



# *Psychophysiology today*

the magazine for mind-body medicine



**Argue for your limitations and sure enough they're yours.  
R.Bach**

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## Editorial



Time has flown since the first issue of *Psychophysiology Today* was published. We received many positive and encouraging emails from all over the world requesting more information, giving compliments about the articles or wanting more help. Many people reported that they appreciated the e-magazine format and asked numerous questions that kept me busy for a few weeks. Increasingly apparent is our dependence on internet communication, which truly makes us a global family, and allows us to communicate quickly. I remembered how long it would take to organize a task like this with regular mail – unimaginable – not practicable at all. 13 years ago when I wrote my final exam at the University, I realized how difficult it was to find all the studies I needed for my research in the library and that it was nearly impossible to get access to specialized topics, articles, studies and so on. I take my hat off to all those earlier editors who had to research how and where to get all the materials; I guess they had to move from place to place. Whereas, I just use a keyboard, a computer and long nights—and, hopefully, will find the time to buy a more ergonomic chair soon (so much for staying healthy at the computer). There is something to be said about our “old” ways of having to search through libraries!

With PubMed, Google and many other search engines, abstracts and full text articles are easily accessible. The problem now is not the number of articles but information overload and how to judge content and quality. I am glad that through *Psychophysiology Today* we can contribute to the exchange of knowledge and am honoured to read all your submissions. However sometimes we need to reject materials in terms of style, content or other reasons. In most cases we will give feedback on the form of changes that should be done to have the article accepted next time. I extend a very special thank you to all my busy colleagues who volunteered to be editors for this e-magazine.

Looking back to our annual highlight –the BFE Meeting -the 9<sup>th</sup> Annual BFE Meeting in Hasselt / Belgium was very successful with in-depth workshops and an outstanding scientific program. The highlight for many attendees was the live piercing by Mr. Kawakami, a yogi from Japan, who also impressed the local media as he demonstrated that what we commonly believe as limits of possibilities may not be what actually is possible.

The many invited speakers and workshop presenters were encouraged to summarize their presentations for *Psychophysiology Today*. Many gladly responded to our request and I especially thank Dr. Don Moss, Dr. Bernie Brucker, and Dr. Gabe Sella for their contributions.

My special thanks is directed to our two editors for language and style Laurence Todd and Jessica Cameron who were most helpful and spent much time on editing this issue and Theresa Stockinger who helped to finish this magazine.

Wishing you a pleasant read and I look forward to your future submissions on common interests, case descriptions, or educational or diagnostic procedures. Please send us an email with your feedback. ([editor@bfe.org](mailto:editor@bfe.org)) We appreciate hearing from you.

Yours truly,  
Monika Fuhs  
Editor-in-chief

## \*Note from the President of the BFE Scientific Advisory Board



All those who attended the 9<sup>th</sup> Annual BFE meeting in Hasselt, Belgium can attest that it was a great success. The workshops and presentations were outstanding and the opportunity to mingle and share with each other and the presenters is a living example of feedback, a process necessary for learning. It truly was an interdisciplinary and multi-national meeting. The e-magazine, so ably edited by Monika Fuhs (she truly does a yeoman's job) synthesized the many themes that underlie the exciting area of applied psychophysiology and biofeedback. The abstracts of the 9<sup>th</sup> Annual BFE Meeting in Hasselt, Belgium, will be published in

June, 2005 issue of *Applied Psychophysiology and Biofeedback*. We thank Frank Andrasik for making this possible.

The BFE looks forward to seeing each of you at the 10<sup>th</sup> Annual meeting to be held in Vienna, February 14-18, 2006. The requests for submissions for this meeting have been sent out. For more information see, [www.bfe.org](http://www.bfe.org).

Finally, I invite each of you to submit articles, short reports, clinical/educational procedures for possible publication in *Psychophysiology Today*.

Erik Peper, Ph.D.  
President  
Scientific Advisory Board

*\*We thank Katherine Gibney Hughes for her helpful editing and comments.*

## **We are pleased to introduce our team of editors:**

### **Monika Fuhs, Mag.rer.nat., Dipl.Psych.:**

Studied Psychology at the University of Vienna, worked at the neuropsychiatric station for children at the Vienna AKH for many years as well as doing a study about kids and development of language for the Vienna Academy of science. Board member of the ÖBfP (Österreichische Gesellschaft für Biofeedback und Psychophysiologie), editor of the new BFE Journal 'Psychophysiology Today', author of articles with Erik Peper, Co- Director of Work Solutions for the “Healthy Computing and prevention at the worksite” program and Director of the Holistic Learning Institute. Monika Fuhs is a licensed teacher and trainer for dyslexia and perception problems (ReLeMaKo®) and brain friendly learning. She teaches workshops in the fields of stress management, Holistic Health, Healthy Computing and optimum human functioning with Erik Peper and brain management and “brain – friendly” teaching and learning in different schools, workshops for “Stress Management and Success for Kids” as well as leading a private practice for kids and adults. Her main interests focus on mind body medicine and what it takes to make people change and how biofeedback and related therapies can help to make this process as successful as possible.

### **Daniel Hamiel, Ph.D.:**

Daniel Hamiel, Ph.D. is head of the Cognitive-Behavioral and Psychophysiological unit, Tel-Aviv Mental Health Center, Tel-Aviv University, Medical School. Director of Cognitive-Behavioral Intervention, the Cohen Harris Center for Trauma and Disaster Intervention. He is a clinical psychologist, certified in biofeedback (BCIA), neurofeedback, and in hypnosis. Past president of the Israeli Association of Biofeedback, he teaches workshops on cognitive psychology and biofeedback in many countries. He was in a clinical practice in Cincinnati, Ohio from 1992-1995. Currently, Dr. Hamiel is involved in developing and performing a stress management program in schools in Israel, Turkey and the USA, for schools that have suffered terror attacks.

### **Don Moss, Ph.D.:**

Donald Moss, Ph.D., is adjunct graduate faculty in Health Psychology at Saybrook Graduate School in San Francisco, California, and a partner in West Michigan Behavioral Services in Grand Rapids, Michigan. He is Editor of the Biofeedback Magazine and Consulting Editor for the Journal of Neurotherapy and the Journal of Phenomenological Psychology. Dr. Moss has over 50 publications in the fields of psychophysiology, biofeedback, and mind-body therapies, including an edited book (Handbook of Mind Body Medicine for Primary Care, Sage, 2003). He has given lectures and workshops on these topics throughout the world, including recent presentations at the Association for Applied Psychophysiology and Biofeedback, the International Association for Cognitive Psychotherapy, the World Congress of Behavioral and Cognitive Psychotherapies, and the Biofeedback Foundation of Europe. He is also past-president of AAPB.

### **Erik Peper, Ph.D.:**

Erik Peper, Ph.D. is an international authority on biofeedback and self-regulation. He is Professor and Director of the Institute for Holistic Healing Studies at San Francisco State University and Director of Work Solutions USA in Berkeley, CA. He is past president of the Biofeedback Society of America (now AAPB) and Biofeedback Society of California and present president for the BFE. He is co-author of Healthy Computing - a biofeedback software protocol to prevent the risk of injury from working with computers. Amongst his most recent books are *Healthy Computing with Muscle Biofeedback: A Practical Manual for Preventing Repetitive Motion Injury*, *Creating Wholeness: A Self-Healing Workbook Using Dynamic Relaxation, Images and Thoughts*, and *Breathing for Health with Biofeedback*.

### **Gabriel Sella, M.D.:**

Gabriel E. Sella, M.D. has been a member of AAPB for over 10 years. He has done research and clinical work in the area of biofeedback for over 10 years. Dr. Sella has published 85 peer-reviewed papers, 10 textbooks and 1 technical CD ROM. He has written chapters in several scientific textbooks and publications. Dr. Sella has given 267 international conferences and seminars, many of them in the area of SEMG investigation and neuromuscular rehabilitation as well as soft tissue injury and pain. Dr. Sella is a founding member of the Biofeedback Foundation of Europe. He is on the editorial board of several journals, including *Europa Medicophysica*.

### ***Section Language and style:***

### **Jessica Cameron:**

Jessica hails from Australia and holds a Bachelor of Arts in English Literature and a Post Graduate Diploma in Management. She is an enthusiastic advocate of biofeedback and works with her partner, Dr. Martin Brink, running an institute for the treatment of chronic pain patients in Berlin. Furthermore she is willing to serve as a volunteer in editing *Psychophysiology today* which ironically takes her back to her first career role as a book editor.

### **Laurence Todd:**

Laurence Todd's interest in psychophysiology is fairly recent, having been appointed Practice Manager to an independent clinic specializing in diagnostic investigations into chronic fatigue syndrome and eating disorders, leading to novel treatments utilizing biofeedback software. Previously, Laurence, a Cambridge Diploma-qualified English teacher, taught a wide range of people both in the UK and Thailand, from senior business management to hospital consultants and from university postgraduates to primary school children, that included a Director of Studies appointment at a leading private language school in London. He is applying this communicative, linguistic knowledge and experience in the hope that this e-magazine can be understood and appreciated by as wide an audience as possible.

# Guidelines for submissions to *Psychophysiology Today*

*Psychophysiology Today* is published four times per year and distributed by the Biofeedback Foundation of Europe as an e-magazine.

## *Editorial Statement*

Items for inclusion in *Psychophysiology today* should be forwarded to [\*\*editor@bfe.org\*\*](mailto:editor@bfe.org)

Articles should be of general interest to the Biofeedback community.

The general interest of the BFE is to offer educational, informative and, where possible, factually based articles and information.

All articles are reviewed by our editor team, the editors reserve 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 electronically, preferably Microsoft Word. PDF files and scanned documents can not be accepted.

If your files are too large for sending electronically please submit on a disc to the address below.

For the authors section submit a biographical sketch (30 words) and photo of the author. 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. GIF or TIFF preferred for graphs and JPEG for photos.

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

***Articles in this issue reflect the opinions of the authors, and do not reflect the policies or official guidelines of BFE unless stated otherwise.***

**Editor in Chief:** *Monika Fuhs, Mag.rer.nat.*

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## **List of editors:**

### **Section Biofeedback:**

- Daniel Hamiel Ph.D., Israel
- Jan v. Dixhoorn Ph.D., NL
- Don Moss, Ph.D., USA
- Gabe Sella, Ph.D. USA
- Erik Peper , Ph.D. USA

### **Section Neurofeedback:**

If you are interested in volunteering as an editor in this field please let us know.

## **Language editors:**

- Jessica Cameron, AUS
- Laurence Todd, GB

## Picture gallery from the 9<sup>th</sup> annual BFE Meeting in Hasselt

If you want to see more pictures please visit [www.bef.org/9th.html](http://www.bef.org/9th.html)



Donald MOSS



Giselher GUTTMANN



Larry KLEIN &  
Erik PEPPER



The Gala dinner was a great event for all



Mitsumasa KAWAKAMI &  
Frank ANDRASIK



## A press release from the local news in Hasselt during the 9<sup>th</sup> BFE Meeting

### "You must be willing to believe in it".

Biofeedback gives equivalent results to years of yoga training.

**Hasselt - "The reason why I invited this Japanese yogi is that I wanted to know how much pain he feels and how he can do these things without screaming of pain", says Dr. Peper, president of the Biofeedback Foundation of Europe. Ten minutes later Mitsumasa Kawakami wets the iron skewer with his tongue and pierces it through the skin of his throat. His respiration rate does not increase, his heart rhythm remains stable. "Health is control over your body", concludes Dr. Peper.**

Biofeedback is a relatively new field within medicine. The method is monitored closely by the pharmaceutical industry, because if Dr. Peper could influence medicine, patients in Western society would need a lot less pills to control pain. A computer with screen would be all that is needed to control pain. Through biofeedback people can see on a computer screen how their body reacts. These reactions are monitored using sensors. The sensors measure muscle tension, skin temperature and blood pressure, analyze these data and show them on the screen in an understandable way. For the patient the computer screen is like a mirror to his inner body. He can see how his muscles react to inner (stress) and outer (workload) stimuli. Working with the physician the patient can figure out how his physical complaints are related to his psychological state. Then he can learn how to react in order to suppress the physical complaint, for example by adapting his respiration rate. "Biofeedback has proven to diminish incontinence in women by 80%", says Dr. Peper, who is the coordinator of the scientific program at the 9th Annual Meeting of the BFE in Hasselt.

#### **Respiration**

"Biofeedback makes it easier to understand your body", says Dr. Peper. Often people are unaware that they work in a certain posture that can cause severe complaints in the future. It is common for journalists to work on the computer with tensed shoulders. This causes, after a period of time, a cramped posture, which leads to pain, faster breathing and the beginning of a vicious circle. While a relaxed posture and slower breathing can reduce pain by a large extent. By using biofeedback you can make this visible in an easy way.

#### **Health**

"Health is control over your body. A yogi practices this skill in an extreme way", says Dr. Peper. Then he asks Mitsumasa Kawakami to show his tongue to convince us that the tongue has no hole in it. We confirm that Mitsumasa has no hole in his tongue and noticed that he has not had any alcohol. "I concentrate and force my body to take the same atomic structure as the steel", explains the yogi. "Apart from a strange cold feeling, I felt nothing at the time the skewer pierced my tongue. But this morning I accidentally pierced my finger while getting the skewers out of the car, and I was bleeding and feeling pain. How I can do these things? By training my brain a lot. It is possible, but you have to be willing to believe in it".

*Translated article. Original article written by Gunter Willekens and published in the newspaper "Het belang van Limburg" on Feb. 24, 2005.*

# The Limits of your Beliefs are the Limits of your Reality<sup>1</sup>

Monika Fuhs \* / Erik Peper\*\*

\*Holistic Learning Institute, Vienna and \*\*San Francisco State University

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*The Japanese Yogi and healer M. Kawakami sat in a half lotus position in front of the audience while numerous sensors were attached. His skin conductivity, pulse, breathing, hand temperature and EEG were projected onto a screen behind him which the audience could observe. He began with a slow breathing meditation and the physiological recording showed slow diaphragmatic breathing--his internal physiological experience-- you could see his stomach moving slightly in and out. Even though everyone was staring and waiting for him to pierce the skewers through his throat and tongue, he appeared calm. Even when a reporter asked to inspect his tongue to be sure that there was not a hole in it already, it did not bother him. He just stuck out his tongue to be inspected. He was calm in a situation where anyone else would usually be nervous. It seemed as if he really didn't mind and did not experience performance anxiety. After a minute, he took the first unsterilised skewer and while exhaling he stuck it through the skin in front of his Adam's apple, he paused while inhaling, and then continued pushing the skewer through the skin during the next exhalation. He then took the second skewer and pushed it through his tongue, again only pushing during exhalation and pausing during inhalation. He was relaxed and looked into the camera. After a while he removed the skewers in the same way he had inserted them. There was no bleeding from his tongue or throat. The puncture wound closed rapidly and the next day there was no inflammation in fact the puncture wounds had healed. He reported no pain during the piercing nor did his physiology show any reaction that would normally be associated with pain. During the piercing his physiology showed a predominance of alpha EEG activity, rapid heart rate that was not different from the baseline and minimal skin conductance activity.*

*At the same time a volunteer from the audience was monitored simultaneously while observing Mr. Kawakami's piercing his throat and tongue. In her case there was an observable physiological response to the demonstration as indicated by an increase in breathing rate, skin conductance level, muscle tension and lowering of her peripheral temperature. She appeared to be watching with bated breath possibly anticipating the potential pain and bleeding and showed no reduction in physiological arousal even after the skewers were removed.*

*She commented afterwards: "I couldn't believe my eyes. The time seemed to pass very slowly and I could almost feel the pain myself. How could he do that?"*

What was the purpose of this demonstration? Was he just a unique person without a regular pain threshold or was he an example of what is a latent potential in each of us and thereby a demonstration that the limits of beliefs are the limits of possibility? When a yogi performs a feat such as piercing, it is not just good showmanship; it is a demonstration of disciplined training and conscious control over mind and body. It defies our culturally accepted Western beliefs that puncturing the skin with an

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<sup>1</sup> Some of the concepts are derived from Peper, E., Gibney, K.H. & Wilson, V. E. (in press). Enhancing Therapeutic Success: Some Observations from Mr. Kawakami: Yogi, Teacher, Mentor and Healer. *Somatics*.

unsterilised skewer will result in pain, bleeding, inflammation and possible infection. The purpose of the demonstration is to re-examine our self-limiting beliefs of what is possible--perhaps we have more potential than we believe?

Mr. Kawakami's purpose was to show that the limits of belief are the limits of reality. Through the demonstration he showed that the commonly accepted notion that it "will hurt, bleed, and become infected" may need to be re-examined and that there may be other cognitive, emotional and spiritual approaches that can open and change the mind-body-spirit-connection.

In earlier research, Mr. Kawakami has demonstrated repeatedly that he has excellent self-regulation skills in breathing and pain control. In one systematic study, he sustained a breathing rate of two breaths per minute for 20 minutes while maintaining normal Oxygen saturation without significantly increasing end-tidal Carbon Dioxide (Peper, Kawakami, Sata, Franklin, Gibney, & Wilson, 2002). He reported that breathing is one of the important processes used to facilitate painless tongue and neck piercing (Peper, Kawakami, Sata & Wilson, in press). Breathing - Pranayama - is a major component of yoga training for voluntary control of the autonomic systems of the body. Mr. Kawakami is a role model for demonstrating human possibilities, whether it is in relaxing the body and focusing the mind, meditation, controlling pain, or enhancing healing through energetic means. The major qualities he has demonstrated through his work are:

- **The limitations of experience are the limitations of our thoughts and beliefs.**  
Kawakami appears to be able to transcend familial and cultural conditioning. With an open mind he inquires about the goal or task at hand. His innate response is, "let's explore and see." He does not limit himself with thoughts of impossibility—he responds by saying, "I do not know what is possible and I will just train and see if it is achievable." In past research, he was always willing to explore and challenge himself and his beliefs – he is willing to be tested and studied to see if what he believes can be scientifically validated. For Mr. Kawakami there is no failure, unless you fail to explore! In this process of exploration, the impossible may become possible. Unlike many other people who would just give up after a few attempts and get stuck in their belief that it is impossible, he appears to have nurtured a "beginner's mind." Open minded exploration is exemplified by a child's curiosity of exploration. A child does not experience "failure" as it learns new skills. Each failure is information (feedback) to do it differently—observe a baby's progression as it learns to crawl and then walk—despite falling down hundreds of times. The hundreds of "failures" of falling do not interfere with achieving the goal of walking. Walking is possible, every one around them walks. Most likely a child does not judge a task as failure or success; it just explores ways of doing things.
- **Awareness, listening and acting in congruence with self-experience.**  
Health involves listening to one's intuition and acting upon it, regardless of whether others agree or not. A profound example of Kawakami's ability to listen to himself was observed in a recent collaborative study of tongue piercing while recording Quantitative Electroencephalography (QEEG) (Peper, Wilson, Gunkelman, Kawakami, Sata, Barton, & Johnston, unpublished). To reduce movement artefacts in the physiological recording, he agreed that someone else could hold his tongue during piercing. Yet, as he started to pierce, he stopped and said he could not do it because he could not relax his tongue when it was being held by another person. He then held his tongue with his left hand while inserting the skewer through his tongue with his right hand. Even though this seems insignificant, it represents a major

critical theme of good health—**he listened to his feelings and acted upon them.** He did not acquiesce to social pressures to continue the experiment. He was willing to try the experiment with someone holding his tongue—another confirmation of his honest willingness to explore—and yet, he confidently stopped the research session because it wasn't working for him. However he did not experience this as a failure as he is aware that most learned skills are state dependent and need to be practiced.

Some others may have continued in order to “save face” and possibly would have injured themselves as they yielded to the pressure of scientific inquiry.

- **Openness to experience and other perspectives.**

Kawakami appears to live his life with full passion and excitement and has an openness to exploration and thereby growth which is not constrained by dogma. He uses every experience and exploration and even challenges for his personal growth and well being. He does not automatically say, “No,” or “It is not possible,” to new experiences or different concepts instead he is open and willing to explore many things and listens to his own experience and not what others say.

- **An alternative attitude towards pain.**

Kawakami reported that he uses a meditative strategy in order not to experience pain or bleeding. From his perspective, pain sensations are a normal defensive reaction within the body and can be inhibited by controlling the autonomic nervous system. For him the skewer, his spirit and his body are one and with concentration, emotional consciousness, will power and prayer to ‘becoming one with the skewer’ he does not experience pain. At first glance it seems that he overrides the thoughts and emotional associations of “it is painful” or “it will induce bleeding.” But it is more than overriding these thoughts; it is letting them disappear and then focusing his thoughts and consciousness on an experience of oneness. He stated it was necessary to welcome--not to be hostile to--the foreign objects or skewers entering his body. It means releasing emotions of anxiety and fear as soon as possible and being prepared for and welcoming the skewer entering the body. He contemplated and spoke to the skewer, “You are gently entering my body”. He believed that through the communication between the skewer and the receiving body, the unification of ego, mind and soul is complete, which allows the painless piercing procedure. From the Yogi’s perspective, this belief is transmitted to the autonomic nervous system that controls the body’s defense system. Through breathing, meditation and mental concentration, he has reported communicating with his sensory and autonomic nervous systems to create or experience a painless experience. When inserting the skewer, he reported piercing only while slowly exhaling and not moving while inhaling. What is important to remember is that he is not abnormal and has normal pain and bleeding responses to stimuli when he is not applying his yogic skill. In fact he reported that he hurt himself on the skewers as he took them out for the demonstration and started bleeding. This is similar to a report by G. Eggetsberger when he studied Mantak Chia in Vienna while he was piercing his body. Yet, afterwards he did not complain about the pain of the piercing but the tightness of the headband that was used to secure the electrodes.

- **Mastering discipline, and training skills.** The painless piercing skill may appear to be magical; but on closer inspection, it is the result of skilful training and discipline. Initially, in Kawakami’s many years as a body-builder, he learned the core principles of success; personal achievement is based upon the quality and quantity of commitment to training and that shaping

one's attitude and intent with discipline is important. His training culminated in him earning the title of Mr Japan. It was his commitment to excellence that introduced him to Yoga, so that he would gain more control and awareness in order to optimise his performance.

The demonstration by the Yogi simply proves that if a person is motivated and willing to practice with awareness plus an ongoing desire to enhance his or her skills, it is possible to learn control and mastery over the body and mind. Most people can learn the skills, however, they may often say, "It is impossible" and therefore not even attempt or invest in the time and commitment required to learn the skills. Remember the many falls of the baby trying to walk. It appears that most people can learn physiological mastery - e.g. most people can learn how to ski; however, only a few will win the Olympic Gold. Yet, most will be able to ski well enough to go down most slopes. Mastery is not magic - just like learning to play basketball or the piano - it takes willingness, desire and practice. Even in cases of fire-walking, most people are able to learn these skills, again demonstrating that the impossible is often very possible. Breaking through one's beliefs by experiencing the "apparently impossible" is not only fun, it is a positive sensation that makes these experiences worthwhile as it creates new possibilities and hope.

The piercing demonstration suggests the possibility that people in pain may have additional options for gaining pain control. Usually, if we experience pain we become exhausted, tend to constrict ourselves and this interferes with healing. Pain is usually experienced as a negative event that disturbs our well being. On the other hand, if we perceive it as a signal that something needs to be changed or that it is signal that has caused a cascading sequence of thoughts and feelings alternative interventions and pain control may be possible. By teaching the attitudes used by Mr. Kawakami, some pain patients experience significant improvement in health and reduction of pain especially if they reframe the pain and try to reframe their sensation, master control of consciousness and accept it as a normal reaction of the body, and develop hope.

## SUMMARY

The lessons extracted from the collaboration with Mr. Kawakami are the following:

1. There may be more to the human being than thoughts and flesh. We are a centre of consciousness that is affected by our past, our future beliefs and by others, thus we need to be aware of our internal state.
2. Look at explorations with an open heart and mind, rather than reaffirming limitations. Say, "Yes, I will explore it" instead of, "This is not possible." Eliminate **psychosclerosis** (a term created by A. Montagu) – a hardening of the attitudes.
3. Learning is an ongoing process. We can learn at all ages but have to be aware that learning does not follow a constantly increasing curve. There may be different steps and long-lasting plateaus. Even when we think we are not learning anything, it may be a period in which the new knowledge gets sorted out and we are crossing this plateau to reach the next step.
4. Listen to yourself. Act upon your intuitions and feelings. Regardless of what others say or want to do, check with yourself, "Do I want to do this? Is it healthy to do?" Finally, give yourself the chance to experience and observe what happens...
5. Contribute to the well-being of others; be generous in spirit and actions.
6. Develop mastery; a process through which self-esteem and confidence are nurtured. Be aware that things are possible even when you fail – it may not be the appropriate time or there may be

something wrong with the conditions. Stay open to experience (e.g. remember how often a child falls until it finally is able to walk – it is a process of much trial and error). Failure is only an outcome or result.

7. Be joyful and have fun in life. See the good in yourself and others.
8. Be open to a spiritual perspective, and changes including new experiences in your life.
9. Remember that great talents do not just fall into your lap; they require hard work also and if you develop enough excitement, work will change into fun!

Mr Kawakami is a role model who demonstrates what is possible so that others can have the opportunity to develop and nurture their untapped potential. Finally, scrutinize your own old beliefs and search for the exceptions to the rules as a possible promise - every exception is an indication that the rule is not the only reality! Expand your beliefs, and your experiences may change. Consider that life is a big stage and you are just an actor and you can decide the role you play. Or to say it with Richard Bach (1970) author of the bestseller *Jonathan Livingston Seagull*,

**“Argue for your limitations and sure enough they're yours.”**

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- **Bach R. (1970):** *Jonathan Livingston Seagull*, Ullstein Gmbh & Co. KG, Berlin



Abb.: Kawakami while inserting the barbecue stick trough his tongue

*\*We thank Jessica Cameron for her editing and helpful comments*

# Psychophysiological Psychotherapy: The use of Biofeedback, biological monitoring, and stress management principles in Psychotherapy

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Sigmund Freud described the interpretation of dreams as the “royal road to the unconscious” for psychotherapy (1900). Today psychophysiology can provide that royal road for psychotherapists. This program introduces fifteen principles guiding the use of psychophysiology in psychotherapy, including specific techniques and case examples, showing the use of biofeedback instrumentation to augment the work of psychotherapy. The author also cites the work of pioneers such as Sandor Ferenczi, Wilhelm Reich, Marjorie and Hershel Toomim, and Ian Wickramasekera, who contributed to understanding the potential role of the body in psychotherapy.

**Principle 1.** Cultivating physiological relaxed states facilitates psychotherapy. Freud began his psychoanalytic practice initially with hypnosis, and after he abandoned hypnosis continued to invite the patient to recline on a couch. The early psychoanalyst Sandor Ferenczi advised the use of relaxation exercises to overcome inhibitions to free association (1925). Commencing a psychotherapy session with a brief relaxation exercise increases the patient’s awareness and expression of emotion, and eases those inhibitions which impede therapeutic awareness (Moss & Lehrer, 1998). When patients either block or struggle with emotional pain, a return to relaxation reduces the intensity of distress and enables acceptance.

**Principle 2.** Observing changes in the body leads to detection of defensive and inhibitory operations. Therapist observations of movement, posture, and changes in non-verbal expression provide keys to current emotional and cognitive processes in the patient. Sudden changes in the body often reveal current moves to block emerging thoughts, feelings and impulses. Patterns of bracing and tension in the musculature support the defensive operations of the mind. The repetitive and chronic suppression of emotions and impulses creates an “armoring” in the musculature (Wilhelm Reich, 1927, 1933). Anna Freud (1936) commented that the “defenses meet our eyes in a state of petrification when we analyze the permanent ‘armor plating of character’.”

**Principle 3.** Electronic monitoring of physiology enhances this recognition of mind-body linkages. Biofeedback instrumentation detects subtle physiological changes and processes not evident to the observer, providing a signal to therapist and patient alike of emotionally significant internal responses. The display of the biological signal reduces therapeutic tensions around “resistance.” The patient perceives the biological signal as “objective” and accepts its image more readily than therapist-initiated interpretations.

**Principle 4.** Biofeedback instrumentation identifies maladaptive physiological responding: Maladaptive responses are disproportionate to the triggering situation, either exaggerated or minimized. In addition, the individual may fail to recover in a timely manner when the triggering stimulus passes. Once maladaptive physiological response patterns are recognized, the biofeedback instrumentation enables a retraining and modification of the maladaptive elements. Toomim and Toomim (1975) introduced a framework utilizing electrodermal biofeedback to identify patterns of over-reactors and

under-reactors, and showed how biofeedback training could facilitate a more optimal pattern of responding for each group.

**Principle 5.** Recognizing the mind-body linkage facilitates psychotherapeutic progress. The psychophysiological principle is that: "Every change in the physiological state is accompanied by an appropriate change in the mental emotional state, conscious or unconscious, and conversely, every change in the mental emotional state, conscious or unconscious, is accompanied by an appropriate change in the physiological state" (Green, Green, and Walters, 1970, p. 3). When the patient directly experiences this reciprocal integrity of body and mind, it facilitates an awareness and ownership of many previously unrecognized emotional and motivational elements in everyday living.

**Principle 6.** When the patient is verbally stuck, turning to physiological pathways moves psychotherapy forward. Exploration of body posture and tensions often serves to move therapy forward, when verbal processing is at an impasse. Direct physical interventions, such as breath training, postural re-alignment, and therapeutic massage, also can facilitate renewed movement toward awareness and health. In general, "body-work" enables expanded subjective awareness.

**Principle 7.** When the patient is physiologically stuck, turning to psychological exploration moves the process forward. Body-work such as breath training or biofeedback can also get stuck, and when this happens, discussing the emotional accompaniments of the physical impasse often clears the way for renewed bodily learning. Wilhelm Reich introduced these classical strategies of mind-body therapies, expressed in principles 6 and 7, in the following comment: "When a characteristic inhibition would fail to respond to psychic influencing, I would work at the corresponding somatic attitude. Conversely, when a disturbing muscular attitude proved difficult of access, I would work on its characterological expression and thus loosen it up" (Reich W., 1927/1942, p. 241).

**Principle 8.** The human being can push negative emotion out of the mind, but not out of the body (Wickramasekera I., 1988, 1998). Individuals can deny many emotions and desires to themselves cognitively, yet the body will disclose undeniable physical reactions when the subject is discussed. Increases in skin conductance, changes in rate and manner of breathing, and increases in muscle tension may all be a warning of such unrecognized emotional distress or conflict.

*Case Example: Larry illustrates this principle that negative emotion can be pushed out of mind, but not out of body. Larry presented himself adamantly as happy and content with his marriage and family. He appeared to be an angry, resentful man, but resisted any discussion contrary to his rigid self-perception. His psychotherapist monitored electrodermal and heart-rate variability biofeedback to monitor Larry's physiology during therapy sessions. His electrodermal response elevated noticeably, and his Very Low Frequency range in his heart rate variability spiked in activity each time the topic of his marriage and wife was mentioned. The physiology was more convincing for him than the therapist's perceptions. He became receptive to this "objective" witness to his unrecognized feelings. The physiological display opened a psychotherapeutic window over time in his therapy*



**Principle 9.** Observing the physiological display can convince the patient of the reality and significance of subjective cognitive and emotional changes. The patient often is surprised by simple recognitions: “You mean that just because I am upset about my spouse, my breathing becomes erratic, my heart rhythms change, and my brain wave patterns are different?” The physiological display can also show patients the power of relaxation skills or a hypnotic induction to bring about dramatic physical changes, and convince the patient to continue to cooperate with such therapies.

*Case Example:* Nora provides an illustration of how the display of physiological data can enhance the patient’s confidence in the therapy process. Nora, a 43-year-old EMT and fire fighter, was presented with repeated trauma in the line of duty, and classic symptoms of PTSD. Her symptoms included nightmares, daytime flashbacks, baseline vigilance and a heightened startle response. She also showed a loss of emotional spontaneity and social withdrawal which contributed to the breakdown of her marriage. Nora was repeatedly referred by her employer for psychological services. Each time she initially made some progress, but continued to experience intermittent flashbacks. She became discouraged by setbacks and quit psychotherapy several times. Monitored with EEG during a therapy session, Nora showed a dramatic spike of cortical activity at 28 Hz. This EEG feature was interpreted to her as a ruminative reliving of a trauma scene. During a hypnotic induction, the spectral display flattened across entire spectrum, completely erasing the 28 Hz spike. Nora was shocked: “I knew I felt better but I didn’t think it really made any difference.” Seeing the change in her brain convinced her that the therapy might have lasting impact.

**Principle 10.** A variety of biofeedback modalities can usefully disclose information relevant for psychotherapy. Some patients are muscular responders, others are cardiovascular responders, others gastrointestinal responders, and others cognitive responders. Access to a wide range of physiological instrumentation allows the therapist to choose specific modalities for monitoring during psychotherapy. Widely used biofeedback instruments for monitoring during psychotherapy include:

- Surface electromyography (SEMG) to detect muscle tension.
- Thermal biofeedback (TEMP) to monitor peripheral skin temperature.
- Electrodermal biofeedback (EDR) to detect changes in skin electrical conductance or skin electrical resistance.
- Respiratory biofeedback (RESP) to monitor rate of breathing, amplitude of breaths, and the “architecture” of breaths.
- The electrocardiogram (EKG) or photoplethysmograph (PPG) to detect current heart rate, blood pulse volume, as well as patterns in heart rate variability.
- EEG biofeedback to detect brain wave patterns, areas of over-activation or under-activation.

Alternatively, a therapist may use a multi-line graph, monitoring several modalities at once, to detect the patient’s personal stress response, physiological activation and recovery patterns.

**Principle 11.** The boundary blurs between psychophysiological training and psychotherapy. Ancient Chinese medicine tells us about the value of regulated breathing in mental calming: “... the tranquility of the mind regulates the breathing naturally and, in turn, regulated breathing brings on concentration

of the mind naturally” (*Questions and Answers of Meisha*, Yue Yanggui, Qing Dynasty, cited by Xiangcai, 2000, p. 7). Today, breath training is included as an adjunctive component within anxiety treatment. This simple skill often provides so much mastery over anxiety that patients proceed to use their new breath skills independently, recovering their self-confidence with little or no additional psychotherapy. Similarly, EEG biofeedback training to reduce a left/right frontal asymmetry in cortical activation often improves mood so rapidly, that patients proceed on their own to accomplish typical therapeutic goals, such as self-affirmation, assertion with peers, and cognitive reframing of problems.

*Case Example: Susan provides an illustration of how physiological training sometimes cancels the need for psychotherapy. Susan was a 34-year-old high achiever, rapidly piercing the glass ceiling at a mid-sized corporation. She requested evaluation for a panic disorder with agoraphobia. Her Psychophysiological Stress Profile (PSP) showed a baseline of shallow, irregular rapid breathing (22-30 breaths/minute). A hyperventilation trial produced a full-fledged panic attack. In two sessions of respiration training, she showed excellent mastery of smooth, full diaphragmatic breathing. Susan returned the next session, and reported how she had used alternating hyperventilation and relaxed breathing trials to prepare herself to enter anxiogenic situations. For example, Susan sat in her car in a parking lot, first hyperventilated to the point of anxiety, then calmed herself with effortless full breathing, and then entered a supermarket without any incidence of anxiety. Her sense of mastery increased rapidly, she increased the range of situations she was able to master, and no “therapy” phase was needed.*

**Principle 12.** A stress management model and stress management skills facilitate symptom management in psychotherapy. The use of biofeedback instruments assists the therapist in teaching the patient a stress management paradigm. The patient can distinguish in a practical way between the provoking stressor and his/her own stress response to that stressor. Biofeedback training also models for the patient a modified and more adaptive response to that same stressor in the future.

**Principle 13.** A variety of basic mind-body principles transfer readily to psychophysiological psychotherapy. For example, consider the principle of response mechanism stereotypy (Sternbach, 1966). When individuals encounter stress their physiological responding is often recurrent and unchanging over a variety of situations. This stereotypy decrees the types of stress-related medical symptoms an individual is likely to develop. The more consistent this stereotypic activation is, the greater is the likelihood of stress-related disease. Re-training a novel, non-stereotypic and more strategic response aids in restoring adaptive functioning.

**Principle 14.** Psychophysiological monitoring supports a variety of behavior therapies and specialized interventions. Physiological indices can guide the course of behavior therapeutic interventions, such as systematic desensitization. Electrodermal feedback, peripheral temperature, respiration, or heart rate variability can each serve to indicate when the patient is calming his/her anxiety, and when the patient’s anxiety is persisting or increasing. In addition, biofeedback assisted relaxation can facilitate recovery following each behavioral exposure trial.

**Principle 15.** Psychophysiology provides a Trojan horse to open the individual’s gates to psychotherapy (Wickramasekera I., 1988, 2003). This is especially true for somatizers, individuals who

present physical complaints without any measurable pathophysiology. These patients represent 50 % or more of patient visits in primary care clinics; they often resent and resist referrals to mental health professionals. Biofeedback emphasizes physiological mechanisms, biomedical instrumentation and measurement of bodily processes, affirms the patient's somatic focus, and reduces the patient's defensive resistance against an inferred psychological understanding of their complaints. Once the patient has accepted biofeedback, relaxed defenses, and achieved physiological relaxation, emotional awareness and self-recognitions often unfold spontaneously.

## Conclusion

In conclusion, biofeedback and biological monitoring are useful in creating readiness for self-exploration, reducing therapeutic resistance, and enabling the patient to recognize mind-body linkages. Display of physiological signals enables therapist and patient alike to identify maladaptive and stereotypic responses to stress, and to retrain more flexible and adaptive responding. Biological monitoring during the course of psychotherapy can provide a "window into the soul" – alerting both patient and therapist to attune to specific topics and life situations which activate somatic threat and distress reactions.

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## Neuroplasticity and the future role of Biofeedback

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There have been many significant discoveries in both the neural and behavioral sciences, which have demonstrated a greater extent of neuroplasticity than our current thinking in clinical medicine and rehabilitation. In fact, today the greatest discrepancy exists between the findings from neuroscience and clinical medicine regarding plasticity. This discrepancy is most likely due to the fact that surviving and repairing central nervous system tissue is not sufficient for function in and of itself. This is why basic scientists have shown that axonal repair and remyelination can take place after injury to the brain, brain stem and spinal cord over a period of many years after damage, however, the data from clinical medicine and rehabilitation demonstrate that people with damage to the brain and spinal cord gain most of their functional recovery in the first six months to possibly one year post damage and that any functional losses remaining at one year post damage are usually permanent.

In 1969, my work at NYU Medical Center as an assistant research scientist, focused on gaining a better understanding of how central nervous system cells get assigned to function. It is well known that central nervous system cells are permanent cells and are not part of a replacement system, which is why it is expected that after damage to the central nervous system there will be some permanent functional losses. However, it was also discovered that the central nervous system has many duplicate cells beyond what is necessary for normal function. Our work at that time had not only gained a better understanding of how humans and animals develop function from cell structure, but also the process by which this occurs. Our laboratory, as well as others at the time, determined that operant conditioning procedures is the method for cell assignment. Over the past three and a half decades, from our work at NYU and later at the University of Miami, School of Medicine, we have developed specific operant conditioning procedures to enable humans to have greater, more efficient use of existing motor neurons in the brain, brain stem and spinal cord.

Essentially, we tried to establish learning at the cellular level using a very sophisticated form of EMG biofeedback that allows us to detect the smallest amount of motor neuron recruitment, even below the levels of functional movement and internal perception, and use this information in the context of learning paradigms to establish more efficient use of motor neuron cells. As we began to apply these techniques clinically to people who had central nervous system damage from strokes, brain injuries, cerebral palsy and spinal cord injuries, we discovered that many of these individuals actually had surviving motor neurons, which could not be used efficiently under normal conditions of recovery and even in response to occupational and physical therapy interventions. Further, we had discovered that many of these individuals were experiencing long term recovery in the central nervous system, even though they were not experiencing long term functional recovery.

Other basic science researchers have corroborated these findings. Applying learning procedures that establish more efficient use of these remaining and repairing cells resulted in significant increases in function that would not occur normally otherwise.

In our applications of these sophisticated EMG biofeedback procedures to patients with strokes, we have discovered that many individuals actually have surviving motor neurons that are not detected by standard clinical examination. Further, we have discovered that under the right conditions of learning, these individuals can better utilize this neural material and can gain some functional use, even of

muscles that appear totally paralyzed at first. Research that used aggressive exercise while measuring EMG did not produce any additional motor neuron function. However, once EMG biofeedback procedures were applied, large increases of motor neuron control were able to be established. This led to the capability of these muscles to respond to physical and occupational therapy procedures from which they have previously plateaued leading to significant functional gains. Length of time since the stroke is not a factor since the learning actually utilizes surviving cells, which were never initially affected by the stroke and long term repairing cells in which case a longer time since the stroke is actually better.

In our applications to brain injuries, we find that many individuals have significant neuroplasticity which has gone unrecognized and cannot translate into function unless these specific learning procedures are employed. Here, particularly, the EMG biofeedback procedures are successful not only in gaining greater motor neuron recruitment to specific groups, but also in gaining better coordination of motor neuron recruitment, which is necessary for function. In some cases, many years post injury, where individuals were totally non-functional in their ADL activities and ambulation, significant functional gains to the point of total independence in upper extremity function and safe independent ambulation have been established. We have been able to show that verbal cognitive abilities are not a factor in this learning. In fact, many individuals with severe memory loss and who are totally nonverbal can learn through these procedures. In recent studies, we have applied these specific EMG biofeedback techniques to people who have been in vegetative states for many years. Even these severe cases can learn precise voluntary motor neuron control, which is then used as a physiological switch to operate communication and environmental control devices.

Cerebral Palsy, which is damage to brain that occurs before, during or shortly after birth resulting in permanent paralysis can be remediated to a greater extent with these specific EMG biofeedback procedures. Traditionally, it is thought that these children would automatically learn to use surviving motor neuron cells as part of their development, if in fact they exist, and certainly with the enhanced learning provided through occupational and physical therapy. However, our work has shown that this is not necessarily true. Many of these children have surviving central nervous system cells, which are not utilized until specific EMG biofeedback procedures are employed. Many children who would normally be facing permanent paralysis have been able to gain functional use of the upper extremities for activities of independent living as well as to become independent walkers.

There are many misconceptions about spinal cord injuries. However, it is now known that all spinal cord injuries are squashing injuries to the spinal cord and that spinal cords are not severed. Our work, as well as the work of others, has shown that many individuals with “complete” spinal cord injuries actually have some surviving motor neurons in the spinal cord. Further, our work, as well as that of other basic neuroscientists have shown that there are different types of structural damage that occur to the neurons in the spinal cord after injury and that some of this damage is capable of structural repair long term. However, clinical data indicate that six months to about one year is the maximum time for functional recovery. In our research work with subjects with spinal cord injuries we have discovered that many people with spinal cord injuries, even those with “complete” spinal cord injuries, have surviving motor neurons, which can be utilized more efficiently with these specific EMG biofeedback procedures resulting in greater functional use of the muscles below the level of the spinal cord injury. Our findings clearly demonstrate that at least some individuals with spinal cord injuries experience long term neurostructural repair which does not translate into function until these specific EMG biofeedback procedures are employed to establish voluntary control of these neurostructures. Indeed,

some spinal cord injury patients will be able to gain greater function later after their spinal cord injury rather than earlier.

In conclusion, it is apparent from recent discoveries in the neurosciences that the central nervous system has much greater functional capacity than is normally acquired under existing environmental conditions. It has been well demonstrated from animal and human research that individuals with damage to the central nervous system often have surviving and repairing central nervous system cells, which are not normally well utilized with current therapeutic interventions. The work from our laboratory and others has clearly demonstrated that specific operant conditioning based biofeedback procedures can be effective in establishing more efficient use of these remaining and surviving central nervous system cells. Considering the current basic neuroscience research, which is discovering neurotrophic factors that promote repair in the central nervous system and the most exciting recent work developing successful procedures for central nervous system transplant, the role of specific biofeedback procedures to establish functional use of these neurostructures is the key variable in bridging the gap between basic neuroscience and clinical medicine and rehabilitation to restore function and improve the quality of life to individuals who would normally be facing permanent paralysis.

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## The story of the trunk (part1): Pain and sEMG investigation in rehabilitation

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A cursory look at the human skeleton tells an intriguing story. A longer look tells a fascinating one.

The story begins with a quadruped ancestor. Modern man inherits a thick and strong anterior longitudinal ligament and a thin and rather weak posterior longitudinal ligament. A thick and strong fibrous ligament right under the backbone is very important to all animals that walk on their four limbs. The ligament is mainly built of collagen, material that has the tensile strength of stainless steel. This ligament helps to support the body weight, most of which ‘hangs’ from the backbone over the ground. The posterior longitudinal ligament is also built mainly of collagen. To respect the body economy, in the quadruped, it doesn’t have to be as thick as the anterior counterpart. It hangs over the backbone and doesn’t have to support much weight.

While this arrangement was appropriate for our quadruped ancestor, the situation changed when the ancestor became mainly a tree dweller. The tree dwelling ancestor was somewhat more evolutionarily advanced and acquired the sitting position as well as partly the erect position while jumping from branch to branch or tree to tree. The skeletal anatomy changed in time to accommodate a new shape for the hind legs, the hips and pelvis as well as the position of the neck and head.

The ligaments didn’t quite follow the evolutionary pattern though. After all, the tree-dwelling ancestor was rather small and practically devoid of fat. The tensile strength of the backbone and ligaments was more than sufficient to withstand the new body position and need for jumping; salutatory action which involved mainly the four limbs.....and the tail.

One relevant point to be remembered at this conjecture, the relevance of which will become apparent later on, is that either in the quadruped walking or in the jumping action, our ancestors used mainly a crossed-movement action, i.e., moving in unison the right forelimb & the hind left limb or the left forelimb & the hind right limb.

If that pattern of motion would not have been successful in our evolution, our ancestors would have fallen pray to the carnivores.....and we wouldn’t be around....in the present shape. The present shape? Well, we are at this moment of evolution incomplete but full bipedal animals, but the ligaments in front and behind the vertebral column haven’t quite changed shape since our early ancestors first sought refuge in the trees. And yes, we live our lives mainly standing or sitting and working with our trunks in a slightly flexed position, and, furthermore, we have acquired a fair amount of fat. Do these characteristics fit with a thin posterior ligamentous support and a thick anterior one? Not really.....but, please, don’t think of the origins of back pain as yet.....

Enough for the moment with bones and ligaments.....After all, they are ‘dressed’ by the myofascial mantle. A good understanding of this mantle was proudly achieved by Monsieur Leotard, a French acrobat from the 19<sup>th</sup> century. This tight type, elastic material gymnastics suit allows the body to move as a whole. If any part of the body is stretched in any direction, the rest of the suit stretches accordingly. Whereas the typical leotard costume is made of only one type of material, our myofascial

mantle is made from several types of material, but the principle of the stretching action follows in the same pattern.

‘Myofascia’ is a composite word. Fascia is a glistening white membrane, very hard and not readily chewable in the steaks that we eat. It is made from an intricate pattern of collagen and elastic fibers, woven in a criss-cross fashion for added elasticity and strength. It is an important component of the connective tissue that envelops the body as a whole in a three dimensional network. It envelops the ‘myo’ part, i.e. the muscles of the body internally and externally. Muscles attach mainly by tendons to the bones and to each other via the fascial connection. Simply put, movement is achieved by a concerted action of muscles as they contract against bones and are sustained by one another via the fascia. The concerted action is the most efficient in terms of energy consumption and efficiency of motion.

If our ancestors would not have been successful in their movement pattern, it is doubtful that they could have survived and reproduced.

This short description of the human trunk tells part of a long evolutionary story.

The trunk is generally a two chamber hydraulic pump. The hydraulic action depends on three diaphragms, made of muscles:

- (a) the laryngeal diaphragm,
- (b) the abdominal diaphragm
- (c) the pelvic floor diaphragm.

One can argue that the main function of the trunk musculature, posterior, lateral and anterior, is to enable the hydraulic action of the three diaphragms to sustain life. Malfunction of either diaphragm or its muscular support may be followed by death in a matter of seconds, minutes or days. For instance, dysfunction of the laryngeal diaphragm leads to swallowing food inside the lung and an inability to maintain thoracic cage pressure necessary for proper blood flow. Malfunction of the abdominal diaphragm disables breathing and normal blood flow between the thorax and the abdomen. Malfunction of the pelvic diaphragm leads to either retention of urine or feces or ongoing incontinence. It also renders impossible the passage of the fetus through the birth canal.

All the muscles of the trunk function to help the diaphragms to act in unison and sustain life. Aside from that, those muscles, within the myofascial mantle, maintain posture and enable the limbs and the head and neck unit to move through the necessary range of motion as far as possible in equilibrium.

It is very important to remember at all times the three-dimensionality and the bilaterality of the trunk. Even though all these muscles are interconnected by the fascia, anatomically they subserve different functions in relation to the bony anatomy and to gravity. The trunk muscles can be further subdivided in different groups in relation to their position and attachments. A first subdivision may be that of:

- (a) the trunk muscles proper that do not attach to either the neck, or the upper or lower limb girdle
- (b) the trunk muscles that attach to the neck or either girdle.

A second subdivision may be the one related to the different functions. Those may include respiration, birthing, defecation and urination, maintenance of posture against gravity in different positions, and postural support for the ballistic actions of the upper or lower limbs. A third subdivision may involve some understanding of the sympathetic and limbic systems and activities related to the survival functions of fight-or-flight, reproduction and ‘body language’. A number of trunk muscles may convey



‘communication’ of a sexual or survival nature. A number of muscles derive embryological from the ancient muscles of the gills, aimed primarily at respiration and now, through evolution, convey emotion and are part of the muscular complex of body language or expression.

This short description of the bony and myofascial anatomic components of the trunk was aimed at a better understanding of trunk function and....dysfunction. It is not the whole story. The reader should always remember the adage of the poet Alexander Pope: “A little knowledge is a dangerous thing”.

Commonly, one finds people leaning forward, placing unequal weight on the lower limbs, protruding abdomens with weak muscles, shallow breathers with thoracic rather than abdominal breathing. The discussion above may help the understanding of some of the background factors which promote pain and deconditioning, fatigue and weakness in such individuals. The clinical examinations are usually nonspecific and do not promote accurate diagnoses or treatment plans. X-rays are generally useless.

### **What objective modalities could be helpful in the investigation and treatment of the majority of cases of ‘soft tissue’ injury as the etiology of most ‘back pain’?**

There are few tools that help to investigate trunk muscles function and dysfunction. Surface electromyography (sEMG) is one of them. It is an electrophysiological modality aimed at detecting and interpreting the electric signals emitted by the skeletal muscles during motion or rest. SEMG of the trunk may be conducted with static or dynamic protocols. The present sEMG equipment is sensitive enough to capture the electric signals of most muscles of the trunk directly or by vectorial analysis. Static sEMG protocols aim at identifying the amplitude of the electric tonus of the muscles close to the spine at rest, usually in the standing position. Other resting muscles may be tested as well during standing or sitting. Static sEMG testing may be useful for identifying imbalance between the right or left side of the trunk, postural sway, spasm over time and gait dysfunction. Dynamic protocols involve the testing of the trunk muscles tonus at rest or through the segments of the range of motion of the trunk. There are several kinds of protocols: range of motion protocols, myofascial protocols, neurological protocols, kinesiologic, ergonomic, functional, athletic, forensic, etc. All the dynamic protocols involve testing the target muscles in a standardized fashion, corresponding to physiologic and kinesiologic principles. Testing is usually done bilaterally, on contra-lateral muscles. The testing involves simultaneous identical motions in the axial skeleton, i.e. in the muscles of the neck or trunk as well as those of the head. The testing may be done simultaneously or with one limb in motion while the contra-lateral limb is at rest in the muscles of the limbs. Well defined periods of motion interspersed with periods of rest are relevant for the interpretation of the results of the sEMG testing. The interpretation of the dynamic sEMG testing has two components:

- (a) the technical component
- (b) the clinical or ergonomic component

The technical component considers the results in terms of statistical and technical consistency, accuracy, validity and reliability. It rules out the presence of electrical parameters of muscular dysfunction, such as spasm, hypertonus, hypotonus, loss of mirror image, co-contractions/ co-activation, myokimia, low voltage related to severe deconditioning or loss of strength or contracture. The clinical or ergonomic component of the interpretation takes into consideration the clinical or ergonomic context of the test. The understanding of anatomic, evolutionary and other parameters alluded to at the beginning of the discussion is paramount for the focused clinical or ergonomic interpretation of the sEMG testing results.

‘Back pain’ is one of the most common ailments of our time. Industrial ‘back pain’ costs close to \$100 billion/ year in the USA and corresponding amounts in other countries. Understanding of the trunk

anatomy, kinesiology and muscles as well as muscular electric behavior in the course of ‘back pain’ symptomatology is paramount to the interpretation of sEMG testing. Such testing and the ensuing treatment plan with neuromuscular rehabilitation involving sEMG / biofeedback could shorten tremendously the length of time of presence of symptoms, the intensity of the pain and related symptoms as well as the length of the overall treatment. Testing of ‘symptomatic’ trunk muscles with appropriate sEMG protocols may also enable the clinicians and legal & administrative authorities to identify people who exhibit skillful symptom magnification and / or malingering. sEMG testing & interpretation offer objective documentation of the presence or absence of dysfunctional muscular behavior, evidence which cannot be derived from any other testing source. Once the testing and interpretation are done, the clinician may establish a back rehabilitation program.

SEMG neuromuscular reeducation of suffering trunk muscles needs to be an integral component of any such program. It enables the sufferer to learn actively the appropriate control of all the trunk muscles and especially of the suffering muscles. Back pain is usually accompanied by electrical dysfunction of the affected muscles. Most typically, these muscles lose the ability to return to normal resting tonus levels and, as such, the ability to get rid of catabolic substances and regain the necessary levels of nutrients, oxygen and energy.

Thus, the vicious cycle may continue until the individual re-learns to establish firm control of the resting tonus as well as the activity tonus for a variety of necessary activities. It makes sense that pain, weakness, deconditioning, fatigue and frustration are a continuum that cannot be solved by ‘pain killers’ or passive treatment modalities. To add insult to injury, many back sufferers get unnecessary surgeries, only to be followed by more pain, or ‘failed back syndrome’.

SEMG testing and interpretation is to skeletal muscles such as those of the trunk what X-rays are to the documentation of fractures. Unfortunately, x-rays are often performed uselessly to document or rule out ‘back pain’, when, in fact, muscles affected by pain don’t show anything specific on x-rays.

SEMG testing and neuromuscular rehabilitation of suffering trunk muscle, (‘biofeedback’) are noninvasive procedures. The suffering individual actually enjoys the treatment program, since it is obvious from the beginning that the individual is enabled to re-establish control of oneself rather than succumb to the control of medications, passive modalities or any other control imposed on the person by the clinical authorities.

The individual undergoing the treatment feels empowered and encouraged by the lessons learned and by the improvement in the pain and other symptoms. The sEMG practitioner may proceed with a final testing of the target muscles at the end of the rehabilitation program. This may provide clinical, legal and administrative documentation of the efficacy of the program, for the benefit of everyone concerned.

An old English proverb teaches that: **“Bones forget, muscles remember”**.

How does the practice of surface electromyography attest to the veracity of this old proverb? By its utilization in the process of retraining affected muscles. Whether the retraining refers to teaching muscles in pain to activate motion and rest in such a way that pain ‘lets go’ or lessens, by teaching muscles to act optimally and fatigue less, by training muscles to utilize the least amount of energy in the course of the expected work or in the course of harmonizing several muscles in their complex activity, sEMG/biofeedback is the technique of choice today.

Future components of this article will contain ‘how to’ sections, designed to illustrate in more practical terms the utilization of the technique in various fields of interest.

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## **Interesting abstracts from scientific journals**

### **Use of complementary and alternative medicine among United States adults: the influences of personality, coping strategies, and social support**

**Honda K., Jacobson JS.**

Department of Epidemiology, Columbia University, New York, NY 10032, USA.

**Background:** Although patterns of utilization of complementary and alternative medicine (CAM) in the community have begun to be described, few studies have addressed the relationships between dispositional psychological factors and the use of CAM. The aim of this study was to examine the associations between CAM use and personality, coping strategies, and perceived social support in a representative sample of adults in the United States.

**Methods:** Data were drawn from the Midlife Development in the United States Survey (MIDUS), a representative sample of 3,032 adults aged 25-74 in the US population. We analyzed use of acupuncture, biofeedback, chiropractic, energy healing, exercise/movement therapy, herbal medicine, high-dose megavitamins, homeopathy, hypnosis, imagery techniques, massage, prayer/spiritual practice, relaxation/mediation, and special diet within the last year. Multiple logistic regression analyses were used to evaluate the association of personality, dispositional coping strategies (primary and secondary control), and perceived social support and strain with CAM use, controlling for socio-demographic factors, medical care access, and physical and mental disorders.

**Results:** Openness was positively associated with the use of all types of CAM except manipulative body-based methods. Extroversion was inversely correlated with the use of mind-body therapies. Primary control was inversely and secondary control directly correlated with the use of CAM. Perceived friend support was positively associated with the use of mind-body therapies, manipulative body-based methods, and alternative medical systems. Perceived partner strain was positively associated with the use of biologically based therapies, and family strain increased the odds of manipulative body-based methods.

**Conclusions:** This study is the first to document a significant association between specific domains of personality, coping strategies, and social support, and the use of CAM among adults in the general population. Understanding the relationships between psychological factors and CAM use may help researchers and health care providers to address patients' needs more effectively and to achieve better adherence to treatment recommendations.

*Corresponding author. Department of Epidemiology, Columbia University, Room 719, 722 West 168th Street, New York, NY 10032. Fax: +1-212-305-9413.*

## **Applied psychophysiology, clinical biofeedback, and rehabilitation neuropsychology: a case study - mild traumatic brain injury and post-traumatic stress disorder**

**Ackerman R.**

Research and Development Division 301, A Backans DCP, Inc, 1700 West Market Street, Akron, OH 44313, USA. [Ackerman@abackans.com](mailto:Ackerman@abackans.com)

This article presents a case study of a 39-year-old European American married woman with a history of child and adolescent incest, marital rape, and physical abuse from her husband for more than 10 years. She was referred to a pain clinic for treatment of headaches and Tourette's syndrome. The client was evaluated with the Ackerman-Banks Neuropsychological Rehabilitation Battery to identify neuropsychological strengths and weaknesses. The Vulnerability to Stress Audit was used to identify life events that were positively and negatively influencing her life. The client was treated for mild traumatic brain injury, post-traumatic stress disorder, cognitive difficulties, impulsivity, confabulation, low frustration tolerance, and inability to evaluate and make decisions about socially appropriate behaviors. Treatment involved traditional psychotherapy, hypnosis, cognitive rehabilitation, biofeedback training, electromyography, finger temperature, and blood pressure.

## **Biofeedback treatment for asthma**

**Lehrer P., Vaschillo E., Vaschillo B., Lu S., Scardella A., Siddique M., Habib R.**

Department of Psychiatry, Robert Wood Johnson Medical School, The University of Medicine and Dentistry of New Jersey, Piscataway, NJ 08854, USA. [lehrer@umdnj.edu](mailto:lehrer@umdnj.edu)

**Study objectives:** We evaluated the effectiveness of heart rate variability (HRV) biofeedback as a complementary treatment for asthma.

**Patients:** Ninety-four adult outpatient paid volunteers with asthma.

**Setting:** The psychophysiology laboratory at The University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School, and the private outpatient offices of participating asthma physicians.

**Interventions:** The interventions were as follows:

- (1) a full protocol (i.e., HRV biofeedback and abdominal breathing through pursed lips and prolonged exhalation);
- (2) HRV biofeedback alone;
- (3) Placebo EEG biofeedback; and
- (4) a waiting list control.

**Design:** Subjects were first prestabilized using controller medication and then were randomly assigned to experimental groups. Medication was titrated biweekly by blinded asthma specialists according to a protocol based on National Heart, Lung, and Blood Institute guidelines, according to symptoms, spirometry, and home peak flows.

**Measurement:** Subjects recorded daily asthma symptoms and twice-daily peak expiratory flows. Spirometry was performed before and after each weekly treatment session under the HRV and placebo biofeedback conditions, and at tri-weekly assessment sessions under the waiting list condition. Oscillation resistance was measured approximately tri-weekly.

**Results:** Compared with the two control groups, subjects in both of the two HRV biofeedback groups were prescribed less medication, with minimal differences between the two active treatments. Improvements averaged one full level of asthma severity. Measures from forced oscillation pneumography similarly showed improvement in pulmonary function. A placebo effect influenced an improvement in asthma symptoms, but not in pulmonary function. Groups did not differ in the occurrence of severe asthma flares.

The results suggest that HRV biofeedback may prove to be a useful adjunct to asthma treatment and may help to reduce dependence on steroid medications. Further evaluation of this method is warranted.

Publication Type: Clinical Trial, Randomized Controlled Trial  
Source: Chest. 2004 Aug; 126(2):352-61.

## **Public and private heart rate feedback in social phobia: a manipulation of anxiety visibility.**

**Gerlach A., Murlane D., Rist F.**

Department of Psychology, Institute I-Psychological Assessment and Clinical Psychology, Westfalian  
Wilhelms University of Munster, Munster, Germany. [agerlach@psy.uni-muenster.de](mailto:agerlach@psy.uni-muenster.de)

According to cognitive behavioural models of social phobia, bodily symptoms are the main source of information concerning social evaluation for social phobics. Experience and perception of bodily

symptoms therefore play an important role in social anxiety. In this study we evaluated the effects of anxiety visibility on patients and controls using feedback of veridical heart sounds. A total of 32 social phobics and 32 controls were asked twice to sit in a chair and appear relaxed while being evaluated. Half of the participants heard their heart sounds first via headphones and then via loudspeakers which were also audible to observers. The presentation order of the heart sound was reversed for the other half of the subjects. Social phobics reported substantially more anxiety than controls. Both groups showed habituation in heart rate from the first to the second presentation, and both groups reported perception of a higher heart rate, but only social phobics reported significantly more anxiety and were more worried about their heart rates in the public than in the private condition. These effects were in excess of actual heart rate differences. In conclusion, social phobics worried about the broadcast of a bodily anxiety symptom, whereas controls did not. Information about arousal made public has a strong potential to increase anxiety levels in social phobics.

Publication Type: Clinical Trial, Randomized Controlled Trial  
Source: Cogn. Behav. Ther. 2004; 33(1):36-45.

## **Combined heart rate variability and pulse oximetry biofeedback for chronic obstructive pulmonary disease: preliminary findings.**

**Giardino N., Chan L., Borson S.**

Department of Rehabilitation Medicine, University of Washington, Seattle, Washington, USA.  
[nicholas.giardino@uc.edu](mailto:nicholas.giardino@uc.edu)

The purpose of this study was to examine the feasibility of an intervention that included heart rate variability (HRV) biofeedback and walking with pulse oximetry feedback to improve functioning and quality of life for patients with chronic obstructive pulmonary disease (COPD). Twenty patients with COPD participated in 5 weekly sessions of HRV biofeedback and 4 weekly sessions of walking practice with oximetry feedback, with instructions for daily home practice. Primary outcome measures were the distance walked in 6 min (6MWD) and overall quality of life, as measured by the St. George's Respiratory Questionnaire (SGRQ). Secondary outcomes included measures of self-efficacy, self-reported disability, anxiety, depression, dyspnea before and after the 6MWD, and HRV at the frequency of respiration during spontaneous and paced breathing. After 10 weeks of training, participants showed statistically and clinically significant improvements in 6MWD and quality of life. Significant changes were also seen in self-efficacy, disability, dyspnea before and after the 6MWD, and HRV amplitude during spontaneous breathing. We conclude that our intervention is feasible for patients with COPD and that further research using a randomized controlled design is warranted.

Publication Type: Clinical Trial

Source: Appl. Psychophysiology Biofeedback. 2004 Jun; 29(2):121-33.

## **Biofeedback-based psychophysiological treatment in a primary care setting: an initial feasibility study.**

**Ryan M., Gevirtz R.**

We sought to determine whether or not an intervention labelled "biofeedback" could be implemented, with patients who were diagnosed with "functional" disorders (Irritable Bowel Syndrome, Fibromyalgia/Chronic Fatigue Syndrome, Myofascial Pain, Anxiety with somatic features, or Non cardiac Chest Pain) in a primary care setting. Could we also achieve cost savings through lowered utilization of medical services? Seventy patients were initially randomized into a treatment group or comparison group based on willingness to participate. Ultimately, 19 patients completed treatment and 30 were followed through usual treatment as a comparison. Treatment patients completed symptom diaries while working with a biofeedback therapist in the primary care facility. Both group's medical expenses were tracked for 6 months prior to and 6 months after the treatment time interval. Patients in the treatment group lowered symptom frequency and severity significantly. Medical costs were differentially reduced in this group such that all costs were \$72 less in the treatment group and \$9 in the comparison for the 6 months following the treatment time period. ( $p < .001$ ). Unfortunately, a large group of assigned treatment patients did not start or complete treatment. These patients had high initial costs and went up even higher post. No comparable group could be found among the controls, limiting any inference regarding cost/benefit. Biofeedback based interventions for "functional" disorders can be easily integrated into primary care settings, can reduce symptoms, and may be able to reduce overall medical costs in this group of patients known as heavy utilizers.

Publication Type: Clinical Trial, Randomized Controlled Trial  
Source: Appl. Psychophysiology Biofeedback. 2004 Jun; 29(2):79-93.

### **Where to Begin...**

When you are asked, "What is there to be thankful for?"  
you either don't know where to begin because you can see so much.

Or you don't know where to begin because you can see so little.

One man sits and says, "I have nothing."  
The man next to him takes a deep breath and realizes that thousands of processes inside  
and outside of his body happened just so he could take that breath.

Each breath, more than a thousand things.....or maybe not.

## **Breathing exercises**

The key to natural, diaphragmatic and abdominal breathing is to begin to learn to sense unnecessary tension in our bodies and to learn how to release this tension. This requires great inner attention and awareness. It requires learning the art of self-sensing and self-observation. An authentic, beneficial work with our breath begins with increasing our awareness. Without sufficient awareness, without great sensitivity to what is happening inside our bodies, any efforts to change our breathing will at best have no effect whatsoever (we'll quickly stop making any efforts at all), and at worst will create more tension and stress in our lives and thus undermine our health and well-being even further.

Here is an exercise from Jan v. Dixhoorn's breathing therapy that he demonstrated in his workshop at the BFE meeting. (Download from [www.euronet.nl/users/dixhoorn](http://www.euronet.nl/users/dixhoorn))

### **Audible exhaling**

In the supine position

- let one hand rest on the abdomen
- let the hand notice how your body is breathing
- Inhale quietly through the nose and blow the air softly out through slightly pursed lips, making the sound of 'fff', again inhale through the nose
- repeat this about 5 times
- Stop it, close the lips, breathe normally, through the nose
- Feel your body and the way your body continues breathing compared to before the audible exhalation: quicker or slower? ... larger or smaller? ... easier or more difficult? ... more or less regular?
- Repeat this twice
- Stop and notice how your body feels... how is your attention ... your mood ... how does your body continue breathing by itself
- Repeat the same instruction in different positions ( sitting, standing ...)

### **Threading needle**

(adapted from: Peper, E. & Weijman, A.C.M.(2003)

- Sit comfortably, now imagine that as you put on your shirt, the middle button fell off and that you quickly have to sew it on. Get a needle with a very small eye. Hold this in between the thumb and index finger of your left hand.



- Take a white thread with your right hand and hold the thread between your right thumb and index finger. Bring the tip of the thread to your lips. Wet the thread to make it into a point and then thread the thread through the eye of the needle.
- Now act out this threading of the needle. Really hold this imaginary needle in front of you, bring the tip of the thread to the eye of the needle. Literally see yourself threading the needle.
- As you are focused and involved in this task, what is happening to your shoulders, the blinking of your eyes, the location and frequency of your breath, the muscle tension in your back, legs, arms and fingers?

In almost all cases, people would notice that during precise accurate work (imaginary threading of the needle) they do not blink, they hold their breath, raise their shoulders and tense their whole body making it more and more immobile,

This demonstrates that in almost all cases people hold their breath when performing fine motor skills. They generally have no awareness of doing so.

*Those, who witnessed the piercing experiment from M .Kawakami may have seen an advanced breathing exercise from Yoga:*

### **Alternate nostril breathing\***

Yogis believe that your frame of mind at the time of breathing affects your whole process of electrical and neurological function of your body. Positive mind control makes for healthy living. It has been proven scientifically that breath taken through the right nostril sets up a positive electromagnetic field in the lungs and that breath taken in through the left nostril sets up a negative field.

To learn Alternate Nostril Breathing, we use a rhythmic pattern like 6 x 3 x 6 x 3, which is an easy rhythm for learning the exercise. Put your right hand over your face with the tip of your middle finger pressing lightly on your Third Eye (the spot just over your nose and between your eye brows). This leaves your thumb available for closing your right nostril, and your ring finger free to close your left nostril.

Close your left nostril. Breathe in 6 counts with your right nostril. Close both nostrils for 3 counts. Close your right nostril. Breathe out left nostril 6 counts. Close both nostrils and hold your breath out 3 counts. Close your right nostril and breathe in with your left nostril 6 counts. Hold this breath in for 3 counts. Breathe out right 6 counts and hold your breath out 3 counts. This would be one round. In right - hold - out left - hold - in left - hold - out right - hold out. Repeat nine or ten rounds.

Alternate Nostril Breathing helps you to develop equal ability to breathe well with either nostril. It can improve a deviated septum.

**\*Note that this is an advanced breathing exercise and should not be done by beginners as this may in the worst case harm your health!**

## Announcement of interesting international meetings

The 12th Annual Meeting of the

**ISARP**  
**INTERNATIONAL SOCIETY FOR THE ADVANCEMENT OF  
RESPIRATORY PSYCHOPHYSIOLOGY**

in  
**Hamburg, Germany**  
**September 14 - 16, 2005**

The program of the meeting will contain several symposia on different aspects of respiratory psychophysiology, e.g. dyspnea, emotions/stress and asthma, non-invasive measuring techniques, HRV and RSA, breathing training, biofeedback, etc.

On the first day different workshops from acknowledged professionals and researchers will be provided. Beside presentations of new instruments with significance to respiratory psychophysiology, several renowned invited speakers will hold lectures on relevant topics. As far as the program develops new information will be posted on the ISARP website  
[www.ohiou.edu/isarp/index.html](http://www.ohiou.edu/isarp/index.html)

We are looking forward to see you in Hamburg.

**Note: Co- sponsors of the BFE that forward our information to their members can ask for an announcement of their meeting in this e-journal for free.**

10th international



# BIOFEEDBACK CONFERENCE

Vienna, February 14-18, 2006

University for Economics and Business Administration  
(WU Wien)

Co-organized and sponsored by the  
Austrian Society for Biofeedback and Psychophysiology  
6th Austrian Day of Biofeedback  
17th Anniversary of the ÖBfP  
February 18, 2006

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Fuhs M., Mag. (A), Gevirtz R., Ph.D. (USA),  
Glazer H., Ph.D. (USA), Hamiel D., Ph.D., (ISR),  
Kirk L., MA (USA), Martin A., Ph.D. (D),  
Peper E., Ph.D. (USA), Sella G., MD. (USA),  
Sideroff S., Ph.D. (USA), Serman B., Ph.D. (USA),  
Thompson L. & M., Ph.D. (CAN), Timmer B., Ph.D. (D),  
and others ...

Invited Speakers:

Friedrich M., Ph.D. (AKH University Clinic Vienna)  
Gevirtz R., Ph.D. (Alliant International University, San Diego)  
Kirk L., MA (Austin Biofeedback Center)  
Sideroff S., Ph.D. (UCLA School of Medicine, Los Angeles)  
Thompson L., Ph.D. (ADD Centres/Biofeedback Institute, Toronto)



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Program Committee:

Grazzi L. (I), Groll Knapp E. (A), Guttman G. (A),  
Friedrich M. (A), Peper E. (USA), Sterman B. (USA),  
Sztembis R. (PI), Timmer B. (D),  
Chair: Fuhs M. (A)

**Selected Topics**

- **Headache and Chronic Pain**
- **Musculoskeletal Disorders / Prevention at the Worksite**
- **Recovery and Rehabilitation**
- **Surface EMG for Physical Therapy**
- **Cardiac Disorders**
- **Incontinence and Urogenital Disorders**
- **Asthma and other Breathing Disorders**
- **Addiction: Alcohol and Drug Abuse**
- **PTSD and Stress**
- **ADHD (Attention Deficit Disorders) and Autism**
- **Learning Disabilities in Children**
- **Psychosomatic Disorders**
- **Integration of Self-Regulation in Psychotherapy**
- **Integration of Meditation Practices and Biofeedback**
- **Holistic Health Concepts ... and many more**

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**ISMA-NL:** International Stress Management  
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**ISARP:** International Society for the Advancement  
of Respiratory Psychophysiology

**BAS:** Biofeedback Association of Serbia

**AAPB:** Association for Applied Psychophysiology  
and Biofeedback

**BSF:** Biofeedback Society of Florida

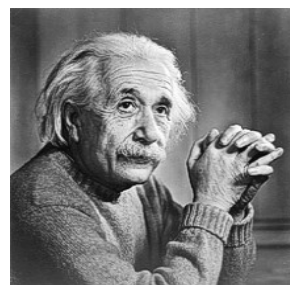
**IAPB:** Israeli Association for Applied  
Psychophysiology and Biofeedback

## Quotes from Albert Einstein

*The intuitive mind is a sacred gift  
and the rational mind is a faithful servant.  
We have created a society that honours the servant  
and has forgotten the gift.*

*In the middle of every difficulty lies opportunity!*

*The problems we face now  
will require a higher level of thinking to solve  
than when we created them!*



In memoriam 50 years  
after his death

## About the authors of this issue:

### **Brucker B., Ph.D., ABPP**

Dr. Bernard S. Brucker is Associate Professor in the Departments of Psychiatry and Behavioral Sciences, Orthopaedics and Rehabilitation and Radiology at the University of Miami, School of Medicine. He is a psychologist who has been a leader in the field of rehabilitation and is currently Chief of the Division of Psychology and Director of the Biofeedback Laboratory at the University of Miami/Jackson Memorial Medical Center. He is the Past President of the Division of Rehabilitation Psychology of the American Psychological Association and the recent Past Chairman of the Brain and Spinal Cord Injury Advisory Council for the State of Florida. Dr. Brucker is currently President of the American Board of Rehabilitation Psychology, Member of the Board, American Board of Professional Psychology, Past Vice President of the Florida Brain Injury Association and Past Board Member of the Association of Applied Psychophysiology and Biofeedback. Dr. Brucker has received the Gil Moss Award from the National Spinal Cord Injury Association for outstanding scientific and clinical contribution to spinal cord injury, the Exceptional Achievement Award, from the Institute of Electrical and Electronics Engineers, for microprocessor control of movement in paralyzed muscle, the Lifetime Achievement Award from the Dade County Chapter of the Florida Psychological Association, the Distinguished Service Award, Division of Rehabilitation, American Psychological Association and the Karl F. Heiser Presidential Award from the American Psychological Association. Dr. Brucker is one of the founders, and the original Co-Director of the Miami Project to Cure Paralysis. He is world renowned for developing specific behavioral procedures for restoring function in people with physical disabilities and has numerous publications, chapters, and presentations at scientific meetings.

For information about the other authors of this issue please see the editorial.