

Biofeedback



For
Personal, Patient, & Planetary Wellness

AIMA Conference
March, 8th 2020

Matthew Whitacre M.D.
Fellow of Integrative Medicine

Brief Introduction to Biofeedback

- ▶ What is Biofeedback
- ▶ History, Research and Efficacy
- ▶ Useful Resources & Professional Organizations
- ▶ Various Forms of Biofeedback
- ▶ Clinical Applications
- ▶ Demonstration of HRV Biofeedback
- ▶ Biofeedback - Social and Planetary Aspects



What is Biofeedback?



Biofeedback is information

Biofeedback provides you with information about your performance to increase your awareness and control over your body



Biofeedback displays your performance back to you.



Biofeedback as Defined by the AAPB:

--Association for Applied Psychophysiology and Biofeedback

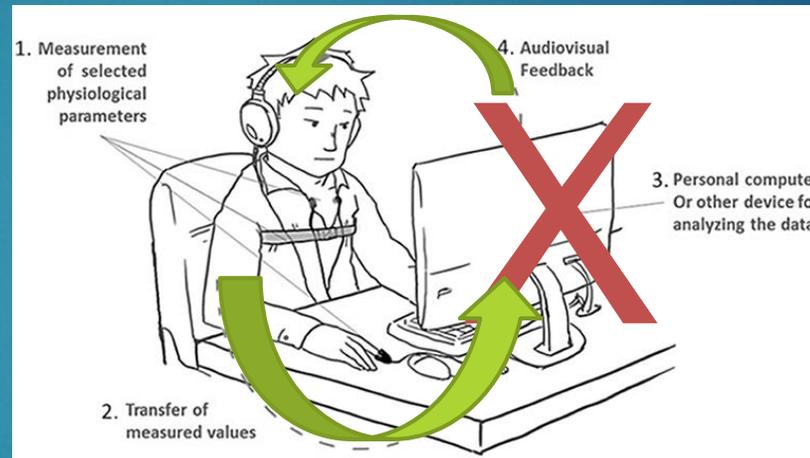


A process that enables an individual to learn how to change physiological activity for the purposes of improving health and performance.

Precise instruments measure physiological activity such as:

- Brainwaves
- Heart function
- Breathing
- Muscle activity
- Skin temperature.

Over time, these changes can endure without continued use of an instrument.



These instruments rapidly and accurately “feed back” information to the user.

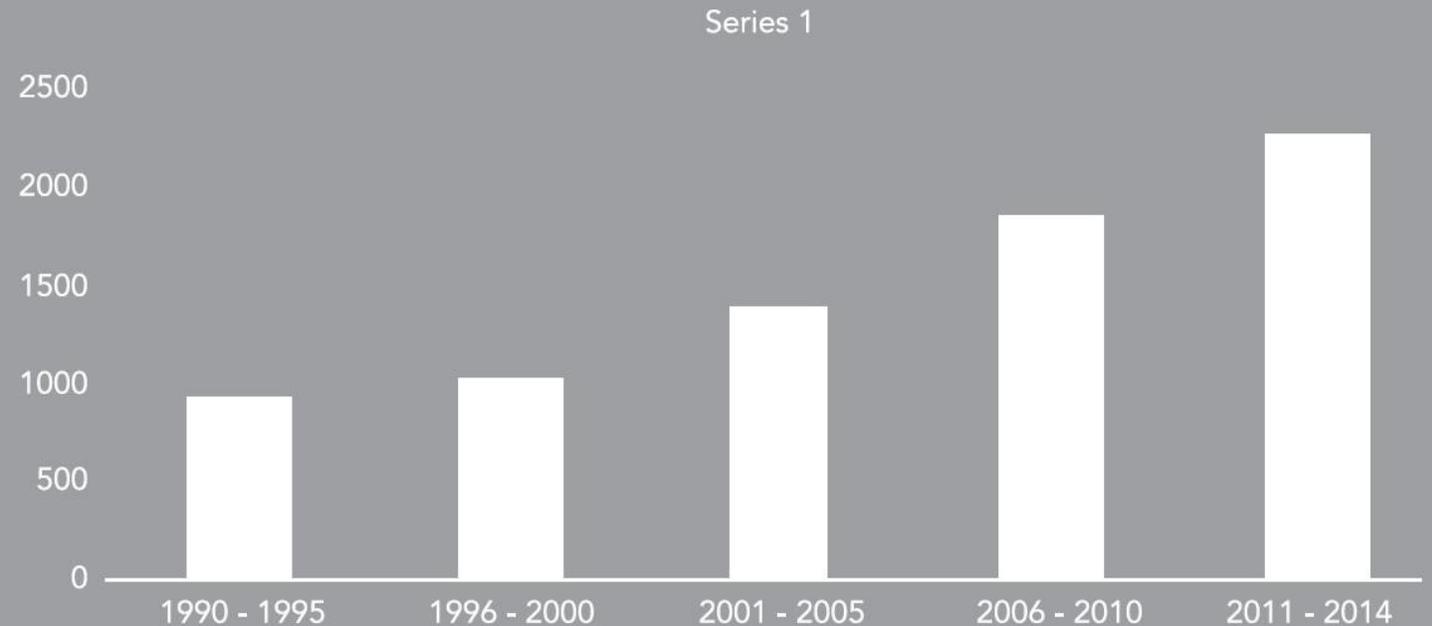
The presentation of this information — often in conjunction with changes in thinking, emotions, and behavior — supports desired physiological changes.

Research

Since its inception in the 1960s biofeedback has been rigorously studied

A review of the term biofeedback on the National Institute of Health's 'PubMed' produced the following results:

ARTICLES ABOUT BIOFEEDBACK BY YEAR



This graph shows how Biofeedback has gained attention in recent years showing only 948 articles published between 1990 and 1995, and 2,267 published since 2010 to present.

Biofeedback & Evidence Based Practice



- ▶ In 2001 The Association for Applied Psychophysiology (AAPB) & The International Society for Neuronal Regulation (ISNR) commissioned a Task Force to develop guidelines and a template in research methodology to measure clinical efficacy.
- ▶ Five level format was generated (Moss and Gunkelman 2002, LaVaque et al 2002):

Criteria for Levels of Evidence for Efficacy

Level 1: Not Empirically Supported:

Supported only by anecdotal reports and/or case studies in non-peer reviewed venues.

Level 2: Possibly Efficacious:

At least one study of sufficient statistical power with well identified outcome measures, but lacking randomized assignment to a control condition internal to the study.

Level 3: Probably Efficacious:

Multiple observational studies, clinical studies, wait list controlled studies, and within subject and intrasubject replication studies that demonstrate efficacy.

Level 4: Efficacious:

- a.) In a comparison with a no-treatment control group, alternative treatment group, or sham (placebo) control utilizing randomized assignment, the investigational treatment is shown to be statistically significantly superior to the control condition or the investigational treatment is equivalent to a treatment of established efficacy in a study with sufficient power to detect moderate differences, and
- b.) The studies have been conducted with a population treated for a specific problem, for whom inclusion criteria are delineated in a reliable, operationally defined manner, and
- c.) The study used valid & clearly specified outcome measures related to problem being treated and
- d.) The data are subjected to appropriate data analysis, and
- e.) The diagnostic and treatment variables and procedures are clearly defined in a manner that permits replication of the study by independent researchers, and
- f.) The superiority or equivalence of the investigational treatment have been shown in at least two independent research settings.

Level 5: Efficacious and specific:

The investigational treatment has been shown to be statistically superior to credible sham therapy, pill, or alternative bona fide treatment in at least two independent research settings.

Efficacy of Biofeedback

Level 5 Efficacious and specific

(Based on multiple randomized studies)

Level 4 Efficacious

Anxiety¹¹

Attention deficit hyperactivity disorder¹²

Chronic pain¹³

Constipation (adult)¹⁴

Epilepsy¹⁵

Urinary incontinence (females)¹⁰

Headache (adult)¹⁶

Hypertension¹⁷

Motion sickness¹⁸

Raynaud's disease¹⁹

Temporomandibular disorder²⁰

Level 3 Probably efficacious

(Based on multiple observational/clinic studies randomized to wait list controls)

Alcoholism/substance abuse²¹

Arthritis²²

Diabetes mellitus²³

Faecal incontinence²⁴

Headache (paediatric)²⁵

Insomnia²⁶

Traumatic brain injury²⁷

Urinary incontinence (males)²⁸

Vulvar vestibulitis²⁹

Efficacy of Biofeedback

Level 2 Possibly efficacious (At least 1 study of sufficient statistical power with well-identified outcome but lacking randomization)

Asthma³⁰

Autism³¹

Bell's palsy³²

Cerebral palsy³³

Chronic obstructive pulmonary disease³⁴

Coronary artery disease³⁵

Cystic fibrosis³⁶

Depressive disorders³⁷

Erectile dysfunction³⁸

Fibromyalgia/chronic fatigue syndrome³⁹

Hand dystonia⁴⁰

Irritable bowel syndrome⁴¹

Post-traumatic stress disorder⁴²

Repetitive strain injury⁴³

Respiratory failure: mechanical ventilation⁴⁴

Stroke⁴⁵

Tinnitus⁴⁶

Urinary incontinence (children)⁴⁷

Level 1 Not empirically supported (Anecdotal or case studies)

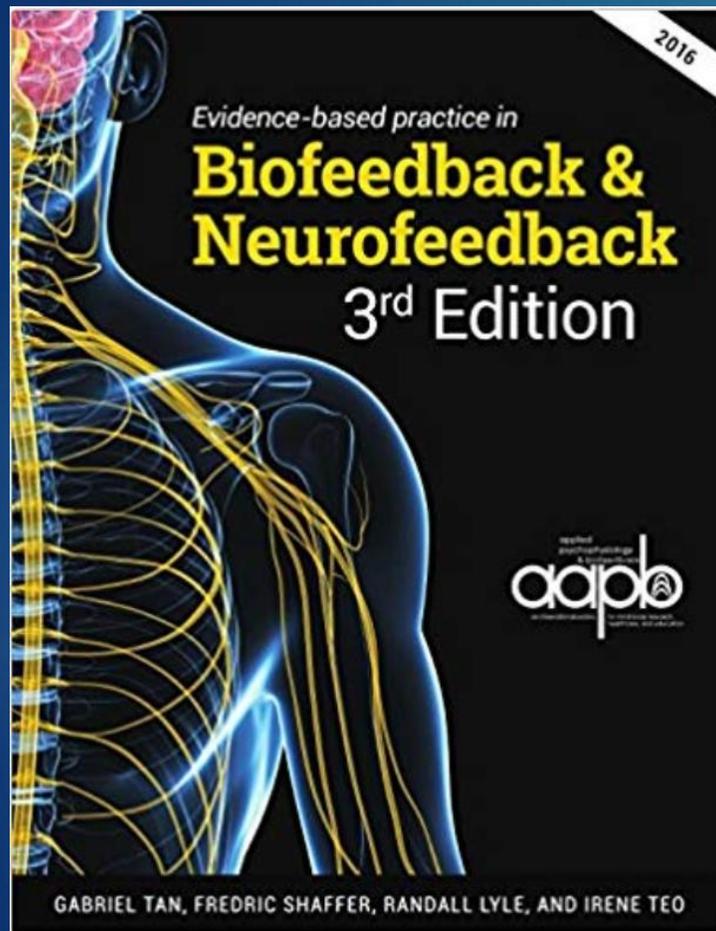
Eating disorders⁴⁸

Immune function⁴⁹

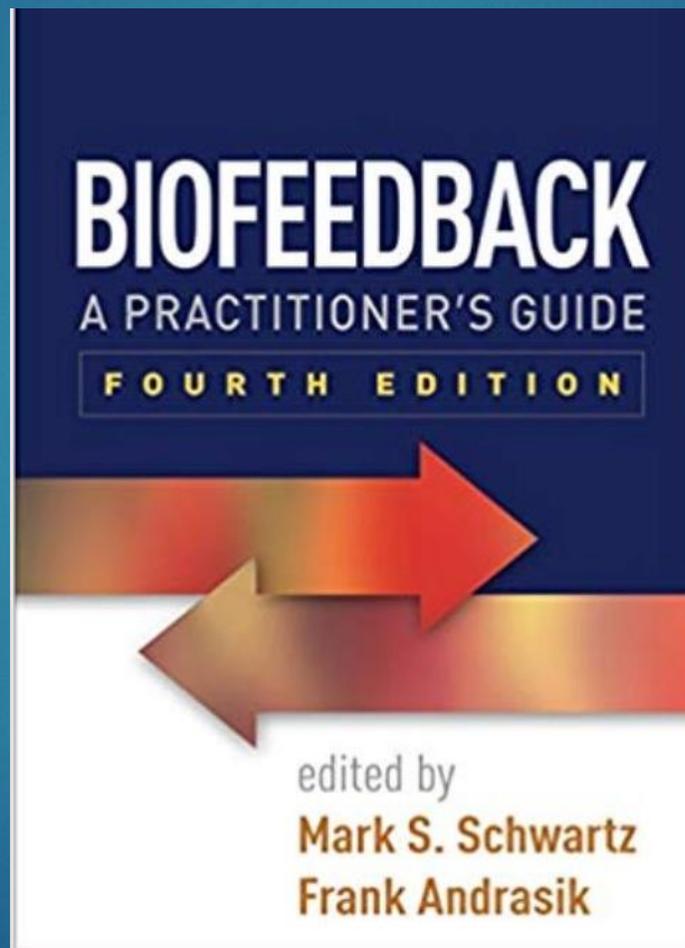
Spinal cord injury⁵⁰

Syncope⁵¹

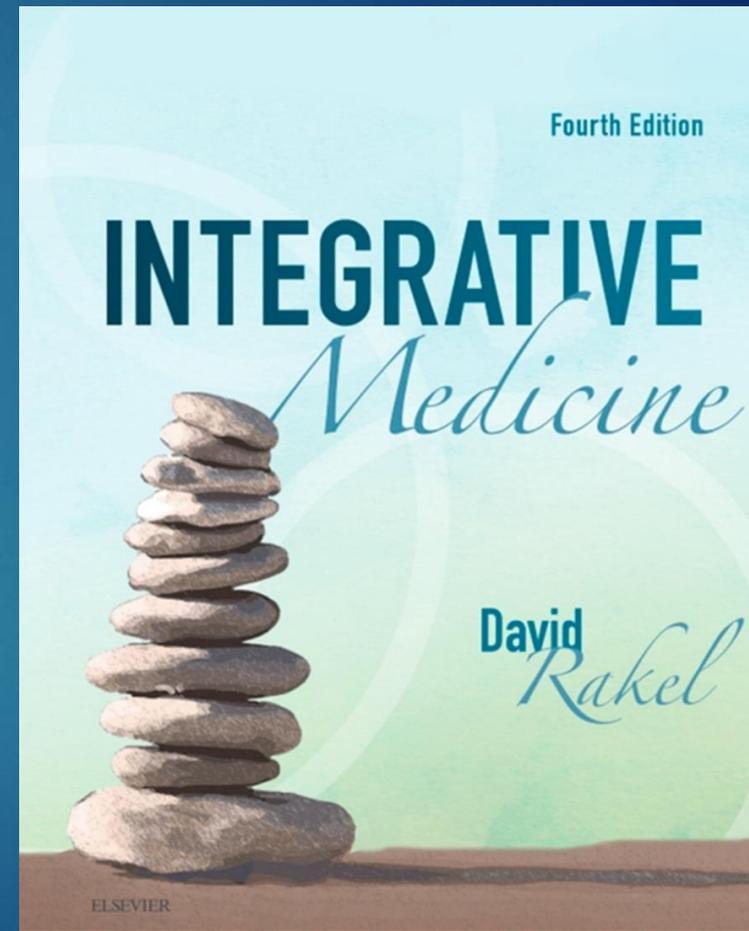
Additional Textbook Resources



2016



2017

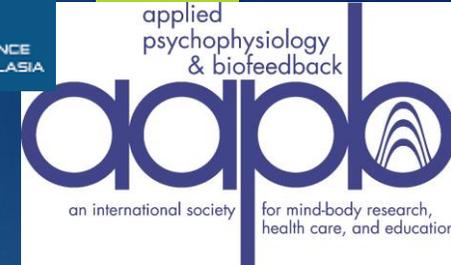
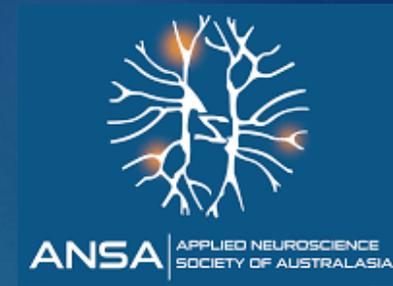


2017

Professional Organizations

- ▶ Applied Neuroscience Society of Australasia

<http://www.appliedneuroscience.org.au/page-1841772>



- ▶ Association for Applied Psychophysiology and Biofeedback

<https://www.aapb.org/>

- ▶ Biofeedback Certification International Alliance

<https://www.bcia.org/i4a/pages/index.cfm?pageid=3696>

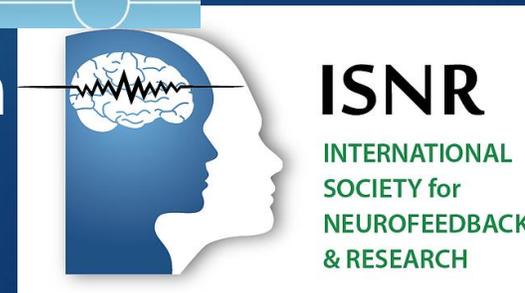


- ▶ Biofeedback Federation of Europe <https://bfe.org/>



- ▶ International Society for Neurofeedback & Research

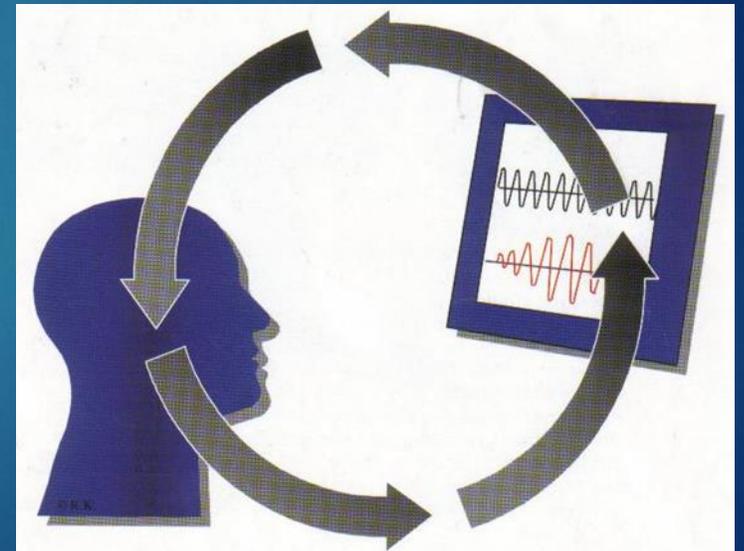
<https://isnr.org/>



Major types of biofeedback

Six major types of biofeedback include:

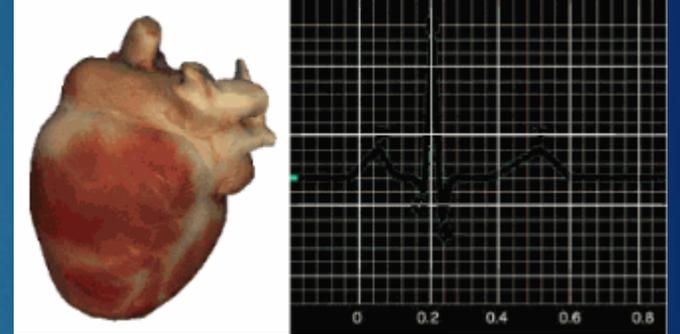
- ▶ Heart rate variability (HRV) biofeedback
- ▶ Muscle biofeedback
- ▶ Neurofeedback
- ▶ Respiratory biofeedback
- ▶ Sweat gland biofeedback
- ▶ Temperature biofeedback



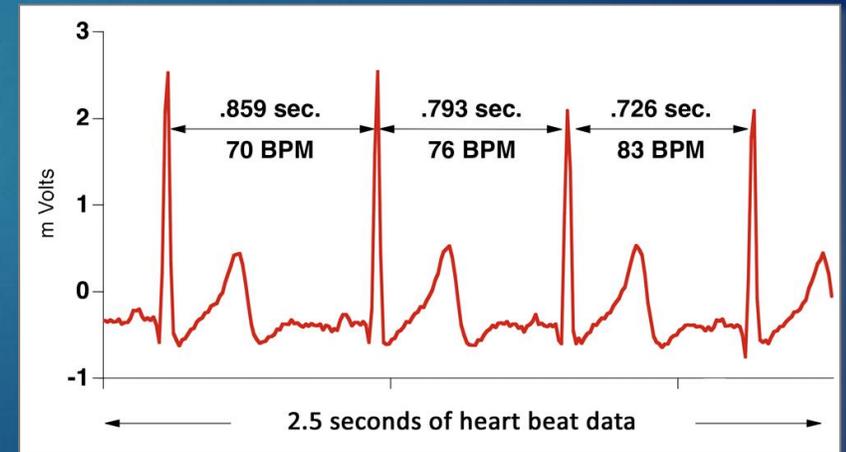
Major types of biofeedback

Heart rate variability (HRV) biofeedback

uses sensors placed on a finger or earlobe, or on your chest and lower torso, or wrists to measure the time interval between each heartbeat.

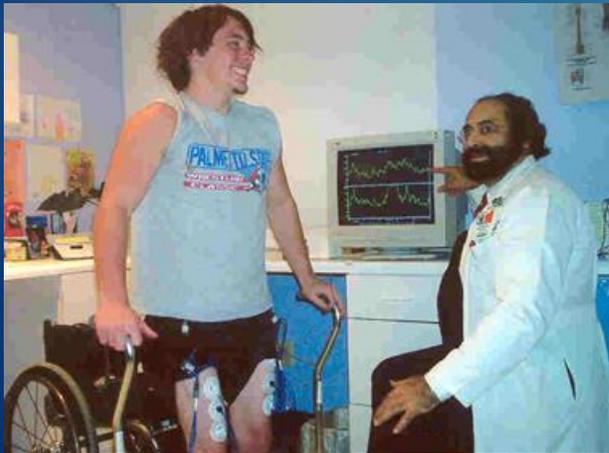


HRV biofeedback is used to treat anxiety, asthma, heart disease, depression, high blood pressure, irritable bowel disorder, & Posttraumatic Stress Disorder (PTSD).



Major types of biofeedback

Muscle (or EMG) biofeedback uses sensors placed over skeletal muscles to monitor the electrical activity that causes muscle contraction.

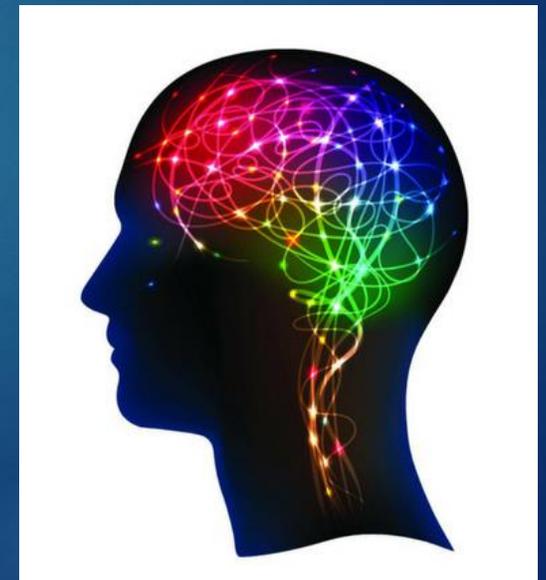


Muscle biofeedback is used to treat disorders as diverse as anxiety, asthma, cerebral palsy, headache, high blood pressure, low back pain, spinal cord injury, and stroke.

Major types of biofeedback

Neurofeedback (EEG biofeedback) uses scalp sensors to monitor the brain's electrical activity.

Neurofeedback is used to treat ADHD, alcoholism and abuse of other substances, epilepsy, migraines, PTSD, and traumatic brain injury.



Major types of biofeedback

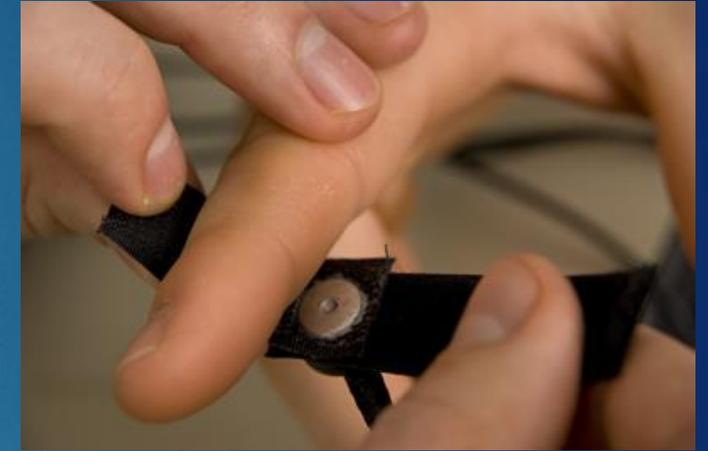
Respiratory biofeedback uses sensor placed around the abdomen and chest to monitor breathing patterns and respiration rate.



Respiratory biofeedback is used to treat anxiety, asthma, chronic obstructive pulmonary disease (COPD), hyperventilation syndrome (HVS), and high blood pressure.

Major types of biofeedback

Sweat gland biofeedback uses sensors placed on the fingers or palms to monitor changes in skin moisture. Electrodermal Activity (EDA)



Sweat gland biofeedback is used to treat hyperhidrosis and high blood pressure, and to teach relaxation.

Major types of biofeedback

Temperature biofeedback uses sensors placed on the hands or feet to measure blood flow to the skin.

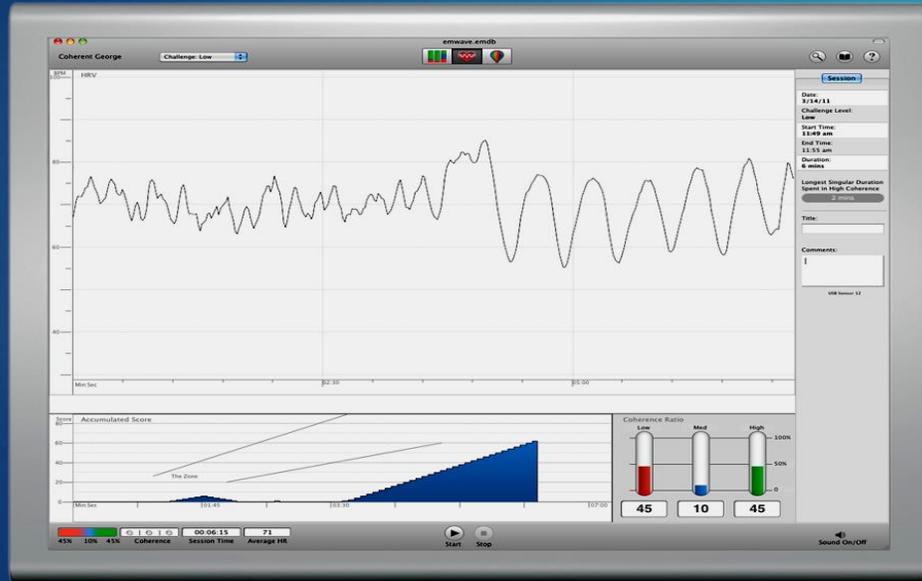


Temperature biofeedback is used to treat headache, high blood pressure, Raynaud's disease, and swelling.



Biofeedback Demonstration

- ▶ Heart Math emWave Pro
- ▶ Wild Divine Healing Rhythms



Recent Clinical Case & HRV Biofeedback

- ▶ 17 y/o Native American male recently diagnosed with panic attacks and GAD. Hx of multiple ER visits over past 2 months and given Ativan which he noted was quite helpful. Rx'd Hydroxyzine 50mg PO q 6 PRN for anxiety which he noted did not seem to help much. Pt followed up at clinic with ARNP was started on Lexapro 10mg PO q day and a referral to Mental health was made.
- ▶ Pt arrives to clinic 3 days later for a walk-in appointment with cc of worsening anxiety and concerns with Lexapro. Pt had unfortunately no showed his Mental Health intake appointment.
- ▶ ARNP consulted with me, to discuss additional Integrative options.
- ▶ HRV biofeedback was offered to the patient, which he agreed to. Anxiety level decreased from 8/10 to 1/10 in intensity and he was able to achieve a highly coherent state.
- ▶ Pt stated that he was amazed with how effective “breathing” could be to alleviated his sx’s. And stated that he felt this to be much more effective then the hydroxyzine he was prescribed.
- ▶ Feeling better, pt agreed to continue the biofeedback session with a trial “stress test.” He was guided to focus on re-creating a mild panic attack. Once feeling his stress and anxiety level increase to 5/10 he was guided to focus on the newly learned breathing techniques and watched the heart monitor reflect back his success in self regulation. By the end of the session, pt left feeling more confident and optimistic. He agreed to f/u with MH, continue practicing breathing exercises & f/u 1 month for a biofeedback session.

Additional Applications

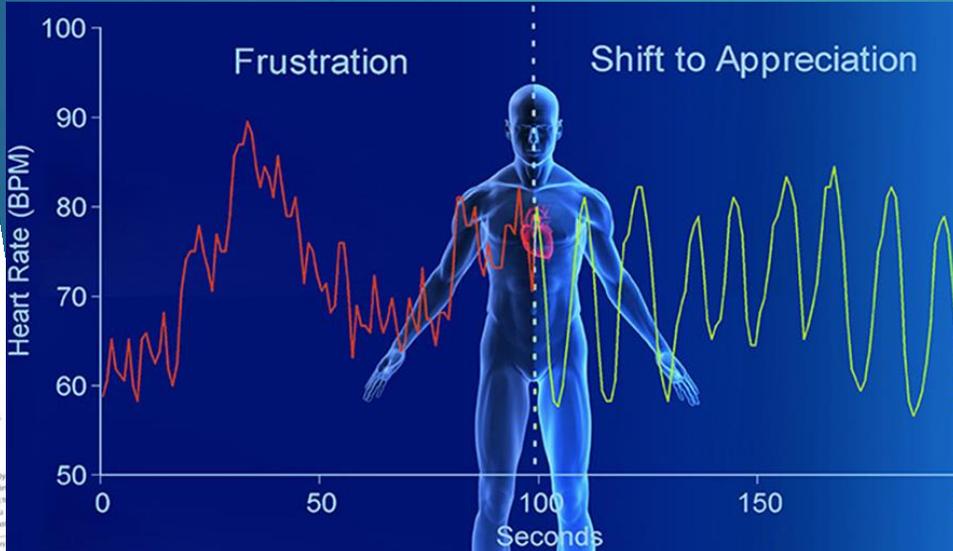
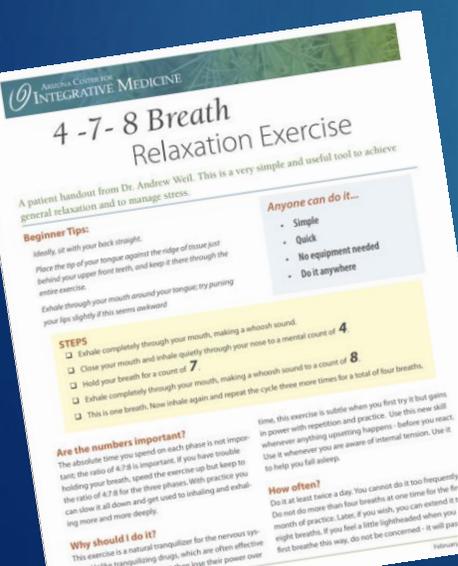
- ▶ Athletes & musicians to achieve optimal performance.
- ▶ Paramedics, law enforcement and military to develop stress resilience.
- ▶ Schools to help student behavior and academic performance.
- ▶ Businesses to help improve work environment.



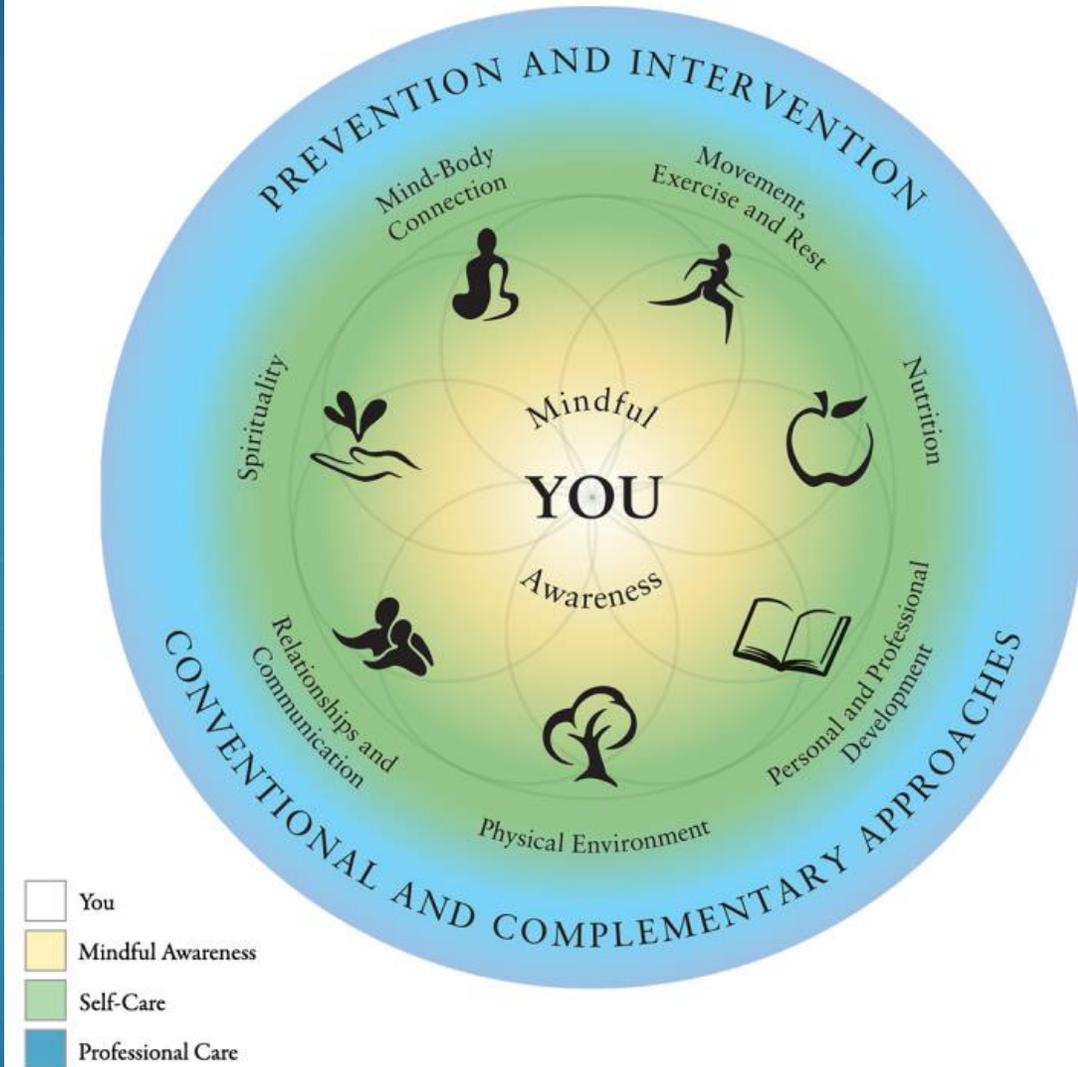
Frontiers in Physiology, 9, 743 2018 Jun 28

Biofeedback can also be a helpful part of an Integrative Wellness Plan.

- ▶ Mindfulness training
- ▶ Adjunct or alternative to meditation
- ▶ Achieve greater coherence
- ▶ Build personal resilience
- ▶ Stress reduction



WHEEL OF HEALTH



 Duke Integrative Medicine

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Research on Coherence & The Heart



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Biofeedback for Personal & Social Wellness

Interpersonal Neurobiology
Interdisciplinary approach to
integrate all fields of science.

Psycho Neuroimmunology
Study of relationships between
mind, body, and physical health

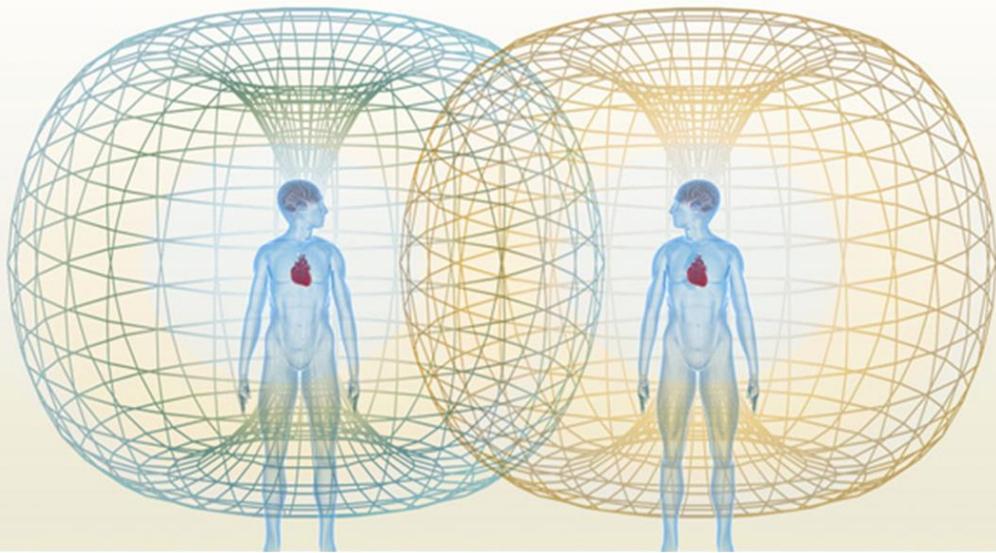


Table 15.1. Positive Social Support is associated with:

Cardiovascular Health

General heart health¹
Lower blood pressure²

Lower cardiovascular reactivity to stress³
Decreased risk of fatal coronary heart
disease⁵

Lower levels of serum cholesterol⁴

Post-heart attack survival rate⁶

Immunological Functioning

Higher level of natural killer cells⁷
Improved immunological functioning⁹

Lower urinary cortisol⁸

General Health Status

Increased health status and well-being¹⁰
Decrease in symptom display¹²

Decreased vulnerability to clinical illness¹¹
Decreased risk of cancer recurrence¹³

Mental Health

Better all-around mental health¹⁴
Decreased depression in the elderly¹⁶

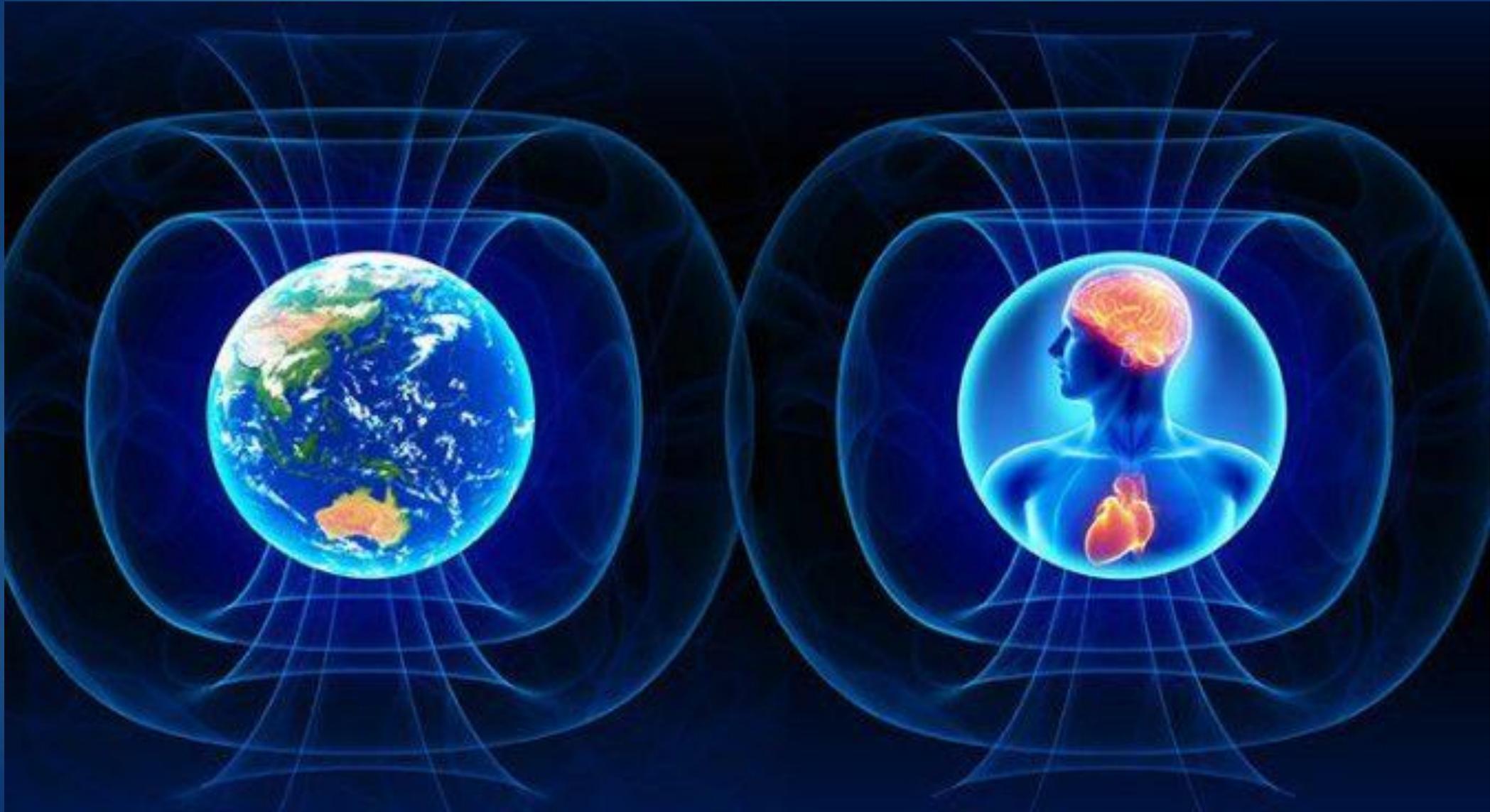
Decreased depression and anxiety¹⁵
Less depression during bereavement in
men¹⁷

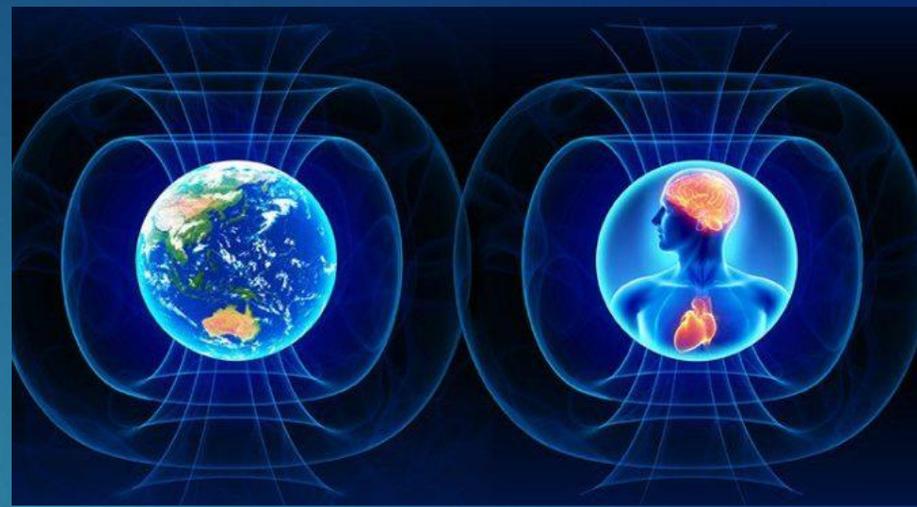
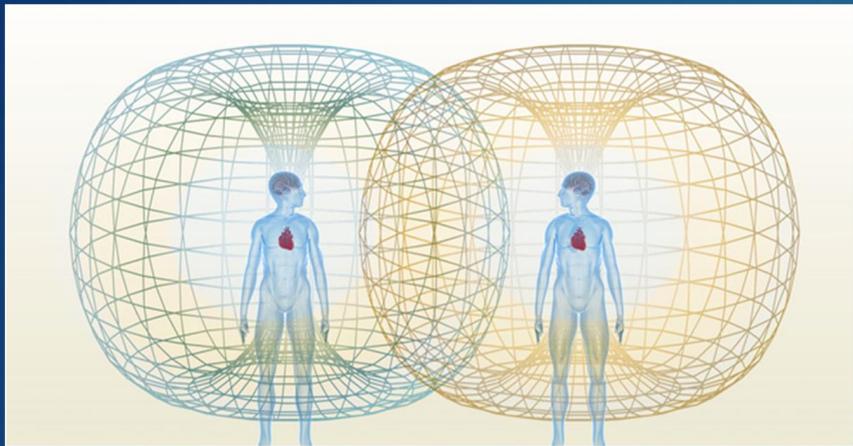
Better emotional regulation¹⁸

Cognitive Functioning and Related Functions

Less severe cognitive decline with age¹⁹ Better sleep²⁰

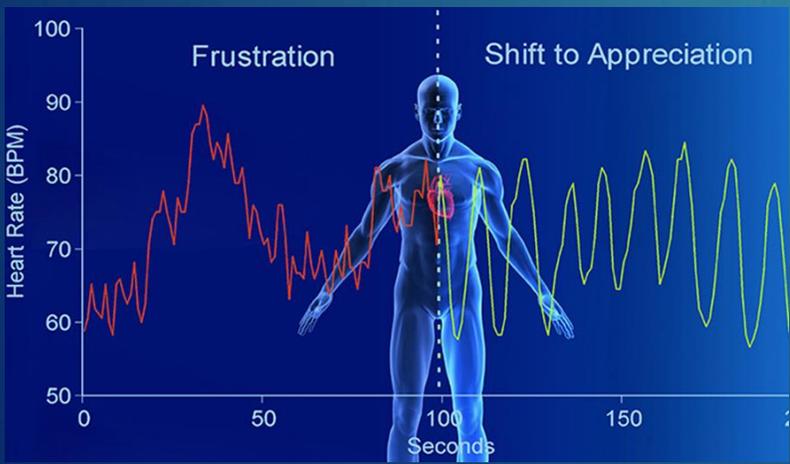
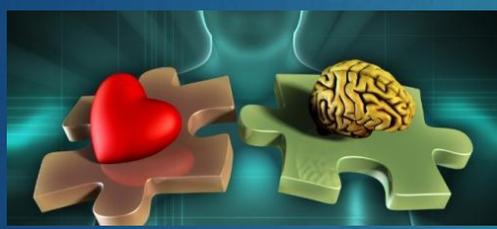
Biofeedback for Planetary Wellness



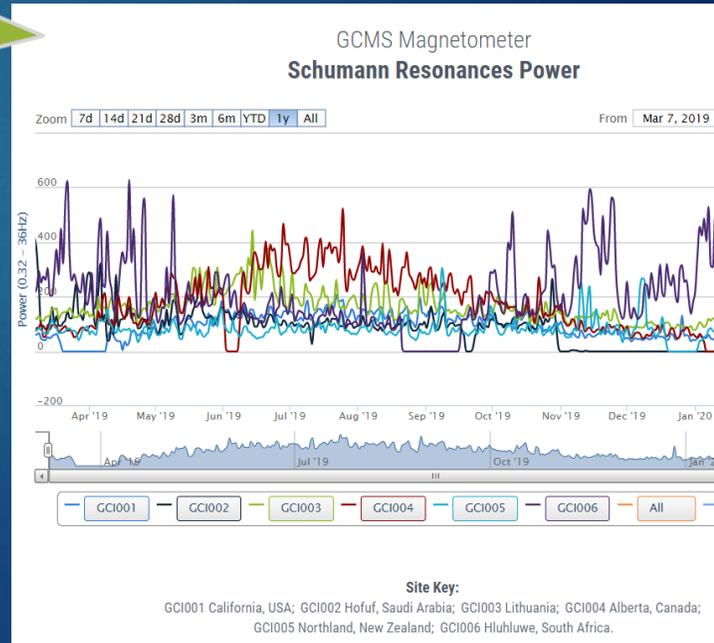


**Social
Coherence**

**Global
Coherence**



**Individual
Coherence**



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