Biofeedback

Applications for Palliative Care

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Third Annual Palliative Care Institute Conference
“Applied Psychophysiology”

Various therapies designed to improve mind-body relationship
reduce high arousal, increase relaxation, pain reduction, improved medication response, improve focus

Biofeedback/Neurofeedback Guided Imagery

Relaxation Strategies Hypnosis/Self-hypnosis

Postural Modification Mindful Stretching

Cognitive strategies: challenging assumptions and examining beliefs
Biofeedback

A learning process to help people gain skills to control their body’s response to stress.

Usually a body function is measured and displayed with a computer so that complex body functions can be viewed easily.
Biofeedback

• “Bio”- biological information

• “feedback”-providing information back to the source in order to modify (improve) function

• Biofeedback= providing biological information back to the source for the purpose of modifying function
Biofeedback

* Biofeedback training encourages active involvement

* Guidance, coaching, and instruction to assist the development of specific skill set – ”self-regulation skills”
Biofeedback Modalities

Most Common:

* **Skin temperature** (degrees), ranges from a few degrees below room temperature up to approximately 95 degrees

* **Skin perspiration** (EDG), measured in micromhos ranges from 0 to 50 (average 7-15)

* **Muscle activity**, (EMG) measured in microvolts ranges 1-100uv

* **Brain waves**, (EEG) measured in microvolts and frequency from 1-40hz, 0-100 uv

* **Respiration**, breaths per minute, pattern

* **Heart rate**, variability (HRV), rate- beats per minute
Biofeedback & Pain Management

Goal: More Awareness and more control → more choices → personal empowerment

1) Reduction of general nervous system arousal ("down training")-
   - reduce fight or flight response
   - strengthen homeostasis

2) Increased control over specific body functions such as muscle contraction or heart rate
Biofeedback

Demonstration

Specific Body Function Training

Reducing Dysponesis- “misplaced energy”

EMG Training:

> shoulder tension reduction
> mindful stretching
> passive limb movement
Biofeedback

Reducing the Stress Response  Fight, Flight or Freeze

Physical pathways of stress reactivity

Sympathetic – activation
  →  fight or flight
Parasympathetic – relaxation, rest and digest
  →  freeze/paralysis
STRESS!!

**SYMPATHETIC NERVOUS SYSTEM** (arousing):
- Brain
- Heart: Accelerates heartbeat
- Stomach: Inhibits digestion
- Pancreas: Stimulates glucose release by liver
- Liver: Stimulates secretion of epinephrine, norepinephrine
- Adrenal gland: Stimulates ejaculation in male
- Kidney: Relaxes bladder

**PARASYMPATHETIC NERVOUS SYSTEM** (calming):
- Brain
- Heart: Slows heartbeat
- Stomach: Stimulates digestion
- Pancreas: Stimulates secretion of insulin
- Liver: Stimulates secretion of bile
- Adrenal gland: Stimulates relaxation
- Kidney: Contracts bladder

**Spinal Cord**

**Third Annual Palliative Care Institute Conference**
Anxiety - generates hypervigilance - high degree of focus on information (physical or communication) which could indicate pain or danger.

Pain - a primary function of pain is to heighten awareness and motivate action to reduce pain.

DEPRESSION

Depression magnifies both pain signals and anxiety (and reduces self-awareness).
Anxiety

Unpredictability and ambiguity are key triggers for anxiety.

To help reduce anxiety, focus on what can be seen clearly and controlled rather than what is unknowable and uncontrollable.

“Whatever you focus on expands….”

Biofeedback can give us something tangible to hold our focus and promote a sense of control.

Having a sense of control can sometimes help break the negative feedback loop of pain - anxiety - depression.
Anxiety

We seek control to feel safe from threat—usually this control is attempted over external factors—people and events.

Our control (influence/power) over external forces decreases as our health declines.

Skills in regulation of our own emotional response is one form of control that can actually increase.

Learning how to do this requires specific information and feedback of our progress, like any other form of learning.

Biofeedback breaks down and overwhelming task to specific steps that allows for “self-regulation” skills to develop.
Anxiety & Pain

Types of Control - Passive and Active Will

**Active will**- use of force and energy to control outside circumstances or our own body

**Passive will**- based on acceptance and permission, letting go with gentle intention

Biofeedback training develops abilities with passive will and can show immediate physical changes of mastering passive will
Biofeedback based

Breathing Retraining
Breathing

When we regulate breathing we can “cultivate” greater balance within the nervous system (homeostasis) and stabilize a range of different physical functions such as blood pressure, digestion, PH level of the blood and brain activity.
Breathing and Blood CO2 levels

Hyperventilation

- Blood pH Level
  - 7.5
  - 7.3
  - 7.1
  - 30 seconds

- Torr
  - 45
  - 40
  - 35
  - 30
  - 30 seconds

- PCO2
  - 30 seconds

Breath Holding

- Blood pH Level
  - 7.5
  - 7.3
  - 7.1
  - 30 seconds

- Torr
  - 45
  - 40
  - 35
  - 30
  - 30 seconds

- PCO2
  - 30 seconds

- Arteriole Diameter
  - 30 seconds

- Arteriole Diameter
The lighter the area, the greater the brain activity.

Your brain…
normal breathing

Your brain on stress -
rapid, shallow breathing…
Breathing & Heart Rate Control

* Respiration rate and pattern influence many aspects of body function

* Heart rate is a key regulator of arousal and constantly varies - this is called Heart Rate Variability (HRV)

* When influenced by respiration- this variability is called Respiratory Sinus Arrhythmia (RSA)
Biofeedback

Demonstration

Heart Rate & Breathing
Biofeedback- Home Training

emWave/ Heart Math
Portable GSR units
Low cost digital thermometers
Journey to Wild Devine
Stress Dots
My Calm Beat
Phone applications: Belly Bio, emWave
Typical Problems with Practice*

* Concentration/distraction
* Difficulty being physically still
* Fear of failure/perfectionism
* Listen to a relaxation exercise but not attending
* Difficulty of task (complex imagery or relaxation strategies)
* Hurrying
* Time of day/fatigue
* Falling asleep during practice
* Dependency on relaxation audio programs
* Medication effects
* Problems with generalization – application to real life challenges
* Lack of support (can’t ask for help-support)

From: Applications Standards and Guidelines for Providers of Biofeedback
Biofeedback Society of America, 1982
Chronic separation from our feelings leads to an inability to distinguish between relaxation and tension: Being tense=normal

Sometimes being out of touch is a way of coping- being numb easier vs. feeling pain

Numbness also allows for a greater degree of activity (productivity) which strengthens self esteem and also helps distract from pain (emotional and physical)

Feeling relaxed may feel strange, uncomfortable, and even trigger anxiety (loss of control – loss of self; Relaxation Induced Anxiety)

Performance anxiety- trying to relax perfectly- replication of how one may live life generally- the harder you try- the worse it gets –> panic cycle
The Five Finger Exercise

- relaxation
- mastery
- closeness
- safety
Resources

Association for Applied Physiology and Biofeedback
http://www.aapb.org/

International Society for Neurofeedback and Research
http://www.isnr.net/

Biofeedback Certification International Alliance
http://www.bcia.org/
Resources

Books
The Relaxation and Stress Reduction Workbook
(Martha Davis, et al.)

Progressive Relaxation (Fanning, et al.)

Thoughts and Feelings: Taking Control of Your Moods and Your Life (McKay, et al.)

Biofeedback Equipment

http://www.stens.com/
http://www.jjengineering.com/
http://www.heartmath.com/
http://bio-medical.com