30-minute sleep epochs fulfilling the criteria for scoring each sleep stage and followed by at least another 30-min epoch of the same stage. The first 10 two-second epochs from each vigilance state fulfilling these criteria were fast Fourier transformed. Power spectra with 1 Hz resolution for each subject, derivation and physiological state were obtained by averaging power derived from the ten-sec epochs. Evidence from statistical tests has revealed stationarity ranging from one to several seconds, usually one to four-second epochs [2]. Ten epochs of two seconds of EEG have proven to satisfy both stationarity and stability for power analysis. This time span is short enough to prevent the statistical parameters from changing during the epoch [2,42,43] and similar spectra have been obtained when analyzing either 20 seconds continuously or divided into 10 two-second epochs [44]. To investigate which frequencies covaried together and which were independent, power spectra from 1 to 15 Hz from all derivations were submitted to PCA, one for each vigilance state (S2, S4, PS and W), with EEG frequencies as variables. The following criteria were used: eigenvalues higher than 1.00 for eigenvectors, and factor loading higher than 0.60 to include or exclude a frequency in a factor or eigenvector. Varimax rotation was used. In order to validate the selection of EEG epochs as representative of each vigilance state, absolute power (AP) of each frequency and derivation was log transformed, and compared among states by means of ANOVAs for repeated measures with W, S4, S2, and PS as the within-subjects variable. For post-hoc pair wise comparisons, Tukey´s Studentized t-tests were used.

RESULTS

PCA yield two independent factors or eigenvectors with the same boundaries for S4 and S2 explaining 87.95 % and 84.62% of the total variance respectively, two eigenvectors for PS which accounted for 81.62 % of the total variance and three eigenvectors for W explaining 78.32 % of the total variance (Table 1). The bands identified by PCA were similar for the two stages of SWS, different for PS and W and from those appreciated by visual inspection. Figure 1 shows power spectra for SWS, PS, and W with the boundaries separating the frequencies that were grouped in each eigenvector. The two independent broad bands that were identified by PCA for S4 and S2 of SWS (Fig. 1 A) were: a band from 5—15 Hz (explaining 7.14% and 77.75% of the variance respectively) and a slow-wave band from 1—8 Hz (explaining 80.81% and 6.87% of the variance respectively) with an overlapping region between 4—8 Hz sharing the variance. The two bands grouped in two eigenvectors identified for PS (Fig. 1 B) were: a slow-wave band from 1—9 Hz (explaining 69.63% of the variance) with an upper limit higher than the one identified for SWS and a band from 10—15 Hz (explaining 11.99% of the variance).
The three bands identified for W (Fig. 1 C) were: a slow band from 1—6 Hz (explaining 52.35% of the variance), an intermediate band from 7—11 Hz (explaining 7.91% of the variance) and a higher band from 12—15 Hz (18.05% of the variance).

TABLE 1—Results from principal component analysis of EEG absolute power from 1 to 15 Hz. Eigenvalues (eigvalue), factor loadings, % of variance and total variance explained for eigenvectors higher than 1.00. Varimax rotated values

	STAGE 2		**STAGE 4**		**PARADOXICAL SLEEP**		**WAKEFULNESS**		
	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue	Eigvalue
Hz	11.66	1.03	10.44	1.79	8.77	2.51	7.85	2.70	1.18
1	0.170	-0.854	0.662	0.164	0.533	0.255	0.707	-0.224	0.039
2	0.407	-0.875	0.893	0.244	0.874	0.198	0.766	0.018	0.350
3	0.472	-0.826	0.890	0.297	0.898	0.138	0.882	0.117	0.280
4	0.548	-0.773	0.877	0.309	0.918	0.184	0.707	0.337	0.435
5	0.637	-0.703	0.872	0.637	0.905	0.206	0.653	0.461	0.418
6	0.677	-0.665	0.879	0.664	0.934	0.154	0.644	0.367	0.538
7	0.628	-0.689	0.833	0.608	0.913	0.157	0.454	0.217	0.652
8	0.667	-0.655	0.774	0.645	0.863	0.239	0.346	0.167	0.855
9	0.776	-0.442	0.403	0.616	0.795	0.275	0.161	-0.014	0.922
10	0.763	-0.522	0.468	0.715	0.556	0.600	0.283	-0.048	0.880
11	0.763	-0.506	0.433	0.782	0.366	0.621	0.604	0.144	0.665
12	0.817	-0.422	0.349	0.864	0.286	0.827	0.461	0.681	0.382
13	0.848	-0.290	0.333	0.878	0.268	0.828	0.223	0.873	0.195
14	0.842	-0.307	0.203	0.860	0.083	0.889	-0.016	0.930	-0.002
15	0.795	-0.286	0.237	0.871	0.057	0.889	-0.077	0.920	-0.061
% of variance	77.75	6.87	80.81	7.14	69.63	11.99	52.35	18.05	7.91
Total variance	84.62		87.95		81.62		78.32		

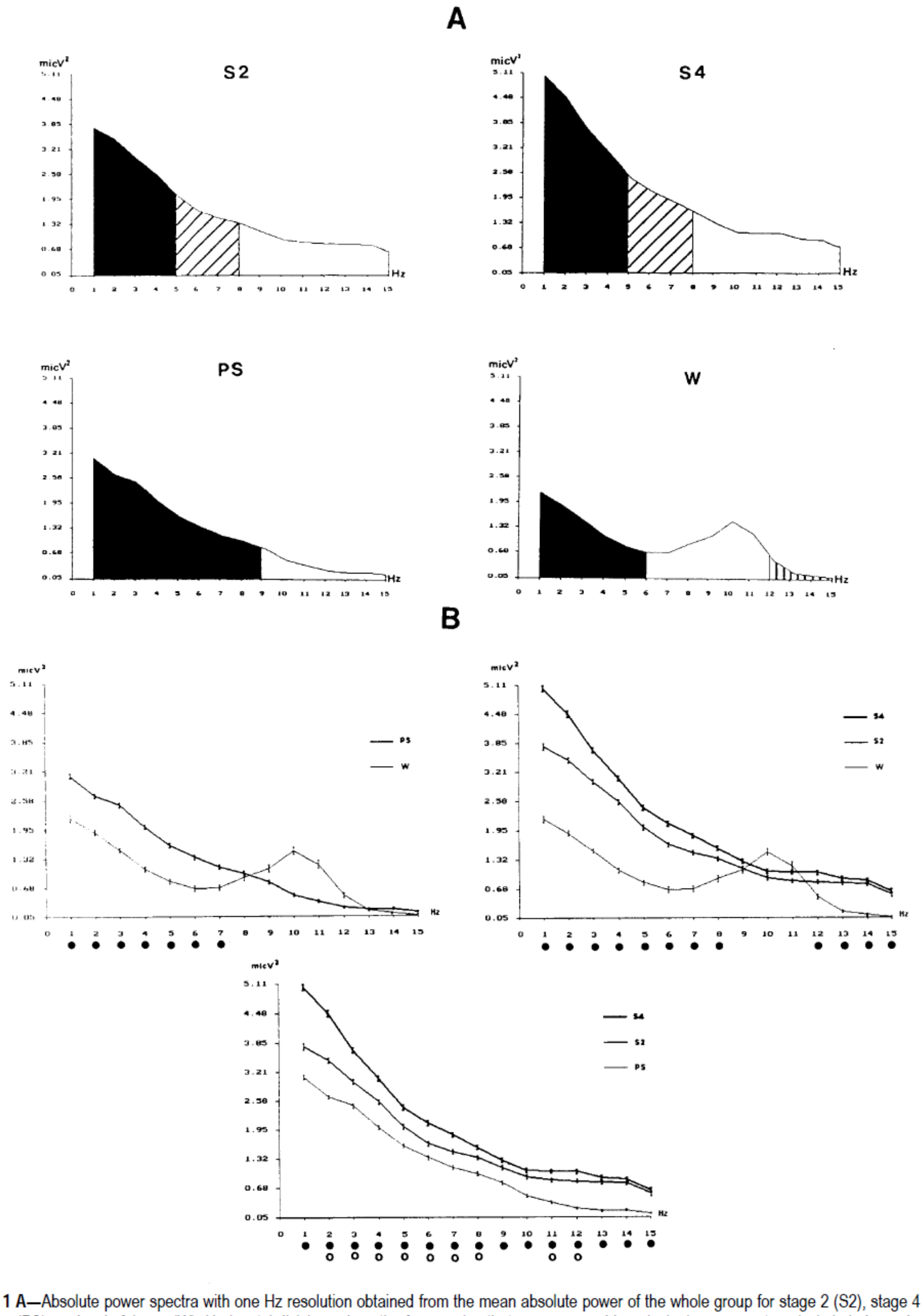

Figure 1 A—Absolute power spectra with one Hz resolution obtained from the mean absolute power of the whole group for stage 2 (S2), stage 4 (S4), paradoxical sleep (PS), and wakefulness (W). Horizontal divisions show the frequencies that were grouped by principal component analysis in independent eigenvectors; Hatched areas in the case of S2 and S4 indicate overlapping areas sharing the variance.

Figure 1B—Mean and standard errors of absolute power spectra with one Hz resolution for PS and W (black circles below indicate significant differences between PS and W), for S4, S2, and W (black circles below indicate significant differences between W and the two stages of slow-wave sleep), and for S4, S2, and PS (black circles indicate significant differences between PS and both slow-wave sleep stages and open circles between S2 and S4).

Statistical results from one-way ANOVAs for repeated measures for each frequency showed significant differences among states for all frequencies ($p<0.0001$ for all cases). Post-hoc pair wise comparisons showed the following significant differences between vigilance states: a) PS showed higher AP than for 1—7 Hz (Fig 1B); S2 and S4 of SWS showed higher AP than W for frequencies from 1—8 Hz and from 12—15 Hz (Fig 1B); b)

Stage 4 showed higher AP than S2 for frequencies from 2—8 Hz and from 11—12 Hz; and c) both stages of SWS showed higher AP than PS for all of the frequencies (Fig 1B).

DISCUSSION

As hypothesized, principal component analysis of power spectra of highly representative EEG activity of W, S2, S4, and PS, identified frequencies that covaried together and that were orthogonally independent from other frequencies for each physiological state. The bands identified by PCA were similar for S2 and S4, and different for PS and for W. These new bands were different form the traditional bands and from prominent activity appreciated by visual inspection, and perhaps the most important, these new bands are consistent with the frequencies of different oscillatory systems observed at cellular level and with the behavioral and functional significance of these rhythms. Power spectra of S2 and S4 were divided into only two identical bands, a slow band from 1—8 Hz and a band from 5—15 Hz with an overlapping region from 5—8 Hz sharing the variance. No theta band was independently identified and traditional theta frequencies from 3.5-4 to 7-7.5 Hz were included together either with slow activity or with spindle activity. These results indicate that frequencies from 1—8 Hz are under a common global influence and the same can be said for activity within 5—15 Hz but independent of each other. These results indicate that slow-wave activity can oscillate at higher frequencies, up to 8 Hz, and that spindle oscillations have a wider range down to 5 Hz. The frequency range identified by PCA from 5—15 Hz agrees with results obtained by cellular recordings of thalamo-cortical neurons, which show oscillations from 6 to 16 Hz with frequency depending on the level of membrane hyperpolarization [5,6,8,27,45]. The separation of slow activity and spindle activity into two eigenvectors suggest that there is a range of slow oscillations and a range of spindle oscillations as a consequence of two different incoming global influences and is consistent with the mutual exclusivity between spindles and delta oscillations observed in intracellular recordings of thalamo-cortical neurons [8,46] and with results of time course analysis of power spectra over successive SWS episodes of one night which show reciprocal predominance either of delta or of sleep spindles in man [47,48] in cats [49], and rats [50]. The existence of an overlapping region between 5—8 Hz suggests that both oscillatory activities have lower amplitude and/or energy in this intermediate region and therefore it is not appreciated by visual inspection; or that there is a frequency region where both influences are competing.

The fact that the new bands are similar for S2 and S4 despite the different amplitude observed a by visual inspection and the different energies obtained with spectral analysis between the two sleep stages, suggests that both sleep stages share common mechanisms and probably are part of the same global state. Regarding theta rhythm, there are also two possibilities: one is that delta and theta oscillations are two rhythms but they are under the same global influence and therefore they behave in a similar way; the second one is that the traditional division of theta band in the human cortical EEG is artificial and theta frequencies do not correspond to an independent oscillator as in rodents [28,29] but are the consequence of the same slow oscillations of thalamo-cortical neurons. The latter agrees with the reported increase in AP of frequencies between 1 to 6-7 Hz in the sleep EEG [18,24], and in AP of theta in the waking EEG after sleep deprivation [32-34] and during drowsiness [31,32]. These conditions are opposed to physiological states in which theta appears in rodents [28,29,35,36]. Power spectrum from PS was grouped in two bands only; however, the physiological meaning is less clear.

During W, three bands were identified resembling the traditional bands, a slow band from 1—6 Hz with significantly lower power than during sleep, an alpha band from 7—11 Hz which showed a peak of power absent during sleep, and a third band from 12—15 Hz, that under this physiological state probably corresponds to beta rather than to sleep spindles. Alpha frequency, as an independent band, was identified during W only, which is in agreement with physiological conditions where alpha band is apparent. Alpha and sleep spindles are characteristic of different conscious states, wakefulness and sleep respectively. Spindle oscillations, in animals, impair information flow through thalamic relays [51], whereas during wakefulness despite alpha activity, information flow is not impaired. Although the neurophysiological generators of this band are not yet clear [4,5,6,52], it is interesting that these frequencies appeared as an independent band only during wakefulness, suggesting that despite having similar frequencies as sleep spindles they are the result of two different mechanisms. A second possibility is that they share the same generator which changes its oscillatory frequency under different global influences. Although the present results obtained with the analysis of 20 seconds of EEG and from the second cycle of sleep only cannot be generalized, they are supported by the following facts: a) power spectra for each vigilance state are very similar to those obtained from all-night analysis [18]; b) statistical differences of absolute power among vigilance states agree with those reported in the literature with spectral power [23] and period analysis [19]; c) nearly identical eigenvectors have been recovered on different sleep cycles from the same subjects (unpublished results), and similar eigenvectors from another group of subjects with similar age, sex, handedness, social, and educational characteristics (results presented at the Third International Congress of the World Federation of Sleep Research Societies, 1999) and; d) the bands extracted by PCA included the most representative EEG activities characteristic of each vigilance state and in agreement with their physiological meaning. Present results are based on the analysis of EEG epochs with typical activity of each vigilance state and therefore it could be argued that it is not surprising that the bands extracted by PCA included the most representative EEG activities characteristic of them. Such epochs were selected on purpose. It is necessary to start with data coming from well-defined sleep stages. It remains to be investigated what happens in not so well-defined epochs or in those with atypical EEG activity. Although, definite conclusions can not be reached with the amount of data analyzed and further research is needed with longer periods of analysis, other sleep cycles, more derivations and different populations of subjects, present results demonstrate, without invalidating results obtained with traditional bands, that the use of narrower bands and PCA can give information which could otherwise be occluded. The new bands extracted by PCA upon spectral densities are consistent with cellular mechanisms of rhythmic activity and therefore seem more adequate than traditional bands for understanding sleep neurophysiology.

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How Placebos Change the Patient's Brain

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Although placebos have long been considered a nuisance in clinical research, today they represent an active and productive field of research and, because of the involvement of many mechanisms, the study of the placebo effect can actually be viewed as a melting pot of concepts and ideas for neuroscience. Indeed, there exists not a single but many placebo effects, with different mechanisms and in different systems, medical conditions, and therapeutic interventions. For example, brain mechanisms of expectation, anxiety, and reward are all involved, as well as a variety of learning phenomena, such as Pavlovian conditioning, cognitive, and social learning. There is also some experimental evidence of different genetic variants in placebo responsiveness. The most productive models to better understand the neurobiology of the placebo effect are pain and Parkinson's disease. In these medical conditions, the neural networks that are involved have been identified: that is, the opioidergic–cholecystokinergic–dopaminergic modulatory network in pain and part of the basal ganglia circuitry in Parkinson's disease. Important clinical implications emerge from these recent advances in placebo research. First, as the placebo effect is basically a psychosocial context effect, these data indicate that different social stimuli, such as words and rituals of the therapeutic act, may change the chemistry and circuitry of the patient's brain. Second, the mechanisms that are activated by placebos are the same as those activated by drugs, which suggests a cognitive/affective interference with drug action. Third, if prefrontal functioning is impaired, placebo responses are reduced or totally lacking, as occurs in dementia of the Alzheimer's type.

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Neurofeedback in ADHD: a Single-blind Randomized Controlled Trial

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21842168

Neurofeedback treatment has been demonstrated to reduce inattention, impulsivity and hyperactivity in children with attention deficit/hyperactivity disorder (ADHD). However, previous studies did not adequately control confounding variables or did not employ a randomized reinforcer-controlled design. This study addresses those methodological shortcomings by comparing the effects of the following two matched biofeedback training variants on the primary symptoms of ADHD: EEG neurofeedback (NF) aiming at theta/beta ratio reduction and EMG biofeedback (BF) aiming at forehead muscle relaxation. Thirty-five children with ADHD (26 boys, 9 girls; 6-14 years old) were randomly assigned to either the therapy group (NF; n = 18) or the control group (BF; n = 17). Treatment for both groups consisted of 30 sessions. Pre- and post-treatment assessment consisted of psychophysiological measures, behavioural rating scales completed by parents and teachers, as well as psychometric measures. Training effectively reduced theta/beta ratios and EMG levels in the NF and BF groups, respectively. Parents reported significant reductions in primary ADHD symptoms, and inattention improvements in the NF group were higher compared to the control intervention (BF, d (corr) = -.94). NF training also improved attention and reaction times on the psychometric measures. The results indicate that NF effectively reduced inattention symptoms on parent rating scales and reaction time in neuropsychological tests. However, regarding hyperactivity and impulsivity symptoms, the results imply that non-specific factors, such as behavioural contingencies, self-efficacy, structured learning environment and feed-forward processes, may also contribute to the positive behavioural effects induced by neurofeedback training.

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In: Journal of the American Board of Family Medicine. 2011 Jul-Aug; 24(4):436-51.

Chronic Constipation: an Evidence-based Review

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21737769
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Chronic constipation is a common condition seen in family practice among the elderly and women. There is no consensus regarding its exact definition, and it may be interpreted differently by physicians and patients. Physicians prescribe various treatments, and patients often adopt different over-the-counter remedies. Chronic constipation is either caused by slow colonic transit or pelvic floor dysfunction, and treatment differs accordingly.

To update our knowledge of chronic constipation and its etiology and best-evidence treatment, information was synthesized from articles published in PubMed, EMBASE, and Cochrane Database of Systematic Reviews. Levels of evidence and recommendations were made according to the Strength of Recommendation taxonomy.

The standard advice of increasing dietary fibers, fluids, and exercise for relieving chronic constipation will only benefit patients with true deficiency. Biofeedback works best for constipation caused by pelvic floor dysfunction. Pharmacological agents increase bulk or water content in the bowel lumen or aim to stimulate bowel movements. Novel classes of compounds have emerged for treating chronic constipation, with promising clinical trial data. Finally, the link between senna abuse and colon cancer remains unsupported.

Chronic constipation should be managed according to its etiology and guided by the best evidence-based treatment.

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In: Neurourology and Urodynamics. 2011 Jun; 30(5):746-53. doi: 10.1002/nau.21104.

Determining the Optimal Pelvic Floor Muscle Training Regimen for Women with Stress Urinary Incontinence

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21661024
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Pelvic floor muscle (PFM) training has received Level-A evidence rating in the treatment of stress urinary incontinence (SUI) in women, based on meta-analysis of numerous randomized control trials (RCTs) and is recommended in many published guidelines. However, the actual regimen of PFM training used varies widely in these RCTs. Hence, to date, the optimal PFM training regimen for achieving continence remains unknown and the following questions persist: how often should women attend PFM training sessions and how many contractions should they perform for maximal effect? Is a regimen of strengthening exercises better than a motor control strategy or functional retraining? Is it better to administer a PFM training regimen to an individual or are group sessions equally effective, or better? Which is better, PFM training by itself or in combination with biofeedback, neuromuscular electrical stimulation, and/or vaginal cones? Should we use improvement or cure as the ultimate outcome to determine which regimen is the best? The questions are endless. As a starting point in our endeavour to identify optimal PFM training regimens, the aim of this study is (a) to review the present evidence in terms of the effectiveness of different PFM training regimens in women with SUI and (b) to discuss the current literature on PFM dysfunction in SUI women, including the up-to-date evidence on skeletal muscle training theory and other factors known to impact on women's participation in and adherence to PFM training.

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In: Archives of Physical Medicine and Rehabilitation. 2011 Jun; 92(6):849-58.

Comparing Biofeedback with Active Exercise and Passive Treatment for the Management of Work-related Neck and Shoulder Pain: a Randomized Controlled Trial

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21621660

To compare the effects of biofeedback with those of active exercise and passive treatment in treating work-related neck and shoulder pain.

A randomized controlled trial with 3 intervention groups and a control group.
Participants were recruited from outpatient physiotherapy clinics and a local hospital.
All participants reported consistent neck and shoulder pain related to computer use for more than 3 months in the past year and no severe trauma or serious pathology. A total of 72 potential participants were recruited initially, of whom a smaller group of individuals (n=60) completed the randomized controlled trial.

The 3 interventions were applied for 6 weeks. In the biofeedback group, participants were instructed to use a biofeedback machine on the bilateral upper trapezius (UT) muscles daily while performing computer work. Participants in the exercise group performed a standardized exercise program daily on their own. In the passive treatment group, interferential therapy and hot packs were applied to the participants' necks and shoulders. The control group was given an education booklet on office ergonomics.

Pain (visual analog scale), neck disability index (NDI), and surface electromyography were assessed preintervention and postintervention. Pain and NDI were reassessed after 6 months.

Postintervention, average pain and NDI scores were reduced significantly more in the biofeedback group than in the other 3 groups, and this was maintained at 6 months. Cervical erector spinae muscle activity showed significant reductions postintervention in the biofeedback group, and there were consistent trends of reductions in the UT muscle activity.

Six weeks of biofeedback training produced more favorable outcomes in reducing pain and improving muscle activation of neck muscles in patients with work-related neck and shoulder pain.

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In: The Spanish Journal of Psychology. 2011 May; 14(1):374-84.

A New Neurofeedback Protocol for Depression

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21568194
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Neurofeedback represents an exciting complementary option in the treatment of depression that builds upon a huge body of research on electroencephalographic correlates of depression.

The objectives of this article are threefold: review the literature on neurofeedback protocols for depression; introduce a new protocol, which aims to synthesize the best qualities of the currently available protocols; and present the results of a small clinical experiment with the new protocol.

Structured survey of the literature; software development; clinical trial with one subject, submitted to ten sessions of neurofeedback (one hour each).

Currently there are twenty-one articles in neurofeedback for depression, among which only six present original experimental results. All of them report positive results with the technique. The most used protocols focus on Alpha inter-hemispheric asymmetry, and Theta/Beta ratio within the left prefrontal cortex. Our new protocol integrates both dimensions in a single circuit, adding to it a third programming line, which divides Beta frequencies and reinforces the decrease of Beta-3, in order to reduce anxiety. The favorable outcome of our clinical experiment, suggests that new research with this protocol is worthwhile.

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In: Psychosomatics. 2011 May-Jun; 52(3):218-29.

Psychophysiologic Treatment for Patients with Medically Unexplained Symptoms: a Randomized Controlled Trial

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Patients presenting with medically unexplained physical symptoms (MUPS) typically present with significant distress and marked impairment in functioning and pose a unique challenge to health care providers. The purpose of this study was to examine the efficacy of a psychophysiological treatment (PT) for MUPS.

Thirty-eight participants meeting criteria for subthreshold somatization disorder (abridged somatization) were randomly assigned to one of two conditions: (1) standard medical care augmented by a psychiatric consultation intervention (wait-list) or (2) a 10-session, manualized, individually-administered PT added to the psychiatric consultation intervention. Assessments were conducted at baseline, at midpoint (after four sessions), and after completing the last session. The primary outcome measure was the severity scale of the Clinical Global Impression Scale anchored for Somatic Symptoms (CGI-SD). Secondary outcome measures were responder status as determined by clinical ratings, self-report measures of mental and physical functioning.

At the end of the trial, the severity (and frequency) of physical symptoms improved significantly more ($p<0.05$) in the intervention group. The average improvement in the CGI-SD was 0.80 points greater in the intervention group than in the wait-list group. PT was also associated with greater improvements in self-reported functioning and depressive symptomatology. The effect sizes at the final assessment point indicate that this intervention had a robust effect on complex somatic symptom presentations.
For patients with high levels of MUPS (abridged somatization), PT produces significant improvements in symptoms and functional status.

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In: Telemedicine Journal and E-Health. 2011 Jun; 17(5):348-57. Epub 2011 May 5.

A Wearable Respiratory Biofeedback System Based on Generalized Body Sensor Network

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21545293

Wearable medical devices have enabled unobtrusive monitoring of vital signs and emerging biofeedback services in a pervasive manner. This article describes a wearable respiratory biofeedback system based on a generalized body sensor network (BSN) platform. The compact BSN platform was tailored for the strong requirements of overall system optimizations. A waist-worn biofeedback device was designed using the BSN. Extensive bench tests have shown that the generalized BSN worked as intended. In-situ experiments with 22 subjects indicated that the biofeedback device was discreet, easy to wear, and capable of offering wearable respiratory trainings. Pilot studies on wearable training patterns and resultant heart rate variability suggested that paced respirations at abdominal level and with identical inhaling/exhaling ratio were more appropriate for decreasing sympathetic arousal and increasing parasympathetic activities.

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In: Current Opinion in Neurology. 2011 Jun; 24(3):203-10.

Treatment of Migraine: Update on New Therapies

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Source: http://www.ncbi.nlm.nih.gov/pubmed/21464715

This review provides a comprehensive selection of the latest clinical trial results in antimigraine treatment.

RThe oral calcitonine gene-related peptide antagonist telcagepant is efficacious in acute treatment. Compared to triptans, its efficacy is almost comparable but its tolerance is superior. The same is true for the 5HT-1F agonist lasmiditan, another agent devoid of vascular effects. Triptans, as other drugs, are more efficient if taken early but nonsteroidal anti-inflammatory drugs and analgesics remain useful for acute treatment, according to several meta-analyses. Single-pulse transcranial magnetic stimulation during the aura rendered more patients pain-free (39%) than sham stimulation (22%) in one study. Topiramate could be effective for migrainous vertigo, but it did not prevent transformation to chronic migraine in patients with high attack frequency. Onabotulinumtoxin A was effective for chronic migraine and well tolerated, but the therapeutic gain over placebo was modest; the clinical profile of responders remains to be determined before widespread use. Occipital nerve stimulation was effective in intractable chronic migraine with 39% of responders compared to 6% after sham stimulation. This and other neuromodulation techniques, such as sphenopalatine ganglion stimulation, are promising treatments for medically refractory patients but large controlled trials are necessary. One study suggests that outcome of patent foramen ovale closure in migraine might depend on anatomic and functional characteristics.

Drugs with a better efficacy or side-effect profile than triptans may soon become available for acute treatment. The future may also look brighter for some of the very disabled chronic migraineurs thanks to novel drug and neuromodulation therapies.

Join the Biofeedback Federation of Europe in Venice!

WEDNESDAY, FEBRUARY 12th (evening) & THURSDAY, FEBRUARY 13th

In-depth scientific presentations (lectures, symposia, paper sessions, and poster)

FEBRUARY 11th-12th & FEBRUARY 14th-15th

One and two day hands-on clinical and educational workshops instructed by internationally recognized clinicians who demonstrate their latest clinical/educational biofeedback treatment approaches. There will be four tracks offered at the conference: biofeedback, neurofeedback, sports, BCIA certification and Italian language. The preliminary workshop schedule includes:

BIOFEEDBACK TRACK

Dr. Stephen Porges
2-day Workshop: The Polyvagal Theory: Neural Mechanisms Mediating Social Behavior, Emotional Regulation, and Health — Invited Talk: The Polyvagal Theory: Demystifying the Link Between Social Behaviour and Health

Dr. Inna Khazan
2-day Workshop: Mindfulness and Acceptance Approach to Biofeedback
Invited Talk: Meditation and Biofeedback: Combining Eastern Traditions with Western Gadgets

Dr. Danielle Matto and Eveline Kempenaar, PT
2-day Workshop: The Added Value of the Biofeedback Stress Profile

NEUROFEEDBACK TRACK

Dr. Paul G. Swingle
2-day Workshop: ClinicalQ and Braindriving: Fundamental Neurotherapy for Professionals

Dr. Jay Gunkelman
2-day Workshop: EEG and QEEG: Integrating Phenotype and Vigilance Models

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October 15, 2013
Symposia, paper sessions and oral presentations

October 30, 2013
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For more information, please contact:

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SPORTS TRACK

Dr. Lindsay Thornton
2-day Workshop: Psychophysiology and Athletes

Dr. Michael Linden and Dr. Leah Lagos
2-day Workshop: Applications of Biofeedback and Neurofeedback in Sport Psychology

BCIA CERTIFICATION WORKSHOPS

This year we are offering several workshops for those interested in pursuing BCIA certification. Five day workshops will begin on February 10th so that attendees are available to attend the Scientific Day on February 13th. Anyone completing one of the workshops will have an opportunity to write the BCIA Certification exam in Venice.

BCIA TRACK

Drs. Lynda and Michael Thompson
5-day BCIA Neurofeedback Program (starts on February 10th) (sequentially translated into Italian)

Dr. Donald Moss, Dr. Erik Peper, Dr. Fred Shaffer
5-day BCIA Biofeedback Program (starts on February 10th) (sequentially translated into Italian)

Dr. Donald Moss, Dr. Fred Shaffer
2-day BCIA HRV Biofeedback Program

BCIA CERTIFICATION EXAM

Anyone wishing to take the BCIA exam in Venice must first:

Register with BCIA

- File certification application and obtain approval
- Submit exam registration form

Contact BCIA for full details:
Visit their website at www.bcia.org or send an email to info@bcia.org

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ITALIAN TRACK

We are offering a variety of Italian language workshops covering a range of biofeedback, neurofeedback and SEMG topics. Among them are:

Dott. Marianna Munafò Ph.D., Marco Casarotti, Ph.D, Martina Marchionni MS, Christian Caldato MS, Arianna Sittoni MS
Un nuovo approccio al Biofeedback per lo Sport e la Gestione dello Stress

Dr. Giuseppe Sacco, Ph.D.
Biofeedback e Psicoterapia: una essenziale integrazione nel trattamento dei disturbi psicofisiologici

Lorena Zanus, Ph.D., Giorgio Bertolotti, Ph.D., Licia Grazzi, M.D., Maria Luisa Rausa, Ph.D.
Biofeedback e Dolore: emicrania, cefalea di tipo tensivo, fibromyalgia, disturbi temporomandibolari e distonie focali

Gabriel Sella, MD
Clinical protocols for assessment and rehabilitation using Dr. Sella's methodology with Surface Electromyography SEMG

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