



Meditation: Elevating Consciousness, Improving Health

Harness the Power of your Inner Magic

© The Wild Divine Pro, Inc.

The Journey to Wild Divine

is the first "inner-active" biofeedback computer adventure to combine ancient wisdom with modern technology for a truly entertaining experience. *The Journey* helps to:

- Increase relaxation
- Improve Focus
- Enhance Creativity

The game measures SCL and HRV using three sensors gently attached to your fingers. Upgrade *The Journey* with The Wild Divine Grapher™ to instantly view and save your data. Analyze performance from multiple sessions.

*Available online 6/30/04

Use the Lightstone and "Magic Ring" finger sensors to explore over 40 energy events on a PC or Mac

THE JOURNEY
to WILD DIVINE

www.wilddivine.com



Biofeedback

Volume 32,

No 3

Fall 2004

Biofeedback is published four times per year and distributed by the Association for Applied Psychophysiology and Biofeedback. Circulation 1600. ISSN 1081-5937.

Editor: Donald Moss PhD
Associate Editor: Theodore J. LaVaque, PhD
sEMG Division Editor: Randy Neblett, MA
EEG Division Editors: Lynda Kirk and Dale Walters, PhD

Copyright © 2004 by AAPB

Editorial Statement

Items for inclusion in *Biofeedback* should be forwarded to the AAPB office. Material must be in publishable form upon submission.

Deadlines for receipt of material are as follows:

- November 1 for Spring issue, published March 31.
- April 1 for Summer issue, published June 30.
- May 15 for Fall issue, published September 30.
- September 1 for Winter issue, published December 31.

Articles should be of general interest to the AAPB membership, informative and, where possible, factually based. The editor reserves the right to accept or reject any material and to make editorial and copy changes as deemed necessary.

Feature articles should not exceed 2,500 words; department articles, 700 words; and letters to the editor, 250 words. Manuscripts should be submitted on disk, preferably Microsoft Word or WordPerfect, for Macintosh or Windows, together with hard copy of the manuscript indicating any special text formatting. Also submit a biosketch (30 words) and photo of the author. All artwork accompanying manuscripts must be camera-ready. Graphics and photos may be embedded in Word files to indicate position only. Please include the original, high-resolution graphic files with your submission – at least 266dpi at final print size. TIFF or EPS preferred.

AAPB is not responsible for the loss or return of unsolicited articles.

Biofeedback accepts paid display and classified advertising from individuals and organizations providing products and services for those concerned with the practice of applied psychophysiology and Biofeedback. Inquiries about advertising rates and discounts should be addressed to Denise Townsend dytownsend@earthlink.net

Changes of address, notification of materials not received, inquiries about membership and other matters should be directed to the AAPB Office:

Association for Applied
Psychophysiology and Biofeedback
10200 West 44th Ave., No. 304
Wheat Ridge, CO 80033-2840
Tel 303-422-8436
Fax 303-422-8894
E-mail: aapb@resourcenter.com
Website: <http://www.aapb.org>

FROM THE EDITOR

From the Editor: Donald Moss, PhD

4

PROFESSIONAL ISSUES

Ethical Issues in Meditation

Sebastian "Seb" Striefel, PhD

5

SPECIAL TOPICS: CASE STUDIES

Overview of Meditation, Consciousness, and Health Today

Sat Bir Khalsa, PhD

9

Meditation Styles: Common Features and Distinguishing Characteristics

Adam Burke, PhD

13

Demystifying Meditation

Ramesh J. Bijlani, MD

16

Meditation and Limbic Processes

Tobias Esch, MD, Massimo Guarna, PhD, Enrica Bianchi, PhD, and George B. Stefano, PhD

22

Brain Mechanisms of Meditation

K. K. Deepak, MD, PhD

29

Relationship between Meditation Practice and Transcendent States of Consciousness

Frederick Travis, PhD

33

Transformation: The Role of Reperceiving

Shauna Shapiro, PhD, and John Astin

37

Mindfulness-Based Stress Reduction: Overview and Applications in Cancer

Linda E. Carlson, PhD

42

AAPB NEWS AND EVENTS

From the President

1A

From the Executive Director

2A

From the President-Elect

3A

About the Authors

46

The articles in this issue reflect the opinions of the authors, and do not reflect the policies or official guidelines of AAPB, unless stated otherwise.

Special Issue: Fall 2004 Meditation: Elevating Consciousness, Improving Health

Donald Moss, PhD



Donald Moss, PhD

The cover of this Fall 2004 issue of *Biofeedback Magazine* shows an ancient seal of a yogi seated in meditation, from the Mohenjodaro region of India, ca. 2,500 B.C.E.¹ Our cover introduces this special issue of the *Biofeedback* magazine: "Meditation: Elevating Consciousness, Improving Health." Yogic practices, including meditation, date back approximately 4500-5000 years, representing an original system of mind-body theories and practices, originating as spiritual practices within a complex cultural and spiritual tradition.

Yogic and meditation practices are gaining increasing acceptance with practical applications, for spiritual, fitness, and health purposes. One of the hottest topics in health care today involves the effort to identify specific spiritual practices, such as meditation, refine their efficacy, and measure their clinical benefits for psychological disorders, psychophysiological conditions, and medical illness.

Our guest editor, Sat Bir S. Khalsa, PhD, brings a background in the neurosciences, chronobiology, and the yoga lifestyle. His current research focus is on the health effects of yoga and meditation. Dr. Khalsa's introductory article reviews both the historical roots of yoga and meditation, and their current applications to health care. In addition, Dr. Khalsa has recruited articles which apply the perspectives of psychophysiology and neurophysiology to explore the brains and bodies of the meditators. Our guest authors examine some of the following questions: What neural and physiological mechanisms are affected by meditative practice? What are some of the measurable health effects of meditation? How can we understand the often wondrous experiences of meditators both psychologically and neurophysiologically?

Articles in the Special Issue

Sebastian Strielfel provides an article on the ethical issues inherent in the clinical application of meditation and spiritual practices. Adam Burke provides a simple overview of the various forms of meditation, highlighting both their common elements and areas in which they diverge. Ramesh Bijlani of the All India Institute of Medical Sciences in New Delhi provides an introduction to one well-known yogic approach, the Raja yoga of Patanjali, and explores the experiential "peak" state called *Samadhi*, which most Hindu meditation approaches seek. He also examines the practical application of meditation in coping with life problems and

enhancing health.

A multi-national team led by Tobias Esch of Berlin has contributed an article exploring the neural mechanisms affected by meditation, especially brain structures in the limbic system. K. K. Deepak of the All India Institute of Medical Sciences in New Delhi examines both physiological processes and neural mechanisms affected in meditation practice, and develops a functional model of meditation identifying four "functional units" corresponding to specific brain structures.

Frederick Travis contributes an article examining the subjective experience of transcendence, its contents, and physiological patterns corresponding to the subjective elements. He also examines the clinical benefits of transcendental experiences. Shauna Shapiro and John Astin examine the currently popular psychological construct of "mindfulness," which has historical roots in Buddhist meditation. They develop a model of mindfulness, emphasizing specific cognitive processes, and introduce the concept of "reperceiving" which designates a specific shift in perspective. The final article in this special series, by Linda Carlson, examines mindfulness-based stress reduction, a specific clinical model for intervention, based on the mindfulness approach.

We are grateful to Sat Bir Khalsa and the authors contributing to this special issue, for the time and energy dedicated to this timely topic.

AAPB News and Events Section

AAPB President Steve Baskin, President-Elect Richard Sherman, and Executive Director Francine Butler offer their current perspectives on events shaping professional research and practice today. In addition, we include a preliminary overview of AAPB's 36th annual meeting in Austin, Texas, April 1-3, 2005.

Proposals and Abstracts are now invited for future special issues of *Biofeedback*: *Hypnosis and Biofeedback for Spring 2005*, *Pediatric Applications of Hypnosis* for Summer 2005, *Teaching Children and Youth to Self-Regulate* for Fall 2005, and *Integrating Life Style Change into Applied Psychophysiological Therapies* for Spring 2006. The editor also welcomes proposals for future special issues of the *Biofeedback Magazine*.

¹This yogic seal is copyrighted, and utilized with the permission of J.M. Kenoyer, courtesy of the Department of Archaeology and Museums, Govt. of Pakistan.

Ethical Issues in Meditation

Sebastian “Seb” Striefel, PhD, Logan, Utah



Abstract: Meditation has been used for thousands of years for achieving many different goals. For any contemplative/relaxation procedure to survive that long there must be some positive outcomes achieved or it would have disappeared because of non use. Meditation was traditionally used as part of various religions, but can be used clinically without religious connotations. Meditation can be used ethically in treatment if a reasonable rationale exists, provided the appropriate informed consent is obtained. Meditation is one way of reflecting on one's own values and gaining a better perspective about ethical behavior and discipline. It can also be useful in treating a wide variety of problems. A number of considerations for ethically using meditation clinically are discussed.

Introduction

Meditation is a term used to label religious study in numerous Eastern Religions. It serves a purpose analogous to prayer and devotion in the Judeo-Christian system (Lichstein, 1988). Meditation in one form or another has been practiced for thousands of years and has survived because its proponents have found it useful for helping to achieve a variety of different goals. The origin of most forms of meditation was within a religion. Meditation is a component of all religions, but many religions do not use the word meditation (Spence, 2004). Words like prayer or contemplation are often used in place of the word meditation. For example, one form of prayer for Catholics is the rosary. The rosary is a form of meditation in which specific prayers are repeated much like the use of a mantra in other forms of meditation. Theresa of Avila's Contemplative Meditation was strongly tied to religion, but meditation can be practiced without any religious elements

in the practice (Spence, 2004). When meditation is used in Western Cultures for clinical purposes, it is generally devoid of religious connections.

Contextual Issues

It is important for applied psychophysiology and biofeedback practitioners to recognize that every form of meditation has an origin and a context that influence the purpose for which it is practiced, when it is used, what is done, why, and by whom. A competent clinician will be familiar with and consider such contextual factors in deciding whether to use meditation, and what form of meditation might be appropriate for helping a specific client achieve his or her treatment goals. For example, someone who practices a specific religion in which a specific form of meditation is practiced might find that form of meditation more comfortable and desirable than an unfamiliar form of meditation that has no religious context. Practitioners, of course, must ensure that the specific form of meditation is appropriate for helping the client achieve his or her treatment goals. The less published support that exists in supporting the use of a particular form of meditation with a client the more important it is to be thorough in obtaining and documenting the informed consent process. The combining of religion and meditation could well help motivate the client to practice meditation regularly. Lehrer and Carrington (2003) pointed out that whether a client likes practicing a specific relaxation or meditation approach is important because she or he is unlikely to practice an approach that she or he does not like.

Chinmoy, a Hindu spiritual teacher said that the difference between meditation and prayer is that “when I pray, I talk and God

listens. When I meditate, God talks and I listen.” (Spence, 2004, p. 2). Such information when used during the informed consent process would also help the practitioner establish good rapport with a client. Whereas, proposing a non-religious form of meditation without discussing why that form of meditation is being proposed, and without also discussing why the form of meditation commonly practiced in the client's religion is not appropriate, could be detrimental to both rapport and motivation. A client could well believe that the practitioner really does not understand him or her or his or her religion and that could also lead to doubt about a practitioner's competence.

Sophisticated Knowledge and Competence

There is a difference between having basic knowledge and/or competence about a form of treatment (e.g., meditation) and having sophisticated knowledge and/or competence about the same form of treatment. With continuing education in the form of classes and workshops, self-study, clinical practice, supervision, and consultation, practitioners knowledge and competence move from a basic level to a more *sophisticated* level of knowledge and competence. When a practitioner has a sophisticated level of knowledge and/or competence, she or he is more likely to be effective in dealing with daily life (Dalai Lama and Cutler, 1998), or for example, in dealing with practice issues like ethical dilemmas, client motivation, the risks and benefits of different forms of meditation or relaxation, etc. Before considering using any form of meditation for helping clients it is important for the practitioner to be competent in the use of that form of meditation.

Increasing Competence Via Meditation

Meditation may well be an effective method for a practitioner to become more competent both as a practitioner in general and as a practitioner who has acquired a higher level of self and ethical control. Meditation can be defined as a way of taking control of the mind so that it becomes more peaceful and focused and the meditator becomes more aware (Spence, 2004). Chinmoy said that effective meditation is listening attentively in silence. When such a state of silence is achieved, not only is the body calm and tranquil, but the mind is also quiet and free from external stimuli and thought. In such a state a practitioner can just be, and can without effort contemplate and reflect on various virtues and their meaning, e.g., compassion, kindness, or ethically right and wrong behaviors. Since our beliefs, values, and attitudes influence our thoughts and our thoughts influence our behavior it seems important to learn to discipline and control our mind. By controlling our thoughts we have a higher probability of engaging in ethically appropriate behavior. The Dalai Lama believes that bringing about discipline within one's mind is a feature of ethical behavior that can lead to greater happiness (Dalai Lama and Cutler, 1998). The more sophisticated a practitioner's level of education and knowledge about what leads to appropriate ethical behavior, the more effective he or she should be at engaging in ethical behavior. Contemplative meditation is believed to help individuals learn to take control of his or her thoughts. Thich Nhat Hahn (2000) combines meditation and ethics as a means of transforming the mind. He believes that when the mind is quiet one can gain insights that lead to inner transformations. Carrington (1998) has pointed out that meditation seems to target the act of thinking rather than the content. Learning to think differently about things could have many positive outcomes.

Selecting a Treatment Approach

In selecting a treatment approach (e.g., a form of meditation) for use with a specific client it is ethically important to consider a

number of factors.

After conducting the appropriate intake, history, and assessments to correctly identify and diagnose the client's problem(s), it is important to work cooperatively with the client in developing appropriate treatment goals and objectives (outcomes). *Why is meditation being considered? Is it a treatment of choice? Does the research literature support its use in helping this client?*

Meditation is generally used to achieve one or more of three primary goals (Lichstein, 1998): a) contemplation and wisdom, b) an altered state of consciousness, and c) relaxation. In clinical treatment settings in Western Culture, relaxation is most likely to be the treatment consideration.

If relaxation training for stress reduction, pain control, or other purposes seems appropriate, a practitioner must select an appropriate relaxation approach. Various forms of biofeedback, relaxation approaches (e.g., progressive relaxation, autogenic training), and meditation can all be used to achieve a relaxed state. A practitioner must thus have a rationale for selecting a particular relaxation approach.

A. One such factor is: *What does the published literature support as being effective and efficient, or even as the treatment of choice for treating the client's current problem(s)?* For example, EMG and skin temperature biofeedback or progressive muscle relaxation might well be appropriate for certain types of headaches, whereas autogenic training might be most appropriate for treating certain kinds of autonomic nervous system problems. Lehrer and Carrington (2003) said that mantra meditations seem to have the most effect on cognitive functions. My own experience is that autogenic training is very effective in producing cognitive effects. As clients learn that their mind (repeating autogenic statements) can produce physiological changes (e.g., warm hands), they readily believe that they can change both their way of thinking and the content of their thoughts. Autogenics seems to be a natural entry for conducting cognitive behavior therapy. Meditation seems to target the act of thinking about something rather than the content of thoughts (Carrington, 1993), but it can impact both.

Cognitive behavior therapy seems to target the content of thoughts. Mantras and autogenic statements seem to block verbal thought. The critical factor for a practitioner in all this is having a rationale for selecting a specific form of relaxation training for helping a client, e.g., selecting a form of meditation rather than one of the other forms of relaxation training.

B. A practitioner should also be able to inform the client about the risks and benefits of the proposed intervention approach (e.g., meditation) and those for other major, appropriate treatment approaches during the informed consent process. So the risks and benefits of a specific form of meditation versus those for progressive muscle relaxation, autogenic training, and/or biofeedback might need to be explained. The client should also be informed about any religious connotations of the treatment approaches discussed. If one is using meditation for treatment of a clinical problem, the content of the informed consent process would be somewhat different than if one were teaching meditation to a community group (non-patients) as a general form of relaxation or stress control. The overlap in producing similar outcomes using different relaxation approaches is striking for those who master an approach (Lehrer and Carrington, 2003). *What published research support exists for different meditation and other relaxation approaches for treating the problems of the clients you see? Have I provided accurate and complete information to the client and obtained a valid informed consent? Did I carefully document the process and content of the informed consent?* This is especially important for interventions that lack published support.

C. *Am I competent to use the proposed intervention? Do I need supervision or consultation? Should I refer this client elsewhere?*

In deciding which form of meditation to use a practitioner would generally use clinically oriented forms of meditation such as Benson's Relaxation Response, Carrington's Standardized Meditation (a modified form of transcendental meditation) (Schwartz and Olson, 2003), or the Mindfulness-Meditation approach pioneered by Jon Kabat-Zinn (Baer, 2003; Kabat-Zinn, et al, 1992; Teasdale, et al, 2000), versus other

forms of meditation which have not been standardized (Lehrer and Carrington, 2003). However, McGrady (2003) pointed out that physicians should question clients about spiritual factors as they relate to treatment and Striefel (2001) pointed out the ethical importance of considering spirituality and religion in all health care services. Since spirituality has again become an important part of health care services it may well be important to consider non-clinically standardized forms of meditation for some limited number of clients who are much more receptive to practicing a tradition that they are familiar with, provided of course, that there is a rationale for using such an approach for treating the client's specific problem.

References

- Baer, R. A. (2003). Mindfulness as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10, 125-143.
- Carrington, P. (1993). The clinical use of meditation. In P. M. Lehrer and R. L. Woolfolk (Eds.), *Principles and practices of stress management* (2nd ed., pp. 139-168). New York, NY: Guilford Press.
- Dalai Lama and Cutler, H. C. (1998). *The art of happiness*. New York, NY: Riverhead Books.
- Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., Pbert, L., Lenderking, W. R., and Santorelli, S. F. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *The American Journal of Psychiatry*, 149 (7), 936-943.
- Lehrer, P., and Carrington, P. (2003). Progressive relaxation, autogenic training, and meditation. In D. Moss, A. McGrady, T. C. Davies, and I. Wickramasekera (Eds.), *Handbook of mind-body medicine in primary care* (pp. 139-149). Thousand Oaks, CA: Sage Publications.
- Lichstein, K. L. (1988). *Clinical relaxation strategies*. New York, NY: John Wiley and Sons.
- Nhat Hahn, T. (2000). *The mind of transformation: Combining ethics and meditation*. Gardena, CA: Parallax Press.
- Schwartz, M. S., and Olson, R. P. (2003). A historical perspective on the field of biofeedback and applied psychophysiology. In M. S. Schwartz and F. Andrasik (Eds.), *Biofeedback: A practitioner's handbook* (3rd ed., pp. 3-19). New York, NY: Guilford Press.
- Spence, A. (May 24, 2004). *Reflections on meditation*. www.bbc.co.uk/religion.
- Striefel, S. (2001). Ethical issues when spirituality or religion and health care meet. *Biofeedback*, 23(3), 8-10.
- Teasdale, J. D., Williams, J. M., Soulsby, J. M., Segal, Z. V., Ridgeway, V. A., and Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, 68, 615-623.



**Since 1971, Adam Crane and associates
have been leaders in the delivery of quality
biofeedback training and equipment at low cost.**

INTRODUCING: BIOFEEDBACK RESOURCES INTERNATIONAL Corp.

(BRI) — Increasing practitioner power through innovation, productivity and cooperation. Beginning with providing better training and equipment options worldwide. In cooperation with the BCIA, BRI - Health Training Seminars (HTS) offers immensely reduced certification expenses while providing more practical, enjoyable learning experiences and requiring fewer lost workdays. Equipment operation, clinical techniques and presentations are best learned live in hands on workshops. Didactic study material is most efficiently, inexpensively and conveniently learned at home.

BRI - HTS General Biofeedback

Plan A: 3 Days (\$595) Gives you practical start-up equipment and clinical basics, plus 10 Personal Biofeedback, 10 Case Presentations and 10 practice patient/client sessions supervised by some of the most successful instructors in the field. Add 32 hours blueprint BCIA didactic home study (\$480 - extremely efficient exam preparation) and **SLASH travel expenses, lost work days, mentoring fees and SAVE 58 to 84%! Biggest equipment purchase training rebates!**

Plan B: 3 Days (\$595), plus 2 Day Advanced (\$395), plus 14 hours BCIA didactic home study (\$210). **Still saves you 25%! While increasing the quality of the training.**

EEG Biofeedback: 3 Days (\$595 Getting started program), plus 2 Day Advanced (\$395) Gives you 40 hours BCIA blueprint didactic training, plus 10 personal biofeedback, 10 case presentations and 10 practice patient/client sessions supervised by leading neurofeedback instructor/practitioners. **Save 22-42%!**

Group BCIA training (including mentoring) can be arranged for as little as \$198 per day, per person.

BCIA CERTIFICATION TRAINING:

New York: October 23-27, 2004
In 2005: January 14-18, April 8-12

BCIA EEG CERTIFICATION TRAINING:

New York: November 5-9, 2004
In 2005: January 21-25, April 15-19

Reserve Your Space Now! Call Toll Free 1-877-669-6463

914-762-4646 • www.mindfitness.com (an amazing site!)

Free Training • Free Online Courses • Superb Quality • Low Cost

One comprehensive biofeedback solution.

One clear choice.

Only one biofeedback provider delivers such a breadth of professional training programs and equipment.

Stens offers professionally run biofeedback and EEG certification programs, as well as application workshops in Chronic Pain, RSA and Stress Management. Now there is more! You can also receive a free one-day advanced biofeedback or EEG workshop with the purchase of a ProComp+/MultiTrace or Bio Integrator system. It's easy to see why there's only one clear choice when it comes to biofeedback — *Stens*.

Professional Biofeedback 4-Day Certificate Program

<i>Austin, TX</i>	<i>Sept. 18-21, 2004</i>
<i>Los Angeles, CA</i>	<i>Oct. 23-26, 2004</i>
<i>Ft. Lauderdale, FL</i>	<i>Nov. 13-16, 2004</i>
<i>San Francisco, CA</i>	<i>Dec. 4-7, 2004</i>

Professional 4-Day EEG Certificate Program

<i>Austin, TX</i>	<i>Sept. 23-26, 2004</i>
<i>Minneapolis, IN</i>	<i>Oct. 9-12, 2004</i>
<i>San Francisco, CA</i>	<i>Dec. 11-14, 2004</i>

Free 1-Day Advanced Application

<i>Biofeedback</i>	<i>(Every month)</i>
<i>EEG</i>	<i>(Sept, Oct, Dec)</i>

2-Day Workshops.

<i>Chronic Pain & Headaches</i>	<i>(Nov., Dec)</i>
<i>Stress Management/</i>	
<i>Incontinence</i>	<i>(August)</i>
<i>Pediatric/RSA</i>	<i>(October)</i>
<i>QEEG</i>	<i>(December)</i>

CEs for APA, CNA, BBS
Visit us at WWW.stens-biofeedback.com



Stens
CORPORATION

Leading suppliers of biofeedback equipment

1-800-257-8367

www.stens-biofeedback.com

SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH



Meditation: Elevating Consciousness, Improving Health

Sat Bir S. Khalsa, PhD

"Who is that in you that controls the mind? It is called the will of the being. It is also part of the mind. Mind is like an onion. It has so many layers. If you peel the onion, you will find nothing."

"What is meditation? When you empty yourself and let the universe come in you."
(Yogi Bhaan, 1977, pp. 92, 175)

Abstract: Meditation is an ancient but simple cognitive technique that historically predates modern religions. The practice of meditation is associated with discrete changes in both psychophysiology and state of consciousness. This has led to its use as both a spiritual technique in many religious traditions as well as a therapeutic intervention. Widespread adoption of meditation may ultimately contribute significantly to improvement in the quality of life in Western society.

Meditation is most simply defined as the sustained control of mental attention in a relaxed and passive manner. The focus of attention may be on a single target such as the breath, a mantra or a visual point as in the case of so-called "concentrative" meditation, or it may be on the flow of sensation or thought in the present moment as in the case of mindfulness meditation. In either case, meditation is the antithesis of the typical ceaseless mental stream of ruminative thought. In this broad definition, meditation can also apply to any behavior in which the mind is so absorbed into/with something, that only the pure experience of the present moment exists. This state can be manifested in a deliberate and prescribed manner such as the formal practice of meditation and yoga. However, it can also come

spontaneously for some in moments during the course of ordinary events when one is completely absorbed in something for an all-to-brief, fleeting moment - a so-called peak experience.

The practice of meditation has been shown to have discreet psychological and physiological effects. Benson has coined the term "relaxation response", which refers to the coordinated psychophysiological response that is generated by meditation and a variety of other similar mind-body practices (Wallace, Benson, and Wilson, 1971; Benson, Beary, and Carol, 1974). The relaxation response is associated with an elevation of mood and well-being, a decrease in cognitive and emotional arousal and a reduction of physiological arousal in both the autonomic nervous system and the hypothalamic pituitary axis (Benson, 1983). Such psychophysiological changes are also consistent with the use of meditation as a spiritual practice to generate transformative, transcendent and unitive states of consciousness described so eloquently by saints and holy men and which underlie the philosophical discipline of mysticism.

The first known archaeological evidence of the practice of meditation dates back to the Indus Valley civilization which ended no later than 1,500 B.C.E., and flourished for millennia before that time, in what is now Pakistan. Artifacts from the ancient cities of Harappa and Mohenjo Daro reveal images of postures synonymous with the practice of yoga and meditation (see www.harappa.com). The most famous of these, depicted on the cover of this issue, is a seal depicting a human figure seated in

the cross-legged lotus yoga/meditation posture, with the heels inverted into the perineum, a well-known yoga meditation technique. Other artifacts from this civilization show sculptures and figurines which have been interpreted to depict the meditative practice of focusing the gaze upon the tip of the nose, the distention of the abdomen characteristic of the full yogic abdominal breathing technique (Rowland, 1953), and the adoption of postures suggestive of hatha yoga techniques (www.harappa.com).

The earliest clear textual description of meditative practice, and the associated transformation in consciousness associated with it, appears in ancient Indian texts which predate the advent of modern religions. In the Upanishads we find:

As a fire without fuel becomes quiet in its place, thus do the thoughts, when all activity ceases, become quiet in their place...When a man, having freed his mind from sloth, distraction, and vacillation, becomes as it were delivered from his mind, that is the highest point...That happiness which belongs to a mind which by deep meditation has been washed clean from all impurity and has entered within the Self, cannot be described here by words; it can be felt by the inward power only...Mind alone is the cause of bondage and liberty for men; if attached to the world, it becomes bound; if free from the world, that is liberty. (Maitrayana Brahmana Upanishad, translation by Muller, 1884, pp. 332-334)

In another passage, a direct analogy with the control of mental attention in meditation is made to the act of steering a horse-driven chariot in which the horses are the

thoughts/senses, the body is the chariot, and the rider is the intellect controlling the horses through the reins which represent the mind.

He who is without discrimination and whose mind is always uncontrolled, his senses are unmanageable, like the vicious horses of a driver. But he who is full of discrimination and whose mind is always controlled, his senses are manageable, like the good horses of a driver. He who does not possess discrimination, whose mind is uncontrolled and always impure, he does not reach that goal, but falls again into Samsara (realm of birth and death). But he who possesses right discrimination, whose mind is under control and always pure, he reaches that goal, from which he is not born again. The man who has a discriminative intellect for the driver, and a controlled mind for the reins, reaches the end of the journey, the highest place of Vishnu (the All-pervading and Unchangeable One). (Katha Upanishad translation by Paramananda, 2002)

In ancient Tantric texts, which may well predate the Vedas and Upanishads, there are similar and very deliberate prescriptions for, and descriptions of, meditation and the resulting transformation in consciousness.

One can be aware of [divine consciousness] only when one is completely free of all thought-constructs.

[The highest state of divine consciousness] is free of all notions pertaining to direction, time, ... space or designation. In verity that can neither be indicated nor described in words.

The aspirant should neither maintain the attitude of aversion nor of attachment towards any one. Since he is freed of both aversion and attachment, there develops ... the nature of the divine consciousness (which is also the nature of the essential Self) in his heart. (Vijnana-bhairava Tantra, translation by Singh, 1991, pp. 14, 113) The early practices of meditation have been most purely maintained throughout history in the practice of yoga, but they have also become embedded practices in oriental religious disciplines such as Buddhist and Hindu meditation practices. Meditation practices do not appear in the Western Judeo-Christian traditions to the same degree, and it has only been over the past half-century that a significant influence of meditation practice has appeared in the West, especially in the late 1960's with the arrival of a number of yoga and meditation teachers from the East. Notably, Maharishi

Mahesh Yogi inspired practice, teaching and research of the Transcendental Meditation technique, and more recently the Dalai Lama has done the same for Buddhist Vipassana or mindfulness meditation, and both groups have promoted meditation research (www.tm.org/research/home.html) (Barinaga, 2003). Currently, both yoga and meditation practices have become very popular amongst the general public both for wellness and as therapeutic interventions (Saper, Eisenberg, Davis, Culpepper, and Phillips, 2004; Barnes, Powell-Griner, McFann, and Nahin, 2004). They have also become the focus of strong media attention, including cover stories in Time magazine on the science of yoga (4/23/01), meditation (8/4/03) and the mind-body connection (1/20/03).

Although historically a spiritual practice, the physiological effects of meditation are ideally suited as a countermeasure for stress-induced arousal and for stress-related physical and psychological disorders. Not surprisingly, over the past three decades meditation has been widely utilized as a therapeutic intervention, and a significant body of research has validated its clinical effectiveness in a wide variety of conditions (Baer, 2003; Proulx, 2003; Perez-de-Albeniz and Holmes, 2000; Murphy and Donovan, 1999; Jacobs, 2001).

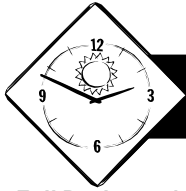
It is remarkable that despite the enormous advances in the physical sciences and technology in the West, a rudimentary cognitive technique with such apparent benefits should have taken so many centuries to have been noticed and adopted. Aside from its therapeutic benefits, perhaps the most valuable contribution to Western society will be the incorporation of basic meditation as a commonplace lifestyle practice. The ubiquitous practice of dental hygiene (i.e. the toothbrush, dental floss) has become a fact of ordinary life, whose adoption as a daily practice has reduced the incidence of dental and oral disease in our society. Since meditation research has already shown measurable health effects in school and workplace settings (Benson et al., 1994; Benson et al., 2000; Deckro et al., 2002; Barnes, Bauza, and Treiber, 2003; Carrington et al., 1980; Peters, Benson, and Porter, 1977; Davidson et al., 2003), it is easily conceivable that meditation may also become a regular daily "mental hygiene"

practiced in homes, schools and workplaces. Such a widespread application of meditation practice may function as a simple but effective preventive medicine that could substantially reduce the incidence of stress-related disorders and psychopathology and improve our overall quality of life.

References

- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10, 125-143.
- Barinaga, M. (2003). Buddhism and neuroscience. Studying the well-trained mind. *Science*, 302, 44-46.
- Barnes, P. M., Powell-Griner, E., McFann, K., and Nahin, R. L. (2004). *Complementary and alternative medicine use among adults: United States, 2002* (Rep. No. 343). Hyattsville, Maryland: National Center for Health Statistics.
- Barnes, V. A., Bauza, L. B., and Treiber, F. A. (2003). Impact of stress reduction on negative school behavior in adolescents. *Health Qual Life Outcomes*, 1, 10-16.
- Benson, H., Beary, J. F., and Carol, M. P. (1974). The relaxation response. *Psychiatry*, 37, 37-46.
- Benson, H., Kornhaber, A., Kornhaber, C., LeChanu, M. N., Zuttermeister, P. C., Myers, P. et al. (1994). Increases in positive psychological characteristics with a new relaxation-response curriculum in high school students. *Journal of Research and Development in Education*, 27, 226-231.
- Benson, H., Wilcher, M., Greenberg, B., Huggins, E., Ennis, M., Zuttermeister, P. et al. (2000). Academic performance among middle-school students after exposure to a relaxation response curriculum. *Journal of Research and Development in Education*, 33, 156-165.
- Benson, H. (1983). The relaxation response: Its subjective and objective historical precedents and physiology. *Trends in Neurosciences*, 6, 281-284.
- Bhajan, Yogi (1977). In Harbhajan Singh Khalsa, Yogiji, *The teachings of Yogi Bhajan*. New York: Hawthorn Books.
- Carrington, P., Collings, G. H., Jr., Benson, H., Robinson, H., Wood, L. W., Lehrer, P. M. et al. (1980). The use of meditation—relaxation techniques for the management of stress in a working population. *J. Occup. Med.*, 22, 221-231.
- Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F. et al. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, 65, 564-570.
- Deckro, G. R., Ballinger, K. M., Hoyt, M., Wilcher, M., Dusek, J., Myers, P. et al. (2002). The evaluation of a mind/body intervention to reduce psychological distress and perceived stress in college students. *Journal of American College Health*, 50, 281-287.

Continued on page 45



SNI QEEG MAPPING SERVICE

48 HOUR TURN AROUND!

Full Package #'s 1-7: Minimum recommended for Neurotherapy

includes priority mail

\$195.00 _____

Full Package #'s 1-6: Without report (1-6 only):

includes priority mail

\$165.00 _____

*If only one choice is made the minimum is \$75.00

1. NxLink – NYU/E. Roy John Normative Database-Eyes Closed	\$60.00 _____
2. EureKa3! – Nova Tech EEG LORETA Analysis System and Adult Normative Database-Eyes Closed	\$60.00 _____
3. Map Insight – Nova Tech EEG QEEG/Topographic Analysis System and Adult Normative Database-Eyes Closed Power, Relative Power, Power Ratios,	\$60.00 _____
4. Neuroguide - R. Thatcher Normative Database	
A. Eyes Closed Linked Ears Z-scores	\$60.00 _____
Eyes Closed LaPlacian Z-scores	
B. Eyes Open Linked Ears Z-scores	\$60.00 _____
Eyes Open LaPlacian Z-scores	
5. Neurorep - W. Hudspeth QEEG Analysis System	
A. Eyes Closed - Weighted Average, Z-scores, Magnitude, % Power, LaPlacian, Average Spectrum, coherence, connectivity	\$60.00 _____
B. Eyes Open - Weighted Average, Z-scores, Magnitude, % Power, LaPlacian, Average Spectrum, coherence, connectivity	\$60.00 _____
6. Thatcher TBI Discriminant Analysis and Severity Index	\$60.00 _____
7. Clinical Correlations and Neurotherapy Recommendations by Bob Gurnee	\$60.00 _____
	Value \$540.00
8. Conventional Medical EEG - Read by Neurologist	\$125.00 _____
9. EureKa3! – Nova Tech EEG LORETA Analysis - Eyes Open-Non Database	\$60.00 _____
10. Map Insight – Nova Tech EEG QEEG/Topographic Analysis Eyes Open – Non Database Power, Relative Power, Power Ratios	\$60.00 _____
11. SKIL Topographic Analysis - Sterman/Kaiser Imaging Eyes Closed or Open, or Task - Clinical and CoModulation Topographic Maps (data and stat) Topometric Display for Delta, Theta, Alpha, SMR, Beta 1 and Beta 2	\$60.00 _____
12. Neurorep - W. Hudspeth QEEG Analysis System: Task Weighted Average, Z-scores, Magnitude, % Power, LaPlacian, Average Spectrum	\$60.00 _____
13. Supervision and Training Hourly Rate	\$100.00 _____
14. Extra set of Printed Maps	\$35.00 _____
15. Q-Metrx Medical Reports Conventional EEG Analysis, Maps and medical report on maps	\$350.00 _____
16. Overnight Shipping & Handling	additional \$8.50 _____
	Total Order \$ _____

Payment must accompany orders. Upload EEG or mail on CD or Zip Disks. Mail check or call/fax with Mastercard, Visa or Discover information. Receive printed Maps in mail or download from our website.

___ Visa ___ Mastercard ___ Discover # _____

Ex: _____/_____ Print Name: _____

Signature: _____ Date: _____

Scottsdale Neurofeedback Institute (SNI) / ADD Clinic

Robert L. Gurnee, MSW, DCSW, BICA:EEG, QEEG Diplomate, Director
Leslie Sherlin, MS

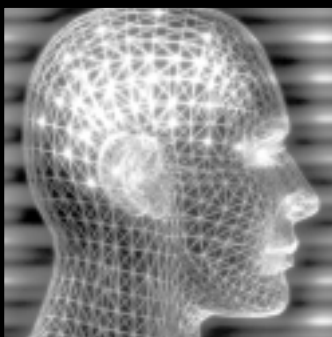
Phone: (480) 424-7200 • Fax: (480) 424-7800

Email: Bob@Add-Clinic.com • LeslieSherlin@SNIQEEG.com

Website: www.SNIqeeeg.com

8114 East Cactus Road Suite 200 • Scottsdale, AZ 85260

ATTENTION
DEFICIT DISORDER
CLINIC



Scientific.



Investigative.



Innovative.



Relevant.

That's APA today.

Join now and save 25% on dues!

In order to affirm the role of science and education in psychology and to make dues more affordable for individuals belonging to multiple scientific organizations, the American Psychological Association has reduced APA dues for members of your society.

If you are not affiliated with APA:

Join APA now!

Members pay just \$47 in 2005, Associate members pay just \$69. You'll receive the \$48 journal credit and all other benefits of membership.

If you are currently an APA Member, Fellow, or Associate member:

You will find instructions on how to take advantage of the 25% dues reduction in your APA dues statement.

If you are a former APA member:

You can reinstate your membership using the 25% dues reduction. Reinstated Members pay just \$190 and Associate members pay just \$137 – offset by a \$45 journal credit and all other benefits!

APA Member Benefits Include:

- First year APA Member dues: \$63 – 25% = \$48
- \$45 member journal credit on already low member subscription rates
- Discounts on vital information resources: APA books, convention fees, and career and teaching aids
- Members-only access to online PsycINFO® and full-text journal article databases
- *The American Psychologist* – APA's monthly journal
- *Monitor on Psychology* – APA's monthly magazine
- Focused information from the APA Science and Education Directorates and the Public Policy Office, the Psychological Science Agenda newsletter, access to scientific divisions of the APA, and links to e-mail and listserv networks.

APA is working on behalf of scientists and academicians through endeavors such as:

- Ensuring continued support for psychological research and education
- Legislative and regulatory advocacy
- Promoting psychological education and psychology's application in education
- Advancing the integrity and exchange of scientific information

Visit APA Online! www.apa.org

**Write to APA Membership, 750 First Street, NE
Washington, DC 20002-4242**

Local: (202) 336-5580; TDD: (202) 336-6123;

Fax: (202) 336-5568; E-mail: membership@apa.org



To take advantage of this special offer, call

1-800-374-2721

SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH



Meditation Styles: Common Features and Distinguishing Characteristics

Adam Burke, PhD, MPH, LAc, San Francisco, CA

Abstract: Meditation is a time honored process used in the pursuit of healing and self-transformation. During the past several decades the practice of meditation has been growing in popularity in the US. As a result we find a plethora of methods that may confuse the novice seeking to begin a practice. Fortunately, despite the apparent differences one observes on the surface there are actually quite a few commonalities to the diverse body of methods. This article presents some of those common themes (including thoughts on posture, object of focus, attitude and breath), and highlights a key distinction between major schools, the quality of attention.

No sky
No earth – yet still
The snowflakes fall

— Haiku poem by Kajiwaru Hashin

A Brief History

Meditation is a self-regulatory, mind-body process used to narrow attention and to produce a state of inner quiescence. It is ideally practiced daily over an extended period of time, with the goal of stabilizing and maintaining these changes. The intended benefits of the practice include improved physical and mental health, greater tranquility, deeper insight into the nature of existence, and transcendence or spiritual liberation. Meditation as a self-transformative process has been used for millennia, as evidenced by extensive treatises on the subject found in India, China, Tibet and other major cultural centers. In the US popularization began around the beginning of the 20th century when ideas from the East

started arriving on American shores. The Theosophical Society, founded in 1875 in New York City, endorsed many Eastern ideas as central to world transformation. Swami Vivekananda addressed the 1893 World Parliament of Religions in Chicago discussing the benefits of meditation and Eastern thought to an exuberant audience. Transcendentalist authors, such as Emerson and Thoreau, incorporated Eastern concepts of life into their writings. This interest in meditation and yoga continued unabated, and has experienced dramatic growth during the last 50 years. As a result, a significant body of scientific literature has been generated on the topic. A search of biomedical literature produces over 1,000 studies with the keyword 'meditation'. A great deal of this research has focused on Transcendental Meditation in the 1970's, followed later by the Relaxation Response, and more recently by studies of Mindfulness Meditation. Much of this work has repeatedly substantiated the benefits of meditation for physical and mental health and well-being.

As a consequence of our interest in Eastern spirituality and related practices, we now find many forms of meditation available in the US to choose from. Although this diversity is advantageous on one level it also presents the consumer or the advising professional with a potential dilemma. What is the best form for any one person to follow? Fortunately, although there are many forms we do find within this diversity a good deal of similarity in essential aspects of practice. In Japan, for example, within the Buddhist meditation tradition, there

have been numerous forms of practice over the centuries, often quite philosophically and ritualistically different from each other. These include the schools of Tendai, Shingon, Jodo, Nichiren, Rinzai Zen and Soto Zen. Despite the real differences between these schools, there may also be similarities in the sitting posture, the use of an object of meditation and proper attitude, and the engagement in regular practice. The same can be said for all systems of meditation practice: Differences exist as do many commonalities in the core elements of practice. That being the case the best style for an individual is often ultimately a matter of availability or of personal preference among forms. Regarding the elements common to practice and some important distinguishing characteristics, they include the following:

The Method

Meditation, as a tool of a specific school of thought, such as Zen Buddhist meditation, takes a specific form, the unique meditation method employed by that school. In general one can speak of two major methods of meditation practice—dynamic and sitting. Dynamic forms involve some type of movement characteristic of the practice, such as the Indonesian practice of Latihan, or the Chaotic Meditation of Rajneesh, or Kinhin (Zen walking meditation). The second, and more characteristic form of meditation, is the sitting practice.

Posture

Sitting meditation generally involves an upright symmetrical posture. The spine is erect, head facing forward, eyes closed or partially closed looking down slightly. The

hands rest on the lap or legs. They may be held in a specific posture, known as a mudra, in order to facilitate retention of focus or as a way to move energy in a beneficial fashion. The specific sitting postures help to reduce sensory input, and to promote stillness and alertness, or relaxation with attention.

Object of Focus

Typically in meditation there is some object of meditation, something to focus one's attention on. This is important as meditation involves narrowing the field of attention as a means to reduce sensory input and extraneous thought. The object can include things such as the breath, a mantra (specific sound repeated mentally, like OM), an internal visual image, or the position of the hands or body.

Proper Attitude

Schools of meditation typically encourage a non-critical attitude in practice. They advise the practitioner to effortlessly return to the object of meditation once the loss of focus is recognized. This fosters the habit of direct return to the object, rather than a delayed return resulting from self-critical analysis of one's practice. Such self-criticism could also be psychophysiologicaly arousing. A second key is effortless striving. One holds the intention to meditate, but does not strive effortfully for success. Finally, a commitment to do the practice consistently and as effectively as possible, to be the best meditator one can be, is useful. This is all to be done with an egolessness, which is often accomplished through the process of offering the practice of meditation as a gift for the greater good.

Proper Environment

It is advised that the meditation be done in a suitable environment. The ideal environment is free of distractions, quiet, and healthy. Historically in India, China and Tibet practitioners would often spend time in caves—dark, quiet and isolated—to do their practices.

Breath

Some practices work with breath directly, either as a vehicle for passive observation, or through self-regulation of the breathing cycle. Otherwise breath is to be natural, typically through the nostrils.

Time and Length of Practice

Practice is ideally done on a daily basis, at a consistent time, for 20 minutes or more. Some schools advise 1-2 hours per seated practice. Occasional extended retreats are also encouraged in some

schools, to cultivate a deepening of focus and greater opportunity for stabilization of behavioral and psychophysiological changes.

Focus of Attention

One of the final aspects of meditation, and a major distinguishing characteristic between forms, is the issue of focus of attention. Meditation involves focusing the attention for the purpose of quieting the mind and body. There are two major schools of thought regarding this question of where to focus. They can be described as Closed Focus and Open Focus. The Closed Focus style is sometimes referred to as *concentration meditation*. It is more common in Yogic meditation practices. In this style the attention is focused on a single object of meditation, such as an internally generated mantra or visual image, to the exclusion of all other input. Transcendental Meditation would be more in keeping with this type of practice. The ultimate goal of this form of meditation is to become so deeply focused on the object that one's consciousness merges with the object thereby eliminating awareness of space, time and self. The practitioner in this case is said to have entered a state of Samadhi, a state of deep absorption, a state of oneness with a universal essence.

By contrast, the Open Focus style is a form in which the practitioner seeks to maintain a continual conscious awareness of changing phenomena, not being fixated on any one thing, but seeking to maintain an awareness of one's endlessly changing experience. This is often referred to as *insight or mindfulness meditation*, and is more common in Buddhist forms. The objective of this path is to become silently present in the midst of ever changing reality, with no attachment to experience. In this latter form one does not seek to transcend momentary awareness, but to remain continually and quietly vigilant in the moment. An example of this would be the Zen practice of Shikantaza 'just sitting'.

Although these two schools of thought use fundamentally different attentional styles – fixed and open – they both seek to move the practitioner to a state where the true nature of existence can be more fully apprehended, where attachment and suffering can be transcended. They both seek to cultivate within the practitioner a deepening and sustained experience of equanimity, health and happiness.

Conclusion

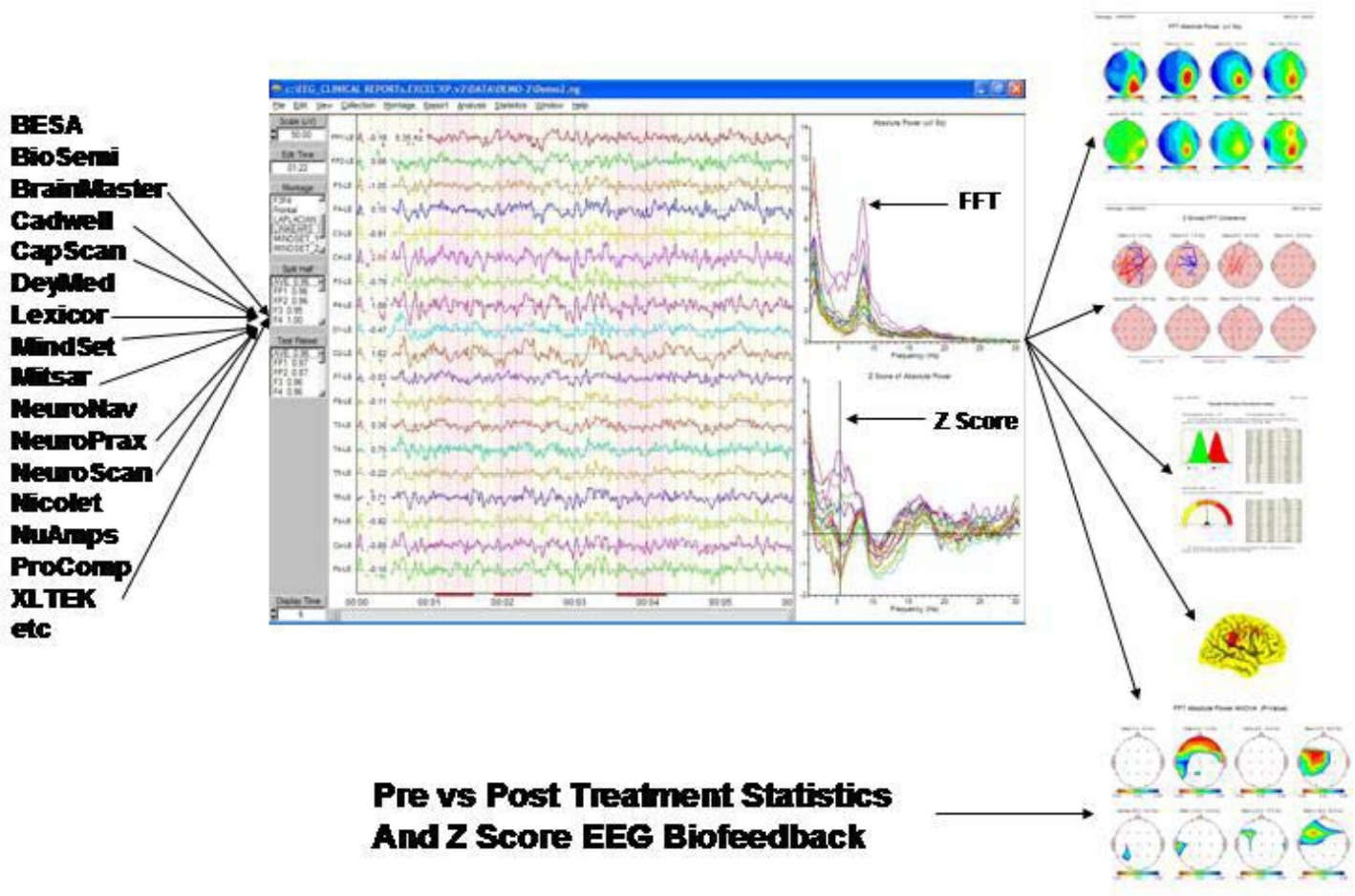
There is considerable unity within the diversity of meditation forms, at least to a degree. The wing of a bird, the fin of a whale, and the hand of a human look quite different on the surface, yet underneath there is a dramatic similarity in skeletal form. It is not surprising that meditation, an expression of our human nature, displays some of this same surface difference and deep similarity. Even such fundamentally distinct aspects of meditation as difference in attentional focus share a similarity in the intended benefits and outcomes of practice. Ultimately, when considering a meditation practice it is important to recognize that many paths lead to the same mountain. In the end it is not so much the path we choose, but what we do along the way.

Enhance & Assess Neurofeedback Training
IVA+Plus Boot Camp: Basic Training in Understanding Why & How the IVA+Plus CPT Works
Becoming an IVA+Plus Expert: A Step-by-Step Approach to Analyzing & Interpreting IVA+Plus Profiles
Physical Therapy for the Mind: Computerized Cognitive Behavioral Training for ADHD, LD, & Brain Injury
Nov. 4, 5, 6, Philadelphia, PA ➤ CE Credits for Psychologists
Call 800-822-0538 ➤ www.braintrain.com

NEUROGUIDE

The Most Comprehensive EEG and QEEG System Available: Dynamic EEG Databases, Discriminant Functions, Power, Coherence, Phase, Pre vs. Post Treatment Statistics, Batch Processing, LORETA & Z Score EEG Biofeedback

Download a **FREE** NeuroGuide Demo at
www.appliedneuroscience.com



Affordable 10 month payment plans – call 727-244-0240 or
email us at qeeeg@appliedneuroscience.com

Also an Expert EEG & qEEG Report Service
Go to www.appliedneuroscience.com/Services/html

SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH



Demystifying Meditation

Ramesh L. Bijlani, MD, New Delhi, India

Abstract: Meditative techniques possibly evolved in the course of resolving basic existential questions. While the validity of the universal consciousness or the Spirit discovered by the mystics may be controversial, the peace and tranquility generated by meditation have been exploited by modern medicine to alleviate misery. This article also touches on the apparent similarities and significant differences between meditative experiences and hallucinations generated by sensorimotor deprivation or psychedelic drugs.

Meditative techniques possibly evolved in the course of resolving some fundamental questions such as "Who am I?", "What is the purpose of life?", and "Is there an Absolute Reality?" These extremely difficult questions have engaged mankind since times immemorial but we still have no definitive answers. Further, these questions are not amenable to scientific exploration the way physical phenomena are. There are broadly two methods appropriate for addressing such questions: introspective reflection and rational analysis. One who chooses the method of introspective reflection would have a natural tendency to seek a quiet corner where he/she can seek his/her answers in silence. If the exercise is repeated often enough, one is likely to discover some finer points which make the process more efficient in exploring the deeper recesses of the mind. Thus the process of sitting silently would itself become more and more elaborate till it acquires a ritualistic character. Since several sages have carried out this exercise independently over millennia in different parts of the world, the details of the technique they have arrived at differ (Anon., 2001). However all meditative techniques have some basic features in com-

mon, and what is still more interesting, the product of meditation is remarkably independent of the technique used. The product of meditation is an experience which belongs to a plane of consciousness quite different from the ordinary. The experience has two main components. First, the clear boundary which ordinarily separates an individual from the rest of the universe gets blurred. The second component of the experience is the glimpse of a reality which seems immutable, imperishable, ineffable, universal and all-pervasive. In short, it has the characteristics of the Absolute Reality, in contrast with the ever-changing, ephemeral and fragile character of the superficial reality which we experience with the help of our sense organs while living in ordinary consciousness. One reason why we are not ordinarily aware of the Absolute Reality is possibly that it is masked by the ordinary reality. Thus the principle of most meditative techniques is to create conditions in which sensory inputs are minimized and ordinary activities of the mind are suspended. To use an analogy, as the turbulence on the surface of the ocean settles down, one can get a better view of the depths.

The Technique

One of the oldest techniques of meditation is based on the eight limbs of Raja yoga as enunciated by Patanjali (Vivekananda, 1995). Raja yoga (literally, the royal path of yoga) is the school of yoga that emphasizes mental perfection. It aims at achieving absence of the ordinary activities of the mind. The ordinary activities have to be suspended in order to enable higher planes of consciousness to work. The

first two limbs are preparatory steps of moral purification, which underscore the point that meditation is not a technique to be practiced in isolation: it should be part of an overall process of self-improvement. The technique of meditation begins with the third limb, which is asana (physical posture). The asana is meant to put the body in a steady and comfortable position. This step reduces the proprioceptive input to the minimum. Further, during the asana the eyes are generally closed, which eliminates visual inputs. The body is also generally kept motionless so that motor output is at its minimum.

The next step in meditation is *pranayama* (control of the life force). The most visible manifestation of the life force is breathing. Therefore, during *pranayama* the person takes slow, regular and deep breaths, and observes closely the process of breathing.

Eight Limbs of Raja Yoga

1.	Yama (Restraints)
a.	Non-violence
b.	Truth
c.	Non-stealing
d.	Continence
e.	Non-hoarding
2.	Niyama (Do's)
a.	Cleanliness
b.	Contentment
c.	Austerity
d.	Study
e.	Surrender to God
3.	Asana (Physical postures)
4.	Pranayama (Breath control)
5.	Pratyahara (Sensory withdrawal)
6.	Dharana (Concentration)
7.	Dhyana (Meditation)
8.	Samadhi (Superconsciousness)

Thus breathing, which we are normally quite unaware of, becomes a conscious process. Sitting comfortably in a quiet place with the eyes closed and breathing slowly, deeply and consciously is in itself quite enough to relax the mind considerably. The normally chaotic thought process of the mind is suspended, and at least for a few breaths the person may be aware of only the process of breathing. In fact, some techniques of meditation consist primarily of disciplined breathing. But the mind, by its very nature, is so restless that it soon breaks through the restful state achieved by consciously regulated breathing. If one can keep all thoughts (other than awareness of breathing) suspended for even twenty breaths at a stretch, it is a remarkable achievement.

It is possibly for this reason that in Patanjali's scheme, meditation has three more steps. The next step after *pranayama* is *pratyahara*, which means sensory withdrawal. After the visual and proprioceptive inputs have been taken care of, the principal source of sensory stimulation is sound. Sounds abound even in a quiet environment. After the other sensory inputs have been curtailed, background noises which were earlier escaping attention get unmasked. Even the rustling of leaves or the chirping of birds may acquire a disturbing character. *Pratyahara* involves a gentle withdrawal of attention from these sounds in an attempt to cultivate a studied indifference to the source and significance of these sounds. In addition to thoughts triggered by sensory stimuli, is the spontaneous flow of thoughts often manifesting as rumination. The person learns to ignore these thoughts as well during *pratyahara*. However, instability is such an inherent characteristic of the mind that left to itself, it cannot remain blank for any respectable length of time, and unless that happens, there can be no room for experiences originating in higher planes of consciousness.

Therefore in Patanjali's scheme, from *pratyahara* the person moves on to the next step, *dharana* (concentration). During *dharana*, the person concentrates on an object or a sound or an idea, in addition to the breath on which he started concentrating during *pranayama*. The mental focus of

concentration during *dharana* is synchronized with the breath so that the two form one unit. A common practice is to concentrate on a humming sound, which is recited silently during each expiration. Although Patanjali did not specify what to concentrate on, the sound selected for recitation is commonly a meaningful sound (i.e. not a neutral sound), symbolizing something sacred to the individual. However, in the transcendental meditation (TM) technique, the meaning of the mantra is not disclosed in the beginning. It is believed that till the process of meditation has been rightly established, the meaning might distract the mind (Mahesh Yogi, 1967). *Dharana* has a two-fold implication in the process of meditation. *First*, as mentioned earlier, it is difficult for the mind to stay devoid of thoughts for any length of time. However, if the mind is made busy with an activity such as repetition of a word, the possibility of avoiding other thoughts improves. If the mind gets a job to do, it does not drift as readily as an idle mind would. However, the mechanical repetition of the word does not require analytic attention. Therefore it does not mask the vision of the Absolute Reality the way an endless train of assorted thoughts would. *Secondly*, if the word or phrase chosen for repetition is sacred to the person, its regular repetition eventually leads to the development of a bond with the sacred entity which the expression symbolizes. The result is that, with time, the

recitation has a catalytic effect on the efficiency with which peace is achieved. And, the peaceful feeling is highly favorable for the consciousness to shift to a higher plane.

After *dharana*, the next step is *dhyana*, or meditation proper. *Dhyana* consists of contemplation on the theme of concentration. Contemplation is a natural sequel to concentration. Frequent sessions of repetition of the same thing would naturally generate some thoughts about it. Thoughts related to the subject of *dharana* (concentration) constitute *dhyana* (meditation). These thoughts further strengthen the bond between the seeker and his sacred support. That, in turn, makes the peace deeper and more durable because now the seeker starts perceiving that the tremendous power of Divine grace has been added to his feeble efforts. The process of meditation ends with *dhyana*. The eighth and last limb of Patanjali's yoga, *samadhi*, is the product of meditation. *Samadhi* is the peak experience during which the seeker is immersed in a transcendent, unitive state of consciousness.

There are several techniques of meditation, which differ widely in their details. In a brilliant analysis, Sri Aurobindo divided the conditions conducive to meditation into two external and two internal conditions (Aurobindo, 1993, p. 147). Nearer our times, Herbert Benson has independently deduced four basic elements that are common to all forms of meditation (Benson, 1975). Physiologically, meditation generally

Table 1
The Basic Elements of Meditation

Sri Aurobindo's conditions	Benson's elements	Limbs of Raja yoga	Physiological correlates
External			
Solitude and seclusion	Quiet environment	Assumed	Sensory attenuation
Stillness of the body	Comfortable posture	Asana	Sensory and motor attenuation
Internal			
Concentration of the will	Mental device	Dharana	Non-analytic attention
Purity and calm of the inner consciousness	Passive attitude	Dhyana	Non-targeted thinking

involves sensory and motor attenuation, non-analytic attention and non-targeted thinking (Deepak, 2002). It is customary to divide the techniques of meditation into those which involve concentration, and those which do not. The difference between these two types is one of emphasis, rather than in the underlying principles. Sri Aurobindo talks of three closely related processes. The first is concentration of the mind on a single train of ideas. It is relatively easy, but the narrowest in its results. The second is contemplation on a single object or idea so that knowledge about the object or idea may arise naturally in the mind. Contemplation is more difficult than concentration but leads to greater results. The third is standing back from one's own thoughts and engaging in self-observation. Self-observation is the most difficult, but the widest and greatest in its fruits. Self-observation leads to "emptying of all thoughts out of the mind so as to leave it a sort of pure vigilant blank on which the divine knowledge may come and imprint itself" (Aurobindo, 1993, pp. 146-147). Since it is a basic principle of learning to proceed from the easy to the difficult, meditative techniques pass through concentration and contemplation before arriving at self-observation. Using Herbert Benson's terminology, concentration, contemplation and self-observation are 'mental devices' of increasing complexity for achieving a vigilant blank, or attentive relaxation. In different techniques of meditation, the emphasis is on one or the other of these mental devices. In techniques emphasizing concentration, the focus of concentration may be neutral or sacred, external or internal. For example, concentration may be on the breath, a part of the body, or on a bright spot of light. When the focus of concentration is external, the eyes may be kept open during meditation. In techniques emphasizing self-observation (or mindfulness), concentration is usually confined to the initial attention to breathing. The reason why concentration is downplayed in several techniques is not only because its results are narrow, but also because it is likely to be confused with straining, which would make meditation unpleasant and counter-productive. Concentration is quiet and steady,

whereas straining implies anxiety and agitation (Sri Aurobindo, 1993, p. 156). The aim of all meditative techniques is to restrain the ordinary activities of the mind while staying not just awake but also alert. Concentration, contemplation and self-observation are the usual, but not an exhaustive list of mental devices used for achieving this combination. A few techniques of meditation require loud chanting, walking, singing and even dancing instead of sitting quietly. The key seems to be total absorption in an activity which does not require analytic attention or targeted thinking. In neurophysiological terms, it translates into marked reduction in neuronal activity, especially in the left parietal lobe.

The question arises as to what is it that steps in to fill the vacuum created by a concerted effort at reduction in neural traffic: Is it consciousness of a deeper reality waiting to reveal itself, or is it a set of mental aberrations or hallucinations? From the scientific point of view, this remains an open question. To keep our minds open to the possibility of perception through a route other than the sense organs is, however, less unscientific than believing that no such route can exist.

The Experience Called Samadhi

Samadhi is an experiential state, and an experience defies description. For example no description can truly convey the sweetness of sugar the way tasting sugar can. If commonplace experiences cannot be described adequately, it is understandable that the limitation would be all the more true for an experience as rare as *samadhi*. Therefore it has been said that if *samadhi* has been experienced, no description is necessary; and if it has not been experienced, no description is adequate.

However, this fundamental limitation has not prevented many of those who have experienced *samadhi* from making attempts to describe it. Although these descriptions differ from one another as might be reasonably expected, they have some striking basic similarities. The first and foremost component of the experience is a radical change in the person's way of looking at oneself. Instead of identifying oneself entirely with the body and mind, the person becomes

aware of a deeper reality within, of which the body and the mind are surface manifestations. The second component of the experience is the perception of the very same reality within, behind and above everything in the universe: everything animate and inanimate. The plurality and multiplicity of the universe are seen as superficial and temporary manifestations of a deeper imperishable reality. To give an analogy, the waves of an ocean have a variety of appearances and a brief existence, but the deeper reality behind all the waves is water. Perception of the individual as part of a vast interrelated universe provides infinite width to the experience. *Samadhi* is a peak spiritual experience. But in fact there is a spectrum of different levels of spiritual experiences (Aurobindo, 1970, pp. 939-955, Austin, 1998, pp. 298-305, 579-584). The earliest experiences that occur after beginning a regular meditative practice may be just brief periods of peace, tranquility and joy. Between these and the peak experience are several planes of consciousness bringing in their wake progressively higher degrees of enlightenment.

Introspective reflection in a state of intense concentration and purification has been used for exploring the mystery of existence by sages across millennia all over the world irrespective of caste or creed. Their experiences as well as their interpretations of the experiences show remarkable similarities. Independent replication of experiences by so many separated so much in time and space is probably the strongest argument in favor of the validity of these experiences. However, being subjective, the only person who can attest the veracity of these experiences is the person who has experienced them. Therefore, an objective proof of the validity of spiritual experiences remains an impossibility. What is more important is to examine the practical implications of these experiences. If these experiences end as an individual achievement, they are not of much value to humanity at large. The deeper and wider consciousness experienced through meditation has extremely positive implications for a basic change in human nature itself. It integrates our physical, emotional and intellectual energies with a deeper and higher power, thereby banishing igno-

rance, evil and misery. Further, the question arises whether a radical change in the nature of a few can in any way make a difference to the world. It has been observed that in towns where at least one percent of the population was practicing transcendental meditation (TM), the crime rate came down significantly (Borland & Landrith, 1976). It seems that when more than a critical mass of people raise their consciousness, it has a ripple effect on their fellow beings (Keyes, 1982). David Hawkins, a pioneer in quantification of consciousness and its collective influence, has argued on mathematical grounds that even a few loving thoughts during the course of the day more than counterbalance all of our negative thoughts. Thus, even a brief and modest elevation of consciousness during meditation has a remarkable spillover effect on an individual's life. Further, Hawkins has suggested that just a few individuals at a highly elevated level of consciousness can exert a significant influence on society as a whole (Hawkins, 1995, p. 237).

Applications of Meditation

Using meditation successfully for rising to a higher plane of consciousness is not common. But several watered-down versions of meditation are used instinctively or under guidance for very ordinary ends.

Dealing with Problems. When faced with a vexing problem, an instinctive response is to retire to a quiet corner and concentrate on the problem. This corresponds to the stage of *dharana*. If this goes on long enough, and frequently enough, an analysis of the problem starts running through the mind. This corresponds to *dhyana*. With luck, a solution to the problem may present itself in a sudden flash, leading to an intensely peaceful feeling. This may correspond to a brief sampling of the *samadhi* experience.

Preserving and Promoting Health. Spiritual seekers have generally enjoyed good health and longevity. To these seekers, health-related gains are a fringe benefit, not the primary goal. However, these gains have become the primary goal of meditation in modern medicine. Several empirical studies suggest that the technique actually works, and we also have evidence for plausible

mechanisms by which meditation might act. Meditation is a relaxing experience, and has therefore been used primarily for the disorders to which mental stress makes a significant contribution. These disorders include hypertension, coronary artery disease, insomnia, incontinence, headache, chronic pain, especially low back pain, stress-related symptoms in cancer, anxiety disorders and premenstrual syndrome (Barrows and Jacobs, 2002; Astin, et al., 2003).

The efficacy of meditative techniques in such a wide variety of disorders is not surprising in view of mounting evidence in favor of the mind-body relationship. Physical and mental relaxation, as achieved during meditation, has reproducible physiological effects such as an increase in EEG alpha activity and skin resistance, and a reduction in respiratory rate, oxygen consumption, arterial lactate levels, and sympathetic activity (Anand et al., 1961; Wallace and Benson, 1972; Vempati and Telles, 2002). It has been reported that those who have been meditating for more than 5 years are, on an average, biologically 12 years younger than people their age in the general population (Wallace et al., 1982). The indicators of aging used in this study were acuity of hearing, near point of vision (roughly, the minimum distance from which a book may be read) and systolic blood pressure. Thus a 60-year old who has been meditating for more than 5 years matches a 48-year old non-meditator so far as these indicators are concerned. At cellular level, slower aging may be due to reduced oxidative stress as suggested by lower lipid peroxide levels in meditators (Schneider et al., 1998). However, by far the most impressive evidence in favor of the mind-body relationship, which meditation exploits for securing health-related benefits, has come from psychoneuroimmunology (Kiecolt-Glaser et al., 2002).

Meditation as Medication: Right or Wrong?

Medicine has borrowed meditative techniques from spiritual disciplines. When meditation is used for spiritual growth, health is a fringe benefit. Purists are prone to question making the fringe benefit itself the goal of the technique. Speaking dispassionately, using meditation for promotion,

preservation and restoration of health cannot be considered abusing, or even misusing, the technique; it is just an instance of under-using. On the positive side, everybody falls ill sometime or the other, but not many are interested in spiritual growth. Using meditation for restoration of health may provide the first opportunity to the patient to get interested in spiritual growth as a worthwhile goal. In fact, the experience of human life down the ages has been that in an overwhelming majority of spiritual seekers, the spiritual turn was triggered by some turbulent, traumatic or tragic episode in life. That being so, ill-health is as good an event as any for initiating the process. While working on a cure for the illness, the person also discovers a technique for spiritual growth. What begins as a treatment ends up being a treat.

Many Roads to Rome?

The ecstatic, unitive and transcendent experience is not restricted to meditation. Similar experiences, dispassionately described as alternative states of consciousness, may be generated by nitrous oxide, lysergic acid (LSD), or sensorimotor deprivation (SMD) (Austin, 1998, pp. 407-436). This raises two questions: first, if drugs or SMD produce hallucinations, are meditative experiences also hallucinations, and second, if meditative experiences are spiritual, are drugs and SMD short-cuts to enlightenment.

Regarding the first question, those who consider all such experiences to be hallucinations are in distinguished company; the Nobel Prize-winning physicist, Richard Feynman, also thinks so (Feynman, 1992). Feynman considers these 'hallucinations' to be the product of sensory deprivation. The fact that many people have had the experience, and that their descriptions of the experience resemble one another, does not prove that the experiences are rooted in reality. It could be simply the result of all of them starting with similar expectations; the interpretation of the experience possibly depends on what one is expecting to 'see'. Some recent brain imaging studies on meditating Buddhist monks and Christian nuns have been construed as 'evidence' for the existence of a supraphysical reality. The authors of these studies have made no such

claims. In fact, one of the best known investigators in this area, Andrew Newberg, has merely said "... the possibility of such a reality is not inconsistent with science" (Rause, 2002). What Andrew Newberg and Eugene d'Aquili have observed is that the peak of spiritual experiences coincides with dramatic reduction in the activity of the brain's left parietal lobe. This is the part of the brain which processes sensory information, and helps define the boundary between the individual and the rest of the universe. Silence of this area at the peak of meditation is not surprising because reducing and ignoring sensory inputs is an important component of meditation. Further, since this is the area which enables the individual to identify himself as separate from the rest of the universe, inactivity of this area is likely to erase this boundary. A feeling of unity with the universe, a feeling of being a drop in an ocean, is the core of spiritual experiences. Newberg and d'Aquili have hypothesized that the brain is so wired that the vacuum created by inactivity of the area which thrives on 'normal' sensory experiences is filled in by the transcendent experience. The experience is indeed real; the question that has not been, and probably cannot be answered is whether the experience corresponds to a reality that really exists. Since science is incapable of proving a negative, it is unreasonable to expect from science proof for the nonexistence of a supraphysical reality.

Regarding the second question, the resemblance between meditation and drug/SMD-induced experiences, when it does exist, is superficial. Two important differences exist between these contrasting situations. First, drug/SMD-induced experiences are temporary. They last only as long as the person is under the influence of the hallucinogenic agent. On the other hand, the meditative experiences have a tendency to gradually outlast the meditative practice. Secondly, and more importantly, the core of the spiritual experience is the transforming influence it has on the individual. A person whose consciousness is elevated by meditation shows a progressive loss of vanity, desires, cravings and aversions, and a remarkable growth in compassion (Aurobindo, 1993, p. 153; Austin, 1998,

pp. 579-584). These behavioral changes are singularly missing in one who has gone through apparently similar drug-induced experiences. This all-important difference holds in spite of similar brain areas being activated or inactivated, and similar neurotransmitters being released in both cases. Thus there is no short-cut to enlightenment. Bliss may have an associated neurochemistry but bliss does not reside in chemical molecules.

Meditation is based on the simple principle that clearing a clutter is enough for clarity to surface spontaneously. But in practice, the inherent restlessness of the mind makes meditation extremely difficult. Several techniques are available to make the process less difficult, but they are nothing more than guidelines. With practice, each meditator works out his own style, so that in the final analysis, there are as many ways to meditate as the number of people who meditate. Further, while meditation as a deliberate exercise may be difficult, getting totally absorbed in an enjoyable activity is easy, and is also a type of meditation. That is why artists, poets, scientists and even athletes have experienced transcendence when deeply immersed in activity. But all the same, meditation as a deliberate exercise is also of value for peace, longevity, and with perseverance, for a direct experience of the universal consciousness. Humanity today is obsessed with a long and ever-growing list of external goals, and is in a terrible hurry to reach them. Meditation is not a panacea for all the problems of the modern world, but is a tempting tool for slowing down, looking within, and reaching beyond the obvious.

References

- Anon. (2001). *Paths of meditation: A collection of essays on different techniques of meditation according to different faiths*. Madras: Sri Ramakrishna Math.
- Anand, B.K., Chhina, G.S., and Singh, B. (1961). Some aspects of electroencephalographic studies in yogis. *Electroencephalography and Clinical Neurophysiology*, 13, 452-456.
- Astin, J.A., Shapiro, S.L., Eisenberg, D.M., and Forsys, K.L. (2003). Mind-body medicine: state of the science, implications for practice. *Journal of American Board of Family Practice*, 16, 131-147.
- Aurobindo, Sri. (1970). *The life divine*, 5th edition. Pondicherry: Sri Aurobindo Ashram.
- Aurobindo, Sri. (1993). *The integral yoga: Sri Aurobindo's teaching and method of practice. Selected letters of Sri Aurobindo*. Pondicherry: Sri Aurobindo Ashram.
- Austin, J.H. (1998). *Zen and the brain: Toward an understanding of meditation and consciousness*. Cambridge: The MIT Press.
- Barrows, K.A., and Jacobs, B.P. (2002). Mind-body medicine. An introduction and review of the literature. *Medical Clinical of North America*, 86, 11-31.
- Benson, H. (1975). *The relaxation response*. New York: Avon Books, pp. 159-161.
- Borland, C., and Landrith, G III. (1976). Improved quality of city life through the transcendental meditation program: Decreased crime rate. In D. W. Orme-Johnson and J. T. Farrow (Editors), *Scientific research on the Transcendental Meditation program: Collected papers, Volume I* (pp. 639-648). Seelisberg, Switzerland: Maharishi European Research University Press.
- Deepak, K.K. (2002). Neurophysiological mechanisms of induction of meditation: a hypothetico-deductive approach. *Indian Journal of Physiology and Pharmacology*, 46, 136-158.
- Feynman, R.P. (1992). "Surely you're joking Mr. Feynman!" *Adventures of a curious character*. London: Vintage, pp. 330-337.
- Hawkins, D.R. (1995). *Power vs. force: An anatomy of consciousness*. Sedona AZ: Veritas Publishing.
- Keyes, K. Jr. (1982). *The hundredth monkey*. Coos Bay, Oregon: Vision Books.
- Kiecolt-Glaser, J.K., McGuire, L., Robles, T.F., and Glaser, R. (2002). Emotions, morbidity and mortality: new perspectives from psychoneuroimmunology. *Annual Review of Psychology*, 53, 83-107.
- Mahesh Yogi, Maharishi. (1967). *Meditation (with questions and answers)*. Rishikesh: International SRM Publications, p. 106.
- Rause, V. (2002, January). Searching for the divine. *Reader's Digest* (India), pp. 124-129.
- Schneider, R.H., Nidich, S.I., Salerno, J.W., Sharma, H.M., Robinson, C.E., Nidich, R.J., and Alexander, C.N. (1998). Lower lipid peroxide levels in practitioners of transcendental meditation. *Psychosomatic Medicine*, 60, 38-41.
- Vempati, R.P., and Telles, S. (2002). Yoga-based guided relaxation reduces sympathetic activity judged from baseline levels. *Psychological Reports*, 90, 487-494.
- Vivekananda, Swami (1995). *Raja yoga: Conquering the internal nature, 22nd impression*. Calcutta: Advaita Ashrama.
- Wallace, R.K., and Benson, H. (1972). The physiology of meditation. *Scientific American*, 226(2), 85-90.
- Wallace, R.K., Dillbeck, M., Jacobs, E., and Harrington, B. (1982). The effects of the transcendental meditation and TM-Siddhi program on the aging process. *International Journal of Neuroscience*, 16, 53-58.

Low Energy Neurofeedback System (LENS) Introductory Training



Throughout this Introductory Training session, attendees will learn the simple but powerful LENS protocols and techniques that use up to 3 1/2-minute treatments, and an average of 13 sessions, to help ameliorate the symptoms of TBI, PTSD, Childhood Developmental and Autistic Spectrum Disorders, Fibromyalgia, Chronic Fatigue, and other disorders.

In-depth discussions include brain mapping and other evaluations, treatment planning, feedback administration, and treatment evaluation.

Introductory 4-day training
November 5 - 8, 2004 New Orleans

Full Four days: \$750
Advanced Reg. \$700 (By October 1)
Advanced consultations also available.

To register, or for more information call
Beth at 845-658-8083

Or visit our websites at
www.ochslabs.com or www.StoneMountainCenter.com

OchsLabs

Len Ochs, Ph.D. Stephen Larsen, Ph.D.

Phone: 925.933.4296 • 3557 Klamath Street • Oakland, CA 94602

SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH

Meditation and Limbic Processes

Tobias Esch, MD, Berlin, Germany; Massimo Guarna, PhD, Siena, Italy; Enrica Bianchi, PhD, Siena, Italy; and George B. Stefano, PhD, Old Westbury, New York



Tobias Esch, MD



George B. Stefano, PhD

Abstract: Currently, complementary and alternative medicine (CAM) are experiencing growing popularity. However, most of the underlying physiological and molecular mechanisms as well as participating biological structures are still speculative. Meditation was examined with regard to the central nervous system activity pattern involved. Frontal/pre-frontal and limbic brain structures play a role in CAM, including meditation. Particularly, left-anterior regions of the brain and reward or motivation circuitry constituents are involved, indicating positive affect and emotion-related memory processing. Thus, trust and belief in a therapist or positive therapy expectations seem to be important. In this regard, endogenous morphine is emerging as a chemical messenger involved in limbic processes.

Introduction

Despite the popularity of complementary and alternative medicine (CAM), little is known about the physiological pathways and biological structures involved. Besides specific effects that CAM therapists claim for themselves and for each single approach, trust, belief, and other subjective or more general factors may play a role in CAM (Slingsby & Stefano, 2000; Slingsby & Stefano, 2001; Esch, Guarna, Bianchi, Zhu, & Stefano, 2004). Thus, the role of belief, emotions, and limbic activation will be of

interest.

The common idea that the limbic system is solely concerned with emotion is at best a half-truth, but there certainly is a connection, which is probably relevant to CAM (Campbell, 1999). The limbic lobe surrounds the corpus callosum and consists of the cingulate gyrus and the parahippocampal gyrus. The hippocampus, which is in the floor of the temporal horn of the lateral ventricle, is also included in the limbic lobe. Additional structures incorporated in the limbic system, i.e., the limbic concept, are the dentate gyrus, amygdala, hypothalamus (especially the mammillary bodies), septal area (in the basal forebrain), and thalamus (anterior and some other nuclei). Functionally, the 'hippocampal formation' consists of the hippocampus, the dentate gyrus, and most of the parahippocampal gyrus (Campbell, 1999).

With regard to CAM, the limbic system is strongly associated with memory (emotional memory), i.e., positive or negative emotions, and the CNS-located reward circuitry: Belief has an emotional component in that the brain motivation and reward circuitry – linked to the limbic system – will be reinforced with a positive emotional valence attached to the believed in person, idea, or thing (Stefano, Fricchione, Slingsby, & Benson, 2001). This emotionalized memory, potentially accompanied by

'somatic markers' (bodily sensations that may escort an emotion), sets the 'feeling tone', i.e., it strongly influences what 'feels right' to a person (Stefano et al., 2001). Furthermore, emotion may reinforce a belief and trigger positive physiological reactions even 'against' rationality (Stefano & Fricchione, 1995b). Thus, belief in regard to a doctor or a therapy (e.g., CAM) may stimulate naturally occurring 'healthy' processes (Stefano et al., 2001). These subjective processes may particularly involve limbic structures, i.e., 'remembered wellness' (Stefano et al., 2001). We recently reviewed the literature on acupuncture, music therapy, meditation and massage therapy, regarding their limbic commonalities (Esch et al., 2004) and found that belief and expectation are crucial components of acupuncture, massage, meditation and music therapy treatment (Esch et al., 2004). When patients actively participate in their treatment, i.e., positively anticipate clinical effects, the chosen therapy presumably is more effective (Esch, et al., 2004).

Meditation as an Example

Recently, we have surmised that there is a connection between constitutive nitric oxide (NO) (and its release via constitutive nitric oxide synthase [cNOS]) and the elemental physiological phenomenon called

the 'relaxation response' (RR) (Stefano et al., 2001), an innate physiological response that is the opposite of the stress response. NO release is involved in this phenomenon, and it may be substantially responsible for some of the RR-related physiological changes (Stefano et al., 2001). The RR has the potential to be elicited actively, i.e., consciously (in humans), not only automatically, but by the use of various techniques such as repetitive imagination or verbalization of a word, prayer, phrase, or even repetitive muscular activity, progressive muscle relaxation, meditation, yoga and other methods (Benson, 1975). Herbert Benson first described the RR (and the technique of eliciting it) more than 30 years ago (Benson, Beary, & Carol, 1974). The RR results in decreased metabolism, heart rate, blood pressure and rate of breathing, as well as a decrease in brain activity (Wallace, Benson, & Wilson, 1971), although a recent study using functional magnetic resonance imaging (fMRI) for brain mapping of the RR and meditation has shown that, even though overall brain activity is decreased, there are regions that are activated in meditation, respectively elicitation of the RR, especially those areas and neural structures involved in attention and control of the autonomic nervous system (Lazar et al., 2000; Newberg et al., 2001). Using the RR in a therapeutic medical approach is becoming more popular today because of its low-cost support of health and self-care. Research has documented that regular elicitation of the RR results in alleviation of many stress-related medical disorders: It is effective in the treatment of hypertension (Stuart et al., 1987), cardiac arrhythmias (Benson, Alexander, & Feldman, 1975), chronic pain (Caudill, Schnable, Zuttermeister, Benson, & Friedman, 1991), insomnia (Jacobs, Benson, & Friedman, 1996), anxiety and mild/moderate depression (Benson et al., 1978), premenstrual syndrome (Goodale, Domar, & Benson, 1990), and infertility (Goodale et al., 1990). Some of these studies, as well as additional reports, used a combination of RR-based approaches and nutritional, exercise, and stress management/behavioral interventions.

With regard to the CNS, the RR activates areas in the brain responsible for emotion, attention, motivation, and memory (e.g., anterior cingulate, hippocampal formation, amygdala) and may also serve the control of the autonomic nervous system (Stefano et al., 2003; Lazar et al., 2000; Newberg et al., 2001). This specific pattern of activation may exert protective effects on the brain, although this is still a speculative prospect (Esch, Fricchione, & Stefano, 2003). However, such a protective mechanism could be related, for example, to a generally decreased production of metabolism-derived harmful by-products, i.e., oxidative stress. Also, the RR seems to be effectively capable of improving concentration and cognitive function, e.g., memory (Esch et al., 2003; Travis, Tecce, & Guttman, 2000). This may be due to hippocampal/limbic activation (see above), including reward or motivation circuitry involvement (Stefano et al., 2001). We now also know that stress may reduce neurogenesis in the adult hippocampus, possibly facilitating memory impairment (Esch, Stefano, Fricchione, & Benson, 2002b). Thus, the RR – and the reduction of stress with it – may be clinically relevant in dementia syndromes (Esch et al., 2002b; Esch et al., 2003). In addition, RR techniques have also been described to be helpful in the treatment of anxiety and depression

(Esch et al., 2003; Elias & Wilson, 1995). Here, anxiolytic effects of the RR may occur by promotion of an inhibitory (GABAergic) tone in specific areas of the brain (Elias et al., 1995).

Meditation has been shown to increase left-sided anterior activation of the brain, a pattern that is associated with positive affect (Davidson, et al., 2003). Again, positive emotion-related brain activity is a substantial part of the CNS reward circuitry, and the frontal regions of the brain not only are involved in RR pathways, but also exhibit a specialisation for certain forms of positive and negative emotion (Davidson & Irwin, 1999). Interestingly, reliable increases in left-sided activation are observable with meditation training in response to both the positive *and* negative affect induction (Davidson et al., 2003). Davidson et al. suggested recently that left-sided anterior activation is associated with more adaptive responding to negative and/or stressful events (Davidson et al., 2003; Davidson, 2000). Specifically, individuals with greater left-sided anterior activation have been found to show faster recovery after a negative provocation (Davidson, 2000).

Deep CNS structures are crucial components of the neural RR pathways. These components primarily consist of limbic structures, but not solely. Hence, increases in regional cerebral blood flow (i.e., brain activity) following or coming along with meditation have been detected, for example, in the dorsolateral prefrontal cortex, inferior or orbital frontal cortices/anterior regions, inferior parietal lobes, pre- and postcentral gyri, temporal lobes, cingulate gyrus, hippocampus and parahippocampus, amygdala, globus pallidus/striatum, thalamus, and the cerebellar vermis (Lazar et al., 2000; Newberg et al., 2001; Davidson et al., 2003; Newberg, Pourdehnad, Alavi, & d'Aquili, 2003; Critchley, Melmed, Featherstone, Mathias, & Dolan, 2001) (Figure 1). However, inconsistent results have been reported with regard to the parietal cortices: Some studies demonstrated an inverse correlation between

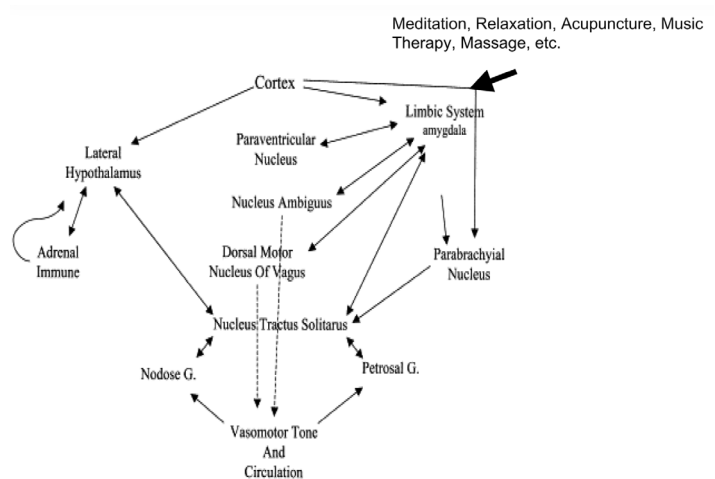


Figure 1. Representative connections among the limbic-hypothalamic-pituitary-adrenal axis, demonstrating that these centers are linked to vital functions, which appear to be modified by complementary medical therapies. This figure specifically depicts vascular tone regulation. This pathway suggests how belief, trust and emotion may exert a level of top-down control on vasomotor activity. The illustration is not meant to be all-inclusive. Taken from Esch, et al., 2004.

the dorsolateral prefrontal and the ipsilateral superior parietal lobe blood flow change: This correlation may reflect an altered sense of space experienced during meditation (Newberg et al., 2001; Newberg et al., 2003). Clearly, meditation is a complex phenomenon that involves several coordinated cognitive processes and autonomic nervous system alterations. RR techniques modulate CNS activity patterns with particular focus on structures associated with attention, emotion, and memory.

Knowing details on the brain activity patterns or CNS involvement in the RR, e.g., through neuroimaging techniques, doesn't necessarily help us with the interpretation of these results. However, we do know now that limbic system activation is an integral part of the brain physiology involved in the RR. Hence, the very same structures that revealed increased activity in the RR, as described, are well-known components of the brain reward and motivation circuitry: Prefrontal and orbitofrontal cortex, cingulate gyrus, amygdala, hippocampus, and nucleus accumbens (Stefano, et al., 2001). Thus, RR and reward circuitry seem to be physiologically interconnected. Memories of the pleasure of wellness, i.e., 'remembered wellness', are accessible to this circuitry through hippocampal mechanisms. Further, belief affects mesocortical-mesolimbic appraisal of an experience, leaving one, for example, well and relaxed. Yet, trust or belief in a therapy/therapist may facilitate positive affect, sense of well-being, and motivation, thereby involving limbic/reward circuitry activation, possibly leading to relaxation (i.e., elicitation of the RR) or initiating a beneficial placebo response (Stefano, et al., 2001).

Molecular Signaling

On the molecular level, nitric oxide, endocannabinoids, and endorphin/enkephalin autoregulatory signaling have been demonstrated or discussed in association with acupuncture (Ma, 2003; Kaprchuk, 2002; Jang, Shin, Kim, Kim, & Kim, 2003; Yang, Huang, & Cheng, 2000; Meissner et al., 2004), meditation techniques (Stefano et al., 2001; Esch et al., 2003; Stefano et al., 2003), music (Esch, 2003b; Esch, 2003a; Salamon, Kim, Beaulieu, & Stefano, 2003), and massage

therapy (Lund et al., 2002; Piotrowski et al., 2003). These molecules that possess a strong CNS affinity may also be involved in the placebo response (besides dopamine and serotonin) (Fuente-Fernandez, Schulzer, & Stoessl, 2002; Fuente-Fernandez & Stoessl, 2002; Sher, 2003) and facilitate positive CAM effects or subjective feelings of well-being and relaxation. Moreover, they own a stress-antagonizing capacity – like CAM (Esch, et al., 2003; Stefano, et al., 2003; Benson, 1984; de la Torre & Stefano, 2000; Esch, 2003c; Esch, 2003b; Salamon, et al., 2003; Spintge, 1985; Steelman, 1990; Knight & Rickard PhD, 2001; Fricchione, Mendoza, & Stefano, 1994; Moyer, Rounds, & Hannum, 2004; Diego, Field, Sanders, & Hernandez-Reif, 2004; Walach, Guthlin, & Konig, 2003; Lund, et al., 2002; Piotrowski et al., 2003; Woods & Dimond, 2002; Wikstrom, Gunnarsson, & Nordin, 2003; Yun, et al., 2002; Lim, Ryu, Kim, Hong, & Park, 2003). The relief of stress or detrimental effects related to stress, i.e., stress-associated diseases, may be due to the CAM-connected reduction of norepinephrine reactivity/turnover or a decreased autonomic nervous system hyperresponsiveness (e.g., see (Esch, et al., 2003; Esch, 2003b; Woods, et al., 2002; Yun, et al., 2002)). This ability has been demonstrated for various CAM therapies (Esch et al., 2003; Hoffman et al., 1982). However, many of the CAM effects occur almost instantaneously. Hence, constitutive nitric oxide, endocannabinoid and morphinergic auto regulation represent rather fast acting signaling pathways ideally suited for this role (Stefano, et al., 2003; Esch, Stefano, Fricchione, & Benson, 2002a).

Subjective and objective mechanisms may be associated with various CAM approaches. For example, a recent study on acupuncture working with anesthetized volunteers, thereby avoiding subjective conscious cognition and interaction, showed a specific analgesic effect (Meissner et al., 2004). However, trust and belief in a therapy/therapist may activate naturally occurring self-healing capacities (self-care), especially when positive qualities like pleasurable sensations, touch, and attention, and feelings of well-being or protection are involved. These subjective qualities may be utilized by CAM therapies. The mind/body that wants to be

cared for and participates in his/her health care as a self and respected being, believing in a remedy or 'resonating' with a method and its unique sociocultural background, feeling in control and giving up resistance – clearly, CAM addresses individual, i.e., subjective, beneficial mind/body physiological pathways. Thus, personal history and former experiences (e.g., 'remembered wellness') as well as therapy expectations may play a role, although CAM is based on specific and non-specific components together, obviously. Every approach may make use of these two components that correspond with each other. This 'holistic' interpretation of CAM with a particular focus upon shared CNS functions and common brain-located innate healing capacities still has to be investigated further and may be critically questioned (Esch, et al., 2004).

Recent information suggests that endogenous morphinergic signaling should be part of this hypothesis as well (Stefano, et al., 2000; Esch, et al., 2004; Stefano, Zhu, Cadet, Salamon, & Mantione, 2004). Endogenous morphine, both biochemically and immunocytochemically, has been found in various neural tissues as well as in limbic structures (Cardinale, et al., 1987; Donnerer, Oka, Brossi, Rice, & Spector, 1986; Donnerer et al., 1987; Gintzler, Levy, & Spector, 1976; Kodaira & Spector, 1988; Kodaira, Listek, Jardine, Arimura, & Spector, 1989; Bianchi, Alessandrini, Guarna, & Tagliamonte, 1993; Bianchi, Guarna, & Tagliamonte, 1994; Guarna, Neri, Petrioli, & Bianchi, 1998; Stefano, et al., 2000; Zhu, et al., 2003; Spector, Munjal, & Schmidt, 2001) (Figure 2). Additionally, reports demonstrate the presence of morphine precursors in various mammalian tissues, including brain, suggesting that this chemical messenger can be made by animals (see (Zhu, et al., 2003). Furthermore, an opiate receptor subtype, designated μ_3 , has been cloned, which is opiate alkaloid selective and opioid peptide insensitive (Cadet, Mantione, & Stefano, 2003), strongly supporting the hypothesis of an endogenous morphinergic signaling system. The psychiatric implications of this system have been examined as well, including brain reward circuitry (Fricchione, et al., 1994). Thus, morphine, given its reported effects and those exerted via con-

stitutive nitric oxide stimulated nitric oxide release, may form the foundation of this common signaling among these complementary medical methodologies (Stefano, et al., 2000). Furthermore, morphine exerts immune, vascular, and neural down-regulating activities in the periphery, i.e., lowering blood pressure via nitric oxide (Stefano & Scharrer, 1994; Stefano et al., 1996). Opiate compounds are part of the reward system. Indeed, morphine may additionally represent signaling that allows one to make rational short cuts, since being rational may be too time consuming, i.e., emotional motivation (Stefano & Fricchione, 1995a). Taken together, endogenous morphinergic signaling would appear to be an important missing component in the literature linking the factors that make complementary medical therapies important.

In particular, multiple component expectation-induced placebo effects may involve morphinergic signaling, since a reduction of placebo effects by the opioid selective antagonist naloxone has been demonstrated (Wager, et al., 2004; Levine, Gordon, & Fields, 1978). In placebo experiments (Wager, et al., 2004) increased brain activity was found. This was determined by fMRI (functional magnetic resonance imaging) during the anticipation of pain relief in the midbrain in the vicinity of periaqueductal gray (PAG) matter,

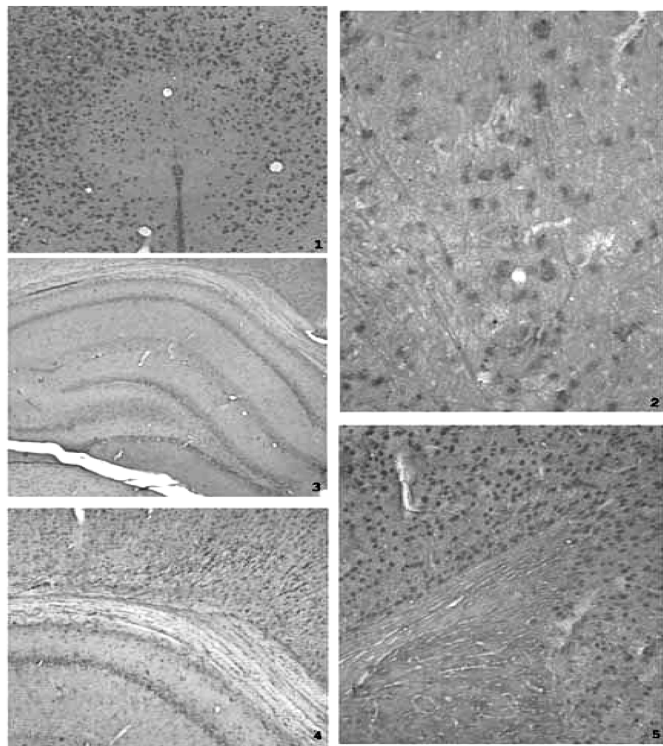


Figure 2. Immunohistochemistry localization of morphine-like immunoreactivity in rodent brainstem, hippocampal formation and cingulate cortex- Immunoreactive neurons are visible in rostral PAG (1), linear raphe (2), dorsal hippocampus (3) and cingulate cortex (4,5). The images in 1, 3 and 5 were obtained from coronal paraffin sections and immunostained with an alkaline phosphatase immunoenzymatic method. Peroxidase-antiperoxidase method was used in coronal vibratome sections for images 2 and 4. An affinity purified anti-morphine IgG which exhibited minimal cross-reactivity with codeine and other peptides, was used in this study. Taken from Esch, et al., 2004.

which contains high concentrations of opiate neurons involved in the descending pain inhibitory pathway. Neurons immunoreactive for morphine are largely present all along the extension of PAG and in brainstem raphe nuclei (Esch, et al., 2004), implicating morphinergic neural pathways in the placebo response. Importantly, this process also may be active in altering the experience of pain. The presence of endogenous morphine has been confirmed by gas chromatography coupled to mass spectrometry in the brainstem and cortex (Donnerer, et al., 1987). Moreover, the prefrontal cortex possesses close neural connections to limbic components such as the hippocampal formation and cingulate cortex where morphine immunoreactivity is largely present in neurons and fibers (Esch, et al., 2004; Spector, et al., 2001). These limbic areas play a major role in memory processes and also mediate motivational, affective and autonomic responses often accompanying pain. Additionally, endogenous morphine appears to modulate memory processes playing a role in weakening the memory of a nociceptive experience (Guarna, et al., 2004). Limbic areas also are connected to the prefrontal cortex, which integrates emotion, memory, belief, expectation, motivation and reward processing, i.e., affective and motivational responses (Stefano, et al., 2001; MacDonald, III, Cohen, Stenger, and Carter, 2000). Also, prefrontal mechanisms may trigger opiate release in the midbrain (Wager, et al., 2004). Taken together, prefrontal cortex activation in placebo as well as CAM treatments may reflect a form of – mainly – externally elicited top-down CNS control, possibly involving morphinergic autoregulatory pathways.

Conclusions

Common brain structures like frontal and limbic regions get activated in various CAM approaches, indicating a crucial role of affect and belief. Meditation therapies also possess a stress-reducing capacity that may be addressed in self-care-oriented medical procedures, some of them accepted for their low-cost (although effective) way of acting in the healing process given their down regulating properties. While medical knowledge and technical abilities are expanding, they still have to be affordable. CAM may help to solve this problem. However, knowledge about mechanisms involved in CAM, including meditation, is often fragmentary. This deficit has to be reduced before CAM becomes part of the regular and scientific medicine. Thus, the existence of subjective CNS phenomena and commonalities in CAM may emphasize the significance of naturally occurring health processes and general self-care capabilities. Trust and belief may increasingly become part of future therapeutic strategies and regular medicine (Slingsby, et al., 2001).

References

- Benson, H. (1975). *The relaxation response*. New York: William Morrow.
- Benson, H. (1984). *Beyond the relaxation response*. New York: Times Books.
- Benson, H., Alexander, S., and Feldman, C. L. (1975). Decreased premature ventricular contractions through use of the relaxation response in patients with stable ischemic heart-disease. *Lancet*, 2, 380-382.
- Benson, H., Beary, J. F., and Carol, M. P. (1974). The relaxation response. *Psychiatry*, 37, 37-45.
- Benson, H., Frankel, F. H., Apfel, R., Daniels, M. D., Schniewind, H. E., Nemiah, J. C. et al. (1978). Treatment of anxiety: A comparison of the usefulness of self-hypnosis and a meditational relaxation technique. *Psychotherapy and Psychosomatics*, 30, 229-242.

- Bianchi, E., Alessandrini, C., Guarna, M., and Tagliamonte, A. (1993). Endogenous codeine and morphine are stored in specific brain neurons. *Brain Research*, 627, 210-215.
- Bianchi, E., Guarna, M., and Tagliamonte, A. (1994). Immunocytochemical localization of endogenous codeine and morphine. *Advances in Neuroimmunology*, 4, 83-92.
- Cadet, P., Mantione, K. J., and Stefano, G. B. (2003). Molecular identification and functional expression of mu3, a novel alternatively spliced variant of the human mu opiate receptor gene. *Journal of Immunology*, 170, 5118-5123.
- Campbell, A. (1999). The limbic system and emotion in relation to acupuncture. *Acupuncture in Medicine*, 17, 124-128.
- Cardinale, G. J., Donnerer, J., Finck, A. D., Kantrowitz, J. D., Oka, K., and Spector, S. (1987). Morphine and codeine are endogenous components of human cerebrospinal fluid. *Life Sciences*, 40, 301-306.
- Caudill, M., Schnable, R., Zuttermeister, P., Benson, H., and Friedman, R. (1991). Decreased clinic use by chronic pain patients: Response to behavioral medicine interventions. *Clinical Journal of Pain*, 7, 305-310.
- Critchley, H. D., Melmed, R. N., Featherstone, E., Mathias, C. J., and Dolan, R. J. (2001). Brain activity during biofeedback relaxation: a functional neuroimaging investigation. *Brain*, 124, 1003-1012.
- Davidson, R. J. (2000). Affective style, psychopathology, and resilience: brain mechanisms and plasticity. *American Psychologist*, 55, 1196-1214.
- Davidson, R. J. and Irwin, W. (1999). The functional neuroanatomy of emotion and affective style. *Trends in Cognitive Science*, 3, 11-21.
- Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F. et al. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine*, 65, 564-570.
- de la Torre, J. C. and Stefano, G. B. (2000). Evidence that Alzheimer's disease is a microvascular disorder: The role of constitutive nitric oxide. *Brain Research Review*, 34, 119-136.
- Diego, M. A., Field, T., Sanders, C., and Hernandez-Reif, M. (2004). Massage therapy of moderate and light pressure and vibrator effects on EEG and heart rate. *International Journal of Neuroscience*, 114, 31-44.
- Donnerer, J., Cardinale, G., Coffey, J., Lisek, C. A., Jardine, I., and Spector, S. (1987). Chemical characterization and regulation of endogenous morphine and codeine in the rat. *Journal of Pharmacology and Experimental Therapeutics*, 242, 583-587.
- Donnerer, J., Oka, K., Brossi, A., Rice, K. C., and Spector, S. (1986). Presence and formation of codeine and morphine in the rat. *Proceedings of the National Academy of Sciences of the USA*, 83, 4566-4567.
- Elias, A. N. and Wilson, A. F. (1995). Serum hormonal concentrations following transcendental meditation—potential role of gamma aminobutyric acid. *Medical Hypotheses*, 44, 287-291.
- Esch, T. (2003a). Musical healing in mental disorders. In G.B.Stefano, S. R. Bernstein, and M. Kim (Eds.), *Musical healing*. Warsaw: Medical Science International.
- Esch, T. (2003b). [Music medicine: Music in association with harm and healing]. *Musikphysiologie Musiktherapeutik*, 10, 213-224.
- Esch, T. (2003c). [Stress, adaptation, and self-organization: balancing processes facilitate health and survival]. *Forschende Komplementärmedizin und klassische Naturheilkunde*, 10, 330-341.
- Esch, T., Fricchione, G. L., and Stefano, G. B. (2003). The therapeutic use of the relaxation response in stress-related diseases. *Medical Science Monitor*, 9, RA23-RA34.
- Esch, T., Guarna, M., Bianchi, E., Zhu, W., and Stefano, G. B. (2004). Commonalities in the central nervous system's involvement with complementary medical therapies: Limbic morphinergic processes. *Medical Science Monitor*, 10, MS6-MS17.
- Esch, T., Stefano, G. B., Fricchione, G. L., and Benson, H. (2002a). Stress-related diseases: A potential role for nitric oxide. *Medical Science Monitor*, 8, RA103-RA118.
- Esch, T., Stefano, G. B., Fricchione, G. L., and Benson, H. (2002b). The role of stress in neurodegenerative diseases and mental disorders. *Neuroendocrinology Letters*, 23, 199-208.
- Fricchione, G. L., Mendoza, A., and Stefano, G. B. (1994). Morphine and its psychiatric implications. *Advances in Neuroimmunology*, 4, 117-132.
- Fuente-Fernandez, R., Schulzer, M., and Stoessl, A. J. (2002). The placebo effect in neurological disorders. *Lancet. Neurology*, 1, 85-91.
- Fuente-Fernandez, R. and Stoessl, A. J. (2002). The placebo effect in Parkinson's disease. *Trends in Neurosciences*, 25, 302-306.
- Gintzler, A. R., Levy, A., and Spector, S. (1976). Antibodies as a means of isolating and characterizing biologically active substances: Presence of a non-peptide morphine-like compound in the central nervous system. *Proceedings of the National Academy of Sciences of the USA*, 73, 2132-2136.
- Goodale, I. L., Domar, A. D., and Benson, H. (1990). Alleviation of premenstrual syndrome symptoms with the relaxation response. *Obstetrics and Gynecology*, 75, 649-655.
- Guarna, M., Neri, C., Bartolini, A., Ghelardini, C., Galeotti, N., Noli, L. et al. (in press). Effects of endogenous morphine deprivation on memory retention of passive avoidance learning in mice. *Neuropsychopharmacology*.
- Guarna, M., Neri, C., Petrioli, F., and Bianchi, E. (1998). Potassium-induced release of endogenous morphine from rat brain slices. *Journal of Neurochemistry*, 70, 147-152.
- Hoffman, J. W., Benson, H., Arns, P. A., Stainbrook, G. L., Landsberg, G. L., Young, J. B. et al. (1982). Reduced sympathetic nervous system responsivity associated with the relaxation response. *Science*, 215, 190-192.
- Jacobs, G. D., Benson, H., and Friedman, R. (1996). Perceived benefits in a behavioral-medicine insomnia program: A clinical report. *American Journal of Medicine*, 100, 212-216.
- Jang, M. H., Shin, M. C., Kim, Y. P., Kim, E. H., and Kim, C. J. (2003). Effect of acupuncture on nitric oxide synthase expression in cerebral cortex of streptozotocin-induced diabetic rats. *Acupuncture and Electrotherapeutics Research*, 28, 1-10.
- Kaptchuk, T. J. (2002). Acupuncture: Theory, efficacy, and practice. *Annals of Internal Medicine*, 136, 374-383.
- Knight, W. E., and Rickard PhD, N. S. (2001). Relaxing music prevents stress-induced increases in subjective anxiety, systolic blood pressure, and heart rate in healthy males and females. *Journal of Music Therapy*, 38, 254-272.
- Kodaira, H., Listek, C. A., Jardine, I., Arimura, A., and Spector, S. (1989). Identification of the convulsant opiate thebaine in the mammalian brain. *Proceedings of the National Academy of Sciences of the USA*, 86, 716-719.
- Kodaira, H., and Spector, S. (1988). Transformation of thebaine to oripavine, codeine, and morphine by rat liver, kidney, and brain microsomes. *Proceedings of the National Academy of Sciences of the USA*, 85, 1267-1271.
- Lazar, S., Bush, G., Gollub, R., Fricchione, G. L., Khalsa, G., and Benson, H. (2000). Functional brain mapping of the relaxation response and meditation. *Neuroreport*, 11, 1585.
- Levine, J. D., Gordon, N. C., and Fields, H. L. (1978). The mechanism of placebo analgesia. *Lancet*, 2, 654-657.
- Lim, S., Ryu, Y. H., Kim, S. T., Hong, M. S., and Park, H. J. (2003). Acupuncture increases neuropeptide Y expression in hippocampus of maternally-separated rats. *Neuroscience Letter*, 343, 49-52.
- Lund, I., Yu, L. C., Uvnas-Moberg, K., Wang, J., Yu, C., Kurosawa, M. et al. (2002). Repeated massage-like stimulation induces long-term effects on nociception: contribution of oxytocinergic mechanisms. *The European Journal of Neuroscience*, 16, 330-338.
- Ma, S. X. (2003). Enhanced nitric oxide concentrations and expression of nitric oxide synthase in acupuncture points/meridians. *Journal of Alternative and Complementary Medicine*, 9, 207-215.
- MacDonald, A. W., III, Cohen, J. D., Stenger, V. A., and Carter, C. S. (2000). Dissociating the role of the dorsolateral prefrontal and anterior cingulate cortex in cognitive control. *Science*, 288, 1835-1838.
- Meissner, W., Weiss, T., Trippe, R. H., Hecht, H., Krapp, C., and Miltner, W. H. (2004). Acupuncture decreases somatosensory evoked potential amplitudes to noxious stimuli in anesthetized volunteers. *Anesthesia and Analgesia*, 98, 141-7, table.
- Moyer, C. A., Rounds, J., and Hannum, J. W. (2004). A meta-analysis of massage therapy research. *Psychological Bulletin*, 130, 3-18.
- Newberg, A., Alavi, A., Baime, M., Pourdehnad, M., Santanna, J., and d'Aquili, E. (2001). The measurement of regional cerebral blood flow during the complex cognitive task of meditation: a preliminary SPECT study. *Psychiatry Research*, 106, 113-122.

Newberg, A., Pourdehnad, M., Alavi, A., and d'Aquili, E. G. (2003). Cerebral blood flow during meditative prayer: Preliminary findings and methodological issues. *Perceptual and Motor Skills*, 97, 625-630.

Piotrowski, M. M., Paterson, C., Mitchinson, A., Kim, H. M., Kirsh, M., and Hinshaw, D. B. (2003). Massage as adjuvant therapy in the management of acute postoperative pain: A preliminary study in men. *Journal of the American College of Surgeons*, 197, 1037-1046.

Salamon, E., Kim, M., Beaulieu, J., and Stefano, G. B. (2003). Sound therapy induced relaxation: Down regulating stress processes and pathologies. *Medical Science Monitor*, 9, RA96-RA101.

Sher, L. (2003). The placebo effect on mood and behavior: possible role of opioid and dopamine modulation of the hypothalamic-pituitary-adrenal system. *Forschende Komplementärmedizin und klassische Naturheilkunde*, 10, 61-68.

Slingsby, B. T. and Stefano, G. B. (2000). Placebo: Harnessing the power within. *Modern Aspects of Immunobiology*, 1, 144-146.

Slingsby, B. T. and Stefano, G. B. (2001). The active ingredients in the sugar pill: Trust and belief. *Placebo*, 2, 33-38.

Spector, S., Munjal, I., and Schmidt, D. E. (2001). Endogenous morphine and codeine. Possible role as endogenous anticonvulsants. *Brain Research*, 915, 155-160.

Spintge, R. (1985). Some neuroendocrinological effects of so-called anxiolytic music. *International Journal of Neurology*, 19-20, 186-196.

Steelman, V. M. (1990). Intraoperative music therapy. Effects on anxiety, blood pressure. *AORN Journal*, 52, 1026-1034.

Stefano, G. B., Esch, T., Cadet, P., Zhu, W., Mantione, K., and Benson, H. (2003). Endocannabinoids as autoregulatory signaling molecules: coupling to nitric oxide and a possible association with the relaxation response. *Medical Science Monitor*, 9, RA63-RA75.

Stefano, G. B. and Frichione, G. L. (1995a). The biology of deception: Emotion and morphine. *Medical Hypotheses*, 49, 51-54.

Stefano, G. B. and Frichione, G. L. (1995b). The biology of deception: The evolution of cognitive coping as a denial-like process. *Medical Hypotheses*, 44, 311-314.

Stefano, G. B., Frichione, G. L., Slingsby, B. T., and Benson, H. (2001). The placebo effect and relaxation response: Neural processes and their coupling to constitutive nitric oxide. *Brain Research: Brain Research Reviews*, 35, 1-19.

Stefano, G. B., Goumon, Y., Casares, F., Cadet, P., Frichione, G. L., Rialas, C. et al. (2000). Endogenous morphine. *Trends in Neurosciences*, 9, 436-442.

Stefano, G. B. and Scharrer, B. (1994). Endogenous morphine and related opiates, a new class of chemical messengers. *Advances in Neuroimmunology*, 4, 57-68.

Stefano, G. B., Scharrer, B., Smith, E. M., Hughes, T. K., Magazine, H. I., Bilfinger, T. V. et al. (1996). Opioid and opiate immunoregulatory processes. *Critical Reviews in Immunology*, 16, 109-144.

Stefano, G. B., Zhu, W., Cadet, P., Salamon, E., and Mantione, K. J. (2004). Music alters constitutively expressed opiate and cytokine processes in listeners. *Medical Science Monitor*, 10, MS18-MS27.

Stuart, E., Caudill, M., Leserman, J., Dorrington, C., Friedman, R., and Benson, H. (1987). Nonpharmacologic treatment of hypertension: A multiple-risk-factor approach. *Journal of Cardiovascular Nursing*, 1, 1-14.

Travis, F., Tecce, J. J., and Guttman, J. (2000). Cortical plasticity, contingent negative variation, and transcendent experiences during practice of the Transcendental Meditation technique. *Biological Psychology*, 55, 41-55.

Wager, T. D., Rilling, J. K., Smith, E. E., Sokolik, A., Casey, K. L., Davidson, R. J. et al. (2004). Placebo-induced changes in FMRI in the anticipation and experience of pain. *Science*, 303, 1162-1167.

Walach, H., Guthlin, C., and Konig, M. (2003). Efficacy of massage therapy in chronic pain: a pragmatic randomized trial. *Journal of Alternative and Complementary Medicine*, 9, 837-846.

Continued on page 32

THE J&J APPLICATIONS ADVANTAGE!

In applications, too, the difference is in the design. We offer an application library and basic protocols.

•EVOLVING BASIC APPLICATION APPLICATION LIBRARIES



•**Neurofeedback**: Single-site Target-Inhibit. Dual site (2 EEG) multi-band coherence. Quad-site (4-site) concordance.

•**EMG Feedback**: Single site muscle relaxation, Dual site co-contraction inhibition. Four / eight site balance training.

•**Stress protocols** with your own photo libraries of stressors for desensitization, fear and/or anger management

•**Vagal Tone Resonant Frequency Stress Management** – HRV, and/or cardio-respiratory synchrony (RSA).

•**Special applications** – couples monitoring, pulse-transit times, hand rehab., Etc.

•**Never get out of date (free Web download upgrades).**

•**BASIC PROTOCOL-MAKER FEATURE**: We also offer you the opportunity of making your own protocols, a simplified self-programming feature. A protocol is a sequence of instructions or screens that can run in a sequence. (Or you can run a session manually, choosing which screens to display and recording and saving at will.)

•Every application of signals and screens comes with a basic protocol. For example you can select a simple Session Recording protocol that steps you through 3 events: (1) Setup no recording – (2) Record for 20 minutes – (3) End and Save. If you prefer, you can easily modify or build your own protocol sequences. By design, we maximize flexibility.

We have too many application to detail here. However let us describe general features in our most popular models.

THE J & J ADVANTAGE!

C2 + Box, Basic Sensors & Software
\$3195 Basic Starter Kit



I & J ENGINEERING

The Difference is in the Design

22797 Holgar Court NE
Poulsbo WA 98370

www.jjengineering.com mail@jjengineering.com
(888) 550 8300 M-F 9-12, 1-4 PST

GENERAL PROPERTIES

A/D conversion 16 bit (64,000 step resolution)
Input Impedance Greater than 100 DB
Common-mode Rejection 50/60 Hz & 100/120 Hz & 150/180 Hz
Triple Notch Filter 0.5 to 400 Hz
Maximum Bandpass 4000 Volts AC
Isolation, Optical 50 µAmphers maximum
Amplifier Failure Protection ±15,000 Volts
Static Discharge Protection 250 Ohms to 2 Mohms
Electrode Impedance Test
Power source Alkaline battery (4 x AA@C2+ / 1x 9-V@C2-GP+)
Battery life 75 cont. hours (approx)
USB properties USB 1.1 built into unit

EMG PROPERTIES:

EMG Bandpasses

100Hz to 400Hz (narrow). 10Hz to 400Hz (wide)

EEG PROPERTIES:

EEG Bandpass 1 to 64 Hz

ECG PROPERTIES:

Heart Rate Bandpass 1Hz to 400Hz
R Wave Filter & Detector Single Beat Update
Error correction Built-in missing beat detector
IBI or HR Output 40 to 200 beats/minute

TEMPERATURE SENSOR PROPERTIES:

Temperature Range 60° to 100°F (15° to 38°C)
Thermistor Sensitivity 1/100th of a degree F

SKIN CONDUCTANCE PROPERTIES:

Skin Conductance Range .5 to 200 µS (5K to 2000 KOhm)
Type Constant current (2 uAmps)

PHOTOPLYTHSMOGRAPH PROPERTIES:

Type Ambient-light correction
Receiver Circuit Pulse-driven self-correcting loop
Emitter wavelength Narrow-band LED infra-red

PULSE TRANSEIT TIME (PTT) PROPERTIES:

Special peak detector monitors delay between ECG R-peak and peripheral peak pulse.

RESPIRATION BAND PROPERTIES:

Type Magnetic belt sensor. Adjustable band
Range Linear distance range: 0 to 4" sensor-to-receiver

Factory Windows software upgrades and applications free at Web site.
Third-party software TBA.



Remote training for EEG Biofeedback overcomes concerns from clinicians

THE CASE FOR EEG BIOFEEDBACK REMOTE TRAINING

A major barrier to the spread of EEG Biofeedback beyond the clinic has been the lack of confidence that clinicians felt when sending equipment remotely with a client to their home, school, office, or other setting. Concerns regarding compliance, the proper use of the equipment, and the ability to monitor and report results have stood in the way of the growth of the field of remote biofeedback training.

Because of financial difficulty, geographic or other limitations, certain clients find themselves unable to continue office-based training. Denying neurofeedback to these clients on those bases is unethical. It is the industry's responsibility to seek other avenues to ensure the creation of a new model in which remote neurofeedback is as effective and well supervised remotely as it is in the clinic.

In remote training, the clinician remains the focal point of responsibility for the deployment, use, and supervision of neurofeedback equipment as he/she is in the clinic. The systems in effect must embody the spirit and intent of applicable laws and regulations, while providing cost-effective, simple, and efficacious feedback to a wide range of clients.

Effective, clinician-based remote neurofeedback training does not consist of merely sending home a clinical instrument, expecting the client — or member of the family — to become a 'mini-clinician.' Rather, there should be continuity of supervision and training. Systems should make it easy to define and deliver protocols, provide reporting and monitoring functions that use the Internet (where applicable) and leverage the clinician's time to the fullest extent of the client base.

The proliferation of EEG Biofeedback should be broad-based, yet maintain the highest possible standards of quality, safety, and adherence to applicable laws and regulations.

EEG Biofeedback should be served by a broad base of education, training, and supervision that empowers and protects clinicians and trainees alike.

EEG Biofeedback should be an agent for change; not an end in itself.

COACHING CLIENTS REMOTELY

Remote training allows the clinician to continue to coach clients while they are away from the clinic setting. It also allows a single clinician to coach multiple patients at any one time by using multiple modules (such as the BrainMaster™) and the Internet.

Clients begin their relationship with the clinician in the standard one-on-one sessions. By the time a client may be impacted by the demands of travel or the diminishing resources of money and time, the clinician will have worked with the client long enough to know that they are now able to handle sessions on the BrainMaster system without constant, direct supervision. Clients who meet those requirements are ready for Remote Training.

Each of these evaluated clients will be supplied by the clinician with a BrainMaster module to connect to their computer at home. The module comes with software and a protocol that the clinician designs specifically for each client. Per the clinician's instructions, each client works with the BrainMaster in the manner they did when they were coached one-on-one at the clinic.

When a client has completed a remote session, they may initiate a module (like the Session Librarian™) which sends, safely and securely via the Internet, the results of that session (including the raw EEG, if desired) to the clinician for observation, analysis, and recommendation at a time convenient to the clinician's daily schedule.

As the remote training branch of a clinician's practice matures, patients will continue to be supervised one-on-one at the clinic, with the clinician observing results and analyzing progress in real time. BrainMaster's 2.0 Clinical Pro Software makes it easy for a clinician to set up, apply, and review Remote Training sessions and client data.

And, at day's end, the clinician will also



download the results of his/her clients' remote training sessions for that day, analyze and record the data, respond to their progress, and then bill those clients for their services.

To further reach clients disenfranchised by finances, travel, or scheduling problems, some clinicians are creating walk-in clinics that can reach and help dozens of clients per day. The BrainMaster 2.0 Remote Systems insure clinician-selected protocol for easy, safe, and effective relaxation training.

For clinicians seeking alternative profit centers for their practice and who find insurance to be challenging — remote training may be the answer. When brainwave training is ordered for home, school or office, clients should feel peace of mind with the personal assurance of a private personal coach directing and motivating them towards achievement session by session.

This distinct change in training environment insists on direct payment from the client offering an income alternative for clinicians in insurance challenged regions yet affordability for clients in need of such service.

To ensure that all who *could* benefit from EEG Biofeedback get the opportunity to experience that benefit, it is incumbent on clinicians to employ new models to reach those ends.

Remote Training is such a model, empowering both clients and clinicians to achieve their mutual goals in the most ethical and efficacious manner possible.

For more information, please
contact us at:
BrainMaster Technologies, Inc.
24490 Broadway Avenue
Oakwood Village, OH
44146

440.232.6000

www.brainmaster.com
sales@brainmaster.com



SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH



Brain Mechanisms of Meditation

K. K. Deepak, MD, PhD, New Delhi, India¹

Abstract: The human brain is naturally equipped with certain mechanisms, which are capable of inducing meditation. A meditative effect appears due to reduction in brain output, decrement in sensory input and modification in the attentional behavior.

Non-analytical attending appears to be a major brain mechanism in induction and sustenance of meditation. In this article three mechanisms have been put together to generate a functional model of meditation vis-à-vis brain structures' involvement in the functional components.

In its earliest form in human history, meditation evolved as a religious process for the upliftment of self and attainment of a higher state of consciousness. For thousands of years it has been transferred from generation to generation (and from teacher to the pupil) in various forms among many religious sects. In ancient times in the East, education was intimately associated with religion. Basically, this religious education was for the attainment of the ultimate truth and its knowledge was rendered to the disciples in various Ashrams or Gurukuls (special schools situated away from the populace) where not only the children of the common masses but also of the royal families used to be educated and trained. The first and foremost aim was to address physical, mental and spiritual well-being for the overall development of the individual. Meditation happened to be one of the most important methods to modulate the mental faculty.

Meditation is not only a body of knowledge but a refined psychomotor skill which can be learned through practice and experience. The best way to transfer this skill to an inexperienced and novice disciple was by direct instruction from an experienced

instructor. However, only motivated and desirous aspirants of this highly skilled knowledge were successful in mastering this mental discipline. The essential process of meditation involves modifying the attentional process with the aim of achieving the highest possible degree of focused attention in a non-analytical manner.

With the increasing complexities of modern times, meditation — which previously was a tool used only to attend to spiritual health — has evolved as a tool for the relaxation of body and mind. It is a particularly effective way to minimize the stress and tension that comes with living in a highly competitive society. This has provided meditation an excellent opportunity for clinical application with almost all stress related disorders. In turn, this has led to the extensive research on quantifying the physiological responses to meditation and comparing it with related interventions for inducing relaxation, such as biofeedback.

The Physiological Response and Clinical Applications of Meditation

Human beings have a natural capacity to achieve a certain level of bodily relaxation. This innate capacity can be induced both passively and actively. This can be induced by oneself or otherwise. In the human brain there are certain neurons, which control human response to stress and fear. This manifests in terms of certain involuntary responses called autonomic responses. Under stress the body reacts with excessive arousal leading to heightened autonomic responses, namely, increased heart rate, raised blood pressure, increased respiration,

excessive sweating, depressed immune defense mechanisms etc. This is essentially a hyper-sympathetic response. Meditation can induce the so-called 'relaxation response' as suggested by Herbert Benson (1975), who proposed that the human body has the innate capacity to induce relaxation. Meditation induces an overall decrement in sympathetic response. In other words it reduces arousal. Various research studies support that it also reduces oxygen demand, blood pressure, heart rate, respiration, perspiration and improves the body's immune defense mechanisms. Thus, a variety of psychophysiological responses accompany the process of meditation. Therefore, meditation serves as an antidote to stress related disorders like headaches, hypertension, diabetes, gastrointestinal disorders, certain psychological disorders and immunological compromises.

The mechanisms of meditation, especially with reference to its induction and subsequent effects have always intrigued scientists and clinicians. There have been several attempts to explore these mechanisms of meditation and allied states of mind. The first point one should recognize is that there are clear differences between meditation and simple relaxation in terms of induction methods, brain activity, autonomic responses, psychic experiences and the end-stage of the process (Warenburg, et al., 1980; Deepak, 2002). The second point is that several other similar states and variants of meditation may induce different psychophysiological responses, qualitatively and quantitatively, and that the induction methods employed by various related interventions may be different. Although it is not possible to cover the mechanisms of all types of meditations in this article, the

physiological mechanisms of induction and a holistic model incorporating the relevant brain structures involved in the induction of meditation and its subsequent effects will be presented. Meditation may involve single or multiple methods of inducing the meditative state including a reduction in movements and thoughts (efferent attenuation; efferent from the Latin root meaning 'to bring out'), reduction of all incoming impulses namely light and sounds (sensory attenuation), and modification of thought processes and rearranging thought patterns and knowledge (cognitive restructuring). The following account describes the physiological effects of these three mechanisms.

The Mechanisms of Induction of Meditation

The first mechanism of induction is 'efferent attenuation' referring to the reduction of all types of outgoing brain activity. Through maintenance of a calm, motionless posture both physically and mentally, one may pass into a relaxation state which is a prelude to meditation. During motionless posture the brain manifests typical brain wave activity in the 12-16 Hz frequency band as has been reported by an eminent American scientist Serman (1977). However, meditation is more than simple motionless posture (simple relaxation) as it involves active relaxation through learned autosuggestion and relaxation of smooth musculature, thus, reducing autonomic effects to a greater degree (Warenburg, et al., 1980). Efferent attenuation operates on the output side of the control system, and it reduces activity and stress on the muscular system (skeletal-motor system). This mechanism is purely voluntary. It is noteworthy here that there are many changes in the brain which follow generalized muscle relaxation. Such reduction unloads the central brain structures and consequently produces the significant beneficial effects of relaxation and thereby can act as an antidote to any kind of stress-induced disease.

The second mechanism of induction of meditation involves sensory attenuation, or the cutting-off of all the possible incoming stimuli. Meditation practice usually requires the reduction of background stimulation of senses through the selection of a calm and quiet place for performing meditation. The

human mind by nature is hyperactive and the distraction of the surroundings adds further instability. However, after practice and expertise one can ultimately learn to meditate in any given surroundings, even with eyes open, suggesting that active suppression of incoming stimuli has been achieved. Sensory attenuation, whether active or passive, remains one of the important mechanisms of induction of meditation. The various types of meditation use various strategies to attain attenuation of sensory inputs like specialized postures (lotus posture etc.) and focusing vision on featureless stimuli (illuminated point by Sahaj yoga meditators, rock gardens by Zen meditators). In some cases masking effects on environmental noise can be achieved through the use of word repetition or production of certain prolonged sounds. These mechanisms work to inhibit the stimulatory effects of sensory input on the brain and as is the case for efferent attenuation, may individually result in elicitation of the relaxation response.

The third mechanism of meditation induction is based on active mental process without involvement of peripheral inputs or outputs. Most oriental meditative practices heavily depend on manipulation of thought processes (cognitive restructuring). Normally a single thought (depending upon degree of reward/punishment attached to it) is capable of inducing a chain of thought activity associated with feelings of sensation, overt/covert feelings, emotional elaboration, muscle tension and a series of autonomic responses. It has been observed that even a non-provoking stimulus can lead to certain degree of generalized muscle tensing. All these effects can be effectively controlled by calming down the thought process. The need of cognitive restructuring as a third mechanism of induction of meditation is explained by two facts. First, the combined effect of the first two mechanisms efferent attenuation and sensory attenuation is multiplicative. That is, the total effect is more than the sum of the two (Warenburg, et al., 1980). Secondly, the types of verbal instruction given to/followed by the subject undergoing meditation practice emphasize the modification of attention. The mental process adopted consists of non-analytical

attending to inner or external stimuli. This is a minimally provocative process and a powerful tool to induce the relaxation response. The differences between meditative concentration, mindful meditation (intake of thoughts with detached observations) and selective attention have been described elsewhere (Deepak, 2002).

The involvement of cognitive restructuring is further supported by its use in achieving the meditative state by practitioners of 'Tai Chi Chuan' (the moving meditation). In this form of meditation the subject meditates while continuously performing soft, smooth, effortless and natural movements.

Of these three mechanisms that are involved in induction of meditation, the last one (cognitive restructuring) appears to be the major mechanism in the induction of meditation. Put simply, this means that meditation is basically a form of attention that is voluntary, non-analytical and the attention follows logical and linear approach that avoids any attempts to analyze and interpret.

Brain Model of Meditation

Several physiological studies (Anand, et al., 1961; Wallace & Benson, 1972; Deepak, et al., 1994; Newberg et al., 2001) and several brain imaging studies (Lazer, et al., 2000; Lou et al., 1999) have provided sufficient literature to put forth a functional model to explain the phenomenon of meditation. The model essentially presents four functional units, each associated with specific brain circuitry as depicted in Figure 1. The number of structural units exceeds the number of functional units (Figure 2). In other words the structures present some overlap in their functioning.

According to this model the prefrontal cortex (the foremost and most advanced part of the higher brain) initiates a desire to start meditation. The prefrontal cortex further controls the process of attention and modifies it into a non-analytical one (functional unit 1, Figure 1). This structure is driven by the lower structures namely thalamus, pons and hippocampus that provide input from internal and external stimuli. Another large structure of the higher brain (posterior parietal cortices) helps in arresting the intruding thoughts. Thus, it pro-

vides an opportunity for the brain to be active within. The activity keeps on shifting from one area to another. Since the parietal cortex deals with body perception, this may result in altered awareness of body and heaviness in limbs (functional unit 2, Figure 1). Another pair of bilateral brain structures (superior temporal cortices) helps in the execution of functional unit 3 (Figure 1). This unit helps in the scanning of internal memory traces that are continuously presented to it in the face of a continuously decreasing barrage of external stimuli. This unit also helps in the genesis of a unique feeling of void and space and also in the perception of various sounds that have been reported in the literature. Since the temporal cortices are a storehouse for memories for emotions, there is a possibility that this is involved in autonomic elaboration of emotions that are seen sometimes in long-term meditators during meditation (functional unit 3, Figure 1). All the above-mentioned functional units require rhythm generators. The necessity of rhythm is important to allow these functional units to execute their functions in a waxing and waning manner. Indeed, the induction of meditation is rhythmic in nature. The two structures of the lower brain (thalamus and pons) have a capacity to generate driving rhythms. These rhythms drive the aforesaid higher brain structures (Figure 2). Fortunately, these two structures also have the capacity to control the incoming external stimuli. Figure 2 provides a description of incoming stimuli, the functional relationship of central brain structures and the characteristics of the output of these structures involved in the process of meditation

Conclusion

Clearly, meditation has a neural basis and through a component analysis we have dissected what is a holistic experience into its functional units. These functional units do have neural substrates. The brain model of meditation described here is simple and comprehensive. Although based on a reductionistic analysis, it is capable of

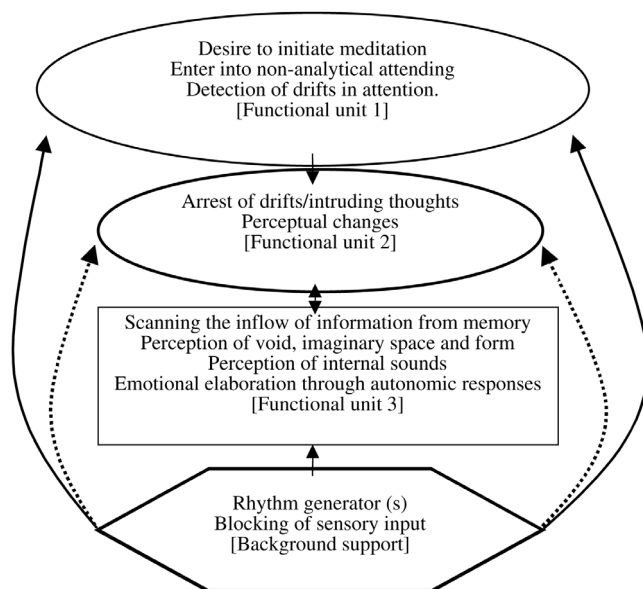


Figure 1. The functional model of brain functioning in the induction and sustenance of meditation. For details please refer to the text.

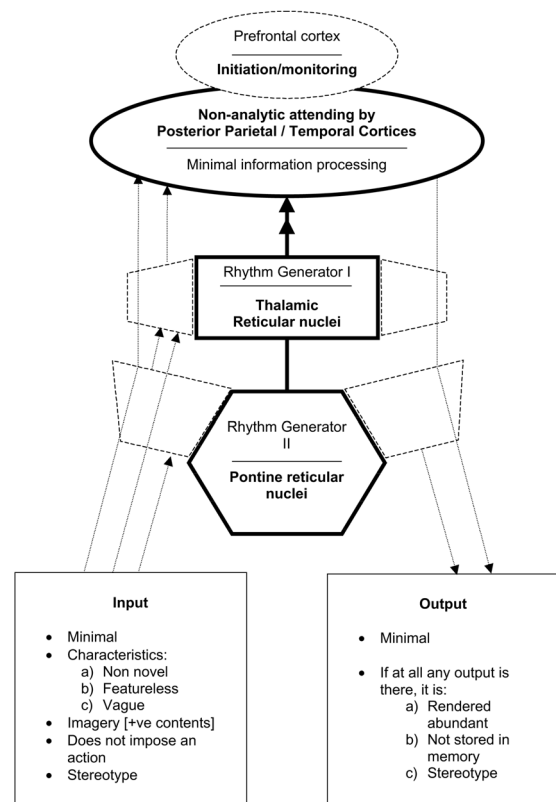


Figure 2. Characteristics of input and output, and neural structures involved in processing them during initial and sustained stage of meditation. The thin arrows represent the input / output pathways along which the activity is minimized. The dashed lined boxes are involved in initiation of meditation. The thick lined boxes contain core structures involved in maintaining sustained meditative state. The thick lined arrows indicate the pathways along which idling rhythm is generated during sustained meditation. There are several other structures involved during initial phase (pre-meditation or inductive phase) and others, which are spontaneously active during sustained stage. Compare this model with functional units given in Fig 1. (Courtesy : editor, Indian Journal Physiology and Pharmacology, Dept of Physiology, All India Institute of Medical Sciences, New Delhi 110029, India).

accounting for the holistic experience of meditation and its effects. The model is not only useful for explaining the brain mechanisms underlying the basic psychophysiology of meditation, but may also be useful for the understanding for various brain disorders and drug-induced meditation-like experiences.

References

- Anand, B.K., Chhina, G.S., and Singh, B. (1961). Some aspects of electroencephalographic studies in yogis. *Electroencephalography and Clinical Neurophysiology*, 13, 452-456.
- Benson, H. (1975). *The relaxation response*. New York: Avon Books, pp. 159-161.
- Deepak, K.K. (2002). Neurophysiological mechanism of induction of meditation: a hypothetico-deductive approach. *Indian Journal of Physiology and Pharmacology*, 46, 136-158.

Continued on page 36

awaken the power of your mind!

The Best in Audio-Visual Entrainment

The DAVID PAL

The DAVID PAL is an affordable, effective, non-drug approach to reduce the symptoms of stress, anxiety, depression, chronic pain, insomnia, fibromyalgia, ADD/ADHD, SAD, CFS and hypertension. Small enough to fit in your shirt pocket, this DAVID is the one for those who want convenience and an easy to use machine. Dim. 2.5" x 3.5"

\$240.00 US



PRODUCTS

- DAVID Paradise XL+, XL, TC and DAVID PAL
- EDA Bioscan & ABT Bioscan
- OASIS – CES
- NEW XL EDITOR CD
- Books on brainwave entrainment and brain function
- NEW Protocol Book
- Special Applications
- CDs & Cassettes
- Freeze-Framer – HRV Monitor
- ThinkFAST! Software
- Accessories
- Training Video
- In-House Training
- and so much more!

Mind Alive Inc.

info@mindalive.com

www.mindalive.com

1-800-661-MIND

(in USA & Canada only)

The DAVID Paradise XL

The DAVID Paradise XL™ is the choice of professionals in the field of neurofeedback (NF), biofeedback and psychology. AVE has been shown to restore neuronal regulation and is effective as an adjunct to NF. TOVA results show AVE outperformed six leading NF (ADD) studies. AVE research is available. Dimensions: 3.5" x 6"

\$460.00 US



Biofeedback and Behavioral Health Practitioners Guild

The Northeastern Regional Biofeedback Society and the Biofeedback and Behavioral Health Practitioners Guild is pleased to co-sponsor three Regional Conferences this year.

Save these dates!

October 16-17, New England

With AAPB and the Biofeedback Society of New England. Featuring Lynda & Michael Thompson.

January 15-16, New Jersey

With AAPB and Rutgers University (presenters tba).

May 5, Westchester NY

With American Biotec (presenters tba).

For more information please visit
our website at
www.nrbs.org
or call (516) 825-6567

Meditation and Limbic Processes

Continued from page 27

Wallace, R. K., Benson, H., and Wilson, A. F. (1971). A wakeful hypometabolic physiologic state. *American Journal of Physiology*, 221, 795-799.

Wikstrom, S., Gunnarsson, T., and Nordin, C. (2003). Tactile stimulus and neurohormonal response: a pilot study. *The International Journal of Neuroscience*, 113, 787-793.

Woods, D. L., and Dimond, M. (2002). The effect of therapeutic touch on agitated behavior and cortisol in persons with Alzheimer's disease. *Biological Research in Nursing*, 4, 104-114.

Yang, R., Huang, Z. N., and Cheng, J. S. (2000). Anticonvulsion effect of acupuncture might be related to the decrease of neuronal and inducible nitric oxide synthases. *Acupuncture and Electrotherapeutics Research*, 25, 137-143.

Yun, S. J., Park, H. J., Yeom, M. J., Hahm, D. H., Lee, H. J., and Lee, E. H. (2002). Effect of electroacupuncture on the stress-induced changes in brain-derived neurotrophic factor expression in rat hippocampus. *Neuroscience Letters*, 318, 85-88.

Zhu, W., Ma, Y., Cadet, P., Yu, D., Bilfinger, T. V., Bianchi, E. et al. (2003). Presence of reticuline in rat brain: A pathway for morphine biosynthesis. *Brain Research: Molecular Brain Research*, 117, 83-90.

Note

¹Corresponding author: George B. Stefano, PhD, Neuroscience Research Institute, State University of New York College at Old Westbury, P.O. Box 210, Old Westbury, New York, 11568, USA. Phone: 516-876-2732; Fax: 516-876-2727; E-mail: gstefano@sun-ynri.org

SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH



Relationship between Meditation Practice and Transcendent States of Consciousness

Frederick Travis, PhD, Fairfield, IA

Abstract: Research demonstrates that transcendental experiences during meditation practice are characterized by distinct subjective and objective patterns. Subjectively, the framework for understanding waking experience—time, space, and body sense—is absent during transcendental experiences. Physiologically, breath patterns, autonomic patterns, EEG patterns, and patterns of cerebral metabolic rate distinguish transcendental experiences from eyes-closed rest. Transcendental experiences give a broader perspective of life. They foster the development of an inner anchor of self-awareness that allows anyone to better deal with high stress and demanding situations. Developing one's sense of self is the basis for recovery from mental instability, substance abuse, addictions and criminal behavior.

...our normal waking consciousness, rational consciousness as we call it, is but one special type of consciousness, whilst all about it, parted from it by the flimsiest of screens, there lie potential forms of consciousness entirely different. We may go through life without suspecting their existence....No account of the universe in its totality can be final that leaves these other forms of consciousness quite disregarded. (James, 1962) pg. 305)

What are these 'potential forms of consciousness' that are entirely different than normal waking consciousness? Chalmers has helped answer this question by categorizing questions about consciousness into easy and hard questions (Chalmers, 1995). The "easy" questions ask how we discriminate, categorize, and react to environmental stimuli, how we report mental states, and

how we deliberately control behavior.

The "hard" questions are: What is the nature of inner experience? The hard questions cannot be investigated in the same way that we investigate objects in the world or observable behavior.

The objective western research tradition has yielded a highly developed understanding of matter. It has penetrated to the non-material quantum mechanical basis of matter and its interactions (Davies, 2001). Yet, our Western scientific tradition is still in its infancy in researching inner subjectivity. It still asks superficial questions about cortical and cognitive mechanisms of experience rather than probing deep into the nature of consciousness underlying cortical and cognitive processing.

In contrast, the subjective traditions of the East—the Vedic tradition of India (Maharishi, 1969), and the Buddhist traditions of China (Chung-Yuan, 1969) and Japan (Reps, 1955)—include systematic meditation techniques predicted to lead to the state of "consciousness itself" without particular content in consciousness. For instance, the Maitri Upanishad 6:19 states:

When a wise man has withdrawn his mind from all things without, and when his spirit of life has peacefully left inner sensations, let him rest in peace, free from the movements of will and desire. . . . Let the spirit of life surrender itself into what is called turya, the fourth condition of consciousness. For it has been said: There is something beyond our mind that abides in silence within our mind. It is the supreme mystery beyond thought. Let one's mind...rest upon that and not rest

on anything else. (Prabhavananda, et al., 2002)

This article explores the subjective and objective correlates of this 'fourth condition of consciousness.' It ends with a consideration of the practical benefits of contact with 'the fourth.'

Distinction between Meditation and Simple Eyes-Closed Relaxation

Modern science is beginning to investigate the reality of inner meditation experiences, and particularly transcendental experiences during meditation practice. The distinction between eyes-closed rest and meditation practice is the subject of debate. For instance, in 1984 Holmes reviewed the meditation literature and reported no differences in heart rate (16 studies), respiration rate (8 studies), electrodermal activity (13 studies), or blood pressure levels (4 studies) during simple eyes-closed rest compared to meditation practice (Holmes, 1984).

Holmes, however, looked at many systems of meditation. Research is emerging suggesting that all meditation techniques are not the same (Orme-Johnson, et al., 1998). Different meditation practices have different steps of practice and different effects (Jin, 1992; Kabat-Zinn, et al., 1992; Travis, et al., 2004). For instance, Qigong involves moving "Qi" to different parts of the body by attending to an area of the physiology while controlling inhalation and exhalation (Lim, et al., 1993); Vipassana or mindfulness-meditation involves attention

on the breath during eyes-closed meditation, and on the dispassionate, non-manipulative observation of ongoing perceptual, bodily and/or mental states during eyes open tasks (Buchheld, et al., 2001); Yoga Nidra meditation involves visualization of various mental and bodily states (Lou, et al., 1999; Lazar, et al., 2000); and the Transcendental Meditation technique involves transcending—an effortless process of experiencing more subtle levels of perception, thoughts and feelings (Travis, 2001), which culminates in the experience of pure, self-referral consciousness; awareness without mental content, referred to as “pure consciousness” (Maharishi, 1969). Since meditation practices are different, mixing together results of studies using different meditations together in one analysis, as Holmes did, would mix different subjective and physiological effects and so confound valid comparisons between eyes-closed rest and meditation practice.

A meta-analysis by Dillbeck and Orme-Johnson (Dillbeck, et al., 1987) focused on studies solely comparing Transcendental Meditation practice to eyes-closed rest. In addition, they transformed group differences into “effect sizes” (Cohen, 1988), and conducted statistics on these effect sizes (Glass, et al., 1981). This quantitative meta-analytic approach is a more rigorous, reliable method of drawing conclusions from many studies than is the qualitative “roll-call” system of meta-analysis used by Holmes (Hunter, et al., 1990).

Dillbeck and Orme-Johnson found that Transcendental Meditation sessions were distinguished from eyes-closed rest by significantly lower breath rates (22 studies), plasma lactate levels (9 studies), and skin conductance levels (20 studies) (Dillbeck, et al., 1987).

The distinction between eyes-closed rest and Transcendental Meditation practice has also recently been tested with a random-assignment within-subjects design that allows for strong cause-effect inferences to be made (Travis, et al., 1999). This study supported the assertion that Transcendental Meditation practice differs from eyes-closed rest. It also revealed a new finding. Differences between eyes-closed rest and Transcendental Meditation practice were *seen in the first minute*, and continued

throughout the session. In the first minute of Transcendental Meditation practice, breath rate was lower, skin conductance levels—a marker of sympathetic tone—was lower, high frequency heart rate variability—a marker of parasympathetic tone—was higher, and frontal alpha EEG coherence was higher. In addition, the levels of these four physiological measures in the first minute of Transcendental Meditation practice did not significantly differ from those measured at 5 or 10 minutes.

These studies lend strong support to the assertion that Transcendental Meditation practice differs from eyes-closed rest. Since all meditations are not the same in practice or results, similar comparative studies need to be conducted with other meditation practices as well. For example, differences between meditation practice and eyes-closed rest are also reported in neuroimaging studies. One example is Newberg’s work demonstrating that Tibetan Buddhism (Newberg, et al., 2001) and Christian prayer (Newberg, et al., 2003) differ from eyes-closed rest by higher frontal and lower parietal cerebral metabolic rate during the practice.

Content Analysis of Transcendental Experiences

To identify common themes of transcendental experiences, individuals’ descriptions of that experience can be analyzed. A content analysis of 64 descriptions of transcendental experiences during Transcendental Meditation practice yielded three common themes: “unboundedness,” “silence,” and “the absence of time, space and body sense” (Travis, et al., 2000). Sense of time, space, and body sense are characteristics that contribute to the framework for understanding waking experience and specific qualities (color, shape, size, movement, etc.) are its content. During transcendental experiences, both the fundamental framework and the content of waking experience are reported to be absent.

These findings suggest that transcendental experiences are not “altered” states of waking. Rather, they reflect a state fundamentally different from waking—all the customary qualities and characteristics of waking experience are not part of transcendental experiences.

Individuals’ descriptions gave insight into the nature of transcendental experiences (cited from Travis, et al., 2000):

During meditation, my thoughts become less and less concrete, less and less absorbing, and often my mind becomes completely free of the grip of thinking and planning—then I am. It is not an experience; there is nothing I can report about this state. I am completely full, vibrant, and alive; but I am completely still. It’s absolute silence.

A second individual echoes the difficulty of describing this inner experience with concepts used to describe ordinary waking experiences:

Actually, it’s not that I experience ‘Oh, how great this is!’, but it’s an inner peace that is very, very nourishing. It’s a feeling of freedom, of no restraints. In this state boundaries do not exist. Time has no meaning. Space has no meaning. I feel right at home. It is normal functioning. Everything seems right.

Physiological Patterns during Transcendental Experiences

Various physiological markers have been reported during transcendental experiences in subjects practicing different meditation techniques. For instance, during practice of Tibetan Buddhism, experiences characterized by the “loss of the usual sense of space and time” were associated with increased frontal regional cerebral blood flow, and significant correlation between left dorsolateral frontal blood flow increases and left parietal blood flow decreases (Newberg, et al., 2001). During practice of Diamond Way Buddhism, experiences of the “dissolution of the self into a boundless emptiness” were associated with right fronto-temporal 40-Hz amplitude increases (Lehmann, et al., 2001). During Transcendental Meditation practice, experiences of “unboundedness” and the “loss of time, space and body sense” were associated with (1) spontaneous breath quiescence (breath periods from 10-40 sec) (Farrow, et al., 1982; Badawi, et al., 1984; Travis, et al., 1997), (2) autonomic orienting at the onset of breath changes (Travis, et al., 1997), (3) increase in frequency of peak power in the alpha band (Badawi, et al., 1984; Travis, et al., 1997), and (4) continued high EEG coherence, which rose to high levels in the first minute of meditation

practice (Travis, et al., 1997; Travis, et al., 1999).

There is a great design-challenge inherent in this research: How can one reliably mark the onset of transcendental experiences? Some researchers have used *subject-initiated signals* — the meditator pulls a string (Newberg, et al., 2001), or presses a button (Farrow, et al., 1982) to mark the occurrence of transcendental experiences during meditation. Other researchers have used *experimenter-initiated signals*, such as a bell ring after key physiological markers are seen (e.g. spontaneous breath quiescence). After the meditation practice, subjects were asked to classify different bell rings (maximum of three) into different experience-categories. One of the bell-rings was after a transcendental experience (Travis, et al., 1997).

The design-challenge here is obvious. When a meditator can signal, he/she would no longer be having an experience that is beyond time and space. To signal, you must be *in* time and space. Despite these major design problems, repeatable patterns in breath, autonomic markers and EEG coherence are reported during transcendental experiences.

Clinical Benefits of Transcendental Experiences

The clinical benefits of transcendental experiences arise from the psychological fact that we do not respond to events themselves, but to our perception of those events (James, 1962; Biederman, 1985). Regular transcendental experiences change our perception of who we are, and so naturally give a different perspective to all experiences (Travis, et al., 2004). This has led to measurable benefits of Transcendental Meditation practice for a variety of clinical populations. O'Connell and Alexander in their book *Self-Recovery* report successful application of the Transcendental Meditation technique to improve the condition of alcoholics, smokers, substance abusers, addicts, dysfunctional families, and high-security prisoners (O'Connell, et al., 1994). Meta-analyses, which pool results from many studies, report that Transcendental Meditation practice compared to other meditation practices results

in (1) greater reductions in anxiety (Eppley, et al., 1989) (144 studies), (2) greater reductions in hypertension (Eisenberg, et al., 1993) (26 studies), (3) greater reductions in the use of alcohol and tobacco (Alexander, et al., 1994) (N=198 studies), (4) greater increases in self-concept (Orme-Johnson, et al., 1998) (51 studies), and (5) greater increases in self-actualization (Alexander, et al., 1991) (42 studies). In addition, the Transcendental Meditation technique has been used successfully in prison settings, resulting in a 40% decrease in recidivism (Rainforth, et al., in press).

The clinical benefits of transcendental experiences can be understood in terms of a movie-metaphor. When watching a movie, most individuals are "lost" in the movie. The movie is real. Your emotions and thoughts are dictated by the ever-changing sequence of the film. Your sense of well-being is constantly shadowed by traffic jams on the freeway, angry outbursts from a friend or family, insensitive remarks by co-workers, and inadvertent mistakes that you or others make. This leads to high mental and physical stress levels resulting in high anxiety, depression, low self-esteem, and stress-related diseases. Although you try to deal with your feelings, which are real, there is a tendency to misattribute the source of these feelings solely to the external circumstances while being relatively unaware of the role of your subjective perception and interpretation of these circumstances.

Repeated transcendental experiences alter this common "movie-going experience". Subjectively, you begin to "wake up" to your inner status. Although continuing to enjoy the movie, you gradually become aware that you exist independent from the movie. You experience a value of 'witnessing' the activity around you (Travis, et al., 2004). Then, the ever-changing movie-frames are a secondary part of experience because those frames are always changing. The most salient part of every experience is your inner expanded self-awareness. What is 'real' shifts from the movie to your self, from outer to inner. As your sense-of-self changes, so your perspective on the problems and challenges you face change. You see them as temporary challenges rather than overwhelming odds. This shift in perspective from outer to inner could be a new

basis for recovery from addiction and mental instability (O'Connell, et al., 1994).

Conclusion

Distinct subjective and objective markers characterize transcendental experiences. Subjectively the framework for understanding waking experience— time, space, and body sense— is absent during transcendental states. Physiologically, breath patterns, autonomic patterns, EEG patterns, and patterns of cerebral metabolic rate distinguish transcendental experiences from eyes-closed rest. Meditative experiences offer a new angle to help clinical populations. Working from the "inside" one gains a broader perspective on life and thus is better able to deal with high stress and demanding situations more effectively. This growth of sense-of-self through meditative practice may be the mechanism for its effectiveness in addressing a wide range of clinical problems.

References

- Alexander, C., P., R., & Rainforth, M. (1994). Treating and preventing alcohol, nicotine, and drug abuse through Transcendental Meditation: A review and statistical meta-analysis. *Alcohol Treatment Quarterly*, 11, 13-87.
- Alexander, C., Rainforth, M., & Gelderloos, P. (1991). Transcendental Meditation, self-actualization, and psychological health: A conceptual overview and statistical meta-analysis. *Journal of Social Behavior and Personality*, 5, 189-247.
- Badawi, K., Wallace, R.K., Orme-Johnson, D., & Rouzere, A.M. (1984). Electrophysiologic characteristics of respiratory suspension periods occurring during the practice of the Transcendental Meditation Program. *Psychosomatic medicine*, 46(3), 267-76.
- Biederman, L. (1985). Human image understanding: Recent research and a theory. *Computer Vision, Graphics, and Image Processing*, 32, 29-73.
- Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring mindfulness in insight Meditation (Vipassana) and Meditation-Based Psychotherapy. *Journal for Meditation and Meditation Research*, 1(1), 10-33.
- Chalmers, D.J. (1995). The puzzle of conscious experience. *Scientific American*, 107, 80-86.
- Chung-Yuan, C. (1969). *Original teachings of Chan Buddhism*. New York: Vintage Books.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, New Jersey: Hove and London.
- Davies, P.C. (2001). Quantum vacuum noise in physics and cosmology. *Chaos*, 11(3), 539-547.
- Dillbeck, M.C., & Orme-Johnson, D.W. (1987). Physiological differences between Transcendental Meditation and rest. *American Psychologist*, 42, 879-881.

Eisenberg, D.M., Delbanco, T.L. and Berkey, C.S. (1993). Cognitive behavioral techniques for hypertension: Are they effective? *Annual Journal of Internal Medicine*, 118, 964-972.

Eppley, K.R., Abrams, A.I. and Shear, J. (1989). Differential effects of relaxation techniques on trait anxiety: A meta-analysis. *Journal of Clinical Psychology*, 45(6), 957-974.

Farrow, J.T., & Hebert, J.R. (1982). Breath suspension during the transcendental meditation technique. *Psychosomatic medicine*, 44(2), 133-53.

Glass, G.V., McGaw, B., & Smith, M.L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: Sage.

Holmes, D.S. (1984). Meditation and somatic arousal reduction. A review of the experimental evidence. *The American Psychologist*, 39(1), 1-10.

Hunter, J.E. and Schmidt, S.L. (1990). *Methods of meta analysis: Correcting error and bias in research findings*. Beverly Hills, CA: Sage.

James, W. (1962). *Psychology: Briefer course*. New York: Collier Books.

Jin, P., & Department of Psychology, L.T.U.B.V.A. (1992). Efficacy of Tai Chi, brisk walking, meditation, and reading in reducing mental and emotional stress. *Journal of Psychosomatic Research*, 36(4), 361-70.

Kabat-Zinn, J., Massion, A.O., Kristeller, J., Peterson, L.G., Fletcher, K.E., Pbert, L., Lenderking, W.R., & Santorelli, S.F. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *The American Journal of Psychiatry*, 149(7), 936-43.

Lazar, S.W., Bush, G., Gollub, R.L., Fricchione, G.L., Khalsa, G., & Benson, H. (2000). Functional brain mapping of the relaxation response and meditation. *Neuroreport*, 11(7), 1581-5.

Lehmann, D., Faber, P.L., Achermann, P., Jeanmonod, D., Gianotti, L.R., & Pizzagalli, D. (2001). Brain sources of EEG gamma frequency during volitionally meditation-induced, altered states of consciousness, and experience of the self. *Psychiatry Research*, 108(2), 111-21.

Lim, Y.A., Boone, T., Flarity, J. and Thompson, W. (1993). Effects of Qigong on Cardiorespiratory Changes. *The American Journal of Chinese Medicine*, 21, 1-6.

Lou, H.C., Kjaer, T.W., Friberg, L., Wildschiodtz, G., Holm, S. and Nowak, M. (1999). A 15O-H₂O PET study of meditation and the resting state of normal consciousness. *Human Brain Mapping*, 7(2), 98-105.

Maharishi (1969). *Maharishi Mahesh Yogi on the Bhagavad Gita*. New York: Penguin.

Newberg, A., Alavi, A., Baime, M., Pourdehnad, M., Santanna, J., & d'Aquili, E. (2001). The measurement of regional cerebral blood flow during the complex cognitive task of meditation: a preliminary SPECT study. *Psychiatry Research*, 106(2), 113-22.

Newberg, A., & Iversen, J. (2003). The neural basis of the complex mental task of meditation: Neurotransmitter and neurochemical considerations. *Medical Hypotheses*, 61, 282-291.

O'Connell, D., & Alexander, C.N. (1994). *Self-recovery*. Binghamton, N.Y.: Harrington Park Press.

Orme-Johnson, D.W., & Walton, K.G. (1998). All approaches to preventing or reversing effects of stress are not the same. *American Journal of Health Promotion*, 12(5), 297-9.

Prabhavananda, S., & Manchester, F., Eds. (2002). *The Upanishads: Breath of the eternal*. New York: Signet.

Rainforth, M., Bleick, C., & Alexander, C.N. (in press). A 13-year follow-up on recidivism rates of Folsom prison inmates who practiced the Transcendental Meditation program. *Journal of Offender Rehabilitation*.

Reps, P. (1955). *Zen flesh, Zen bones*. New York: Doubleday Anchor.

Travis, F. (2001). Autonomic and EEG patterns distinguish transcending from other experiences during Transcendental Meditation practice. *International Journal of Psychophysiology*, 42(1), 1-9.

Travis, F., Arenander, A., & DuBois, D. (2004). Psychological and physiological characteristics of a proposed object-referral/self-referral continuum of self-awareness. *Consciousness and Cognition*, 13, 401-420.

Travis, F., & Pearson, C. (2000). Pure consciousness: distinct phenomenological and physiological correlates of "consciousness itself". *The International Journal of Neuroscience*, 100, 77-89.

Travis, F., & Wallace, R.K. (1997). Autonomic patterns during respiratory suspensions: possible markers of Transcendental Consciousness. *Psychophysiology*, 34(1), 39-46.

Travis, F. and Wallace, R.K. (1999). Autonomic and EEG patterns during eyes-closed rest and transcendental meditation (TM) practice: the basis for a neural model of TM practice. *Consciousness and Cognition*, 8(3), 302-18.

Note

Corresponding author: fravis@mum.edu

Phone 641-472-7000 x. 3309,

Fax: 641-472-1123

Brain Mechanisms of Meditation

Continued from page 31

Deepak, K.K., Manchanda, S.K., and Maheshwari, M.C. (1994). Meditation improves clinicoencephalographic measures in drug-resistant epileptics. *Biofeedback and Self Regulation*, 19(1), 25-40.

Lazar, S.W., Bush, G., Gollub, R.L., Fricchione, G.L., Khalsa G., and Benson, H. (2000). Functional brain mapping of relaxation response and meditation. *Neuroreport*, 11(7), 1581-1585.

Lou, H.C., Kjaer, T.W., Friberg, L., Wildschiodtz, G., Holm, S., and Nowak, M. (1999). A 15O-H₂O PET study of meditation and resting state of normal consciousness. *Human Brain Mapping*, 7(2), 98-105.

Newberg, A., Alavi, A., Baime, M., Pourdehnad, M., Santanna, J., and d'Aquili, E.G. (2001). The measurement of regional cerebral blood flow during the complex cognitive task of meditation: a preliminary SPECT study. *Psychiatry Research*, 106(2), 113-122.

Sterman, M.B. (1977). Sensorimotor EEG operant conditioning: experimental and clinical effects. *Pavlovian Journal Biological Sciences*, 12, 63-92.

Travis, F., and Wallace, R.K. (1999). Autonomic and EEG patterns during eye-closed rest and transcendental meditation practice: The basis for a neural model of TM practice. *Consciousness and Cognition*, 4, 159-162.

Wallace, R.K. and Benson, H. (1972). The physiology of meditation. *Scientific American*, 226(2), 85-90.

Warrenburg, S., Oagano, R.R., Woods, M., and Hlastala M. (1980). A comparison of somatic relaxation and EEG activity in classical progressive relaxation and transcendental meditation. *Journal of Behavioral Medicine*, 3(1), 73-93.

Note

¹Address all correspondence to K. K. Deepak, MD, PhD, New Delhi, India at e-mail address: kkdeepak@hotmail.com

 **Thought
Technology Ltd.**

Free BioGraph Infiniti™ Workshops

We are offering FREE one day workshops on **"How to get the most out of your BioGraph Infiniti Software."** We will be holding these workshops across North America periodically.

Please visit our website
for more information.



Thought Technology Ltd.

Tel: (800) 361-3651 • 514-489-8251

Fax: 514-489-8255

<http://www.thoughttechnology.com>

SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH

Meditation and Transformation: The Role of Reperceivingⁱ

Shauna L. Shapiro, PhDⁱⁱ, Santa Clara, CA,
and John Astin,ⁱⁱⁱ San Francisco, CA

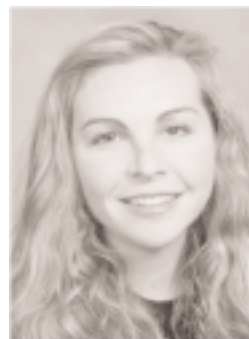
Abstract: The intention of this paper is to explore the questions: "What exactly is mindfulness? And, how does it work?" In attempt to define mindfulness, we suggest three essential components (axioms): (1) Intention, (2) Attention, and (3) Attitude (IAA). In attempt to explore how mindfulness works, a meta-mechanism of action, "reperceiving" is introduced. Reperceiving is a shift in perspective (making what was subject, object) which allows increasing capacity for objectivity about one's own internal experience. We suggest this shift in perspective underlies the transformational effects of mindfulness.

Recently, the psychological construct *mindfulness* has received a great deal of attention. Mindfulness has its roots in Eastern contemplative traditions and is most often associated with the formal practice of mindfulness meditation. In fact, mindfulness has been called "the heart" of Buddhist meditation (Kabat-Zinn, 2003; Thera, 1962). Mindfulness, however, is more than meditation, it is "inherently a state of consciousness" which involves consciously attending to one's moment to moment experience (Brown and Ryan, 2003). The meditation practice is simply a means to develop the state, or skill, of mindfulness. The intention of this paper is to refine the exploration of this particular state of mindfulness and to explore the questions: "What exactly is mindfulness? And, how does it work?"

Over the past 20 years the majority of research has focused on clinical intervention

studies to evaluate the efficacy of mindfulness-based interventions such as the Mindfulness Based Stress Reduction (MBSR) program. This line of research primarily addressed the first order question "Is mindfulness effective?" The studies led to promising data suggesting that mindfulness is an effective intervention for treatment of both psychological and physical symptoms (see Baer, 2003; Bishop, 2002). Clearly this line of research is fundamental to validating mindfulness as an efficacious psychological intervention, and controlled clinical trials across diverse populations should continue.

However, an equally important direction for future research is to address the second order question "How do mindfulness-based interventions actually work?" Investigating questions concerning the mechanisms of action underlying mindfulness-based interventions will require two different but complementary lines of exploration. The first approach involves dismantling studies to separate and compare the various active ingredients in mindfulness-based interventions such as social support, relaxation, and cognitive behavioral elements. The second approach involves examination of the central construct of *mindfulness* itself, to determine if the development of "mindfulness" is what actually leads to the positive changes that have been observed, rather than other common characteristics of mindfulness programs. This step can be facilitated through



Shauna L. Shapiro, PhD



John Astin

the recent development of two valid and reliable measures of mindfulness (see Brown and Ryan, 2003, Bishop, 2002). A testable theory of the *mechanisms* involved in the process of mindfulness itself is needed to explicate how mindfulness effects change and transformation. The aim of this paper is to propose a first draft of such a theory, focusing on mindfulness itself, as opposed to the whole package of MBSR and other mindfulness-based interventions.

We would like to emphasize that this is a beginning, a first attempt at understanding the mysterious and complex process of mindfulness. Further, it is "a" theory, not "the" theory – it is a search for common ground on which to build a more precise understanding of the primary mechanisms of action involved in mindfulness practices that have made their way into contemporary psychology and behavioral medicine. Our intention is to open a dialogue.

How does mindfulness work? We posit three components (axioms) of mindfulness: (1) Intention, (2) Attention, and (3) Attitude (IAA). We then introduce a meta-mechanism of action, "reperceiving" and discuss the significance of this shift in perspective in terms of the transformational effects of mindfulness.

A Model of Mindfulness

The Axioms. In an attempt to break mindfulness down into a simple, comprehensible construct, we reflected on the core components of the practice, the essential building blocks of mindfulness. An often cited definition of mindfulness — “paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994, p. 4) — embodies the three axioms of mindfulness:

1. “On purpose” = Intention,
2. “Paying attention” = Attention,
3. “In a particular way” = Attitude (mindfulness qualities)

Axioms are fundamental building blocks out of which other things emerge. We suggest that Intention, Attention and Attitude are the fundamental components of mindfulness. From an understanding of IAA we can deduce how mindfulness might work. Intention, Attention, and Attitude are not separate processes or stages—they are interwoven aspects of a single cyclic *process* and occur simultaneously (see Figure 1). Mindfulness *is* this moment to moment process.

Axiom I. Intention. When Western psychology attempted to extract the essence of mindfulness practice from its original religious/cultural roots, we lost, to some extent, the aspect of Intention, which for Buddhism was enlightenment and compassion for all beings. It seems valuable to explicitly bring this aspect back into our model. As Kabat-Zinn writes, “Your intentions set the stage for what is possible. They remind you from moment to moment of why you are *practicing in the first place*”

(32). He continues, “I used to think that meditation practice was so powerful ...that as long as you did it at all, you would see growth and change. But time has taught me that some kind of personal vision is also necessary” (1990, p.46). The inclusion of intention (i.e., *why* one is practicing) as a central component of mindfulness is crucial to understanding the process as a whole.

Axiom II. Attention. A second fundamental component of mindfulness is *attention*. In the context of mindfulness practice, paying attention involves observing the operations of one’s moment-to-moment internal and external experience. This is what Husserl refers to as a “return to things themselves”. That is, suspending all the ways of interpreting experience and attending to experience itself, as it presents itself in the here and now. In this way one learns to attend to the contents of consciousness, moment by moment. Attention has been suggested in the field of psychology as critical to the healing process. For example, Gestalt therapy emphasizes present moment awareness, and its founder, Fritz Perls claimed that, “attention in and of itself is curative.” The importance of attention can also be seen in cognitive-behavior therapy, which is based on the capacity to attend to (i.e., observe) internal and external behaviors. At the core of mindfulness, is this practice of paying attention.

Attention is distinct from awareness. Awareness can be thought of as “knowing” whereas attention is what directs and/or focuses our awareness. Mindfulness is a form of awareness, a particular kind of knowing which allows the ontological status of the object to be recognized, as one is able to see things as they are. As Brown and Ryan eloquently put it, “awareness and attention are intertwined, such that attention continually pulls “figures” out of the “ground” of awareness...” (2003, p.822).

Axiom III. Attitude. However, *how* we attend is also essential. The *qualities* one brings to attention have been referred to as the attitudinal foundations of mindfulness (Kabat-Zinn, 1990, Shapiro and Schwartz, 1999, 2000). This axiom asserts that the attitude one brings to the attention is essential. Often, mindfulness is associated with bare awareness, and the quality of this awareness is not explicitly addressed.

However, the quality of this attention, the *attitudes* we infuse it with define the attention itself. Attention can have a cold, critical quality, or it can include an “an affectionate, compassionate quality...a sense of openhearted, friendly presence and interest” (Kabat-Zinn, 2003, p. 145). It is helpful to note that the Japanese characters of mindfulness are composed of two interactive figures: one mind, and the other heart (Santorelli 1999). Therefore, perhaps a more accurate translation from the Japanese is heart-mindfulness (Shapiro and Schwartz, in preparation), which underlines the importance of including “heart” qualities in the attentional practice of mindfulness (see Shapiro and Schwartz, 2000 for review).

We posit that persons can learn to attend to their own internal and external experiences, without evaluation or interpretation, and practice acceptance, kindness and openness even when what is occurring in the field of experience is contrary to deeply held wishes or expectations. With training, one becomes increasingly able to take interest in each experience as it arises and also allow what is being experienced to pass away (i.e., not be held on to). Through intentionally bringing the attitudes of patience, compassion and non-striving to the attentional practice, one develops the capacity not to seek out pleasant experiences, or to push aversive experiences away. In fact, attending without bringing the heart qualities into the practice may result in practice that is condemning or judgmental of inner experience. Such an approach may well have consequences contrary to the intentions of the practice such as cultivating the patterns of judgment and striving instead of equanimity and acceptance.

Proposing “a” Theory. We suggest that the 3 axioms, IAA, are the fundamental components (or internal behaviors from a Behaviorist perspective) of mindfulness. We posit that they account directly or indirectly for a large amount of the variance in the transformations that are observed in mindfulness practice. Building on these behaviors, we propose a meta-mechanism of mindfulness, which suggests that intentionally attending with openness and nonjudgmentalness leads to a significant shift in perspective, which we term *reperceiving*.

Mindfulness Axioms

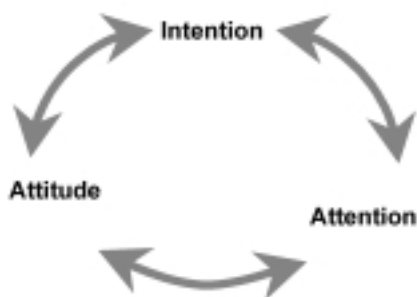


Figure 1

Reperceiving as Meta Mechanism.

Reperceiving involves a fundamental *shift in perspective*, which allows what was previously subject, to become object. Reperceiving is akin to the western psychological concepts of *decentering* (Safran and Segal, 1990), *deautomatization* (Deikman, 1982; Safran and Segal, 1990) and *detachment* (Bohart, 1983). For example, Safran and Segal define decentering as the ability to “step outside of one’s immediate experience, thereby changing the very nature of that experience.” (117) Deikman describes deautomatization as “an undoing of the automatic processes that control perception and cognition.” (p. 137). And according to Bohart (1983), *detachment* “encompasses the interrelated processes of gaining ‘distance,’ ‘adopting a phenomenological attitude,’ ...and the expansion of ‘attentional space’.” (see Martin, 1997 for review). All of these concepts share at their core a fundamental *shift in perspective*. This shift, we believe, is facilitated through mindfulness – the process of intentionally attending moment by moment with openness and non-judgmentalness (IAA).

Reperceiving and Development.

Reperceiving can be described as a rotation in consciousness in which what was previously “subject” becomes “object.” This shift in perspective (making what was subject, object) has been heralded by developmental psychologists as key to development and growth across the lifespan (see Kegan, Wilber, Piaget). Therefore, if reperceiving is in fact a meta-mechanism underlying mindfulness, then the practice of mindfulness is simply a continuation of the naturally occurring human developmental process whereby one gains an increasing capacity for objectivity about one’s own internal experience.

This natural developmental process is illustrated in the classic example of a mother’s birthday, in which her 8-year son gives her flowers, while her 3-year old gives her his favorite toy. Although developmentally appropriate, the 3-year old is basically caught in the limits of his own self-centered (i.e., narcissistic) perspective. For him, the world is still largely “subjective,” that is, an extension of his self (preconscious fusion). And as a result, he cannot clearly differentiate his own desires from those of another.

However, as he develops, a shift in perspective occurs such that there is an ever-increasing capacity to take the perspective of another (e.g., “my mother’s needs are different from mine”), precisely because what was previously subject (identification with the mother) has now become an object which he subsequently realizes he is now separate from (no longer fused with). This is the dawning of empathy, the awareness of his mother as a *separate* person with her own needs and desires. The example demonstrates that as individuals are able to shift their perspective away from the narrow and limiting confines of their own personal points of reference, development occurs.

Mindfulness Practice Continues

Developmental Process. If we view reperceiving as a naturally occurring developmental process, we can see meditation as a means of continuing or accelerating the multi-step process of development. The next step in this process, is an increasing capacity for objectivity in relationship to one’s internal/external experience. As Goleman suggests, “The first realization in ‘meditation’ is that the phenomena contemplating them” (1980, p. 146).

Disidentification with Contents of Consciousness. Through the process of intentionally focusing nonjudgmental attention on the contents of consciousness, the mindfulness practitioner begins to strengthen what Deikman refers to as “the observing self”. To the extent we are able to observe the contents of consciousness, we are no longer completely embedded in or fused with such content. For example, if we are able to see *it*, than we are no longer merely *it*; i.e., we must be *more* than *it*. Whether the *it* is pain, depression, or fear, reperceiving allows one to dis-identify from thoughts, emotions, body sensations as they arise, and simply be with them instead of being defined (i.e., controlled, conditioned, determined) by them. Through reperceiving we realize, “this pain is not me,” “this depression is not me,” “these thoughts are not me,” as a result of being able to observe them from a meta-perspective.

The shift in perspective is analogous to our earlier example of the young toddler who over time is eventually able to see himself as separate from the objective world in

which he had previously been embedded. However, in this case, the dis-identification is from the content of one’s mind (e.g., thoughts, feelings, self-concepts, memories) rather than one’s physical environment. Through reperceiving brought about by the cultivation of mindfulness, the stories that were previously identified with so strongly become simply “stories.” In this way, there is a profound shift in one’s relationship to thoughts and emotions, the result being greater clarity, perspective, objectivity, and ultimately equanimity. This process is similar to Hayes and colleagues’ (1999) concept of cognitive diffusion, in which the emphasis is on changing the context of one’s relationship to mental activity rather than the specific content of the mental activity itself.

Disidentification with Sense of “self.” The next step in the developmental process can be a shift in perspective as applied to self-concept. As one strengthens the capacity for self-witnessing/inner observation, there is often a corresponding shift in self-sense. The “self” starts to be seen through or deconstructed, and is realized to be a psychological construction, an ever-changing system of concepts, images, sensations and beliefs. These aggregates, or constructs that were once thought to comprise the stable self, are eventually seen to be impermanent and fleeting. Through reperceiving not only do we learn to stand back from and observe our “story” or inner commentary about life and the experiences encountered, we also begin to stand back from (witness) our “story” about who and what *we* ultimately are. Through this shift in perspective, identity begins to change from the contents of consciousness to awareness itself. It is this figure/ground shift that may be responsible for the transformations facilitated through mindfulness practice.

Connection with Larger “Self.” As noted, reperceiving involves the development of a meta-cognition, a witnessing awareness that can stand back and observe the workings of the mind. As we discussed, the capacity to observe our ever-changing inner experience – thoughts, feelings, concepts, memories, perceptions, sensations – facilitates dis-identification from such mental-emotional content, which in turns fosters greater cognitive-behavioral flexibility and less automatic reactivity. As one

strengthens the capacity for self-witnessing/inner observation, there is often a corresponding shift in self-sense. This shift in identity may then give space for the arising of a larger sense of "Self" which transcends and includes all experience. This "Self" contains both "other" and small "self" and recognizes there is no distinction between the two. This larger "Self" has been referred to as "true nature", "Buddha nature", "witness", "awareness", and "pure consciousness".

Summary

In summary, we posit that the state of mindfulness is composed of three axioms, Intention, Attention and Attitude (IAA). When IAA are simultaneously cultivated, the state of mindfulness arises. Through this process, re-perceiving occurs, facilitating a dramatic shift in perspective. This shift, we suggest, is at the heart of the change and transformation affected by mindfulness practice. Further, this shift is simply a continuation (or acceleration) of the naturally occurring developmental process.

The developmental process can be roughly summarized as following 5 steps: (1) preconscious fusion. (2) Through *re-perceiving* we are able to experience a separation of self from other. (3) As we continue to develop the capacity to *re-perceive*, we are able to separate self from the contents of consciousness. (4) This shift in relationship to experience often corresponds a deconstruction of sense of "self." (5) As awareness continues to be refined and expanded a state of consciousness ensues which includes both other and "self" and recognizes there is not distinction between the two. This developmental process is best captured through the Hindu saying

When I forget who I am I serve you.

Through serving I remember who I am,
And know that I am you"

References

- Baer, R.A. (2003). Mindfulness training as a clinical intervention: a conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10, 125-143.
- Barlow, D.H., and Craske, M.G. (2000). *Mastery of your anxiety and panic (3rd ed.)*. New York: Psychological Corporation.
- Bishop, S.R. (2002). What do we really know about mindfulness-based stress reduction? *Psychosomatic Medicine*, 64, 71-83.
- Bohart, A. (1983). *Detachment: a variable common to many psychotherapies?* Paper presented at the 63rd Annual Convention of the Western Psychological Association, San Francisco, CA.
- Borkovec, T.D. (2002). Life in the future versus life in the present. *Clinical Psychology: Science and Practice*, 9, 76-80.
- Brown, K.W., Ryan, R.M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84(4), 822-848.
- Deikman, A.J. (1982). *The observing self*. Boston: Beacon Press.
- Goleman, D. (1980). A map for inner space. In R.N. Walsh and F. Vaughan (Eds.), *Beyond ego* (pp. 141-150). Los Angeles: J.P. Tarcher.
- Hayes, S.C., Strosahl, K., and Wilson, K.G. (1999). *Acceptance and commitment therapy: an experiential approach to behavior change*. New York: Guilford.
- Hayes, S. (2002). Acceptance, mindfulness and science. *Clinical Psychology: Science and Practice*, 9, 101-106.
- Kabat-Zinn, J. (1990). *Full catastrophe living: using the wisdom of your body and mind to face stress, pain and illness*. New York: Delacorte.
- Kabat-Zinn, J. (1994). *Wherever you go, there you are: mindfulness meditation in everyday life*. New York: Hyperion.
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: past, present, and future. *Clinical Psychology: Science and Practice*, 10, 144-156.
- Martin, J.R. (1997, April). Limbering across cognitive-behavioral, psychodynamic and systems orientations. In J.R. Martin (Chair), *Retooling for integration: perspectives on the training of post-licensed psychotherapists*. Symposium presented at the 13th annual conference of the Society for the Exploration of Psychotherapy Integration, Toronto, Canada.
- Nolen-Hoeksema, S., and Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology*, 61, 115-121.
- Ryan, R.M., and Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68-78.
- Ryan, R.M., Kuhl, J., and Deci, E.L. (1997). Nature and autonomy: an organizational view of social and neurobiological aspects of self-regulation in behavior and development. *Development and Psychopathology*, 9, 701-728.
- Safran, J.D., and Segal, Z.V. (1990). *Interpersonal process in cognitive therapy*. New York: Basic Books.
- Santorelli, S. (1999). *Heal thy self: lessons on mindfulness in medicine*. New York: Random House.
- Segal, Z.V., Williams, J.M.G., and Teasdale, J.D. (2002). *Mindfulness-based cognitive therapy for depression: a new approach to preventing relapse*. New York: Guilford Press.
- Shapiro (1992).
- Shapiro, S.L., and Schwartz, G.E.R. (1999). Intentional systemic mindfulness: an integrative model for self-regulation and health. *Advances in Mind-Body Medicine*, 15, 128-134.
- Shapiro SL and Schwartz GE. (2000). The role of intention in self-regulation: Toward intentional systemic mindfulness. In Monique Boekaerts, Paul R. Pintrich, Moshe Zeidner (Eds.) *Handbook of Self-Regulation*, 253-273. Academic Press, NY.
- Teasdale, J.D., Segal, Z.V., and Williams, J.M.G. (2003). Mindfulness training and problem formulation. *Clinical Psychology: Science and Practice*, 10, 157-160.
- Thera, N. (1962). *The heart of Buddhist meditation*. New York: Weiser.

Notes

¹The authors would like to acknowledge the Center for Mindfulness and Health Care, which invited the talk on Mechanisms of Mindfulness, March 2004, from which this paper is based. We also acknowledge Linda Carlson for her contribution. Dr. Shapiro also acknowledges her parents, Johanna and Deane Shapiro, and in particular, her grandfather, Benedict Freedman, who significantly contributed to developing the ideas for this paper.

²Correspondence directed to Shauna L. Shapiro, PhD Counseling Psychology Department. Santa Clara University. 500 El Camino Real. Santa Clara, CA. 95053-0201. slshapiro@scu.edu

³California Pacific Medical Center, San Francisco, CA.

EEG/QEEG Data Base Receives FDA Approval

The NeuroGuide EEG and QEEG software has received FDA 510k approval for the sale of the normative database and discriminant function software as a medical device. The FDA approval number is K041263. FDA registration promotes high standards and general acceptance of quantitative EEG. Go to www.appliedneuroscience.com to read more. (This brings to two the number of QEEG software analysis systems that have gained FDA approval, including NX Link and NeuroGuide).

RESPeRATE

The only FDA-cleared, non-drug, medical device clinically proven to lower high blood pressure with no side effects.

\$295⁰⁰

Includes: Resperate unit, instructional video, user manual, elastic respiration belt and sensor, batteries

RESPeRATE utilizes a patented technology to pace your breathing from the normal range of 14 to 19 breaths per minute to the "therapeutic zone" of under 10 breaths per minute.

Within a few minutes into the exercise the muscles surrounding the small blood vessels dilate and relax, thereby allowing blood to flow more freely, resulting in lower blood pressure. The RESPeRATE's pacing technology enables you to perform these therapeutic breathing maneuvers effortlessly.

Your breathing returns to normal after each session but the beneficial impact on your blood pressure accumulates. When these exercises are performed for as little as 15 minutes a day, 3-4 times a week they have been shown to significantly lower blood pressure with no side effects.



BMI = BIOFEEDBACK

BMI has been providing the biofeedback community with quality products and professional training for over 25 years.

From state-of-the-art computer biofeedback system to simple hand-held units, BMI carries the widest selection of biofeedback products.

**PC SYSTEMS | STAND ALONE UNITS | ACCESSORIES
DISPOSABLE SUPPLIES | BOOKS & SOFTWARE**

Visit our website at bio-medical.com and browse our wide selection of biofeedback equipment and supplies.



DAVID PARADISE TC

Professional quality Audio-Visual Entrainment device. Features easy programmability, wide session variety, and a vast number of functions.

This product is the one most chosen by psychologists, medical doctors and clinicians of all types, for their clients as a take-home device.



Includes: Tru-Vu Omniscreen Eyesets, stereo headphones, stereo patch cord, carrying bag, 3 color overlays, A/C adapter, Manual, DAVID User's Guide

\$360⁰⁰

FREEZE-FRAMER 2.0

Designed to prevent, manage and reverse the negative effects of stress, and to enable users to learn how to operate their mind-body-heart as a unified system, achieving new levels of health and well-being.



Includes: CD-ROM, Quick-Start Booklet, "Quiet Joy" music CD, Pulse Sensor, Online Help and Tutorial, Free Tech Support

\$295⁰⁰

The Freeze-Framer Interactive Learning System is an easy-to-use software program, learning system and patented heart rhythm monitor.

800.521.4640

Bio-Medical Instruments Inc.
2387 E. 8 Mile Road, Warren, MI 48091

SPECIAL TOPICS: MEDITATION, CHANGES IN CONSCIOUSNESS, AND HEALTH



Mindfulness-Based Stress Reduction: Overview and Applications in Cancer

Linda E. Carlson, PhD, Calgary, Alberta, Canada

Abstract: The origin and format of Mindfulness-Based Stress Reduction (MBSR) is introduced, followed by a brief summary of the clinical research into its effectiveness in various medical populations. A more comprehensive overview of our and others' research on MBSR in cancer patients follows, detailing studies that have shown improvements in mood, stress symptoms and quality of life, as well as shifts in immune and hormonal parameters. A theory of biological dysregulation in disease and some evidence based on studies of relationships between sleep, stress, immune function and disease are presented and discussed.

What is MBSR?

When Jon Kabat-Zinn first developed the Stress Reduction and Relaxation program at the University of Massachusetts Medical Centre in the late 1970s, it's unlikely he ever imagined it would come to this. Currently, in 2004, there are several hundreds of programs of what is now called Mindfulness-Based Stress Reduction (MBSR) in locations around the world as distant as South Africa, Australia, Germany and Argentina. Training programs are flourishing and MBSR is being applied to conditions as diverse as heart disease, pain, anxiety, fibromyalgia and eating disorders, as well as to childbirth training and problems in prisons and school settings.

The popularity of the program is reflected in cover stories in *Time Magazine*, the *New York Times Magazine* and in national news coverage. An internet search of "Mindfulness-Based Stress Reduction" yields 5,470 hits. Most seem to be touting the virtues of the approach and offering

courses. So what is this magic bullet that's taking the health care system by storm?

In fact, MBSR has its roots in 2,500 years of contemplative spiritual traditions, in which the practice of focusing attention and awareness upon the moment-by-moment experience of being, in an open and non-judgmental manner, is actively cultivated. This new twist on the ancient practice of mindfulness seems to be just what the Western world has been clamoring for, as it strips the practice of its ritualistic and religious overtones and packages it in a way that has proven accessible to many, but still manages to retain the essence of the practice. Kabat-Zinn describes MBSR as, "A well-defined and systematic patient-centered educational approach which uses relatively intensive training in mindfulness meditation as the core of a program to teach people how to take better care of themselves and live healthier and more adaptive lives." (Kabat-Zinn, 1990). Key components of the program include theoretical material related to relaxation, meditation, and the body-mind connection and the experiential practice of meditation during group meetings and daily home based practice. Diverse but related practices utilize body and breath awareness, attention regulation, and include sitting meditation, walking meditation, and gentle hatha yoga. Group process focused on problem-solving related to impediments to effective practice, practical day to day applications of mindfulness, and supportive interaction between group members are a meaningful part of the regular group meetings.

Clinical Applications of MBSR

MBSR has been clinically utilized with success in treating the symptoms of disorders such as chronic pain (Kabat-Zinn, Lipworth, and Burney, 1985; Kabat-Zinn, Lipworth, Burney, and Sellers, 1987), anxiety disorders (Kabat-Zinn, Massion, Kristeller, Peterson, Fletcher et al.; Miller, Fletcher, and Kabat-Zinn, 1995) (Roemer and Orsillo, 2002), fibromyalgia (Kaplan, Goldenberg, and Galvin-Nadeau, 1993; Sephton, Lynch, Weissbecker, Ho, and Salmon, 2001), and epilepsy (Deepak, Manchanda, and Maheshwari, 1994), and in general medical populations (Reibel, Greeson, Brainard, and Rosenzweig, 2001). Components of MBSR have been used in an individual format to help hasten the rate of skin clearing in psoriasis sufferers (Kabat-Zinn, Wheeler, Light, Skillings, Scharf et al.), and improve movement and symptom management in multiple sclerosis patients (Mills and Allen, 2000). Aspects of MBSR have been incorporated into mindfulness-based cognitive therapy (MBCT; Segal, Williams, and Teasdale, 2002) which has successfully reduced relapse rates in treatment of major depression (Teasdale et al., 2000). Mindfulness techniques have also been incorporated into Dialectical Behavior Therapy (Dimidjian and Linehan, 2003; Linehan, 1987), an approach to the treatment of patients with difficult personality disorders, and the recently popular Acceptance and Commitment Therapy (Blackledge and Hayes, 2001).

A recent study of MBSR for healthy workers published by Davidson, Kabat-

Zinn et al. (Davidson, Kabat-Zinn, Schumacher, Rosenkranz, Muller et al., 2003) has caused quite a stir in the popular media. Brain electrical activity was measured before and immediately after, and then 4 months after an 8-week MBSR training program for healthy subjects in the workforce. Twenty-five subjects were tested in the meditation group and 16 in a wait-list control group. At the end of the 8-week period, subjects in both groups were vaccinated with influenza vaccine. Significant increases in left-sided anterior cortical activation, a pattern previously associated with positive affect, were found in the meditators compared with the non-meditators. Amazingly, there were also significant increases in antibody titers to influenza vaccine among subjects in the MBSR group compared with those in the wait-list control group. Finally, the magnitude of increase in left-sided activation predicted the magnitude of antibody titer rise to the vaccine. This study nicely demonstrated that a short training program in mindfulness meditation could have profound effects on both brain function and immunity.

MBSR in Cancer Patients

Our focus has been on offering MBSR training to groups of cancer patients. The issues endemic in cancer diagnosis and treatment such as increased levels of stress and distress, fear of death and dying, loss of control, loss of independence and feelings of isolation are just those that MBSR is theoretically well suited to address (Mackenzie, Carlson, and Specia, 2004; Brennan and Stevens, 1998). Beginning in 1995, the Department of Psychosocial Resources at the Tom Baker Cancer Centre offered patients the opportunity to participate in the MBSR program. In October 1997 we began a randomized wait-list controlled clinical trial, evaluating the effect of the MBSR program on mood and symptoms of stress in cancer outpatients, which was the first published controlled trial to investigate mindfulness meditation in cancer patients (Specia, Carlson, Goodey, and Angen, 2000). Participants were a heterogeneous group. Indeed, the final sample of 89 patients consisted almost equally of patients from stage I-IV disease with all types of cancers and in various phases of treatment.

Participants in the intervention group of this RCT had less overall mood disturbance, less tension, depression, anger, concentration problems, and more vigor than control subjects following the intervention. They also reported fewer symptoms of stress, including peripheral manifestations of stress, cardiopulmonary symptoms of arousal, central neurological symptoms, gastrointestinal symptoms, habitual stress behavioral patterns, anxiety/fear, and emotional instability compared to those still waiting for the program. We then analyzed the result of the six-month follow-up, which indicated a maintenance of these gains over the follow-up period (Carlson, Ursuliak, Goodey, Angen, and Specia, 2001).

We next received a grant in July 2000 from the Canadian Breast Cancer Research Initiative for a study entitled "The Effects of a Mindfulness Meditation Intervention on Psychological Parameters, Quality of Life and Autonomic, Endocrine and Immune Functioning in Breast and Prostate Cancer Patients." Two papers have been published thus far from the study; one looking at the pre-post effects on immune function (Carlson, Specia, Patel, and Goodey, 2003) and one looking at hormone levels (Carlson, Specia, Patel, and Goodey, 2004). A third on blood pressure is currently under review. The one-year follow-up data has yet to be submitted for publication.

Briefly summarized, fifty-nine and forty-two patients were assessed pre- and post-intervention, respectively. The 59 patients attended a median of eight of a possible nine sessions over eight weeks (range 1-9). They also practiced at home as instructed, reporting an average of 24 minutes/day of meditation and 13 minutes/day of yoga over the course of the eight weeks. This was similar to what we had seen in the previous study, and heartening, since there was some concern that these patients may not have been well enough to comply with the homework demands. Significant improvements were seen in overall quality of life, symptoms of stress and sleep quality. In terms of the immune outcomes, although there were no significant changes in the overall number of lymphocytes or cell subsets, there were changes in the secretion of cytokines upon cell stimulation. Cytokines

are particles of the immune system that can have antitumor as well as pro- or anti-inflammatory activity, so depending on the subtype of cytokine, either increases or decreases in production are desirable. We found results that were consistent with a shift in immune profile from one associated with depressive symptoms (and cancer) to a more normal healthy profile. Significantly, interleukin-4, one of the cytokines studied, has been identified as possibly having anti-tumor activity in breast cancer and levels of this cytokine increased more than three-fold post-intervention. If physiologically meaningful increases in this or other anti-cancer cytokines can reliably be produced through meditation it may point to potentially beneficial effects on disease outcome. Of course, studies to definitely demonstrate this are still a long way off.

The patterns of secretion of the stress hormone cortisol were also of special interest to us, as previous research had demonstrated that abnormal profiles were associated with shorter survival time in breast cancer patients (Sephton, Sapolsky, Kraemer, and Spiegel, 2000). That is, patients who didn't display the usual healthy pattern of higher cortisol in the morning, declining throughout the day, were more likely to die of their illness. Prior to intervention, we found that about 40% of our sample evidenced similar types of abnormal daily secretion patterns to those seen in the previous study. However, after MBSR there were fewer troubling evening cortisol elevations and more patients evidenced the healthy pattern of decreases throughout the day. This also points to a potential regulating effect of MBSR on patterns of stress hormone secretion, similar to what was seen with the immune results.

The theory we are now postulating is that meditation, and MBSR in particular, may affect diurnal systems such as cortisol, immune function, autonomic function and other daily rhythms such as sleep. MBSR may counteract dysregulation in these systems by having a modulating, or normalizing effect on these natural cycles, which are often dysregulated in patients with disease. These positive regulating effects may result in better disease outcomes for these patients. As mentioned above, however, tests of this putative association between

MBSR, changes in biologic rhythmicity and disease outcome have yet to be conducted.

This theory is supported, however, by recent work in our lab looking more closely at sleep parameters in cancer patients who participate in MBSR and their association with stress levels. Sleep rhythm, of course, has very important biological functions that affect many aspects of functioning when dysregulated, and is associated with other systems we have been studying. People with sleep deprivation or sleep disorders (including shift workers with dysregulated sleep patterns) have alterations in various measures of immune function (Bovbjerg, 2003), and are also at higher risk for cancer (Davis, Mirick, and Stevens, 2001; Schernhammer, Laden, Speizer, Willett, Hunter, et al.) and have higher mortality rates (Savard and Morin, 2001).

Similar to what others have reported, we found a very high proportion of our cancer patients with disordered sleep (approx. 85%). In these patients, sleep disturbance was closely associated with levels of self-reported stress and mood disturbance, and when stress symptoms declined over the course of the MBSR program, sleep also improved (Carlson, Specia, Goodey, and Garland, 2004). Whether decreases in stress led to improvements in sleep, or vice versa, and via which neuroimmune or neuroendocrine pathways, is as yet unknown. It may well be that all these systemic dysregulations are related to one another, and as a whole, contribute to negative disease outcomes. These associations present exciting and fruitful avenues for future research.

Another fascinating avenue of inquiry has been to delve further into the self-perceived benefits of MBSR in cancer patients using qualitative methods of inquiry, as up to this point much of the research has been quantitative. To that end we've recently conducted a grounded theory interview study investigating patients' self-perceived effects of participating in ongoing MBSR after cancer diagnosis and treatment. Themes that have consistently emerged include: Self-Regulation (internal control, empowerment, less reactivity); Transformation (change in perspective, acceptance, creation of new path); Collective Learning (validating one's experience, process of discovery), and; Group Dynamics (friendship, motiva-

tion, sharing, support, collective meditation). These rich themes point to a number of avenues through which MBSR has affected the lives of participants in profound ways, and suggest many potential research directions.

A recent review of MBSR concluded that "although the efficacy of MBSR to self-manage stress and mood symptoms associated with cancer seems particularly promising, it would be difficult based on a single randomized controlled trial (the Tom Baker study) to strongly recommend it at this time. This study is significant however as it represents the first rigorous test of the efficacy of this approach to foster adaptation to a medical illness. Replication is clearly needed to firmly establish its efficacy in this population" (Bishop, 2002, p.76).

Indeed, other researchers have also been investigating MBSR in cancer patients. A study by Shapiro, Bootzin, Figueredo, Lopez, and Schwartz (2003) examined the relationship between participation in an MBSR program and sleep quality and efficiency, but did not find statistically significant relationships between participation in an MBSR group and sleep quality. They did, however, find that those who practiced more informal mindfulness reported feeling more rested. This is contradictory to our preliminary sleep findings summarized above, but could be explained by the differing methods used to measure sleep parameters, or slight differences in program content.

An innovative study by Kabat-Zinn's group looked at the effects of combining a dietary intervention with MBSR on prostate specific antigen (PSA) levels, an indicator of the level of activity of the prostate cancer, in men with prostate cancer and found the combined program resulted in a slowing of the rate of PSA increase (Saxe, Hebert, Carmody, Kabat-Zinn, Rosenzweig, et al., 2001). This is another interesting finding that links MBSR with the body's biological regulatory systems.

Conclusions

In summary, MBSR seems to appeal to the yearning of both those with disease and those without for a more genuine way of living, and slowing down our fast pace of life. It has been shown in several quasi-

experimental and experimental designs to have promise in the treatment of many medical disorders, including cancer. What the field needs now, I would offer, in addition to implementing rigorous randomized controlled clinical trials, is to further elucidate potential mind-body mechanisms of action, such as dysregulation of immune, endocrine, autonomic and sleep systems. In parallel to this, more phenomenological inquiry into the lived experience of MBSR participation is needed to fully understand the human terms of this journey. As we look back on the explosion of interest and research on MBSR over the last decade, it's quite likely that Jon Kabat-Zinn may be most surprised of us all.

References

- Bishop, S. R. (2002). What do we really know about mindfulness-based stress reduction? *Psychosomatic Medicine*, 64, 71-83.
- Blackledge, J. T. and Hayes, S. C. (2001). Emotion regulation in acceptance and commitment therapy. *Journal of Clinical Psychology*, 57, 243-255.
- Bovbjerg, D. H. (2003). Circadian disruption and cancer: sleep and immune regulation. *Brain, Behavior and Immunity*, 17 Suppl 1, S48-S50.
- Brennan, C. and Stevens, J. (1998). A grounded theory approach towards understanding the self perceived effects of meditation on people being treated for cancer. *The Australian Journal of Holistic Nursing*, 5, 20-26.
- Carlson, L. E., Specia, M., Goodey, E., and Garland, S. (2004). Improvements in sleep quality in cancer outpatients participating in mindfulness-based stress reduction. *Psychosomatic Medicine*, 66, A-80.
- Carlson, L. E., Specia, M., Patel, K. D., and Goodey, E. (2003). Mindfulness-based stress reduction in relations to quality of life, mood, symptoms and stress and immune parameters in breast and prostate cancer outpatients. *Psychosomatic Medicine*, 65, 571-581.
- Carlson, L. E., Specia, M., Patel, K. D., and Goodey, E. (2004). Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress and levels of cortisol, dehydroepiandrosterone-Sulfate (DHEAS) and melatonin in breast and prostate cancer outpatients. *Psychoneuroendocrinology*, 29, 448-474.
- Carlson, L. E., Ursuliak, Z., Goodey, E., Angen, M., and Specia, M. (2001). The effects of a mindfulness meditation based stress reduction program on mood and symptoms of stress in cancer outpatients: Six month follow-up. *Supportive Care in Cancer*, 9, 112-123. (correct)
- Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F. et al. (2003). Alterations in brain and immune function produced by mindfulness meditation. *Psychosom. Med.*, 65, 564-570.

- Davis, S., Mirick, D. K., and Stevens, R. G. (2001). Night shift work, light at night, and risk of breast cancer. *J. Natl. Cancer Inst.*, 93, 1557-1562.
- Deepak, K. K., Manchanda, S. K., and Maheshwari, M. C. (1994). Meditation improves clinicoelectroencephalographic measures in drug-resistant epileptics. *Biofeedback and Self-Regulation*, 19, 25-40.
- Dimidjian, S. and Linehan, M. (2003). Defining an agenda for future research on the clinical application of mindfulness practice. *Clinical Psychology: Science and Practice*, 10, 166-171.
- Kabat-Zinn, J. (1990). Full catastrophe living: Using the wisdom of your body and mind to face stress, pain and illness. New York: Delacourt.
- Kabat-Zinn, J., Lipworth, L., and Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal of Behavioral Medicine*, 8, 163-190.
- Kabat-Zinn, J., Lipworth, L., Burney, R., and Sellers, W. (1987). Four-year follow-up of a meditation based program for the self-regulation of chronic pain: Treatment outcomes and compliance. *The Clinical Journal of Pain*, 2, 159-173.
- Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, D. E., Pbert, O. et al. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *American Journal of Psychiatry*, 149, 943-963.
- Kabat-Zinn, J., Wheeler, E., Light, T., Skillings, A., Scharf, M. J., Croplwy, T. G. et al. (1998). Influence of a mindfulness meditation-based stress reduction intervention on rates of skin clearing in patients with moderate to severe psoriasis undergoing phototherapy (UVB) and photochemotherapy (PUVA). *Psychosomatic Medicine*, 60, 625-632.
- Kaplan, K. H., Goldenberg, D. L., and Galvin-Nadeau, M. (1993). The impact of a meditation-based stress reduction program on fibromyalgia. *General Hospital Psychiatry*, 15, 284-289.
- Linehan, M. M. (1987). Dialectical behavior therapy for borderline personality disorder. Theory and method. *Bulletin of the Menninger Clinic*, 51, 261-276.
- Mackenzie, M. J., Carlson, L. E., and Specia, M. (2004). Mindfulness-based stress reduction (MBSR) in oncology: rationale and review. Unpublished manuscript (Under review) *Psychotherapy and Psychosomatics*.
- Miller, J. J., Fletcher, K., and Kabat-Zinn, J. (1995). Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders. *General Hospital Psychiatry*, 17, 192-200.
- Mills, N. and Allen, J. (2000). Mindfulness of movement as a coping strategy in multiple sclerosis. A pilot study. *General Hospital Psychiatry*, 22, 425-431.
- Reibel, D. K., Greeson, J. M., Brainard, G. C., and Rosenzweig, S. (2001). Mindfulness-based stress reduction and health-related quality of life in a heterogeneous patient population. *General Hospital Psychiatry*, 23, 183-192.
- Roemer, L. and Orsillo, s. M. (2002). Expanding our conceptualization of and treatment for generalized anxiety disorder: Integrating mindfulness/acceptance-based approaches with existing cognitive-behavioral models. *Clinical Psychology: Science and Practice*, 9, 54-68.
- Saxe, G. A., Hebert, J. R., Carmody, J. F., Kabat-Zinn, J., Rosenzweig, P. H., Jarzowski, D. et al. (2001). Can diet in conjunction with stress reduction affect the rate of increase in prostate specific antigen after biochemical recurrence of prostate cancer? *Journal of Urology*, 166, 2202-2207.
- Schernhammer, E. S., Laden, F., Speizer, F. E., Willett, W. C., Hunter, D. J., Kawachi, I. et al. (2001). Rotating night shifts and risk of breast cancer in women participating in the nurses' health study. *Journal of the National Cancer Institute*, 93, 1563-1568.
- Segal, Z. V., Williams, M. G., and Teasdale, J. D. (2002). Mindfulness-based cognitive therapy for depression. New York: Guilford Press.
- Sephton, S. E., Lynch, G., Weissbecker, I., Ho, I., and Salmon, R. (2001). Effects of a meditation program on symptoms of illness and neuroendocrine responses in women with fibromyalgia. *Psychosomatic Medicine*, 63, 91.
- Sephton, S. E., Sapolsky, R. M., Kraemer, H. C., and Spiegel, D. (2000). Diurnal cortisol rhythm as a predictor of breast cancer survival. *Journal of the National Cancer Institute*, 92, 944-1000.
- Shapiro, S. L., Bootzin, R. R., Figueredo, A. J., Lopez, A. M., and Schwartz, G. E. (2003). The efficacy of mindfulness-based stress reduction in the treatment of sleep disturbance in women with breast cancer: an exploratory study. *Journal of Psychosomatic Research*, 54, 85-91.
- Specia, M., Carlson, L. E., Goodey, E., and Angen, M. (2000). A randomized, wait-list controlled clinical trial: the effect of a mindfulness meditation-based stress reduction program on mood and symptoms of stress in cancer outpatients [In Process Citation]. *Psychosomatic Medicine*, 62, 613-622.
- Teasdale, J. D., Segal, Z. V., Williams, J. M., Ridgeway, V. A., Soulsby, J. M., and Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, 68, 615-623.

Note

¹Direct Correspondence to:
Dr. Linda E. Carlson,
Assistant Professor, University of Calgary
Division of Psychosocial Resources
Alberta Cancer Board – Holy Cross Site
2202 2nd St. S.W.
Calgary, Alberta, Canada T2S 3C1
Phone: (403) 355-3209,
Fax: (403) 355-3206
E-Mail: l.carlson@ucalgary.ca

Meditation: Elevating Consciousness, Improving Health

Continued from page 10

- Jacobs, G. D. (2001). Clinical applications of the relaxation response and mind-body interventions. *Journal of Alternative and Complementary Medicine*, 7 Suppl 1, S93-101.
- Muller, M. (1884). Maitrayana Brahmana Upanishad, 6th Prapathaka: 34. In M. Mueller (Transl. and Ed.), *The sacred books of the east, volume 15*. Oxford: Clarendon Press, 1879-1910.
- Murphy, M. and Donovan, S. (1999). *The physical and psychological effects of meditation A review of contemporary research with a comprehensive bibliography 1931-1996*. (2nd ed.) Sausalito, CA: The Institute of Noetic Sciences.
- Paramananda, S. (2002). Katha Upanishad, Part 3. In S. Paramananda (transl.), *Project Gutenberg, The Upanishads*. Retrieved July 9, 2004, from website <http://onlinebooks.library.upenn.edu/webbin/gutbook/lookup?num=3283>
- Perez-de-Albeniz, A. and Holmes, J. (2000). Meditation: Concepts, effects and uses in therapy. *International Journal of Psychotherapy*, 5, 49-58.
- Peters, R. K., Benson, H., and Porter, D. (1977). Daily relaxation response breaks in a working population: I. Effects on self-reported measures of health, performance, and well-being. *American Journal of Public Health*, 67, 946-953.
- Proulx, K. (2003). Integrating mindfulness-based stress reduction. *Holistic Nursing Practice*, 17, 201-208.
- Rowland, B. (1953). *The art and architecture of India*. Baltimore, Maryland: Penguin Books.
- Saper, R. B., Eisenberg, D. M., Davis, R. B., Culpepper, L., and Phillips, R. S. (2004). Prevalence and patterns of adult yoga use in the United States: Results of a national survey. *Alternative Therapies in Health and Medicine*, 10, 44-49.
- Wallace, R. K., Benson, H., and Wilson, A. F. (1971). A wakeful hypometabolic physiologic state. *American Journal of Physiology*, 221, 795-799.

ABOUT THE AUTHORS

John A. Astin, PhD, received his doctorate in Health Psychology from the University of California, Irvine. From 1997-1999, he was a research fellow in the Complementary and Alternative Medicine Program at the Stanford University School of Medicine. From January 2000-June 2002, he was the director of mind-body research at the Complementary Medicine Program, University of Maryland School of Medicine. In July of 2002, he took a position as Research Scientist at the California Pacific Medical Center in San Francisco. His research and clinical work has focused on several related areas: 1) the use of mind-body therapies, particularly mindfulness meditation, to treat various health-related problems; 2) psychosocial factors associated with use of complementary and alternative medical therapies; 3) the psychological construct of control and its relationship to mental and physical health; and, 4) the role of spirituality in healthcare. His research has appeared in such journals as *Archives of Internal Medicine*, *JAMA*, and the *Annals of Internal Medicine*. He is the co-author (with Deane Shapiro) of the book: "Control therapy: An integrated approach to psychotherapy, health, and healing." Along with his scholarly pursuits, Dr. Astin is also an accomplished singer, songwriter and recording artist having produced 5 albums of original music that are distributed worldwide.

Enrica Bianchi, PhD, is currently conducting research in the Department of Neuroscience at the University of Siena in Italy. Her research interests have been generally in the field of molecular and anatomical neuropharmacology. Her recent published research has studied mu-opioid receptor binding characteristics and the neuroanatomical localization of endogenous morphine in the brain. She is also interested in the involvement of endogenous opioid activity in complementary and alternative therapies.

Ramesh L. Bijlani, MD, is a product of the B. K. Anand school of physiology which pioneered classical studies on yoga at All India Institute of Medical Sciences

(AIIMS) nearly 50 years ago. He is an ardent student of religious and spiritual traditions and has studied in depth the works of Sri Aurobindo, one of the most powerful exponents of Indian wisdom in recent times. About 5 years ago, Dr. Bijlani initiated at AIIMS a facility which uses meditation and other elements of yoga as tools for influencing the mind positively in order to promote self-healing.

Adam Burke, PhD, MPH, Lac, is a research psychologist, acupuncturist, and educator. He received advanced degrees in public health and psychology from the University of California. He has also studied traditional Chinese medicine in San Francisco and in Sichuan, China. He is currently assistant professor/associate director, Department of Health Education/Institute for Holistic Healing Studies, at San Francisco State University. Dr. Burke is actively engaged in mind-body healing research and policy work. He is also the author of the recently released book, *Self Hypnosis*, published by Crossing Press.

Linda E Carlson, PhD, completed her doctorate in Clinical Psychology at McGill University in Montreal. She then held a Terry Fox Postdoctoral Research Fellowship funded by the National Cancer Institute of Canada at the Tom Baker Cancer Centre in Calgary, Canada. Currently she is an Assistant Professor in the Department of Oncology in the Faculty of Medicine at the University of Calgary, and an adjunct professor in the Department of Psychology. She is currently funded by a Canadian Institutes of Health Research New Investigator Award. Her research interests lie in the field of psychoneuroimmunology, mind-body medicine, exercise interventions, meditation and yoga, smoking cessation and quality of life research in cancer patients. Dr. Carlson works out of the Department of Psychosocial Resources of the Tom Baker Cancer Centre, as a psychologist and a researcher.

K. K. Deepak, MD, PhD, an additional professor of Physiology in AIIMS is an expert on the Autonomic Nervous System. He has been working on various aspects of

Yoga, Meditation, Biofeedback and Hypnosis for the past two decades and his work on Meditation as intervention strategy has been widely acclaimed. Recently his group has compared the effect of yogic intervention with biofeedback for irritable bowel syndrome. He currently directs the Clinical Autonomic Function Laboratory at the All India Institute of Medical Sciences. The work of Dr K.K. Deepak has specialized in applying a reductionistic approach towards the in-depth analysis of physiological signals. His scientific approach is based on non-invasive assessment of physiological signals and it attempts to extract information on brain mechanisms from peripheral signals.

Tobias Esch, MD, studied medicine at the University of Goettingen (Germany). He was a resident in neurology (University of Witten/Herdecke, Germany), followed by internal medicine, surgery and family medicine – where he became specialized in 2004. Mr. Esch wrote his thesis on stress and mutation research and received his doctoral degree (MD) in 2000. Since then he has published a variety of reports on stress. Dr. Esch was appointed research fellow at Harvard Medical School (U.S.A.) in 2001. He is clinically trained in complementary, integrative and mind/body medicine. Currently, Dr. Esch is a fellow at the Charité, University Medicine Berlin (Germany).

Massimo Guarna, PhD, is currently conducting research in the Department of Anatomical and Biomedical Sciences at the University of Siena in Italy. His research interests are in the molecular physiology of endogenous opioids such as endogenous morphine and codeine. His recently published research has evaluated mu-opioid receptor binding characteristics, the role of endogenous morphine in nociception and the neurophysiology of endogenous morphine secretion/release. He is also interested in the involvement of endogenous opioid activity in complementary and alternative therapies.

Sat Bir S. Khalsa, PhD, has conducted research in neuroscience, chronobiology and

sleep and is currently on the faculty of Harvard Medical School as an Instructor in Medicine. He has also practiced a yoga lifestyle for over 30 years and is a certified Kundalini Yoga instructor. His current research interests are in the effects of yoga and meditation practices. He is currently conducting a clinical trial at Brigham and Women's Hospital evaluating a yoga treatment for insomnia funded by the National Center for Complementary and Alternative Medicine. He also teaches a course in mind body medicine for Harvard medical students.

Shauna L. Shapiro, PhD, is an assistant professor at Santa Clara University. She received her doctorate in clinical psychology at the University of Arizona and is adjunct faculty for Andrew Weil's Program of Integrative Medicine. Her research has focused primarily in examining the effects of MBSR across a wide range of populations including breast cancer, insomnia, substance abuse, and health care professionals. Dr. Shapiro has published over two dozen articles and book chapters in the area of meditation and has presented her research findings nationally and internationally.

George B. Stefano, PhD, received his Ph. D. from Fordham University and was awarded a Distinguished Teaching Professorship at SUNY where he is the Director of the Neuroscience Research Institute. He has published over 300 reports and edited 7 books. He has grants from the National Institute of Mental health, National Institute on Drug Abuse, National Science Foundation, Fogarty International Center, Cell Dynamics and International Lifewaves. His research deals with the demonstration of morphine as an endogenous signaling molecule and mind/body interactions potentially involving opiate signaling.

Sebastian "Seb" Striefel, PhD, became a Professor Emeritus in the Department of Psychology at Utah State University in September 2000. For twenty six years he taught graduate level courses in ethics and professional conduct, clinical applications of biofeedback, clinical applications of relaxation training and behavior therapy. He was also the Director of the Division of Services at the Center for Persons with Disabilities at Utah State University. In that role he managed a variety of programs, including an outpatient clinic, a biofeedback lab and an early intervention program. He is a past president of the Association of Applied Psychophysiology and Biofeedback (AAPB), past president of the Neurofeedback Division of AAPB, current vice-president of and past secretary/treasurer of the International Section of AAPB, and regularly writes an ongoing ethics column and conducts workshops on ethics, standards, and professional conduct.

Frederick Travis, PhD, received his Masters in Psychology 1986 and his PhD in Psychology in 1988 from Maharishi University of Management. After a two-year post-doctoral position in EEG sleep research at University of California Davis, he returned to Maharishi University of Management to direct the EEG, Consciousness and Cognition Lab. Over the last 14 years he has authored and co-authored 39 papers that have investigated subjective and physiological markers of meditation practice and of growth of human consciousness through meditation practice.

Does AAPB have your e-mail address?

- e-mail communications enable AAPB to communicate better with members.
- E-mail communications also save AAPB money, and enable the Association to use your dues money for other critical activities.

Please send your e-mail address today to the following address:

aapb@resourcenter.com

I don't know who you are.

I don't know your company.

I don't know your products.

I don't know your reputation.



Now, what was it you were selling?

(This is what your potential customers may be thinking.)

Educate your customers by defining your image.

Advertise in aapb's BIOFEEDBACK Magazine.

For Advertising Contact:

the d.townsend group

Denise Townsend • dytownsend@earthlink.net

Phone: 940-723-0272



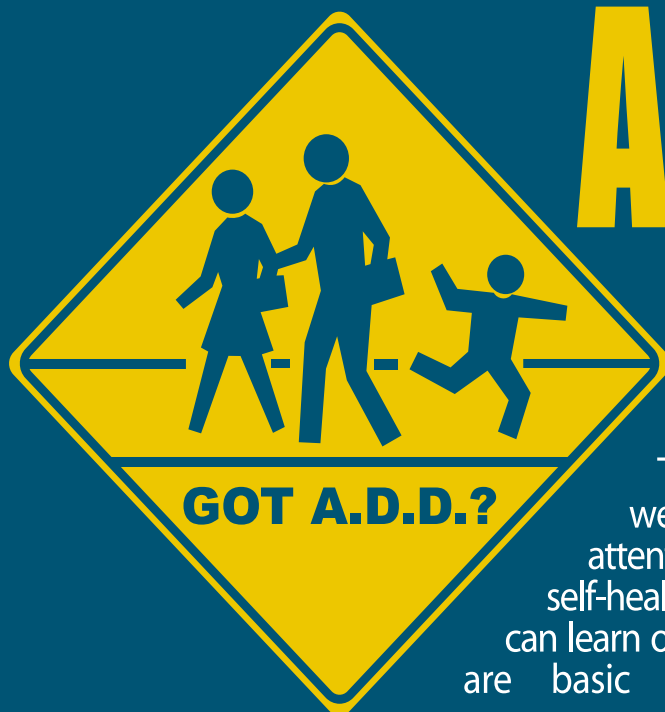
Association for Applied Psychophysiology and Biofeedback

10200 W 44th Ave Suite 304,

Wheat Ridge CO 80033-2840

Canadian
Publication
Agreement
#1583581

Address Service Requested



ADD The 20 Hour Solution

A New
Book by

Mark Steinberg, Ph.D. and Siegfried Othmer, Ph.D.

Training minds to concentrate and self-regulate naturally without medication.

This new book describes the method by which we can improve the brain's ability to pay attention and regulate its behavior. It explains the self-healing capacities of the human brain and how it can learn or re-learn the self-regulatory mechanisms that are basic to its normal design and function.

The EEG Institute at the Brian Othmer Foundation is a non-profit organization offering a variety of brain wave training programs for adults and children. Our primary focus is to promote awareness among the public and among health professionals of the power of neurofeedback. Our staff teaches professionals throughout the world who want to incorporate neurofeedback into their practices.

For more information about incorporating neurofeedback into your practice, visit us at:

www.eeginfo.com

The EEG Institute • 22020 Clarendon St. Suite 305 • Woodland Hills, CA 91367 • 818.373.1334 • www.eeginstitute.org

aapb News & Events

FROM THE PRESIDENT

Creating the Next Step: Honoring Tradition and Embracing Science

Steve Baskin, PhD



It is my belief that AAPB is a truly unique professional group with members from numerous disciplines and diverse backgrounds. We need to keep our shared values paramount and continually meet the demands of an increasingly segmented membership. In a sense, unity and diversity come through our science. Peter Madill, the program chair for the 2005 meeting, is a primary care physician who takes a unique perspective on our field. His views are a hybrid, as Peter says in his native New Zealand twang (we're meeting in Texas), between "brain science" and mind-body medicine. Our meeting theme is "Creating the Next Step: Honoring Tradition and Embracing Science." It will be an exciting provocative meeting. We are emphasizing our core science and values while attempting to increase our visibility by reaching out to students and other professional groups. Here's a sampler.

Our annual meeting is in Austin, Texas; a wonderfully unique and diverse city (sound familiar?) with great music venues, outstanding restaurants, and Texas friendliness. The Renaissance Hotel is a well-priced luxurious property with both class and great meeting space. Our meeting will begin on Thursday evening, March 31 with one of the pioneers and thought leaders in our field, the noted **Herbert Benson, MD**.

Dr. Benson is the founding President of the Mind-Body Medical Institute and Associate Professor of Medicine at Harvard Medical School. He is the author of over 170 scientific papers and ten books including the groundbreaking work, *The Relaxation Response* in 1975. Dr. Benson is a pioneer in behavioral and mind/body medicine as well as bringing spirituality and healing into medicine. He has recently hypothesized that eliciting the relaxation response liberates constituent nitric oxide that counteracts the effects of major stress hormones. Peter and I are thrilled that Dr. Benson has accepted our invitation. This will be a fantastic event.

Ed Taub, PhD, has been a major figure in behavioral neuroscience for many years. He has graciously accepted our invitation to give a keynote address. Dr. Taub is a Past-President of AAPB, Professor of Psychology at the University of Alabama-Birmingham, Senior Scientist for the Center for Aging at UAB and Director of the Taub Therapy Clinic. He is the developer of the innovative Constraint-Induced (CI) Movement Therapy — a new family of rehabilitation techniques. This exciting therapy is shown to be effective in producing large improvements in limb use in the real-world environment in patients post-stroke. His initial therapy constrained movement of the less affected arm while intensively training, with

massed practice, use of the arm more affected by the stroke. A number of neuroimaging studies have shown that the concentrated repetitive-practice of CI therapy produces a cortical reorganization that increases the area of cortex involved in the innervation of movement of the more affected limb. Dr. Taub's work has emerged from his basic behavioral neuroscience research with monkeys. He has done work with upper limb deficits with stroke and other neurological conditions, lower limb deficits in individuals with neurologic and orthopedic conditions and recently in children with partial paralysis from cerebral palsy. This intensive rehab therapy has helped brains "rewire" themselves. Ed will receive the 2004 Distinguished Scientific Award for the applications of psychology by the American Psychological Association. His work is remarkable. Ed is a long-term AAPB member, one of our most noted scientists, and a great friend to our community.

One of the more innovative clinicians and researchers in the chronic pain world is **Robert Gatchel, PhD**, Chair of Psychology at the University of Texas-Arlington. Dr. Gatchel has investigated the complex and dynamic interaction among physiologic,

Continued on page 4A

FROM THE EXECUTIVE DIRECTOR'S DESK



Hellooo Out There

Francine Butler, PhD

Have you ever been in a group in a conversation where the topic happened to be one you were very familiar with – in fact, the topic was one about which you consider yourself something of an expert? But nobody knew you were there! Several recently published articles have made me feel that way about biofeedback and AAPB.

The first article appears in the *APA Monitor* (June 2004, pages 42-44), and is entitled “Alternative Health Care Gains Steam.” The author notes that “nearly half of all Americans have used some type of alternative or complementary medicine” and she cites meditation and relaxation therapy as examples of mind-body applications. The article quotes Margaret Chesney, deputy director of the National Center for Complementary and Alternative Medicine (NCCAM) as saying that the public is turning to these forms of medicine but that there is little to no evidence that many of these therapies are safe and effective. She goes on to describe NCCAM’s efforts to support research to study efficacy. Examples of funded studies include the effects of meditation on hypertension, acupuncture on brain activity, yoga on HIV and diabetes, self-hypnosis in surgery, massage for cancer-related fatigue, and B-vitamins on stress. The article concludes with a call for psychologists to make a contribution to CAM research.

The second article titled “Expanding Medical Training” in the *APA Monitor* (June 2004, pages 46-48) reports there is a need for “increased integration of behavioral and social sciences into medical school curricula.” The report emphasized the need to focus on behavior’s role in health, physician-patient communication and social influences on the health care system. The strategy is to affect medical school educa-

tion with the hope that if physicians understand how important behavior is, they can change how health care functions. The article concludes it is possible that “physicians who back behavioral interventions might also persuade more insurers to pay for proven interventions.”

While these two reports extol the virtues and the need to study CAM therapies, the third report by Barnes et al (2002) tells us who uses CAM and breaks the data into numerous categories. I urge all of you to read this article because it presents a perspective of biofeedback within the larger scheme of CAM in the context of all CAM usage. From the abstract: It has been estimated that the U.S. public spent between \$36 billion and \$47 billion on CAM therapies in 1997. Of this amount, between \$12.2 billion and \$19.6 billion was paid out of pocket for the services of professional CAM health providers, such as chiropractors, acupuncturists, and massage therapists. The next commonly used CAM therapies during the past 12 months were use of prayer, specifically for one’s own health (45%). Deep breathing exercises were used

by 11.6% and progressive relaxation by 3%. And biofeedback – are you ready for this – 0.1%.

Given that the number for use of progressive relaxation is 3%, one wonders why our usage data is so low.

AAPB members are the most knowledgeable group of professionals in the world who understand the benefits of biofeedback. We should be seen as THE SOURCE of knowledge in this area – for APA, for other professionals, and for health statistics.

Why then, is it, that our voice is not heard. Helloooooo out there! Can you hear me?

The report is available at
<http://www.nccam.nih.gov/news/camsurvey>

Reference

Barnes, P.M, Powell-Griser, E., McFann, K., & Nahin, R.L. (2004). Complementary and alternative medicine use among adults: United States, 2002. *Advance Data from the Vital and Health Statistics; No. 343* (May 27, 2004). Hyattsville, MD: National Center for Health Statistics.

We Encourage Submissions

Send chapter meeting announcements, section and division meeting reports, and any non-commercial information regarding meetings, presentations or publications which may be of interest to AAPB members. Articles should generally not exceed 750 words. Remember to send information on dated events well in advance.

Send Word (.doc) or text files to: Ted LaVaque, PhD, tlavaque@gbonline.com and they will be considered for posting on the AAPB website.

FROM THE PRESIDENT-ELECT

Quality Clinical Presentations

Richard Sherman, PhD



No field can progress without new ideas. This is especially true of developing fields such as applied psychophysiology and bio/neurofeedback. A great place to share ideas is at meetings where they can get exposure and discussion. Last year's annual meeting was chock full of presentations of new ideas and early testing of ones which have been around for a while.

Most of the posters were really exciting not only for their ideas but for the high quality of the studies. They tended to be reports of meticulous delineations of psychophysiological responses to interventions or tests of measurement techniques. What made the posters reporting trials of clinical interventions so valuable was their clean methodology and good writing. Readers could usually tell just what was done and why each step was taken. The populations tested were identified, the objective measures used to determine severity of the problem were shown, pre and post intervention baselines showing extent of the problems before and after the interventions were reported, the interventions were clearly explained, and – of great importance, in many cases, the post-intervention baselines were long enough to tell whether the interventions actually had effects once the patients returned to their normal lives.

These are the characteristics of good clinical presentations. They are based on the principles of single case and single group designs which have proven to be highly effective for demonstrating whether or not a new idea has an effect on the people it is tried on. Both designs follow the general format of pre-treatment baseline – intervention – post-treatment baseline/follow-up. This is abbreviated as an A-B-A design. These designs require good diagnosis of the problem, objective tracking of changes in

the problem's intensity, and long enough baselines to encompass expected variability of the problem. For example, baselines for studying typical migraines without aura need to be about a month long. The intervention includes every potentially effective part of the treatment and is given for long enough and with sufficient intensity to maximize the odds of success – to “give it everything it's got”.

There is no use worrying about what makes a technique work until it is proven to have a clinically important effect in the first place. Thus, these designs aren't intended to provide evidence of why changes take place by sorting out the contributions of non-specific factors such as the placebo effect, but they do show that the changes are real and consistent. Finding out how much of the effect is due to changes with time and the placebo effect (up to 50% in behavioral interventions) can wait until the technique's overall impact can be estimated.

Single subject designs are for testing a brand-new idea. Each subject can be treated very differently as the technique is altered to be successively more effective and subjects can differ from each other as the types of subjects appearing to be most responsive to the technique are identified through trial and error. Single group designs are the next step. They use the matured technique so each participant gets a similar treatment and the participants are as similar as possible in variables which would be expected to affect the treatment (e.g., age, in a wound healing study) diagnostic characteristics of the disorder. Single group designs need to have sufficient subjects so amount of symptom change due to the intervention can be differentiated from random variability between subjects and over time. This permits an estimation of the intervention's

effectiveness for a specific disorder.

No attempt is made to sort out which parts of the intervention are producing the effect as the idea at this point is to show that there is, indeed, a clinically important effect. If the effect isn't clinically important or if the technique takes longer or is more expensive than current interventions, there is no need to progress to complex, expensive studies. There is certainly no need at this stage to try to demonstrate whether the theory underlying the intervention is correct or not.

The best aspect of these designs is that they are absolutely free to perform. Other than the time needed for the pre-treatment baseline, they don't require clinicians to do anything they wouldn't do when performing high quality interventions. Pre-treatment baselines are usually done between the time a patient is identified and the first or second week of treatment as there is usually sufficient lag time between the initial contact and when the treatment really gets rolling.

Most new clinical ideas die of their own obvious failure as the clinicians who try them realize that not much is happening. Unfortunately, people frequently don't realize that their ideas aren't working because they don't follow-up their patients long enough to see if the treatment has maintained its effectiveness. For example, when I surveyed hundreds of people treating phantom limb pain, all thought their treatments were effective (over sixty unrelated treatments were identified). When patients' records were evaluated, it turned out that only one of the treatments was having any effect at all. The patients simply were going on to other therapists rather than returning to the original therapist so the mass of therapists thought their interventions worked.

Many clinicians waste major parts of their careers providing useless treatments because the treatments have never been tested using the simple A-B-A designs discussed above. There is simply no need for this. When the US Food and Drug Administration began to require that suppliers of devices and medications actually provide evidence that they were effective, nearly every medication and device on the market disappeared. The levels of evidence required in those early days weren't the

stringent nightmares of today. All the FDA asked for was a few decent clinical studies.

Surgical and behavioral interventions aren't governed by the FDA unless they involve the use of devices. Surgical societies and journals have now generally adopted the requirement that at least single group of studies with follow-ups of clinically significant duration be performed before a technique is accepted in wide clinical trial practice. The days when the "big man on campus" gets his (it always used to be "his")

intervention accepted because he says it works are rapidly dying within the surgical arena. Hopefully, behavioral medicine will continue joining the trend as well.

The basic principles for doing good clinical presentations are summarized in the following table. When these commonly applied precepts are followed, everybody benefits.

Continued on page 6A

Creating the Next Step: Honoring Tradition and Embracing Science

continued from page 1A

psychological, and social factors that may perpetuate or worsen a clinical pain condition. His significant contributions have helped explain the diversity of pain or illness expression and led to numerous clinical interventions including much work with biofeedback. His work has stressed the importance of early intervention and prevention. We are very fortunate to have him sharing with us in Austin his exciting clinical research.

The early operant conditioning work in epilepsy by Barry Sterman PhD (our 2004 distinguished scientist) has a wonderful place in our scientific history. This year we are fortunate to have **Jon Walker, MD**, share with us his exciting research combining coherence and power training to remediate epilepsy. Dr. Walker is a Dallas based board certified neurologist and electroencephalographer who is making a major neurofeedback contribution. The program committee is putting together a morning or afternoon epilepsy session, with a few surprise presenters, to further explore this important area of research and therapy.

We have planned a unique introduction to AAPB for new members and student members. Frank Andrasik PhD, our journal editor and Past-President has agreed to put together a free, that is correct, no cost intro to research methods workshop. Frank gives a wonderful, invigorating and very understandable overview of methodology issues. This will help the early professional become a good consumer of the research literature as well as to design studies and gather data

easily and effectively. Also for our students and new members, we will have an "Ask the Experts" symposium where some of our most noted senior researchers and clinicians will give a "snapshot" of their work and answer questions about our field. We are also please to announce that our Board Member Susan Antelis, MPS, will also give a free workshop on how to begin and market a private practice or join a group practice. This will be a true "how-to" experience geared for our student members and individuals new to the field. We are making a commitment to reduce the gray in our society.

We are also working on getting a well-

known nutritionist and a group of experts exploring the research and clinical guidelines on reducing cardiac risk factors. We are also planning an invited woman's health symposium. As the year proceeds, I will be sending you e-mail updates letting you know the progress of the meeting. The program committee, Peter and I promise you a diverse exciting program, exploring the waterfront of applied psychophysiology, neurofeedback, biofeedback, and mind-body medicine. So please plan to come and bring your friends and colleagues.

Talk to you soon,
Steve Baskin

Printed AAPB Membership Directory Available

A number of requests have been received for printed copies of the Directory. You may order a printed copy listing the name, address, city, state, zip code, phone number, and email address. If you would like a copy, please complete and return the order form below.

Please send _____ (quantity) copy(ies) of the AAPB printed Directory at a cost of \$23 each, including postage and handling.

Name: _____

Address: _____

City, State, and Zip Code: _____

Phone: _____ Email: _____

Payment: ☐ check ☐ Visa ☐ MasterCard ☐ American Express

Card Number: _____

Expiration Date: _____

Name on Card: _____

Cardholder signature: _____

Mai this form to AAPB, 10200 W. 44th Ave. #304, Wheat Ridge CO 80033 or fax to 303 422-8894

AAPB's 36th Annual Meeting



March 31 –

April 3

2005

The

Renaissance

Hotel

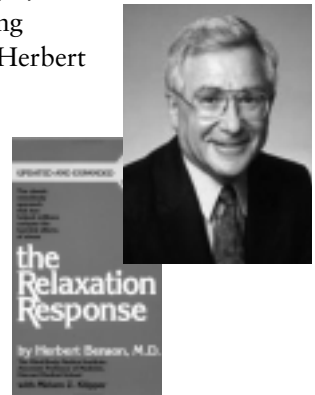
Austin,

Texas



Come join AAPB in Austin where the leaders of our industry will be gathering to share cutting-edge research and insight. Plans are in the works for a memorable event. We guarantee you the best in applied psychophysiology, neurofeedback, biofeedback, and mind-body medicine. Here are just a few of the confirmed highlights you can expect:

- The meeting will begin Thursday night, March 31, with a very special opening reception presentation by the noted Herbert Benson, MD. Dr. Benson is a pioneer in behavioral and mind-body medicine and the founding President of the Mind-Body Medical Institute and Associate Professor of Medicine at Harvard Medical School.
- AAPB's Past President, Ed Taub, PhD, will be giving a keynote lecture highlighting his award-winning research on Constraint-Induced Movement Therapy. This intensive rehab therapy has helped brains "rewire" themselves post-stroke, in other neurological conditions and recently in children with partial paralysis secondary to cerebral palsy.
- Naomi Eisenberger, from UCLA, will join us this year. Her work explores the neurocognitive mechanisms underlying both physical and social pain (pain following rejection). Her research has appeared in *Science* and she is one of the brilliant young voices in cognitive neuroscience whose work is very relevant to future clinical applications.
- Jon Walker MD, a neurologist, will present his exciting work with neurofeedback in patients with epilepsy. Dr. Walker is a wonderful clinician and electroencephalographer who will educate us with his most recent clinical findings.
- Bob Gatchel, PhD, has investigated the complexities in physiologic, psychological, and social aspects in the presentation of numerous chronic pain conditions. He has done extensive biofeedback work and is a leading clinician and researcher in the chronic pain field.



Visit the AAPB Website at www.aapb.org for details as they become available and watch for your program coming soon.

Quality Clinical Presentations

continued from page 4A

Cardinal Rules* for Establishing Credibility When You:

Prepare a *Clinical* Presentation/Article

Be certain to:

1. Title your presentation/article appropriately so it doesn't promise more than it can deliver or ascribe changes to one aspect of a multifaceted intervention.
2. Begin with a brief summary of what you did/found.
3. Describe the general characteristics of the group you worked with and define your inclusion and exclusion criteria.
4. Present how your patients were diagnosed. Don't fall into the trap of trusting diagnoses by others if such diagnoses are known to be frequently incorrect. Use recognized criteria so your audience will understand that your patients had the disorder you claim to be treating.
5. Use correct assessment techniques for the disorder (e.g., the MMPI is not valid for establishing the psychological components of low back pain).
6. Define your assessment so you establish the basis for saying that people learned the tasks you were teaching during your treatment, e.g., if you are teaching people to change their muscle tension, show the baseline status then show that those people who improved changed in the desired direction. This establishes the relationship between the intervention and changes in symptoms.
7. Use the correct outcome measures and use them correctly. Review the literature so you are up to date. For example, *0 – 10 analog pain scales must define 10 to have an objective limit such as "would faint if had to bear the pain for one more second"* rather than "most pain can imagine".
8. Establish pre and post treatment baselines of sufficient duration to establish symptom variability, e.g., headache baselines need to be between two weeks and a month. This is how you demonstrate effectiveness.
9. Use the correct design for the level of work done on the intervention already, e.g., a new idea needs only a baseline – intervention – baseline design while a test of an idea which has been shown to produce changes needs to incorporate a control group to show that changes are not due to non-specific effects.
10. Include sufficient subjects so your results are likely to be due to the intervention rather than chance variability.
11. Clearly explain what your intervention was and have some way to know that there was sufficient intensity to have a chance of causing a change, e.g., one relaxation session isn't likely to cure anything.
12. Present your results clearly with graphics rather than just tables. Show sufficient descriptive statistics so people decide what happened.
13. Never ascribe symptom changes to one aspect of a multifaceted intervention when you have no way to tease out the effect of that aspect, e.g., if you gave relaxation training and biofeedback, don't say that the changes were due to biofeedback only.
14. Do not worry about the need to prove an underlying mechanism for the technique you used. All you need to do in a clinical presentation is demonstrate that a change did take place. Other types of research demonstrate how and why.

Listen to/Read a *Clinical* Presentation/Article

Is/are there:

1. Adequate diagnosis and assessment of the subjects?
2. Adequate pre treatment baseline to establish symptom variability?
3. Objective outcome measures relevant to the disorder? Were they used correctly?
4. Intensity of the intervention sufficient to produce an effect?
5. Way to check whether the intervention was successful (drug taken properly, behavioral technique successfully *learned* and then used).
6. Sufficient patient-subjects so result is credible?
7. Appropriate design for the question (e.g. single group, controls, believable placebo, etc.?)
8. Sufficient descriptive statistics so results are clear?
9. Long enough follow-up so duration of results can be established?
10. In a multifaceted intervention, were any changes in symptoms ascribed to one element of the intervention when there is no way to differentiate the effects of each part?

*From the inside front cover of: Sherman, R. (2003). *Clinical research: Skills clinicians need to maintain effective practices*. Suquamish, WA: Behavioral Medicine Research & Training Foundation.

lifestyle | health | research

Fibromyalgia AWARE

**The first and only
magazine offering
insightful information
on Fibromyalgia.**



The magazine that addresses the needs and concerns of people affected by Fibromyalgia and overlapping conditions.

Health | Accurate, up-to-date information is provided by top healthcare professionals, enabling readers to evaluate a variety of treatment options.

Lifestyle | After the diagnosis, practical suggestions and inspirational stories emphasizing a positive balance of mind, body and spirit can help ease the transition to a new lifestyle.

Research | "Hope" for the future rests in the field of research. Readers are informed about the newest avenues of medical thought, clinical trial outcomes and the most recent research findings.

Overlapping Conditions | Knowledge is key. The ability to understand, manage and improve overall health is enhanced by learning more about other illnesses and conditions that sometimes occur with fibromyalgia.

Fibromyalgia AWARE is available as our gift to you for a tax-deductible donation of \$35 or more per year.

Fibromyalgia AWARE is published by the National Fibromyalgia Association, a not-for-profit organization helping people with Fibromyalgia.

To receive this extraordinary magazine contact us at:
(714) 921-0150 or FMaware@fmaware.org
Visit our web site: www.fmaware.org

Book Order Form

Send this form to AAPB

10200 W. 44th Ave. Suite 304, Wheat Ridge, CO 80033

or log onto the website at www.aapb.org and click on the AAPB Bookstore

New and Popular AAPB Publications!



BC-80: Pain: Assessment and Intervention from a Psychophysiological Perspective - By Richard Sherman, PhD

Information about our current knowledge of pain disorders in a straightforward, and easy-to-understand format. Provides practical assessment and treatment strategies, which are supported by clinical research. Comes with a CD-Rom



BC-81: Practice Guidelines and Standards for Providers of Biofeedback and Applied Psychophysiological Services, 2004 - By Sebastian Striefel, PhD

Information to providers and others that will help them develop reasonable expectations about legal and ethical practice issues and practice guidelines and standards of client/patient care and treatment.

Member Price: \$69.95

Non-Member Price: \$89.95

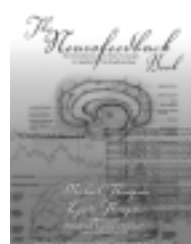
Member Price: \$20.00

Non-Member Price: \$35.00



BC-79: Evidence-Based Practice in Biofeedback and Neurofeedback - By Christopher Gilbert, PhD, and Carolyn Yucha, PhD

A summary of the research findings, mostly over the past 20 years, examining the efficacy of biofeedback for approximately 38 various disorders.



BC-76: The Neurofeedback Book - By Lynda Thompson, PhD, and Michael Thompson, PhD

An understandable explanation of the science behind biofeedback and neurofeedback. Material specifically written to prepare for certification, including a special section corresponding to the BCIA blueprint areas for EEG biofeedback.

Member Price: \$35.00

Non-Member Price: \$55.00

Member Price: \$79.00

Non-Member Price: \$99.00

☐ Member Member Number: _____ ☐ Non-member Date of Order: _____

Name: _____

Company Name: _____

Address: _____

City, State, Zip: _____

Country, Postal Code: _____

Phone: _____ Fax: _____

Email: _____

Code	Quantity	Title	Price Each	Amount

Postage/Handling

Purchase Amount

\$15-\$25

\$25.01-\$50

\$50.01-\$100

\$100.01 +

Express Mail

Fee

\$10

\$15

\$20

\$25

To be determined

Subtotal: _____

Postage Fee: _____

Tax (7.2% for Colorado Residents Only): _____

International Mail and special delivery will be billed at cost plus a \$10 special handling fee.

Total: _____

☐ Visa ☐ American Express ☐ Mastercard

Card Number: _____ Exp. Date: _____

Name on Card: _____

THE INFINITE POWER OF BIOFEEDBACK



& PSYCHOPHYSIOLOGICAL SOFTWARE

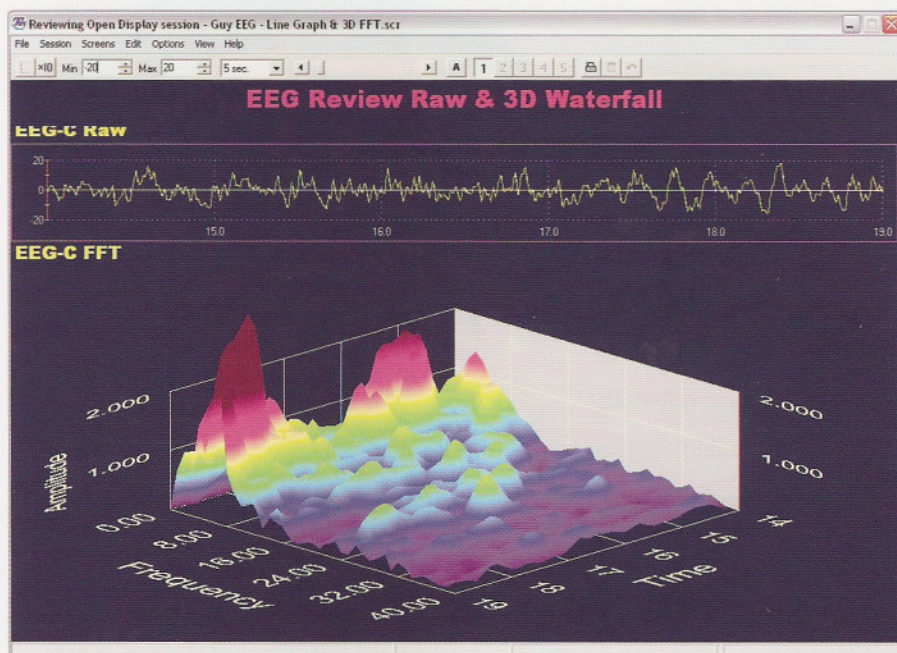


Whether you are a clinician looking for a versatile biofeedback tool or a researcher who needs a powerful data-acquisition system, the BioGraph Infiniti™ platform is designed to offer you the most complete and adaptable software solution.

One of our top design goals was to make BioGraph Infiniti™ the most powerful clinical tool possible. The program's ability to record accurate data, to track a client's learning curve both within and across recording sessions and to generate reliable reports are among its top features.

Biofeedback and Data Acquisition

STATE-OF-THE-ART MULTIMEDIA BIOFEEDBACK: With its audiovisual capabilities and exciting animations to deliver physiological feedback in many creative ways, the Infiniti Software ensures that you have a multitude of options to choose from when trying to reach a diverse client population.



EEG linegraph and 3D FFT allow you to analyze a specific temporal event.

Some Application Suites include display screens designed for viewing on multiple monitors. This powerful shaping tool allows clinicians to modify the feedback conditions on the fly and teach clients to rapidly adapt to new conditions.

TIMESAVING FEATURES ALLOW FLEXIBLE

TRAINING ROUTINES: The BioGraph Infiniti™ software allows you to load up to 5 feedback screens during a session and switch between them, on the fly. This, and other timesaving features, lets you rapidly adapt the training task to your client's needs. It provides an increasingly challenging and diversified feedback environment, without having to stop, load a new screen and restart the session.

SCRIPTED SESSIONS FACILITATE STANDARDIZED ASSESSMENTS AND

FOLLOW-UPS: Time and event-based scripts let you run automatic sessions that guide clients through pre-defined sequences of activities and then generate activity-specific statistics. These powerful scripts help you standardize assessment and follow-up sessions for optimal clinical effectiveness.

THE INFINITI

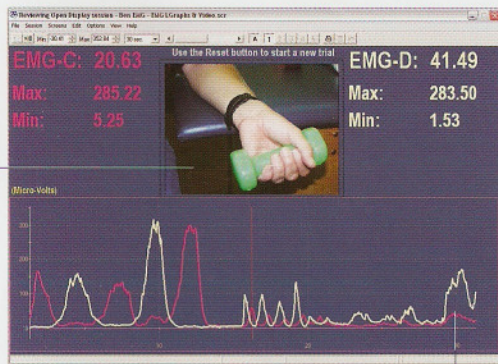
Thought Technology's BioGraph Infiniti™ software platform has been carefully designed to meet your current and future needs for biofeedback and psychophysiology - with maximum flexibility and ease of use. BioGraph

Infiniti's modular design offers a selection of specialized Application Suites as well as powerful Application Developer Tools, to satisfy beginner and

SOFTWARE

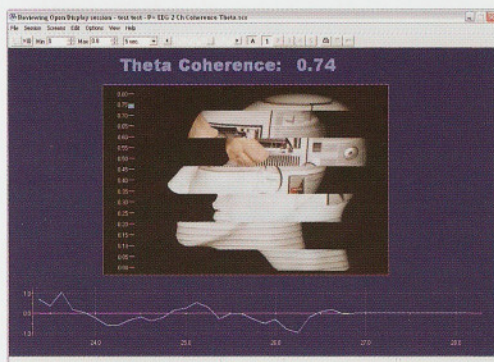
expert users alike. These options allow you to install additional features, as you need them. Not only will the software adapt itself to your needs, it will also grow with them as new modules become available. New technology like USB, Web Cam Video, Compact Flash, Automatic Impedance Checking and Sensor Recognition are integrated seamlessly.

PLATFORM



View the video images, in real-time, with the recorded physiological signals.

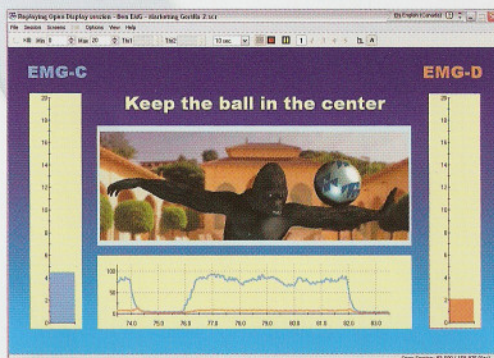
Review the data and slide the time-line, back and forth, along the physiological signal to see the corresponding video image(s).



EEG coherence biofeedback



Feedback capabilities include playing AVI movies, MIDI songs, MIDI tones, CD Music, MP3 and Wave files. Conduct the orchestra by individually controlling multiple instruments in a MIDI song.



Exciting games and animations

SYNCHRONIZE PSYCHOPHYSIOLOGY WITH VIDEO: Extend your toolbox for client assessment and training. BioGraph Infiniti™ software allows you to record your client's actions with a Web camera and synchronize the video with the physiological signals.

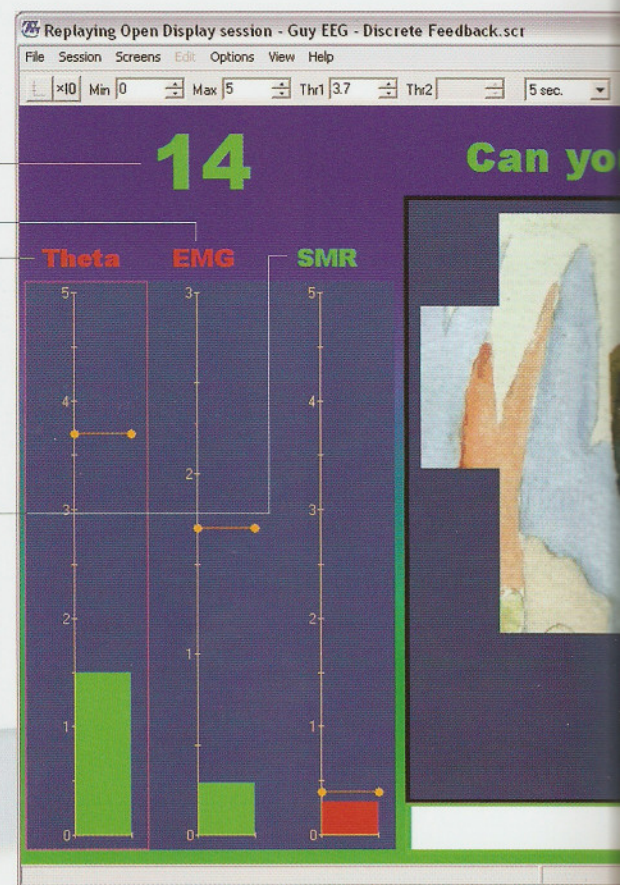
Extensive Database Options

- **CLIENT DATABASE** allows you to store as much or as little client information as required.
- **CLIENT CONFIDENTIALITY** function gives you the option to hide all sensitive client information from database screens, printed reports and exported data.
- **INACTIVITY FLAG** can warn you and your assistants if a client has not been in for a visit for too long, to help your client management work.
- **ARCHIVE, RESTORE, EXPORT AND IMPORT** client functions allow you to manage the client database and share clients between clinics without deleting important client data.
- **DATA EXPORTING FUNCTIONS** extend your ability to analyze client physiology by making it available to other data-processing applications.

Event-counters and discrete feedback options give reinforcing rewards when all conditions are met and held for a given period of time.

Selective inhibiting allows multiple animations to be controlled independently.

Instantaneous feedback gives immediate indication of success.

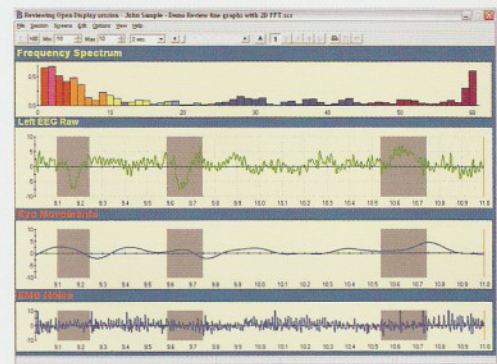


Session Reviewing and Reporting

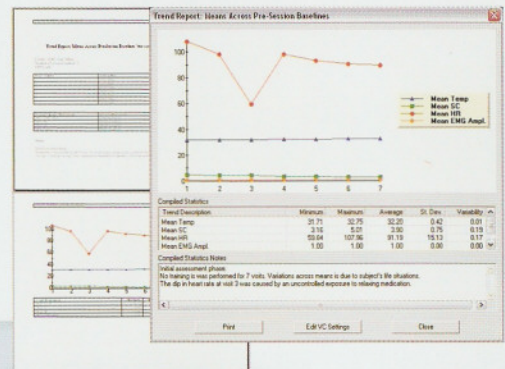
POWERFUL DATA-PROCESSING FEATURES: With its robust signal acquisition capabilities, accurate artifact rejection functions and flexible statistical analysis engine, the BioGraph Infiti™ software allows you to easily normalize recorded data and generate reliable data.

SPECIALIZED SESSION REPORTS: Scripted sessions generate sophisticated statistical reports that break down the session's data into meaningful segments and give you appropriate statistics for each segment. This ensures that you get only the most clinically significant information without having to sort through irrelevant data.

TREND REPORTING ON CLIENT PROGRESS: BioGraph Infiti's powerful trend report capabilities allow you to follow a client's progress from visit to visit, providing you with guidance regarding the next step to take. Trend reporting lets you easily demonstrate a client's learning curve, both during a given script session and across script sessions, to enhance case management and to facilitate reimbursement.



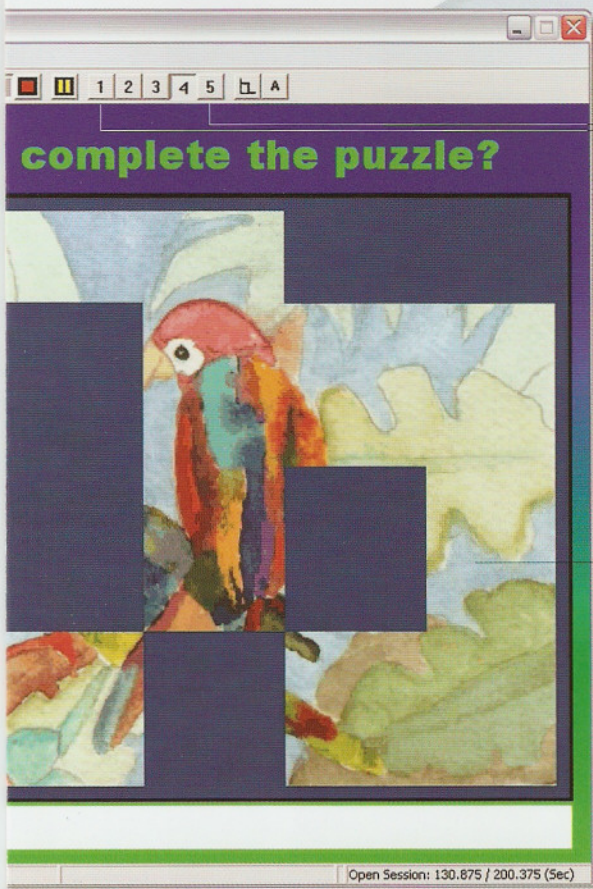
Manual or automatic artifact rejection allows you to rapidly clean session data for optimal statistical validity.



A powerful trend report generator gives you direct control over what gets printed. Demonstrating a learning curve has never been so easy.

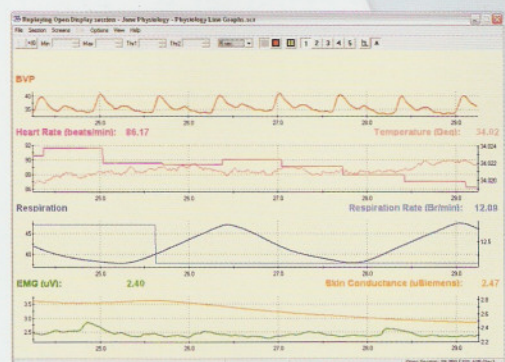
The ability to re-compute all previously saved sessions with new analysis criteria allows you to perform "what if" evaluations of recorded sessions.

Session and Trend reports are generated as word processing documents. You can edit and save the reports before they are printed.

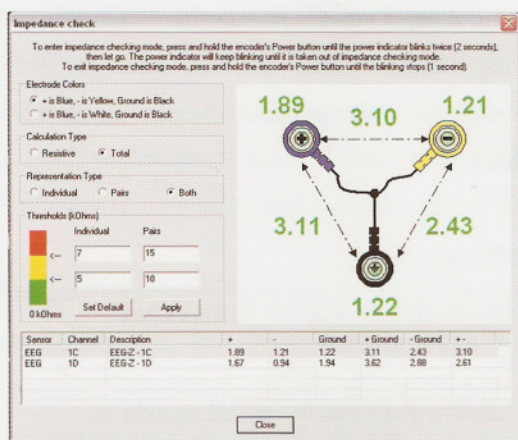


Load up to five screens and switch between them instantly for optimal training and reviewing capabilities.

A discreet reward puzzle.



Physiological biofeedback screens.



Integrated impedance checking.

Infiniti System hardware features:

- For enhanced quality of recording, the system provides integrated impedance checking, in one easy step with the EEG-Z sensors.
- BioGraph Infiniti's ability to process our new Infiniti encoders' high sampling rates enables you to record raw signals at 2048 samples per second. This sampling power allows more precise signal processing capabilities for EEG, EMG and EKG signals.
- The automatic sensor recognition feature ensures proper hardware setup. Each time you record a session. Beginners will also appreciate this new level of user-friendliness.
- The Infiniti system offers two ways to record low-noise physiological data: You can use the feather-light fiber optic cable, for a low-noise, direct-to-computer, connection or use the Compact Flash memory card to use the device as a stand-alone data-logging unit.

Application Developer Tools

The Application Developer Tools include three separate programs: the Channel Editor, the Screen Editor and the Script Editor.

The three are required to build complete Application Suites.

THE CHANNEL EDITOR allows you to build sophisticated data-processing structures, which are composed of up-to 40 physical channels and up-to 255 virtual channels, for biofeedback or data-acquisition applications. The Channel Editor includes a large library of computation algorithms and an intuitive user-interface to make developing specialized applications a breeze.

THE SCREEN EDITOR enables you to design any number of display screens to use in conjunction with a given channel set. Screens are designed by placing graphing and media instruments on a blank screen area. Combine immediate and discrete feedback instruments with timers and event-counters to build the sophisticated feedback paradigms that are required for today's demanding biofeedback environment.

THE SCRIPT EDITOR is a powerful programming tool, which allows you to write session scripts for automatic assessment, follow-up and training applications. Scripts expand the power of the Infiniti system by allowing you to break a physiological recording down to the smallest logical component and define precise task-specific statistics. Scripted sessions are the only way to generate reliable trend reports as they allow you to perform standard and repeatable assessment and follow-up recordings.

What our Users say about the Infiniti Software Platform:

"I have been using two ProComp Infiniti's with the BioGraph Infiniti™ for my NIH funded research on energy medicine.... I find the system's functionality, clinical tools programmability and reporting features very impressive. It will enhance and perhaps transform the practice of psychophysiology as well as biofield science."
Gary E. Schwartz, Ph.D.

"I am extremely impressed with the Infiniti system in terms of the excellence

in the design of the hardware and software. It is extremely versatile, and has outstanding displays and accurate signal processing. It should be applicable for all biofeedback and neurofeedback protocols."
Joel Lubar

"The EEG-Z, combined EEG and impedance sensor, used with the ProComp Infiniti hardware, is terrific. Checking impedance is quick and easy, plus you know immediately which electrode, if

any, has a poor connection. The client gains two ways: faster hook-up and better quality feedback. The Infiniti system worked perfectly at a workshop I just gave... Infiniti will lead the field in combining neurofeedback and other biofeedback modalities."
L. Thompson, Ph.D.

"You and your staff should be very proud of this achievement... it will advance the practice of biofeedback."
Fred Shaffer, Ph.D.



Thought Technology Ltd.

2180 Belgrave Avenue, Montreal, Québec, Canada H4A 2L8
(800) 361-3651 • Tel (514) 489-8251 • Fax (514) 489-8255
www.thoughttechnology.com

MAR644-00